4.2.2d Records with measurable indicators with impact across various Yogic interventions for clinical/ therapeutic services (with photographs)

ABDOMINAL DISEASE

(उदर रोग)

डा० महावीर अग्रवाल
प्रति - कुलपति
पतंजलि विश्वविद्यालय, हरिद्वार

University of Patanjali
Haridwar

Patient Name :- Dinesh Sharma

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 10541-18 HIN (एच0आई0एन0): 14959452793

Full Name. (पूरा नाम): Dinesh Sharma Age & Gender (आयु एवं लिंग): 43 पुरुष

Full Address. (पूरा पता) Didwana, Lalsot, Distt. Dausa (Rajasthan)

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9414844688

Occupation (व्यवसाय): Medicine/AS ~~Marital Status~~ (वैवाहिक स्थिति)

Disease (रोग): उदर रोग, ब.B.D. सिर में तनाव मोलम साफ नहीं जुकाम.

Duration of Disease (रोग की अवधि): 5 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): अंग्रेजी, आयुर्वेद, आयुर्वेदिक दवाईयां होमो पैथिक दवाईयां,

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 5 years

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) सिर में तनाव कम, पेट में बारीपन कम, मोलम साफ हुआ

Percentage (प्रतिशत): 50%

Dated (दिनाँक): 26/05/2018 **Patient Signature (रोगी हस्ताक्षर)** 26/05/18

Dr.Signature

डा० महावीर अग्रवाल
प्रति - कुलपति
पतंजलि विश्वविद्यालय, हरिद्वार

University of Patanjali ★ Haridwar ★

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 225/19 HIN (एच0आई0एन0): 15149579152793

Full Name. (पूरा नाम): Dinesh Kumar Sha Age & Gender (आयु एवं लिंग): 43 Male

Full Address. (पूरा पता) Hanuman Valika Colony Laksar (Haridwar)

E-mail. (ई–मेल) Sharma

Mobile No. (मोबाईल नं0) 9 0 1 4 8 0 4 6 8 8

Occupation (व्यवसाय): Krishi Marital Status (वैवाहिक स्थिति): Yes

Disease (रोग): Digestive system liver Stuck Backpain-clergy

Duration of Disease (रोग की अवधि): 6 Year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

योग से शरीर हल्का व शांत रहता है षट्कर्म से कब्जी, सिरदर्द, लीवर, पाचन तंत्र में बहुत फायदा है।

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 25/5/19 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

डा० महावीर अग्रवाल
प्रति - कुलपति
पतंजलि विश्वविद्यालय, हरिद्वार

University of Patanjali Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): ..... HIN (एच0आई0एन0): 14959452793

Full Name. (पूरा नाम): दिनेश कुमार शर्मा Age & Gender (आयु एवं लिंग): 45 Md

Full Address. (पूरा पता) ग्राम - डिडवाना तहसील - लालसोट - जिला दौला (राजस्थान)

E-mail. (ई–मेल) .....

Mobile No. (मोबाईल नं0) 9 7 1 4 8 4 4 6

Occupation (व्यवसाय): कृषि Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): उदर रोग

Duration of Disease (रोग की अवधि): 5 वर्ष

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): आयुर्वेदिक

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 3 वर्ष

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) मेरी नाभि हली हुई थी नाभि सेट करने के बाद पेट में 75% फायदा है।

Percentage (प्रतिशत): 75%

Dated (दिनाँक): 09/01/19 **Patient Signature** (रोगी हस्ताक्षर).....

Dr.Signature.....

डा० महावीर अग्रवाल
प्रति - कुलपति
पतंजलि विश्वविद्यालय हरिद्वार

University of Patanjali * Haridwar *

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम दिनेश कुमार शर्मा, HIN 151495945 2793 है। मुझे शुरू में पाचन मोटापा तक लीवर की परेशानी रहती थी, जिसके लिए मैंने 21/5/16 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे पाचन तक लीवर मोटा की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे रिश्तेदार के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : लीवर मे परेशानी, खाना पचाने मे तकलीफ, मोटापा

मैं 20/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr Sachin को दिखाया।

मरीज़ को दवाइयाँ दी गई:

विभाग (मैं दिखाया) : योग एवं षटकर्म और पचकर्म

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।
और अब मुझे यहाँ इलाज लेते हुए 25/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 80 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब मुझे लीवर मे परेशानी नही होती है ना ही मोटापा है और ना ही खाना पचाने मे तकलीफ होती है

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य योग व षटकर्म और पचकर्म का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 9414844688

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 25/5/19

Dinesh
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

25/5/19

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kumar

रोगी का नाम - Dinesh Kumar Sharma आयु - 43 लिंग - male

रोगी का पता - Honuman Vatika Colony Jalsot (Dausa)

रोगी के लक्षण - लीवर मे परेशानी, खाना पचाने मे तकलीफ, मोटापा

रोग के लक्षण - पाचन का न होना, कुछ भी पचना, वजन का ना बढना

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR

पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो RNR

रोग मे सुधार प्रतिशत - 80%

चिकित्सक का अनुभव - Patient got 80% Result through Yog and Shatkam treatment.

रोगी का उपचार सबधी कथन - अब मुझे ना ही लीवर मे परेशानी है और ना ही मोटापा है और ना ही खाना पचाने मे तकलीफ है खाना अच्छे से पच रहा है, वजन 3 kg बढा है और आगे की ऐसी चिकित्सा और योगा करता रहूँगा जिसके से वजन में बढोतरी करूँगा।

दिनांक - 25/5/19

चिकित्सक के हस्ताक्षर 25/5/19

Dinesh

रोगी के हस्ताक्षर

University of Patanjali * Haridwar *

JAGDAMBA X-RAY & DIGNOSTIC CENTRE

Front of Govt. Hospital, Lalsot (Dausa) Mob. 9785475903

Name..... Age.....

Ref. By..... Date... 19/09/17

BIO-CHEMISTRY

TEST	RESULT	NORMAL	TEST	RESULT	NORMAL
Boold Glucose Fasting		70-110 mg/dl	S. Magnecium		1.1-2.5 mg/dl
PG/PP 1/2 hr.		>160 mg/dl	Urine Glucose		Nil
PG/PP 1 hr.		>140 mg/dl	Urine Glucose		Nil
PG/PP 2 hr.		>120 mg/dl	Urine Glucose		Nil
PG/PP 3 hr.		>100 mg/dl	Urine Glucose		Nil
Blood Suger		70-120 mg/dl	Urine Glucose		Nil
Blood Urea		10-50 mg/dl	S. Bilirubin (Direct)	0.60	0.0-0.2 mg/dl
B.U.N.		10-25 mg/dl	S. Bilirubin (In Direct)		0.3-0.7 mg/dl
S. Uric Acid		2.1-7.4 mg/dl	S. Bilirubin (Total)	1.24	0.4-1.1 mg/dl
S. Creatinine		0.6-1.1 mg/dl	S.G.O.T. (Kinetic)	40	10-35 U/L
S. Cholesterol		100-250 mg/dl	S.G.P.T. (Kinetic)	49	09-43 U/L
S. Trigiycerides		60-165 mg/dl	Totel Proten		6.4-8.3 gm/dl
S. Total Lipids		400-1000 mg/dl	Albumin		3.5-5.0 gm/dl
LDL Cholesterol		Upto 150 mg/dl	Gibumin		2.2-3.5 gm/dl
VLDL Cholesterol		Upto 80 mg/dl	A/G Ratio		1.3-2.5:1
HDL Cholesterol		35-70 mg/dl	S.Alkaline P Tase		60-300 U/L
S. Acid P'Tase		0.5-5.0 K.A. Units	Gamma Gt (Kinetic)		11-40 U/L
S. Calcium		8.0-10.2 mg/dl	S. Amylase		25-98 U/L
S. Phosphorus		1.3-6.1 mg/dl	S. Lipase		0-190 U/L
S. Sodium		135-155 mg/dl	Ck Nac Activated (Kinetic)		24-171 U/L
S. Potassium		3.5-5.5 meq/dl	CK-MB (Kinetic)		0-25 U/L
S. Chloride		96-105 meq/dl	LDH (Kinetic)		230-460 U/L

Lab Invetigation Help Doctor To-Arrive at correct Dignosis And Proper Follow-Up of his patient
This reports are Not Valid for Medico-Legal Purpose All Subject to Lalsot Jurisdiction only !

TEHNOLOGIST PATHOLOGIST

ment_save/A...

46822

2016

24

Male

प्राणायाम Pranayam
भस्त्रिका Bhastrika
कपालभाति Kapalbhati
बाह्य Bahya
अनुलोम-विलोम Anulom-Vilom
भ्रामरी Bhramari
उद्गीथ Udgith
उज्जायी Ujjayi

पतंजलि योगपीठ फ्रेज-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
8/12/2016 9:04 AM
University of Patanjali * Haridwar *

Weight 60 Kg
12/09

JAGDAMBA X-RAY & DIGNOSTIC CENTRE

Front of Govt. Hospital, Lalsot (Dausa) Mob. 9785475903

Name..... Dinesh ..... Age 04/12/2017

Ref. By..... Date.....

BIO-CHEMISTRY

TEST	RESULT	NORMAL	TEST	RESULT	NORMAL
Blood Glucose Fasting		70-110 mg/dl	S. Magnesium		1.1-2.5 mg/dl
PG/PP 1/2 hr.		>160 mg/dl	Urine Glucose		Nil
PG/PP 1 hr.		>140 mg/dl	Urine Glucose		Nil
PG/PP 2 hr.		>120 mg/dl	Urine Glucose		Nil
PG/PP 3 hr.		>100 mg/dl	Urine Glucose		Nil
Blood Suger		70-120 mg/dl	Urine Glucose		Nil
Blood Urea		10-50 mg/dl	S. Bilirubin (Direct)	0.32	0.0-0.2 mg/dl
B.U.N.		10-25 mg/dl	S. Bilirubin (In Direct)		0.3-0.7 mg/dl
S. Uric Acid		2.1-7.4 mg/dl	S. Bilirubin (Total)	1.0	0.4-1.1 mg/dl
S. Creatinine		0.5-1.1 mg/dl	S.G.O.T. (Kinetic)	39	10-35 U/L
S. Cholesterol		100-250 mg/dl	S.G.P.T. (Kinetic)	48	09-43 U/L
S. Triglycerides		60-165 mg/dl	Total Proten		6.4-8.3 gm/dl
S. Total Lipids		400-1000 mg/dl	Albumin		3.5-5.0 gm/dl
LDL Cholesterol		Upto 150 mg/dl	Glbumin		2.2-3.5 gm/dl
VLDL Cholesterol		Upto 80 mg/dl	A/G Ratio		1.3-2.5:1
HDL Cholesterol		35-70 mg/dl	S.Alkaline P Tase		60-300 U/L
S. Acid P'Tase		0.5-5.0 K.A. Units	Gamma Gt (Kinetic)		11-40 U/L
S. Calcium		8.0-10.2 mg/dl	S. Amylase		25-98 U/L
S. Phosphorus		1.3-6.1 mg/dl	S. Lipase		0-190 U/L
S. Sodium		135-155 mg/dl	Ck Nac Activated (Kinetic)		24-171 U/L
S. Potassium		3.5-5.5 meq/dl	CK-MB (Kinetic)		0-25 U/L
S. Chloride		96-105 meq/dl	LDH (Kinetic)		230-460 U/L

Lab Investigation Help Doctor To-Arrive at correct Dignosis And Proper Follow-Up of his patient

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TEHNOLOGIST PATHOLOGIST

University of Patanjali * Haridwar *

JAGDAMBA X-RAY & DIGNOSTIC CENTRE

Front of Govt. Hospital, Lalsot (Dausa)Mob. 9785475903

Name Dinesh Age 44

Ref. By Self Date 17/02/18

BIO-CHEMISTRY

TEST	RESULT	NORMAL	TEST	RESULT	NORMAL
Boold Glucose Fasting		70-110 mg/dl	S. Magnecium		1.1-2.5 mg/dl
PG/PP 1/2 hr.		>160 mg/dl	Urine Glucose		Nil
PG/PP 1 hr.		>140 mg/dl	Urine Glucose		Nil
PG/PP 2 hr.		>120 mg/dl	Urine Glucose		Nil
PG/PP 3 hr.		>100 mg/dl	Urine Glucose		Nil
Blood Suger		70-120 mg/dl	Urine Glucose		Nil
Blood Urea		10-50 mg/dl	S. Bilirubin (Direct)	0.25	0.0-0.2 mg/dl
B.U.N.		10-25 mg/dl	S. Bilirubin (In Direct)		0.3-0.7 mg/dl
S. Uric Acid		2.1-7.4 mg/dl	S. Bilirubin (Total)	0.8	0.4-1.1 mg/dl
S. Creatinine		0.6-1.1 mg/dl	S.G.O.T. (Kinetic)	30	10-35 U/L
S. Cholesterol		100-250 mg/dl	S.G.P.T. (Kinetic)	40	09-43 U/L
S. Triglycerides		80-165 mg/dl	Total Proten		6.4-8.3 gm/dl
S. Total Lipids		400-1000 mg/dl	Albumin		3.5-5.0 gm/dl
LDL Cholesterol		Upto 150 mg/dl	Gibumin		2.2-3.5 gm/dl
VLDL Cholesterol		Upto 80 mg/dl	A/G Ratio		1.3-2.5:1
HDL Cholesterol		35-70 mg/dl	S.Alkaline P Tase		50-300 U/L
S. Acid P'Tase		0.5-5.0 K.A. Units	Gamma Gt (Kinetic)		11-40 U/L
S. Calcium		8.0-10.2 mg/dl	S. Amylase		25-98 U/L
S. Phosphorus		1.3-6.1 mg/dl	S. Lipase		0-190 U/L
S. Sodium		135-155 mg/dl	Ck Nac Activated (Kinetic)		24-171 U/L
S. Potassium		3.5-5.5 meq/dl	CK-MB (Kinetic)		0-25 U/L
S. Chloride		96-105 meq/dl	LDH (Kinetic)		230-460 U/L

Lab Invetigation Help Doctor To-Arrive at correct Dignosis And Proper Follow-Up of his patient

This reports are Not Valid for Medico-Legal Purpose All Subject to Lalsot Jurisdiction only !

TEHNOLOGIST PATHOLOGIST

University of Patanjali * Haridwar *

निःशुल्क परामर्श

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No. AH-201 / 0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रात: 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 4 HIN NO : 14959452793

Prescription No. : 1Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP AC-824742555099

पंजीकरण संख्या Reg. No. 225-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 19/05/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-3-2019 कक्ष संख्या Room No. 0

रोगी : श्री/श्रीमती Patient : Mr./Mrs. DINESH KUMAR SHARMA आयु Age 43 Year लिंग Sex Male

पता Address DIDWANA LALSOT ,Dausa ,Rajasthan ,India

फोन Landline No. : मो. Mobile No. : 9414844688 ईमेल E-mail :

Patient Complaint:
C/O Weakness, Poor Indigestion, Weight Loss,Cold And Cough Wt-60 ,Ht- 5.7 -
-Gilbert-Syndrome

Diagnosis:
Udara Roga / Abdominal Disease, Pratishyay / Commom Cold

July 2013
BP
Sugar - No
Tigroid

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

1	CHANDRAPRABHA VATI	40	GM	Take 2 tablets each with lukewarm water in the morning and evening
	UDARAMRITA VATI	60	GM	

Follow-up Date: 18/06/2019

Pranayam / Asanas: ANULOM-VILOM, BHRAMRI, KAPALBHATI, BHASTRIKA, BAHYAPRANAYAAM, UDGITH, UJJAI

Remarks: TREATMNET START - 20/05/2019 TO 26/05/2019

ACUP POINT- STO,LIV,INT,CALF,COLD,ALL CHANNLES

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE - 23/05/19 TO 26/5/19 ACUPRESSURE
2	SHATKARMA	JAL NETI TRIFLA + WATER
3	SHATKARMA	KUNJARKRIYA FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM STEAM
6	SHATKARMA	SUTRA NETI RUBBER NETI
7	SHATKARMA	TRATKA TRATAKA
8	SHATKARMA	YOG-NIDRA YOG-NIDRA

2315 TO 26/5/

5660 / 1 days
9110 / 3 days

P 120 Vinay Ji
Refer to Panchkarma for Shirodhara
with Kativasti for 5 Days

पतंजलि योगपीठ-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth-1, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar-249405, Uttarakhand, India
फोन Phone : 01334 - 246908, 246909, 246910, 246717 फैक्स Fax : 01334 - 246905, 246964 E-mail : divyayog@divyayog.com, patient.care@divyayog.com Web : www.divyayog.com

Note : Not for Medico Legal Purpose

19-May-19 10:22 AM

University of Patanjali Haridwar

नि:शुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Token 6 HIN NO : 14959452793

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रात: 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PST no. AC-824742555099

Prescription No: 1

पंजीकरण संख्या Reg. No. 10541-2018 ..... चिकित्सक Vd. Dr. Ashish Sharma ..... दिनांक Date 21/02/2018

विभाग Deptt. KAYACHIKITSA ..... वार्षिक संख्या Annual No. KA-4913-2018 ..... कक्ष संख्या Room No. 26

रोगी : श्री/श्रीमती Patient : Mr./Mrs. DINESH KUMAR SHARMA ..... आयु Age 43 Year ..... लिंग Sex Male

पता Address DIDWANA LALSOT Dausa Rajasthan India

फोन Landline No. : ..... मो. Mobile No. 9414844688 ..... ईमेल E-mail : .....

Patient Complaint:
Pain In Abd/Weakness/Burning In Stomach/Weight-Loss - -Gilbert-Syndrome

Diagnosis:
Udara Roga / Abdominal Disease

Since - 5yr
BP
Sugar
Thyroid
No.

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

Follow-up Date: 23/03/2018

1	UDARAMRITA VATI	60	GM	Take 2 tablets with lukewarm water in the morning and evening.[AFTER MEAL]
2	PUNARNAVARISHTA	450	ML	Mix 4 spoon of medicine in an equal amount of water and take it in morning and evening.
	ASHWAGANDHARISHTA	450	ML	
3	WHEAT GRASS JUICE	25	ML	mix all the above juice and take mor. and eve. empty stomach
	GILOY SWARAS	10	ML	
	ALOE VERA JUICE	10	ML	
	GODHAN ARK	10	ML	
	NEEM LEAVES	5	GM	
	TULSI PANCHANG JUICE	5	ML	
4	GASHAR CHURNA	100	GM	Take 1 tsp with / water / After meal.[NIGHT] For 30 Days

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYA, BHRAMRI, UDGITH, UJJAI

पतंजलि योगपीठ फेज-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 240008, 240888, 240999, 246737 • फैक्स Fax : 01334 - 244805, 240064 E-mail: divyayoga@divyayoga.com, patientcare@divyayoga.com Web : www.divyayoga.com

Note : Not for Medico Legal Purpose

University of Patanjali Haridwar

Dr. Anit Path Lab

AN ISO 9001 : 2015 CERTIFIED LAB

43, Moji Colony, Pradhan Marg, Malviya Nagar, Jaipur
Ph. : 0141-4040146 Mob. : 8003174628 • E-mail : dranitpathlab@gmail.com

Name : DINESH SHARMA
Referred by : Dr. A.K GOYAL
Part scanned : Whole Abdomen

Age : 45 Yrs / Sex : M
Date :9-May-19

- Liver is normal in size , shape and echotexture .
  No focal lesion or IHBR dilatation .
- Gall bladder is partially distended ,wall is not thickened .
  No calculus or mass lesion .CBD & Portal vein are normal.
- Pancreas is normal in size ,shape and echotexture .
- Spleen is normal in size ,shape and echotexture .
- Both kidneys are normal in size ,shape and echotexture .
  CMD maintained .No calculus or hydronephrosis .

  Right kidney measures 107x32mm, Left kidney measures 102x43mm.
- Urinary Bladder is partially distended ,wall is not thickened .
  No calculus .

  Prevoid urine vol is 152ml, postvoid residual urine vol is 15.7ml
- **Prostate is enlarged in size(45x28x35mm ,Vol is 23.7ml) & normal in echotexture.**
  Median lobe projecting into UB.
- No free peritoneal fluid or lymphadenopathy noted .

IMPRESSION :

GRADE I PROSTATOMEGALY.

Please correlate clinically .

Dr. Anit Kumar Goyal
MD (Radiodiagnosis)
Reg .No.009539 (RMC).

University of Patanjali ★ Haridwar

Patient Name:- Pramod Kumar Tyagi

चिकित्सक हेतु

चिकित्सक का नाम - डॉ सचिन कुमार त्यागी

रोगी का नाम - प्रमोद कुमार त्यागी आयु - 66 लिंग - पुरुष

रोगी का पता - रुड़की, हरिद्वार, उत्तराखण्ड

गैस, अम्लपित्त, पेनक्रियाज, सुगर

रोग के लक्षण - भूख ना लगना, थकान का होना, शरीर में भारीपन, खट्टी डकारें आना,

रोगी की पूर्व परीक्षण रिपोर्ट्स - R/A पिछली रिपोर्ट्स / फोटो

नई रिपोर्ट्स / फोटो - R/A

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव -

Patient got 80% Result through my and Sudian treatments

रोगी का उपचार संबंधी कथन - जब मैं यहाँ आया तो मुझे भूख नहीं लगती थी, थकान ज्यादा होती थी, छाती में जलन, व भारीपन होता था पूरे शरीर में. जब से मैंने डॉ सचिन त्यागी जी के संस्थापन में योग व कर्म की क्रियाएँ व सन्तुलित आहार ले के तो मुझे अपने ऊपर 7-10 के बीच ही आराम लगने लगा जिस से की अब पहले से अच्छी भूख लग रही है। शरीर में हल्कापन महसूस हो रहा है। छाती में बिल्कुल भी जलन नहीं हो रही है

धन्यवाद

दिनांक

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर Pramod

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम प्रमोद त्यागी , HIN 15596297121 है। मुझे शुरू में गैस, अम्लपित्त, पेनक्रियाज, सुगर की परेशानी रहती थी, जिसके लिए मैंने 25/05/19 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे गैस, अम्लपित्त, पेनक्रियाज, सुगर की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमें हमारे अपने परिजनों के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : भूख ना लगना, थकान लगना, शरीर में भारीपन होना,

मैं 04/06/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य डॉ सचिन कुमार त्यागी को दिखाया।

मरीज़ को दवाइयाँ दी गई: नहीं

विभाग (में दिखाया) : योग एवं षटकर्म विभाग

योग (किया या नहीं): योग किया है

संतुलित आहार (लिया या नहीं): संतुलित आहार लिया,

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 14/06/19 (10 दिन) दिनांक / माह /वर्ष हो गए और आज अब मैं 80 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब पहिले से भूख अच्छी लग रही, थकान कम महसूस हो रहा है, शरीर में हल्कापन लग रहा है

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य डॉ सचिन कुमार त्यागी व पूरी षटकर्म टीम का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 8299541652

रिपोर्ट्स उपलब्ध कराई गयी हाँ (✓) या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष:
14/06/19

मरीज़ के हस्ताक्षर
Pramod

वैद्य के हस्ताक्षर

University of Patanjali * Haridwar *

परख डायग्नोस्टिक सैन्टर

मालवीय चौक, येहसादून रोड, रुड़की, (हरिद्वार)

डा0 कोकिला गुप्ता
एम.डी
रेडियोलोजिस्ट एवं सोनोलोजिस्ट
पू. पू. मेडीकेयर,
राजा राजा मेडिकल कालेज, शाहिपुर.
Regd. No. 17320

ULTRASOUND REPORT

NAME MR. PRAMOD TYAGI
AGE /SEX M]

RF/BY PATANJALI HOSPITAL
DATE 21 June 2019

LIVER Size Normal IHBR normal
Echo texture homogenous Portal vein 12mm

GALL BLADDER Size normal Wall thickness 3 mm
Pericholecystic collection absent Lumen - **echo free**

C B D Calibar 4 MM Course smooth

PANCREAS **Well defined cystic mass of size 54x47 mm seen in pancreatic head region** Pancreatic duct - **dilated 9.5 mm**

UPPER RETEROPERITONEUM ===
Para arotic lymphadenopathy absent . Arota and IVC normal

RT. KIDNEY Size Normal . Corticomedullary diferentation is maintained, Ivicalyceal system is. compact Renal parenchymal thickness is normal.

LT KIDNEY Size is normal , Corticomedullary differentiation is maintained, Pelvicalyceal system is compact.Renal parenchymal thickness is normal.

SPLEEN Size 11.6x4.88 cms ,Echo texture is normal
Splenic vein normal with absent splenic collaterals .

FREE FLUID Absent , at time of examination.

URINARY BLADDER Wall thickness normal , Content --- echofree
, **PROSTATE** enlarged measuring 3.53xx4.13x4.13 cms ,volume 31.6 cc. Glandular outline and echotexture is normal .
No intra glandular mass or calcification is seen

OPINION 1. WELL DEFINED CYSTIC MASS OF SIZE 54X47 MM SEEN IN PANCREATIC HEAD REGION .
2. BORDERLINE SPLENOMEGALY .
3.ENLARGED PROSTRATE GRADE (I BPH) .

ADV- MRI UPPER ABDOMEN

[DR KOKILA GUPTA M.D]

NOT FOR MEDICO LEGAL PURPOSE

University of Patanjali
Haridwar

परख डायग्नोस्टिक सैन्टर

मालवीय चौक, देहरादून रोड, रूड़की, (हरिद्वार)

डा0 कोकिला गुप्ता
एम.डी
रेडियोलोजिस्ट एवं सोनोलोजिस्ट
पू. पू. रेजीडेन्ट,
राजा राजा मेडिकल कालेज, ग्वालियर,
Regd. No. 17320

ULTRASOUND REPORT

P-NAME MR. PRAMOD KUMAR AGE/ SEX[M]

RF/BY PATANJALI HOSPITAL DATE 5 June 2019

LIVER Size Normal IHBR normal
Echo texture homogenous Portal vein 12mm

GALL BLADDER size normal Wall thickness 3 mm
Pericholecystic collection absent Lumen =echo free

C B D Caliber 4 mm Course smooth

PANCREAS -- Single cystic lesion of size 66x45 mm seen in seen in head of pancreas .

UPPER RETEROPERITONEUM ===
Para aortic lymphadenopathy absent. Arota and IVC normal

RT. KIDNEY-- Size normal. Corticomedullary differentiation is maintained, Pelvicalyceal system is compact .Renal parenchymal thickness is normal.

LT KIDNEY -- Size is normal, Corticomedullary differentiation is maintained, Pelvicalyceal system is compact .Renal parenchymal thickness is maintained.

SPLEEN -- Size 13.3X5.63 cms . Echo texture is normal
Splenic vein normal with absent splenic collaterals.

FREE FLUID - absent , at time of examination.

URINARY BLADDER - Wall thickness 3-4 mm . Content ---- echo free

PROSTATE Size is normal , normal homogenous echo texture.

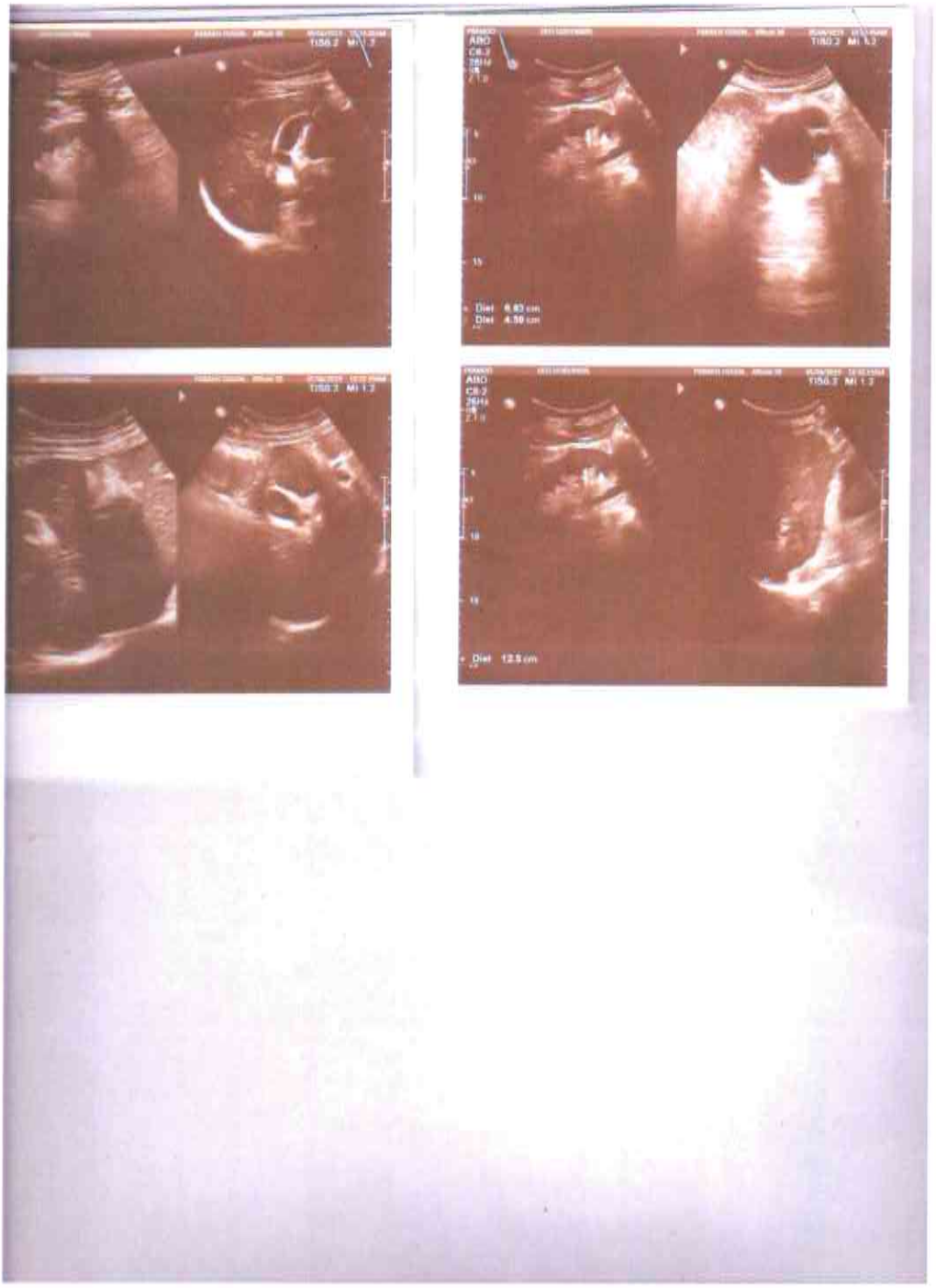
OPINION
1.BORDERLINE SPLENOMEGALY .
2. CYSTIC LESION OF SIZE 66X45 MM SEEN IN SEEN IN Head of PANCREAS .
3.STOMACH AND DUODENUM - OVER DISTENDED .

ADV- CECT WABD

DR - R.PAUL M.D

NOT FOR MEDICO LEGAL PURPOSE

University of Patanjali * Haridwar *



University of Patanjali * Haridwar *

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Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 36814/19 HIN (एच0आई0एन0): 15396297121

Full Name. (पूरा नाम): Mr Pramod Tyagi Age & Gender (आयु एवं लिंग): 66 M

Full Address. (पूरा पता) Roorkee Haridwar

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 8 2 9 9 5 4 1 6 5 2

Occupation (व्यवसाय): Retired Govt Service Marital Status (वैवाहिक स्थिति)

Disease (रोग): Gas Acidity Sugar Heart Ribbon Pancreas

Duration of Disease (रोग की अवधि): 3 Years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Allopathic

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 3 Year

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

जब मैं यहां पर आया था तब मुझे बिलकुल भी भूख नहीं लगती थी मैं एक रोटी भी नहीं खा पाता था अब जब सात दिन में योग व प्राणायाम षट्कर्म क्रियाओं से मेरी भूख में सुधार हुआ है। अब मैं दो रोटी खा पा रहा हूँ

Percentage (प्रतिशत): 80 %

Dated (दिनाँक): 14/6/19 Patient Signature (रोगी हस्ताक्षर) Pramod

Dr.Signature

University of Patanjali * Haridwar *

Patient Name : Suvajit Nag

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_saveAp.

नि:शुल्क परामर्श

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No. AH-2017-0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 9 HIN NO : 15610150578

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

Prescription No: 2

पंजीकरण संख्या Reg. No. 42779-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 20/06/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-1034-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. SUVAJIT NAG आयु Age 45 Year लिंग Sex Male

पता Address HAZRA RARA ,Coochbehar ,West Bengal ,India

फोन Landline No. : ..... मो. Mobile No. : 8257870962 ईमेल E-mail : .....

9593364436

Follow-up Date: 20/07/2019

Patient Complaint:
C/O Alcoholism

1	UDRAMRIT VATI	40	GM	Take 2 tab of medicine After meal with water / milk For 30 Days
	CHITRAKADI VATI	40	GM	

Notes: suck the chitrakadi vati.

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation, Ajeerna / Indigestion

Since - April 2019

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI

Remarks: REATMENT START-21/06/2019 TO 27/06/2019
ACUP POINT-STO,INT,LIV,CALF

20%
Gagan K Kumar 24/8/19

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

रक्तचाप B.P — No
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other
Sugar. No
Thyroid - No
2210 / 1Day RNA

5520 / 6Days

PRO
Vinay Si

20/6/19

 20-Jun-19 3:01 PM

Maharishi Dayanand Gram, Dist. Haridwar National Highway 58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Web: www.divyayoga.com

University of Patanjali * Haridwar *

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 42779-2019 HIN (एच0आई0एन0): 15610150578

Full Name. (पूरा नाम): SUVAJIT NAG Age & Gender (आयु एवं लिंग): 45 M

Full Address. (पूरा पता) HAZRA PARA, COOCH BEHAR 736101. W.B.

E-mail. (ई–मेल) [illegible]

Mobile No. (मोबाईल नं0)

Occupation (व्यवसाय): Pvt. service Marital Status (वैवाहिक स्थिति) MARRIED

Disease (रोग): Alcoholism & less appetite

Duration of Disease (रोग की अवधि): Last 4 months

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Allopathy

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): At 3 months

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Excellent, I am amazed with the effect w/o medicine and now I get back my appetite & promise not to touch Alcohol.

Percentage (प्रतिशत): 95%

Dated (दिनाँक): 27/06/19 **Patient Signature** (रोगी हस्ताक्षर) Suvajit Nag

Dr.Signature

University of Patanjali * Haridwar *

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम SUVAJIT NAGE , HIN 15610150578 है। मुझे शुरू में Alcoholism & Liver की परेशानी रहती थी, जिसके लिए मैंने April 2019 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे LIVER & Alcoholism की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे Patanjali website के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Not able to have food & loss of Appetite along with Alcoholism

मैं 20/06/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Dr. Sachin Kr. Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: No medicine

विभाग (में दिखाया) : SAFK, SHATKARMA

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।
और अब मुझे यहाँ इलाज लेते हुए 7 days / 27/6/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 95 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: I left Alcohol & can having Food 3 times a day after 2 months

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Dr. Sachin Kr. Tyagi, Akhilesh Ji & all Team members का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: kingmaker7a@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 9543364636

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 27/06/2019 Suvajit Nag
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kumar Tyagi

रोगी का नाम - Suvajit Nay आयु - 45 लिंग - M

रोगी का पता - Harzaa Para Cooch Behar - 736101 W.B

रोग[redacted] - Indigestion, Alkalic

रोग के लक्षण - Drink Hard, Loss of Appetite Not Eating Proper

रोगी की पूर्व परीक्षण रिपोर्ट्स - 2MP पिछली रिपोर्ट्स / फोटो RND

नई रिपोर्ट्स / फोटो RND

रोग में सुधार प्रतिशत - 95%

चिकित्सक का अनुभव - Patient got 98% Resolved through Yog and Sutchin [illegible]

रोगी का उपचार संबंधी कथन - जब मैं यहाँ पर आया था मुझे [illegible] ज्यादा लगता था और मैंने इसके लिए अंग्रेजी दवाईयों का सेवन किया मगर कोई आराम नहीं हुआ परन्तु षट्कर्म और योग करने के 7 दिन में मेरे अन्दर काफी परिवर्तन हुआ और मुझे अब काफी आराम मिला मैंने शराब भी छोड़ दी।

दिनांक -

चिकित्सक के हस्ताक्षर

Suvajit Nay

रोगी के हस्ताक्षर

University of Patanjali * Haridwar *

ACHALASIA CARDIA

(एकलासिया कार्डिया)

University of Patanjali
Haridwar

Patient Name : HARIMA KANSAL

DR. SIDDHARTH DIAGNOSTICS

AE-26, RAMGANGA VIHAR, PHASE-I, OPP. AKBAR KA QILA, MAIN KANTH ROAD MORADABAD Ph: 0591-2460490, 7830017768

DIGITAL X-RAY | ULTRASOUND | COLOR DOPPLER | PATHOLOGY | BIOCHEMIST

PATIENT'S NAME : HARIMA
REFERRED BY : PATANJALI HOSPITAL
AGE/SEX : 25YRS /F
DATE : 05/09/17

BARIUM SWALLOW STUDY

Distal 2/3rd of the esophagous is mildly dialated in caliber with hold up of the oral contrast, barium /air level with beak like narrowing of the lower esophageal sphincter .These findings simulate ? ACHALASIA CARDIA
Minimal passage of barium seen in stomach
Rest of the Esophagus is appears normal , no evidence of extrinsic compression, filling defect or ulcer crater is visualized.

Adv:ENDOSCOPY /MANOMETRY STUDIES

DR SIDDHARTH SINGH
MBBS.DMRE

DR. SIDDHARTH DIAGNOSTICS • MORADABAD •

ALL ANOMALIES MAY NOT BE APPARENT ON ULTRASOUND KINDLY CORRELATE THESE FINDINGS WITH CLINICAL & OTHER INVESTIGATIVE FINDINGS PATH
NOT VERIFIED REPORTS ARE NOT VALID FOR MEDICO LEGAL PURPOSE, IMPRESSION IS A PROFESSIONAL OPINION NOT AN ABSOLUTE DIAGNOS

University of Patanjali Haridwar

DR. SIDDHARTH DIAGNOSTICS

AE-23, RAMGANGA VIHAR, PHASE-I, OPP. AKBAR KA QILA, MAIN KANTH ROAD MORADABAD PH: 0591-2450490, 7838077884

DIGITAL X-RAY | ULTRASOUND | COLOR DOPPLER | PATHOLOGY | BIOCHEMISTRY

PATIENT'S NAME : HARIMA GUPTA
REFERRED BY : DR. RAJIV GUPTA
MBBS, MD, DM

AGE/SEX : 23YRS /F
DATE : 18/02/15

BARIUM SWALLOW STUDY

Oropharynx appears normal

Esophagous is mildly dilated with presence of air fluid level in mid esophagous and smooth narrowing of the terminal esophagous with hold up of barium in esophagous in delayed films (10 minutes) simulating Partially Obstructing Stricture In Distal Esophagous/GE Junction

Adv: clinicopathological correlation

DR SIDDHARTH SINGH
MBBS.DMRE

DR. SIDDHARTH DIAGNOSTICS MORADABAD

LL ANOMALIES MAY NOT BE APPARENT ON ULTRASOUND KINDLY CORRELATE THESE FINDINGS WITH CLINICAL & OTHER INVESTIGATIVE FINDINGS PATIENT IDENTITY
NOT VERIFIED REPORTS ARE NOT VALID FOR MEDICO LEGAL PURPOSE, IMPRESSION IS A PROFESSIONAL OPINION NOT AN ABSOLUTE DIAGNOSIS



University of Patanjali ★ Haridwar ★

DR. SIDDHARTH DIAGNOST

DIGITAL X-RAY

Modern SCANNING CENTRE

COURT ROAD, NEAR GANDHI ASHRAM, MORADABAD - 244 001 (U.P.)
Phone : 0591-2404466, 2416436

Dr. R.K. Jain
M.B.B.S., D.M.R.D.
Radiologist & Sonologist

WORKING HOURS
For X-rays 9.00 a.m. to 6.00 p.m.
For U/S 11.00 a.m. to 9.00 p.m.
Sunday Closed

DATE	December 31, 2014	NO	20
PATIENT NAME	Mrs. Hamima Gupta	AGE	23 F
REFERED BY	Dr. Kshitij Charaya MS		
INVESTIGATION	Barium Swallow ; RAO views, lying.		

The lower end of oesophagus is narrowed in all the films with 'funnel' shaped lower third of oesophagus.

Middle & upper one-third of thoracic oesophagus appears to be slightly dilated.

CONCLUSION These findings simulate narrowed lower end of oesophagus with slightly dilated upper & middle third of oesophagus.
? Chronic oesophagitis with oesophageal stricture.
Oesophagoscopy & biopsy are suggested.

Dr. R.K. Jain 31/12/14.

NOTE : 1. ALL ANOMALIES MAY NOT BE APPARENT ON ULTRASOUND SCANNING.
2. CO-RELATE THESE FINDINGS WITH CLINICAL & OTHER INVESTIGATIVE FINDINGS.



University of Patanjali Haridwar

(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)

Patanjali Ayurved Hospital, Haridwar

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 13050/17 HIN (एच0आई0एन0): 147485493458

Full Name (पूरा नाम): HARIMA GUPTA Age & Gender (आयु एवं लिंग): 25, F

Full Address, E-mail & Mobile No. (पूरा पता एवं मोबाईल नं0): MANSAROVAR GIRLS INTER COLLEGE, NAVEEN NAGAR, MDA KANTH ROAD, MORADABAD, E.mail:- harimakansal@gmail.com Mob:- 8979379055

Occupation (व्यवसाय): HOUSE WIFE Marital Status (वैवाहिक स्थिति): MARRIED

Disease (रोग): ACHLESIA CARDIA

Duration of Disease (रोग की अवधि): 3 YRS

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Endoscopic Balloning

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 YR

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) Very effective

ercentage (प्रतिशत): 80%

ated (दिनाँक): 28/02/17

Harima

Signature (हस्ताक्षर)

University of Patanjali ★ Haridwar ★

रोगी की पूर्व परीक्षण रिपोर्ट्स- पिछली रिपोर्ट्स Yes

नई रिपोर्ट्स NO

रोग में सुधार प्रतिशत- 85 %.

रोगी का उपचार सम्बन्धी कथन- Highly effective Procedure. Inspite of 1yr treatment of Allopathy & dilation, i was unable to Swallow my food. Then, One day i heard about 'Patanjali Yogpeeth". Here under guidance of Dr. Sachin Tyagi [HOD Shatkarma Deptt.], i am able to overcome my problem. I am highly thankful to patanjali.

चिकित्सक का अनुभव-

Patient got 85% Result. ent her Problem.

दिनांक

चिकित्सक के हस्ताक्षर 28/4/18

Harima.
रोगी के हस्ताक्षर

University of Patanjali ★ Haridwar ★

योग संदेश में प्रकाशन हेतु

चिकित्सक का नाम- Dr. Sachin Kumar Tyagi

रोगी का नाम- Harima Gupta आयु: 26 yrs लिंग: Female

रोगी का पता- Mansarover Girls Inter College, Naveen Nagar, MDA, Kanth Road, Moradabad

रोगी के लक्षण- Achlesia. Candida.

रोग के लक्षण- Achlesia Candida

उपचार अवधि- 12 दिन /माह दि0 14/04/18 से दि0 25/04/18 तक

रोगी द्वारा सेवन औषधियां: None

① Shankh — 1
② Kunjar — 1
③ Jal Neti — 1
④ Accu · 1 —
⑤ Y. T —



Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 24349-2018 HIN (एच0आई0एन0): 147425934568

Full Name. (पूरा नाम): Hauma Gupta Age & Gender (आयु एवं लिंग): 26 F

Full Address. (पूरा पता) Mansarovar Girls Inter College, Naveen Nagar, MDA, Kanth Road, Moradabad

E-mail. (ई–मेल) haumakansal@gmail.com

Mobile No. (मोबाईल नं0) 8 9 7 9 3 7 9 0 5 5

Occupation (व्यवसाय): House Wife Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Achlesia Cardia

Duration of Disease (रोग की अवधि): 3 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Dilation

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 years

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) Highly effective procedure. Inspite of 1 year treatment of Allopathy & Dilation, I was unable to swallow my food. Then, One day I heard about Patanjali Yogpeeth. There under guidance of Dr. Sachin Tyagi [H.O.D Shatkarma Deptt.], I have am able to overcome my problem. I am highly thankful to patanjali.

Percentage (प्रतिशत): 85%

Dated (दिनाँक): 25/04/18 Patient Signature (रोगी हस्ताक्षर) Hauma

Dr.Signature



ALCOHOLIC DISEASES

(एल्कोहॉलिक रोग)

PATIENT NAME : MANISH MANI

University of Patanjali ★ Haridwar

JEEVIKA DIAGNOSTICS
Fully Automated Pathology Lab
Hematology, Histopathology & Cytology Centre

Dr. Nidhi Jais Sahu
MBBS MD (PATHOLOGY)
MGIMS, SEWAGRAM
WARDHA, MAHARASHTRA
Reg. No. 16757
Ex- Consultant Pathologist,
Surotech Hospital, Nagpur

First Floor, Above Bank of Baroda ATM, Opp. District Hospital Gate No. 2, Next to Manbhari Saree Showroom, Near Police Kotwali, Chhindwara.
Ph.: 242086 Mobile : 9479819675 E-mail : jeevikadiagnostics@gmail.com Time : 8 am to 10 pm Sunday : 8 am to 4 pm For Home Collection - Call 8224085694

Patient Name	: MR. MANISH TIWARI	Age	: 30 Yrs
Ref By Dr.	: U C JAIN	Sex	: Male
Date	: 02/02/2019	Lab. Ref. No.	: 10

Complete Blood Count

CBC Done On Fully Automated Blood Cell Counter - Horiba ABX Micros -60

Test Name	Findings	Flag	Normal Values
Haemoglobin	14.5		11-16.5 gm/dl
RBC	04.4		3.8-5.8 mil./cmm
Total Leucocyte Count	5.9		3.5-10.5 10^3/mm^3
Platelet Count	*130*	L	150-450 10^3/mm^3
HCT	41.2		35-47 %
MCV	93.0		80-97 fL
MCH	32.8		27-34 pg
MCHC	*35.2*	H	30-35 gm/dl
RDW	15.0		10-16.50
PCT	00.1		0.1-0.5 %
MPV	08.7		6.5-11 fL
PDW	17.1		10-18 %
DIFF. LEUCOCYTE COUNT			
Lymphocytes	28.5		17-48 %
Monocytes	06.1		4.5-10 %
Neutrophils	65.4		45-76 %

* Kindly co-relate Clinically

Page No 1

Parvati C./Manoj Y. / Virendra S.
Technician /Typist

Dr. Nidhi Jais Sahu
Consultant Pathologist

Always with you in sickness and in health

University of Patanjali Haridwar

10C

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 16373-2019 HIN (एच0आई0एन0): 1553016597

Full Name. (पूरा नाम): मनीष शक्ति तिपाठी Age & Gender (आयु एवं लिंग): 31 पुरुष

Full Address. (पूरा पता) शान पेजाब इण्डस्ट्रियल चौक हिसवाड़ा मेरठ प्रदेश

E-mail. (ई–मेल) contishthi192@gmail.com

Mobile No. (मोबाईल नं0) 9 3 4 0 9 3 4 9 0 8

Occupation (व्यवसाय): नौकरी Marital Status (वैवाहिक स्थिति) शादी-शुदा

Disease (रोग): खिन्ना (Addicted) cough, Headache, cholesterol पीठ दर्द घुटने का।

Duration of Disease (रोग की अवधि): 06 साल

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): अंग्रेजी दवा लेता था।

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 06 साल

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) मैं जब यहां आया था तो उससे पहले मैं बहुत दवा पीता था, 6 साल से मुझे cholesterol की था, खाने के cholesterol का मतलब ही नहीं पता है। Serum triglycerides मुझे बिना पीठ की दवा लिये बिना पीठ की-दी आती थी, अब मुझे पीठ की दवा लेने की जरूरत नहीं पड़ी। मैं बिल्कुल ठीक हूँ Mr. Dr. Sachin Tyagi Sir को दिखाया, Dr. Sir ने मेरा इलाज किया मैं Dr. Sir का बहुत बहुत धन्यवाद देता हूँ। Dr. Sir ने मुझे बिल्कुल ठीक कर दिया।

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 18/04/2019 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature



PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No (AH-2017-0023)

Reg. No: 6260/15335816597 Dated: 17/04/2019

Name of Patient: Mr./Mrs./Ms.: MANISH MANI Age/Sex: 31Yer/M

Address:

Referred by:

LIVER FUNCTION TEST

TEST	VALUE	NORMAL VALUE
Total Serum Bilirubin	1.2	mg%(0.2 – 1.0)
Direct Serum Bilirubin	0.5	mg%(0.0 – 0.2)
Indirect Serum Bilirubin	0.7	mg%(0.2 – 0.8)
S.G.O.T.	18.6	IU/L (< 40)
S.G.P.T.	38.5	IU/L (< 40)
Serum Alkaline Phosphate	68.0	U/L (53 – 128)
Serum Total Protein	7.4	(5.5 - 8.0 gm/dl)
Serum Albumin	4.1	(3.5 - 5.5 gm/dl)
Serum Globulin	3.3	mg% (2.3 – 2.6)
A/GRatio	1.2:1	(1.2 - 2: 1)

Technologist

Pathologist

University of Patanjali Haridwar

Patanjali Yogpeeth, Delhi Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone 01334 - 240008, 248888, 248999, 246737 Fax 01334 - 244805, 240664 E-mail: divyayogasidhyayoga.com Web: www.divyayoga.com

Not for Medico Legal Purpose

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No (AH-2017-0025)

202

Reg. No. 5330/15335816597

Name of Patient : Mr./Mrs./Ms. : MANISH MANI

Address :

Referred by :

Dated : 26/03/2019

Age/Sex : 31Yer/M

LIVER FUNCTION TEST

TEST	VALUE	NORMAL VALUE
Total Serum Bilirubin	1.2	mg%(0.2 – 1.0)
Direct Serum Bilirubin	0.4	mg%(0.0 – 0.2)
Indirect Serum Bilirubin	0.8	mg%(0.2 – 0.8)
S.G.O.T.	32.5	IU/L (< 40)
S.G.P.T.	61.0	IU/L (< 40)
Serum Alkaline Phosphate	122.0	U/L (53 – 128)
Serum Total Protein	7.0	(5.5 - 8.0 gm/dl)
Serum Albumin	3.8	(3.5 - 5.5 gm/dl)
Serum Globulin	3.2	mg% (2.3 – 2.6)
A/GRatio	1.1:1	(1.2 - 2. 1)

University of Patanjali ★ Haridwar ★

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 246888, 246999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@divyayoga.com Web: www.divyayoga.com

Not for Medico Legal Purpose

ATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH-2017-0023)

Reg. No: 6260/15335816597 | Dated: 17/04/2019

Name of Patient (Mr./Mrs./Ms.): MANISH MANI | Age/Sex: 31Yer/M

Address:

Referred by:

LIPID PROFILE

TEST	VALUE	NORMAL VALUE
Serum Cholesterol	179.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
HDL Cholesterol	65.0	mg% (35 – 60)
LDL Cholesterol	124.0	mg% (Desirable < 130) (Border Line 130 – 159) (High > 160)
Serum Triglycerides	209.0	mg% (10 – 190)
Serum VLDL	40.8	mg% (5 - 40)

Technologist

Pathologist

University of Patanjali Haridwar

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar 249405, Uttarakhand, India
Phone: 01334 - 240006, 248888, 248999, 246737 Fax: 01334 - 244805, 240604 E-mail: divyayoga@divyayoga.com Web: www.divyayoga.com

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PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No: (AH-2017-0023)

Reg. No.: 5916/15535816597

Name of Patient : Mr./Mrs./Ms.: MANISH MANI

Dated: 08/04/2019

Age/Sex: 31Yer/M

Address: Dr. SACHIN.TYAGI

Referred by:

LIPID PROFILE

TEST	VALUE	NORMAL VALUE
Serum Cholesterol	165.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
HDL Cholesterol	64.4	mg% (35 – 60)
LDL Cholesterol	109.2	mg% (Desirable < 130) (Border Line 130 – 159) (High > 160)
Serum Triglycerides	232.0	mg% (10 – 190)
Serum VLDL	46.4	mg% (5 - 40)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@divyayoga.com Web: www.divyayoga.com

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JEEVIKA DIAGNOSTICS
Fully Automated Pathology Lab
Hematology, Histopathology & Cytology Centre

Dr. Nidhi Jais Sahu
MBBS MD (PATHOLOGY)
MGIMS, SEWAGRAM
WARDHA, MAHARASHTRA
Reg. No. : 16737
Ex- Consultant Pathologist,
Suretech Hospital, Nagpur

Floor, Above Bank of Baroda ATM, Opp. District Hospital Gate No. 2, Next to Manbhari Saree Showroom, Near Police Kotwali, Chhindwara.
Mobile : 9479819675 E-mail : jeevikadiagnostics@gmail.com Time : 8 am to 10 pm Sunday : 8 am to 4 pm For Home Collection - Call 8224085694

NAME	:	Mr. MANISH Tiwari	AGE	:	30Yrs.
REF. BY	:	Dr. U C Jain	SEX	:	Male
DATE	:	02/02/2019	LAB. ID NO.	:	10

LIPID PROFILE

TEST NAME	RESULTS	UNIT	REF.RANGE
Total Cholesterol	212.4	mg/dl	150-200
HDL Cholesterol	39.2	mg/dl	40-60
LDL Cholesterol	103.34	mg/dl	0-150
VLDL	69.86	mg/dl	5-40
Triglycerides	349.3	mg/dl	<150
RATIO			
TG / HDL Cholesterol	8.91		0-5.0
LDL/ HDL Cholesterol	2.64		0-3.5
Total Cholestrol/HDL	5.42		1.0-3.5

Stop outside Food
(Rosuvastatin).
Rp
(1) Tb Rosuvas (10mg)
0 — 1 — 0
3 mm

& repeat
lipid profile

Kindly co-relate Clinically
Page No. 1

Parvati C./Manoj Y. / Virendra S.
Technician /Typist

Dr. Nidhi Jais Sahu
Consultant Pathologist

University of Patanjali * Haridwar *

Always with you in sickness and in health

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम ऋषि नाथ तिवारी, HIN 15538165 97 है। मुझे शुरू में Eddictal की परेशानी रहती थी, जिसके लिए मैंने Nagaur 2016 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे [illegible] की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे [illegible] के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : · cholesterol, Triglycerides, Lever Problem थी।

मैं 26/03/2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr. Sachin Tyagi [illegible] को दिखाया।

मरीज़ को दवाइयाँ दी गईं: आयुर्वेद

विभाग (में दिखाया) : बाह्य रोग = Dr Sachin Tyagi Sir

योग (किया या नहीं): किया

तुलित आहार (लिया या नहीं): हाँ

पालन मेरे मेरे द्वारा किया गया।

र अब मुझे यहाँ इलाज लेते हुए 25 Day दिनांक / माह /वर्ष हो गए और आज अब मैं 0 % ठीक हो चुका हूँ।

ी मरीज़ के लक्षण व रिपोर्ट: [illegible] cholesterol [illegible] दवा खाने [illegible] पहले से [illegible] पीने [illegible] नहीं पाता था।

सके लिए मैं वैद्य जी, परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य Dr. Sachin Tyagi Sir, एवं समस्त स्टाफ बाह्यरोग का हार्दिक आभार व्यक्त करता हूँ।

न आई डी: OmPathi143@gmail.com मोबाइल व व्हाट्सप्प नंबर: 9340934308

ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

क / माह /वर्ष: 04/2019

मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Tyagi

रोगी का नाम - मनीष मणि त्रिपाठी आयु - 31 लिंग - पुरुष

रोगी का पता - एस. पंजाब शुगर मिल - चांद, जिला, हिड़वाड़ा, मध्य प्रदेश

रोगी के लक्षण - नासा करता था, (चिंता)

रोग के लक्षण - cholesterol,

रोगी की पूर्व परीक्षण रिपोर्ट्स - yes पिछली रिपोर्ट्स / फोटो yes

नई रिपोर्ट्स / फोटो yes

रोग में सुधार प्रतिशत - 100%.

चिकित्सक का अनुभव - Patient got 100% Result in His health issue.

रोगी का उपचार संबंधी कथन - मैं जब यहां आया था तो उसके पहले मैं बहुत दारू पीता था, 6 साल से। cholesterol भी था। cholesterol नारमल हो गया है। मुझे बिना नींद की दवा लिये बिना नींद भी नहीं आती थी अब मुझे नींद की दवा लेने की जरूरत नहीं पड़ती मैं बिल कुल ठीक हूँ Dr. Sachin Tyagi sir को दिखाया Dr. sir ने मेरा इलाज किया Dr. sir को बहुत, बहुत बधाई देता हूँ।

और पूरे कर्म स्वरूप को।

दिनांक -

चिकित्सक के हस्ताक्षर रोगी के हस्ताक्षर

University of Patanjali ★ Haridwar

PATIENT NAME : MUKESH KUMAR GUPTA

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम _____ , HIN _____ है। मुझे शुरू में _____ की परेशानी रहती थी, जिसके लिए मैंने 22/04/19 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय मे दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे _____ की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंतत: हमने हमारे _____ के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : _____

मैं 22/04/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य _____ को दिखाया।

मरीज़ को दवाइयाँ दी गई: _____

विभाग (में दिखाया) : _____

योग (किया या नहीं): _____

संतुलित आहार (लिया या नहीं): _____

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 26/04/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 100 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: _____

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य _____ का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: _____

मोबाइल व व्हाट्सप्प नंबर: _____

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

26/04/19
दिनांक / माह /वर्ष:

मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - सुधीर त्यागी

रोगी का नाम - मुकेश गुप्ता आयु - 33 लिंग - M

रोगी का पता - असरंगज मुंगेर बिहार

रोगी के लक्षण - नशे की लत

रोग के लक्षण - नशा

रोगी की पूर्व परीक्षण रिपोर्ट्स - पिछली रिपोर्ट्स / फोटो

नई रिपोर्ट्स / फोटो

रोग में सुधार प्रतिशत - 100%

चिकित्सक का अनुभव - Patient got 100% Result in His Healthy issue. Through Yog and Sutkum treatment

रोगी का उपचार संबधी कथन - यहाँ आने के पहले मैं जिस हालत में था और अब अभी मैं 100% सुधार हो गयी हूँ

दिनांक -

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali ★ Haridwar ★

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 23633-2019 HIN (एच0आई0एन0): 15558193547

Full Name. (पूरा नाम): Mukesh Kr Gupta Age & Gender (आयु एवं लिंग): 33 | 21

Full Address. (पूरा पता) Asarjan Munger

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 6 2 0 4 7 1 6 1 7 1

Occupation (व्यवसाय): Business Marital Status (वैवाहिक स्थिति) Yes

Disease (रोग): Addiction

Duration of Disease (रोग की अवधि): 3-4 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

very nice process very faithfully
Peeple & dochers is very nice
place thanks

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 26/04/19 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali ★ Haridwar ★

PATIENT NAME : SUDEEP RAMOLA

P&P

B-315-*-*

SWR-523-2019

SUDEEP RAMOLA

36 - MALE

22/04/2019

29/04/2019

ROGI AVLOKAN HETU/PATIENT UNDER OBSERVATION

DR SACHIN TYAGI

satisfactory

HIN: 15559233302

Follow-up Date: 29/05/2019

Patient Complaint:
C/O Fatty Liver,Alchoholic Since 15 Years, Renal Calculi With Grade1 Weakness, Sleep-Disturb

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation, Nidra Nasha / Insomnia

1. SARASVATARISHTA — 450 ML — Take 4 spoons in an equal amount of water after meals in the morning and evening

Notes:
Shankha Prakshalan - Do it After every 3 months.
2. Kunjara Kriya - Twice a week.
3. Jal Neti - Twice a week.
4. Rubber Or Sutra Neti - Twice a week.
5. Yog Nidra +Trataka - Everyday while sleeping.
6. Acupressure - Continue it for 15 days at home.
7. Steam -Twice a week.
8. Yoga Class - Every day morning and evening empty stomach.

Note:-
1. Kunjar Kriya- Do it Every day till 15 days then twice a week Acidity and Asthma Disorders.
2. Jal Neti+ Rubber Neti Continue for one month then twice a week Aathma, Sinusitis ,Cold & Cough , Polypus (Only Jal Neti), Allergic Stress, Insomnia and Headache Disorders.

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI, SHAVASANA

Remarks:

University of Patanjali ★ Haridwar

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_saveAp

निःशुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL
बहिरंग चिकित्सा विभाग O.P.D.

Reg. No. AH-2017-0028

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily
Token 1 HIN NO : 15559233302

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....
Prescription No: 1
पंजीकरण संख्या Reg. No. 24070-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 22/04/2019
विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-523-2019 कक्ष संख्या Room No. 0
रोगी :श्री/श्रीमती Patient : Mr./Mrs. SUDEEP RAMOLA आयु Age 36 Year लिंग Sex Male
पता Address PREM NAGAR, DEHRADUN ,Dehradun ,Uttarakhand ,India
फोन Landline No. : ..... मो. Mobile No. : 9760370231 ईमेल E-mail : .....

Follow-up Date: 22/05/2019

Patient Complaint:
C/O Fatty Liver,Alchoholic Since 15 Years, Renal Calculi With Grade1 , Weakness, Sleep-Disturb

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation, Nidra Nasha / Insomnia

1	SARASVATARISHTA	450 ML	Take 4 spoons in an equal amount of water after meals in the morning and evening

Admission in I.P.D
2 - MEDHAVATI - 120 R.
3 - Ashwagandha CAP - 1 - 1
after meals

Since - 1yr
BP sugar
Hypoid
301
Gagan Kumar 22/4/19

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI, SHAVASANA

Remarks: TREATMENT START23/04/19 TO 29/04/19

ACUP POINT,ALL DIGESTIVE POINT,CALF, P.GLAND

Satkarma Treatment: Yes

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI Medha Kunty	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	SUTRA NETI	RUBBER NETI
7	SHATKARMA	TRATKA	TRATAKA
8	SHATKARMA	YOG-NIDRA	YOG-NIDRA

3175
3 Days

6395
7 Days

22/04/19 The fifth
शिरोधारा 6 कीटवला तेल 1x 5 days

पतंजलि योगपीठ फ्रेज-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 240008, 248868, 248999, 246737 फैक्स Fax : 01334 - 244805, 240664 E-mail : divyayoga@divyayoga.com, patientcare@divyayoga.com Web : www.divyayoga.com

22-Apr-19 2:21 PM

Note : Not for Medico Legal Purpose

University of Patanjali ★ Haridwar ★

Dr.Saxena's Neurophysiology Lab

13,Subhash Road, Income tax Lane,Dehradun,,Uttrakhand.

Phone-: 0135-2655950,09219787611

EEG & BRAIN MAP ANALYSIS

Patient No : 200402
Name : Mr. Sudeep
Address :

Date : 20/04/2017 14:58:36
Age : 32 Years (M)
Consult : self

Last Meal : 1 hour back
Cooperation : yes
Medication

Last Attack :
Handedness : right

History

Observation

This record has many movement artifacts. The background activity arising from both the ocsipital areas and getting attenuated by eye opening.

HV and PS didn't contribute any abnormality. Seizure discharges not seen, focal slow and sharp waves not seen.

Impression

Normal awake record

Dr.Sashendra Saxena.MD.DM.(Neurology)

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

g. No. (पंजीकरण सं0): 2407019 HIN (एच0आई0एन0): HSS923302

ll Name. (पूरा नाम): SUDEEP RAMOLA Age & Gender (आयु एवं लिंग): MALE 36

ll Address. (पूरा पता) PREMNAGAR DEHRA DUN

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9760370231

cupation (व्यवसाय): Bussiness Marital Status (वैवाहिक स्थिति)

ease (रोग): CERVICAL SPINE PROBLEM

ration of Disease (रोग की अवधि): 2 Years

atment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Yes

ration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 2 Years

ect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) [illegible]

centage (प्रतिशत): 80 %

ed (दिनाँक): 29/4/2019 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम SUDEEP RAMOLE , HIN 15559233302 है। मुझे शुरू में Twomnia, Cervical, Alchoholic की परेशानी रहती थी, जिसके लिए मैंने 22-04-2019 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे Cervical Alchoholic की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे Joyti Negi के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : चिड़-चिड़ापन होना, फूला आना, गर्दन दर्द आदि, शराब की लत रहना।

मैं 22-04-2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य DR. SACHING Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: Ayurveda Medician

विभाग (में दिखाया) : Yog & Shatkarmer.

योग (किया या नहीं): Kiya

संतुलित आहार (लिया या नहीं): Liya

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 29-4-2019 (7) दिनांक / माह /वर्ष हो गए और आज अब मै 80 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: गुलाब में कंट्रोल है, थोड़ा बहुत नींद आ रही है, मन शांत है।

जिसके लिए मे वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य डॉ सचिन कुमार त्यागी व सम्पूर्ण स्टाफ का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 9760570231

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं (-)।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 29/4/2019

मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - SACHINE TYAGI

रोगी का नाम - Sudeep. Ramola आयु - 36 लिंग - Male

रोगी का पता - Prem Nagar Dehra Dun

रोगी के लक्षण - चिड़ा-चिड़ापन होना, नींद न आना, शराब का एडिक्शन,

रोग के लक्षण - सन नींद न आना, चिड़-चिड़ापन होना,

रोगी की पूर्व परीक्षण रिपोर्ट्स -

पिछली रिपोर्ट्स / फोटो

नई रिपोर्ट्स / फोटो

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव -

Patient got 80% Result in his health issue through yog and Sadhana

रोगी का उपचार संबधी कथन - जब मैं यहां आया था मुझे नींद की Problem थी। और Cerivical Problem थी Alchoholic, Problem थी अब मैंने यहां 7 दिन Treatment कराया (योगा एवं सटकरम) Dr. Sachine Tyagi जी के सनीदीया में अब मुझे अच्छा महसूस हो रहा है।

दिनांक - 29/01/19

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

PATIENT NAME : SUVAJIT NAG

University of Patanjali * Haridwar

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_saveAp

नि:शुल्क परामर्श

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 9 HIN NO : 15610150578

क्लीनिक एवं सेंटर नं. Clinic & Centre No.

Prescription No: 2

पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP

पंजीकरण संख्या Reg. No. 42779-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 20/06/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-1034-2019 कक्ष संख्या Room No. 0

रोगी : श्री/श्रीमती Patient Mr./Mrs. SUVAJIT NAG आयु Age 45 Year लिंग Sex Male

पता Address HAZRA RARA ,Coochbehar ,West Bengal ,India

फोन Landline No. मो. Mobile No. 8257870962 ईमेल E-mail

9593364436

Follow-up Date: 20/07/2019

Patient Complaint:
C/O Alcoholism

1	UDRAMRIT VATI	40	GM	Take 2 tab of medicine After meal with water / milk For 30 Days
	CHITRAKADI VATI	40	GM	

Notes: suck the chitrakadi vati.

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation, Ajeerna / Indigestion

Since - April 2019

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI

Remarks: REATMENT START-21/06/2019 TO 27/06/2019
ACUP POINT-STO,INT,LIV,CALF

20%

Gagan K Kumar 24/8/19

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

रक्तचाप B.P. — No
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other
Sugar. No
Thyroid - No
2210 / 1kg RNA

5520 / 6 Days

PRO
Vinay Si

20/6/19

20-Jun-19 3:01 PM

University of Patanjali * Haridwar *

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 42779-2019 HIN (एच0आई0एन0): 15610150578

Full Name. (पूरा नाम): SUVAJIT NAG Age & Gender (आयु एवं लिंग): 45 M

Full Address. (पूरा पता) HAZRA PARA, COOCH BEHAR - 736101. W.B.

E-mail. (ई–मेल) [illegible]

Mobile No. (मोबाईल नं0)

Occupation (व्यवसाय): Pvt. Service Marital Status (वैवाहिक स्थिति) MARRIED

Disease (रोग): Alcoholism & less appetite

Duration of Disease (रोग की अवधि): Last 4 months

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Allopathy

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): At 3 months

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Excellent. I am amazed with the effect w/o medicine and now I get back my appetite & promise not to touch Alcohol.

Percentage (प्रतिशत): 95%

Dated (दिनाँक): 27/06/19 **Patient Signature** (रोगी हस्ताक्षर) Suvajit Nag

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम SUVAJIT NAG , HIN 156/16/05578 है। मुझे शुरु में Alcoholism की परेशानी रहती थी, जिसके लिए मैंने April 2019 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय मे दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे Liver & Alcoholism की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नही हुआ। अंततः हमे हमारे Patanjali website के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Not able to have food & Lack of Appetite along with Alcoholism

मैं 26/06/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Dr. Sachin Kr. Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: NO MEDICINE

विभाग (में दिखाया) : SAFE. SHATKARMA

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 7 days | 27/6/19 दिनांक / माह /वर्ष हो गए और आज अब मै 95 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: I left Alcohol & smoking and 3 times a day after 2 months

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Dr. Sachin Kr. Tyagi, Acharya Ji & all Yogpeeth members का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: kingsuvajit@gmail.com

मोबाइल व व्हाट्सप्प नंबर: 9641364436

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 27/06/2019

Suvajit Nag
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Kumar Tyagi

रोगी का नाम - Suvarit Nay आयु - 45 लिंग - M

रोगी का पता - Harida Para Cooch Behar - 736101
W.B

रोग [redacted] - Indigestion, Alcoholic

रोग के लक्षण - Drink Hard, Loss of Appetite
Not eating Proper

रोगी की पूर्व परीक्षण रिपोर्ट्स - 2NP

पिछली रिपोर्ट्स / फोटो RND

नई रिपोर्ट्स / फोटो RND

रोग में सुधार प्रतिशत - 95%

चिकित्सक का अनुभव -
Patient got 95% Result from Yog and Sudhan [illegible].

रोगी का उपचार संबंधी कथन -
जब मैं यहाँ पर आया था मुझे केर [illegible] ज्यादा सतता था और मैंने इसके लिए अंग्रेजी दवाईयों का सेवन किया मगर कोई आराम नहीं हुआ परन्तु यह कर्म और योग करने के 7 दिन में मेरे अन्दर काफी परिवर्तन हुआ और मुझे अब काफी आराम मिला मैंने शराब भी छोड़ दी।

दिनांक -

चिकित्सक के हस्ताक्षर

Suvarit Nay

रोगी के हस्ताक्षर

University of Patanjali ★ Haridwar ★

PATIENT NAME : VARUN SURA

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 2+637-2019 HIN (एच0आई0एन0) 15572182290

Full Name. (पूरा नाम): Varun Suri Age & Gender (आयु एवं लिंग): 31 M

Full Address. (पूरा पता) Flat no 202 Ram Janki Enclave Road no 5 Rajendra Nagar Patna 800016 Suri Varun21@gmail.com E-mail. (ई–मेल) 8084638899 Mobile No. (मोबाईल नं0)

Occupation (व्यवसाय): Business Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Addiction

Duration of Disease (रोग की अवधि): 15 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): De Addiction

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 12 years

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Excellent जब यहां आया था तो मैं हाथ पीता था Rajnigantha खाता था अब मैं यहां से ला रहा हूँ तो सब छोड़ रहा हूँ

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 14/5/2019 Patient Signature (रोगी हस्ताक्षर) Varun

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15572182240
Prescription No: 1
Clinic & Centre No: HEADOFFICE **ID Proof:**
Reg No: 27637-2019 **Doctor :** DR SACHIN TYAGI - E00428 **Visit Date:** 07/05/2019
Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-627-2019 **Room No:** 0
Patient Name: (Mr/Ms/Mrs.) Mr. Varun Sura **Age:** 31 **Sex:** Male
Address: F No.-202, Ram Janki Enclave, Patna Patna Bihar
Landline No. : **Mobile No. :** 8084638899 **E-mail :**

Follow-up Date: 06/06/2019

Patient Complaint:
C/O Anindra ,Alchoholic, Smoking, Since 15Years,Gastric

1	MEDHA VATI	40	PC	Take 1-1 Tablet each half-an-hour after breakfas, lunch and dinner with lukewarm water

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation. Nidra Nasha / Insomnia

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI, SHAVASANA
Remarks: TREATMENT START08/05/19 TO 14/05/19

ACUP POINT ALL DIGESTIVE POINT, CALF, P.GLAND

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Printed on: May 24, 2019

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Varun Suri , HIN 15572182240 है। मुझे शुरू में नशा करता था की परेशानी रहती थी, जिसके लिए मैंने Risha Re Addl. Mo. दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे नशा लत की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नही हुआ। अंततः हमे हमारे परिचित से के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : N/A

मैं 7/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Sachin Kumar Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: N/A

विभाग (में दिखाया) : शत करम

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।
और अब मुझे यहाँ इलाज लेते हुए रविवार 14/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 100 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: सब ठीक है

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Sachin Kr Tyagi Aur Patanjali का हार्दिक का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: Suri Varun21@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 8084638899

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं (✓)। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 14/5/19 **मरीज़ के हस्ताक्षर** **वैद्य के हस्ताक्षर**

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kr Tyagi

रोगी का नाम - Varun Suri आयु - 31 लिंग - Male

रोगी का पता - Flat no 202 Ram Jonki Enclave Road no 5 Rajendra Nagar Patna 800016

रोग ~~के लक्षण~~ - नींद की Problem नहीं

रोग के लक्षण - दारू पिने का मैल रहता था

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो RNR

रोग में सुधार प्रतिशत - 100%

चिकित्सक का अनुभव - Patient got 100% Result through yog and Sleticuma.

रोगी का उपचार संबंधी कथन -

जब मैं यहां आया था तो मैं शराब पिता था अब मैं यहां से चिकित्सा के बाद सब छूट गया

दिनांक - [signature]

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

[signature]

University of Patanjali * Haridwar *

BRONCHITIS

(ब्रोंकाइटिस)

PATIENT : AKSHIT BATRA

University of Patanjali * Haridwar *

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 29462-2019 HIN (एच0आई0एन0): 15828230642-

Full Name. (पूरा नाम): Akshit Batra Age & Gender (आयु एवं लिंग): 19 M

Full Address. (पूरा पता) 21, Chintpurni Colony, Sector-14 Sonipat

E-mail. (ई–मेल) —

Mobile No. (मोबाईल नं0) 9 0 3 4 8 7 9 1 3 7

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति) Unmarried

Disease (रोग): Bronchitis

Duration of Disease (रोग की अवधि): 1 year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Nothing

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): —

fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

Great effect, I take asthma pump regularly but after this treatment no pump is required.

Percentage (प्रतिशत): 95%

Dated (दिनाँक): 22/05/19 Patient Signature (रोगी हस्ताक्षर) A Batra

Dr.Signature

University of Patanjali ★ Haridwar ★



पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Abhit Batra, HIN 155782306412 है। मुझे शुरू में ~~Bronchitis~~ Breathing problem की परेशानी रहती थी, जिसके लिए मैंने 1/1/2018 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे Bronchitis की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे friend के द्वारा पतजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Breathing problem

मैं 15/5/19 दिनांक / माह /वर्ष को पतजलि योगपीठ, हरिद्वार में वैद्य Sachin Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: Nothing

विभाग (में दिखाया) : Shatkarma

योग (किया या नहीं): किया

संतुलित आहार (लिया या नहीं): लिया

का पालन मेरे मेरे द्वारा किया गया।
और अब मुझे यहाँ इलाज लेते हुए 7 दिन दिनांक / माह /वर्ष हो गए और आज अब मैं 95 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: Good

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य Sachin Tyagi and all Shatkaram Staff का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 9034879137

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 22/05/19

मरीज़ के हस्ताक्षर A Batra

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar ★



चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kumar Tyagi

रोगी का नाम - Akshit Batra आयु - 19 लिंग - Male

रोगी का पता - 21, Chintpurni colony, Sec-14 . Sonipat

रोगी ~~के लक्षण~~ - Bronchitis, Fatty Liver, Obesity

रोग के लक्षण - Breathing problem, over weight, Digestive Prob

रोगी की पूर्व परीक्षण रिपोर्ट्स - N

पिछली रिपोर्ट्स / फोटो N/A

नई रिपोर्ट्स / फोटो N/A

रोग में सुधार प्रतिशत - 95%

चिकित्सक का अनुभव - Highly motivated.
Patient got 90% Result in his health issue.

रोगी का उपचार संबधी कथन - Great effect, Now no asthma pump is required. I am completly fine.

दिनांक - 22/05/19

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali ★ Haridwar ★

CELIAC DISEASE

(संवेदी आंत रोग)

PATIENT NAME : PUSHPA BISHT

University of Patanjali ★ Haridwar ★

DIAGNOSTIC REPORT

SRL Diagnostics

CLIENT CODE : C000022247

CLIENT'S NAME AND ADDRESS :
PUSHPA BISHT
SHOP NO 50A ELDECO SHOPPE

226010

Cert. No. [illegible]

SRL LIMITED
SRL REFERENCE LAB, GP 24, MARUTI INDUSTRIAL ESTATE,UDYOG
VIHAR,SECTOR-18,
GURGAON, 122015
HARYANA, INDIA
Tel : 1800-232-000, 1800-102-8282, Fax : 0124-4591001 CIN : U74899PB1995PLC045958
Email : connect@srl.in

PATIENT NAME : PUSHPA BISHT PATIENT ID **PUSHF150619820**

ACCESSION NO **0024RI006548** AGE : 36 Years SEX : Female DATE OF BIRTH 15/06/1982

DRAWN 18/09/2018 09:13 RECEIVED : 18/09/2018 09:15 REPORTED 21/09/2018 16:04

REFERRING DOCTOR : DR. Anupam Wakhlu CLIENT PATIENT ID

Test Report Status	Final	Results	Biological Reference Interval	Units

EIA - AUTO IMMUNE

*** HTTG/DGP SCREEN, SERUM**

HTTG/DGP SCREEN	193.84	High	Negative: < or = 20 Positive: > or =20	Units

METHOD : ENZYME LINKED IMMUNOSORBENT ASSAY (ELISA)

Comments

REMARK : Please correlate the result with the clinical, histopathological and other serological findings of the patient along with response to Gluten free diet.

Interpretation(s)
HTTG/DGP SCREEN, SERUM:
HTTG/DGP SCREEN

Gluten-sensitive patients deserve IgA and IgG antibodies to gliadin and to a component of the gut endomycium. Endomycin antigen has been identified as the protein cross-linking enzyme known as tissue transglutaminase. IgA anti-tissue transglutaminase is 95% sensitive and 97% specific and is a well used screening test. However, sensitivity for HTTG/DGP Screen is shown to have higher sensitivity (close to 100%) for screening of celiac disease. It allows for simultaneous detection of both IgA and IgG antibodies to a selectively deamidated synthetic peptide and h-TTG increase during in the detection of celiac disease even with consistent IgA deficiency.

Test utility
Patients with active celiac disease have values above 20 units. HTG/DGP IgA+IgG screen is 92.3 percent sensitive when compared to biopsy-confirmed CD and 84.1 percent sensitive in patients with dermatitis herpetiformis. The screen is almost 84.9 percent specific in suspected patients that were not diagnosed as having CD. The presence of these antibodies can be used in conjunction with clinical findings and other laboratory tests to aid in the diagnosis of IgA sufficient and IgA deficient celiac disease.

Limitations:
- A negative result in an untreated patient does not totally rule out gluten-sensitive enteropathy.
- In treated patients known to express IgA antibodies, gliadin IgA antibody levels represent a better indication of dietary compliance than gliadin IgG antibody concentrations.
- False positives (high antibody levels without characteristic histological findings) are possible. Other specific celiac serologic tests such as the endomycin (EMA) can be run to confirm positive findings. Serum IgA levels can also be measured to check for IgA deficiencies.
- Positive results can occur even if individual assays for h-TTG and gliadin IG are negative. Since this screening test detects IgG and IgA antibodies to both h-TTG and gliadin IG there can be an additive effect due to multiple "high negative" results for multiple individual assays.

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation

Note: Not for Medico Legal Purpose

HIN: 15376781706
Prescription No: 2
Clinic & Centre No: HEADOFFICE **ID Proof:**

Reg No: 66780-2018 **Doctor :** DR SACHIN TYAGI - E00428 **Visit Date:** 23/09/2018

Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-1139-2018 **Room No:** 0

Patient Name: (Mr/Ms/Mrs.) Mr. Pushpa Bisht **Age:** 36 **Sex:** Female

Address: 3/101 Virat Khand Gomtinagar Lucknow Uttar Pradesh

Landline No. : **Mobile No. :** 0 **E-mail :**

Follow-up Date: 23/10/2018

Patient Complaint:
C/O Hypothyroidism Chronic Constipation,Celiac , Migraine,Knee Pain,Back Pain,

1	ABHYARISHTA	450	Mix 4 spoon full of Medicine in an equal amount of lukewarm water and take it in the morning and evening after meals.

Diagnosis:
Celiac Disease, Avtugranthi Sarva Aipta / Hypothyroidism, Vibandha / Constipation, Ardhabvedhak / Migraine

Pranayam / Asanas: MANDHUKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN, MARKATASAN, BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI

Remarks: TREATMENT WILL BE START FROM DATE- 24/09/2018 TO 30/09/2018

ACUP POINT - STO,LIV,INT,CALF,THY,BRAIN,

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Printed on: October 27, 2018



Email : connect@srl.in

PATIENT NAME : PUSHPA BISHT PATIENT ID : **PUSHF150619820**

ACCESSION NO : **0024RJ004723** AGE : 36 Years SEX : Female DATE OF BIRTH : 15/06/1982

DRAWN : 12/10/2018 07:51 RECEIVED : 12/10/2018 07:53 REPORTED : 13/10/2018 16:52

REFERRING DOCTOR : DR. SACHIN TYAGI CLIENT PATIENT ID :

Test Report Status **Final**	Results	Biological Reference Interval	Units

EIA - AUTO IMMUNE

*** TISSUE TRANSGLUTAMINASE IGA, SERUM**

TISSUE TRANSGLUTAMINASE IGA	**49.16**	**High**	Negative: < 12.0 Equivocal: 12.0 - 18.0 Positive: > 18.0	U/mL

Comments

REMARK : Please correlate the result with the clinical, histopathological and other serological findings of the patient along with response to Gluten free diet.

Interpretation(s)
TISSUE TRANSGLUTAMINASE IGA, SERUM-TISSUE TRANSGLUTAMINASE IgA, SERUM

Gluten-sensitive patients develop IgA and IgG antibodies to gliadin and to a component of the gut endomysium. Recently, tissue transglutaminase (t-Tg), a calcium-dependent enzyme that catalyzes the transamidation of specific polypeptide bound glutamine residues has been identified as the unknown endomysial antigen. Interestingly, gliadin is the preferred substrate for this enzyme creating antigenic neo-epitopes, which are thought to generate the immune response in genetically susceptible individuals.

and follow up of celiac disease. Circulating IgA t-Tg antibodies are present in

SRL Diagnostics

CLIENT CODE : C000022247

CLIENT'S NAME AND ADDRESS :
PUSHPA BISHT
SHOP NO 50A ELDECO SHOPPE

226010

SRL LIMITED
B-1/12, VIPUL KHAND, GOMTINAGAR
LUCKNOW, 226010
UTTAR PRADESH, INDIA
Tel : 0522-4412121,4428378,7570809716, Fax
CIN : U74899PB1995PLC045956
Email : customercare.lucknow@srl.in

PATIENT NAME : **PUSHPA BISHT** PATIENT ID : **PUSHF150619820**

ACCESSION NO : **0024RI006548** AGE : 36 Years SEX : Female DATE OF BIRTH : 15/06/1982

DRAWN : 18/09/2018 09:13 RECEIVED : 18/09/2018 09:15 REPORTED : 18/09/2018 11:45

REFERRING DOCTOR : DR. Anupam Wakhlu CLIENT PATIENT ID :

Test Report Status **Final**	Results	Biological Reference Interval	Units

SPECIALISED CHEMISTRY - TUMOR MARKER

CA 125 (OVARIAN CANCER MONITOR), SERUM

CA 125	11.9	<2.0 - 35.0	U/mL

METHOD : CHEMILUMINESCENCE

Interpretation(s)
CA 125 (OVARIAN CANCER MONITOR), SERUM-CA 125 is a surface antigen, identified as a 200-1000 kDa mucin-like glycoprotein associated with non-mucinous epithelial ovarian malignancy. CA 125 is a useful tumor marker for evaluating therapy and monitoring disease status in patients under treatment for ovarian cancer. Measured serially the levels of CA 125 correspond with disease progression or regression. The rate of change in CA 125 is also highly prognostic. As a diagnostic tool however, the level of CA 125 alone is not sufficient to determine the presence or extent of disease. Levels of CA 125 should not be interpreted as absolute evidence of the presence or the absence of malignant diseases. Before treatment, patients with confirmed ovarian carcinoma frequently have levels of CA 125 within the range observed in healthy individuals. Preoperative levels of CA 125 in patients with malignant pelvic masses provide no information regarding the histological grade or diameter of the tumor mass.

Elevated levels of CA 125 can be observed in patients with nonmalignant diseases. Patients with certain benign conditions, such as hepatic cirrhosis, acute pancreatitis, endometriosis, pelvic inflammatory disease, menstruation and first trimester pregnancy show elevated levels of CA 125. Elevated levels are also found in 1 to 2% of healthy donors.

Measurements of CA 125 should always be used in conjunction with other diagnostic procedures, including information from the patient's clinical evaluation. The concentration of CA 125 in a given specimen determined with assays from different manufacturers can vary due to differences in assay methods, calibration, and reagent specificity. Values obtained with different assay methods cannot be used interchangeably. Heterophilic antibodies in human serum can react with reagent immunoglobulins interfering with in-vitro immunoassays. Patients routinely exposed to animals or to animal serum products can be prone to this interference and anomalous values may be observed.

****End Of Report****
Please visit www.srlworld.com for related Test Information for this accession

Dr Abhishant Pandey, MD
Pathologist
LAB HEAD

Dr. Nidhi Awasthi, MD
Pathologist

University of Patanjali Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)

Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 66780-2018 HIN (एच0आई0एन0): 153767817706

Full Name. (पूरा नाम): Pushpa Bisht Age & Gender (आयु एवं लिंग): 36 F

Full Address. (पूरा पता) D-42 Defence Colony Telibagh, Lucknow

E-mail. (ई–मेल) itl.trip@gmail.com

Mobile No. (मोबाईल नं0) 9838610423

Occupation (व्यवसाय): Business Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Thyroid, celiac disease, migraine, knee Pain, Auto immune disease

Duration of Disease (रोग की अवधि): Last 3 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No.

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): —

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Great Relief Improvement from Before

Percentage (प्रतिशत): 80%

Dated (दिनाँक): ~~31/10/18~~ 31/10/18 Patient Signature (रोगी हस्ताक्षर) Pushpa Bisht

Dr.Signature

University of Patanjali ★ Haridwar ★

योग संदेश में प्रकाशन हेतु

चिकित्सक का नाम- DR. Sachin Kumar Tyagi

रोगी का नाम- Pushpa Bisht आयु: 36 लिंग: F

रोगी का पता- D-42, Defence colony, Telibagh, Lucknow

रोगी के लक्षण- Knee Pain, Indigestion, constipation, migraine, lethargy, fatigue, wheat allergy, Lactose Intolerance

रोग के लक्षण- Same as above

उपचार अवधि- ...14 दिन /माह दि0..24/9/18से दि0.....7/10/18 तक

रोगी द्वारा सेवन औषधियां: No medicine

1. Shankh Prakshalan
2. kunjar kriya
3. Jalneti kriya
4. Sutra Neti kriya
5. Stam
6. Yaynion + Pratyaka
7. Acupuncture

University of Patanjali Haridwar

रोगी की पूर्व परीक्षण रिपोर्ट्स पिछली रिपोर्ट्स Reports attached

नई रिपोर्ट्स Reports Attached

रोग में सुधार प्रतिशत- Tests awaited 80%.

रोगी का उपचार सम्बन्धी कथन- Good

When I came I was having migraine, constipation, Knee Pain and Thyroid under the treatment of DR. Sachin Kumar Tyagi I have about 80% Relief Tests awaited.

चिकित्सक का अनुभव- Good – Patient got 80% Realiff in Her multiple Autoimmune Disease through Yog and Sethana and Few Panchkar Procedures for.

चि

[signature] 7/10/18

चिकित्सक के हस्ताक्षर

Sushfa Bisht

रोगी के हस्ताक्षर

University of Patanjali Haridwar

SRL Diagnostics

Cert. No MC-2015

CLIENT CODE : C000022247

CLIENT'S NAME AND ADDRESS :
PUSHPA BISHT
SHOP NO 50A ELDECO SHOPPE

226010

SRL LIMITED
SRL,REFERENCE LAB, GP-26, MARUTI INDUSTRIAL ESTATE,UDYOG VIHAR,SECTOR-18,
GURGAON, 122015
HARYANA, INDIA
Tel : 1800-222-000, 1800-102-8282, Fax : 0124-4591001 CIN - U74899PB1995PLC045956
Email : connect@srl.in

PATIENT NAME : PUSHPA BISHT PATIENT ID : **PUSHF150619820**

ACCESSION NO : **0024RI006548** AGE : 36 Years SEX : Female DATE OF BIRTH : 15/06/1982

DRAWN : 18/09/2018 09:13 RECEIVED : 18/09/2018 09:15 REPORTED : 21/09/2018 16:04

REFERRING DOCTOR : DR. Anupam Wakhlu CLIENT PATIENT ID :

Test Report Status **Final**	Results		Units
ENDOCRINOLOGY			
THYROID ANTIBODIES, SERUM			
ANTI-THYROGLOBULIN ANTIBODIES	**518.2**	High < or = 60 (Negative) > 60 (Positive)	U/mL
METHOD : CHEMILUMINESCENCE			
ANTI-THYROID PEROXIDASE ANTIBODIES	**455.30**	High < or = 60 (Negative) > 60 (Positive)	U/mL
METHOD : CHEMILUMINESCENCE			

Comments

NOTE: VALUE RECHECKED FOR SERUM ANTI-THYROGLOBULIN ANTIBODIES.

****End Of Report****

Please visit www.srlworld.com for related Test Information for this accession
TEST MARKED WITH '*' ARE OUTSIDE THE NABL ACCREDITED SCOPE OF THE LABORATORY.

Dr. Aarti Khanna Nagpal, DNB
Pathologist

Dr. Chandan Hazarika
Microbiologist

Dr. Shakti Aggarwal
Senior Biochemist

Dr. Mamta Kumari
Consultant Microbiologist

PATIENT NAME : SARTHAK SOM

University of Patanjali * Haridwar *

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation. Note: Not for Medico Legal Purpose

HIN: 15212727257
Prescription No: 1
Clinic & Centre No: HEADOFFICE **ID Proof:**

Reg No: 16656-2018 **Doctor :** DR SACHIN TYAGI - E00428 **Visit Date:** 02/04/2018

Department: SHATKARM CLINIC AND RESEARC **Annual No:** SH(ENT)-2738-20 **Room No:** 3

Patient Name: (Mr/Ms/Mrs.) Mr. Sarthak Som **Age:** 9 **Sex:** Male

Address: Gali N.48 Samrat Vikram Colony Saharanpur Saharanpur Uttar Pradesh Phone:8534019000

Landline No. : 8534019000 **Mobile No. :** 8534019000 **E-mail :**

Follow-up Date: 02/05/2018

Patient Complaint:
Cough, Cold(Celiac Disease)

1	SWASARI PRAVAHI	250 ML	Take 1 tsp of medicine mor- eve before food

Diagnosis:
Jeeran
Pratishyaya/Sinusitis,
Celiac Disease

Pranayam / Asanas: ANULOM-VILOM, BHRAMRI, KAPALBHATI
Remarks:
ACCU,P-STO,LIV,INT,CALF,BRAIN,SINS

TREATMENT WILL BE START FROM -28/03/2018 TO 06/04/2018

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Printed on: April 02, 2018

University of Patanjali Haridwar

योग संदेश में प्रकाशन हेतु

चिकित्सक का नाम- सचिव कुमार त्यागी जी

रोगी का नाम- SARTHAK Som आयु: 9 Y लिंग: M

रोगी का पता- SAMRAT VIKRAM COLONEY LANE No - 4 B SAHARANPUR

रोगी के लक्षण- ~~Sol~~ CELIC Disease

रोग के लक्षण- Vomating - Wheat elergy.

उपचार अवधि- 17 दिन ~~माह~~ दि0 28/3/18 से दि0 13/4/18 तक

रोगी द्वारा सेवन औषधियां: - No medcine

Shatkarma Treatment

1. Shankh Prashalan
2. Kunjar Kriya
3. Jal Neti Kriya
4. Rubber Neti
5. Steam
6. Yogniora
7. Tratakas
8. Yoga Colan

University of Patanjali Haridwar



रोगी की पूर्व परीक्षण रिपोर्ट्स- पिछली रिपोर्ट्स Attested

नई रिपोर्ट्स Attested

रोग में सुधार प्रतिशत- 100%

रोगी का उपचार सम्बन्धी कथन- जब मैं यहाँ आया तो मैं बहुत परेशानी में था तो मैं Patanjali yog pheth में आया और पंचकर्म विभाग में डॉ सचिन कुमार त्यागी जी के निर्देशन में 17 दिन का उपचार हुआ जिससे मैं अब पूरी तरह स्वस्थ हूँ और मैं गूँद से बनी चीजें भी खाँ पा रहा हूँ और मैं अब पूरी तरह स्वस्थ महसूस कर रहा हूँ। और मैं सभी स्टाफ का धन्यवाद देता हूँ।

चिकित्सक का अनुभव-

Patient got 100% relief in his celiac disease through yog & Sleeting method.

दि०

13/04/18

चिकित्सक के हस्ताक्षर

SARTHAK

रोगी के हस्ताक्षर

University of Patanjali Haridwar

Dr Lal PathLabs

National Reference Lab: Sector-18, Block-E, Rohini, New Delhi - 110 085
Main Lab: 34, Ebday House, Hanuman Road, New Delhi - 110 001
Tel: 011 - 3040-3210, Fax: 011 - 3040-3204
E-mail: lalpathlabs@lalpathlabs.com Web: www.lalpathlabs.com

LPL - PSC TRINAGAR
3762 MAIN ROAD, TRINAGAR,
NEAR KANHAIYA NAGAR METRO
STATION,NEW DELHI - 110035
DELHI

Name	: Master SARTHAK SOM			Collected	: 13/10/2015 1:11:00PM
Lab No.	: 123545838	Age: 7 Years	Gender: Male	Received	: 13/10/2015 1:11:27PM
A/c Status	: P	Ref By : SELF		Reported	: 14/10/2015 12:39:45AM
				Report Status	: Final

Test Name	Results	Units	Bio. Ref. Interval
IMMUNOGLOBULIN IgA, SERUM (Immunoturbidimetry)	195.00	mg/dL	35.00 - 200.00

Comments

IgA accounts for 13% of total immunoglobulins and protects the skin & mucosa against micro-organisms. It is capable of binding toxins & in combination with Lysozyme develops anti-bacterial and anti-viral activities. IgA is the predominant immunoglobulin in body secretions like saliva, sweat and colostrum. Polyclonal IgA increase is seen in Chronic liver diseases, Chronic infections, Autoimmune disorders, Sarcoidosis and Wiscott - Aldrich syndrome. Monoclonal IgA increase is seen in IgA Myeloma. Decreased synthesis of IgA is found in Congenital and Acquired Immunodeficiency diseases. Decreased IgA levels are seen in Protein losing enteropathies and skin burns.

TISSUE TRANSGLUTAMINASE (tTG) ANTIBODY, IgA, SERUM (EIA)	>170.0	Units	<20.00

Interpretation

RESULT IN Units	REMARKS
< 20	Negative
20 - 30	Weak Positive
> 30	Positive

Note

1. To diagnose Celiac disease the test should be performed *before* eliminating gluten from the diet.
2. False positive results are seen in Type 1 Diabetes, Chronic Liver Disease, Heart Failure and Psoriatic or Rheumatoid Arthritis. It is likely that proteins other than tTG may act as antigens for anti-tTG antibodies.
3. False negative results may be seen in children below 2 years & patients with IgA deficiency. There is high prevalence of IgA deficiency in Celiac disease thus simultaneous screening for IgA level has been recommended.

Comments

This test is used for the determination of IgA autoantibodies to human tissue transglutaminase for the differential diagnosis of Celiac disease / Gluten sensitive enteropathy (GSE). Celiac disease is characterized by small intestinal damages with flat mucosa leading to malabsorption with depletion of key nutrients. Tissue transglutaminase is one of the main endomysial autoantigens that can be easily detected for the diagnosis of Celiac disease. Other recommended tests are Endomysial, Gliadin & Reticulin antibodies along with small intestinal biopsy. Negative serology does not exclude a diagnosis of GSE. IgA deficiency should be considered in patients with suggestive clinical presentation.

If test results are alarming or unexpected, Client is advised to contact the laboratory immediately for possible remedial action.
@ Tests conducted at National Reference Lab, New Delhi, a CAP (7171001), ISO (FS 604111) and NABL (M-0061) accredited laboratory.

DEPARTMENT OF IMMUNOPATHOLOGY

POSTGRADUATE INSTITUTE OF MEDICAL EDUCATION AND RESEARCH CHANDIGARH

Research Block A, 4th Floor, Room No. 23

Anti-tissue transglutaminase antibodies (IgA-tTG)

Name	Sarthak	CR No.	201703029796
Age/Sex	8 Yrs/M	Lab No.	14142/17
Clinical In-Charge		Received on	09/05/17
Ward/OPD	Pediatric Medicine-Unit1		

Test	Result (EliA U/ml)
IgA-tTG (serum)	14.0
Remarks	-

Analyzer detection limit for IgA-tTG is from 0.1 to 128 EliA U/ml.

Method Fluoroenzyme

Reference ranges for IgA-tTG (EliA U/ml)

Negative less than 7

Equivocal 7 - 10

Positive greater than 10

Entered on		Entered by	Isaac Jamesh(Sr. Lab.Technician)
Validated by	Yashwant Kumar(Associate	Validated on	11-05-17 04:38 PM

University of Patanjali Haridwar

Immuno Diagnostics Pvt. Ltd.

Leading Immuno Assays Laboratory of Northern India

AN ISO 9001:2008 CERTIFIED LABORATORY

Reference No.	1509132166	Age	7 Years
Patient	MASTER. SARTHAK	Sex	MALE
Reff. By	DR. ABHINAV GUPTA	Date	16/09/2015
Sample Collection Date/Time	16/09/2015	Sample Type	SERUM
Sample Receiving Date/Time	17/09/2015 12:16AM	Report Print Date	17/09/2015
Sample From	CHAWLA PATHOLOGY	Report Authenticate Date / Time	17/09/2015 10:31AM

SPR

REPORT BY CLIA

INVESTIGATION		OBSERVED VALUE	UNITS	REFERENCE RANGE
REPORT BY CMIA				
ANTI TRANSGLUTAMINASE IgA ANTIBODY (tTG)	:	338.5	U/mL	Negative < 12.0 Weak Positive 12 - 18 Positive > 18.0

Comment : The indentification of tissue transglutaminase (tTG) as the major target antigen of EMA provided the opportunity of a more easy and reliable diagnosis of celiac disease. tTG is an enzyme that upon wounding is released
from cells where it is thought to aid in tissue repair.
Anti-tTG antibodies show higher sensitivity and specificity than anti-Gliadin antibodies. Furthermore they correlate

* Quality controlled report with external quality assurance

*** END OF REPORT ***

Printed By : SANJAY Checked By : ASHOK Authenticated By : DR MALTI 17/09/2015 10:51AM

Dr. Vimla Patni
M.B.B.S., M.D. (Path & Micro)
Hony Consultant Pathologist

Dr. Ajay Kumar
Ph.D. (BARC)
Specialisation in Thyroid Physiology

Dr. Malti Goyal
M.B.B.S., M.D. (Path)
Hony Consultant Pathologist

109, Pocket D&E Shopping Complex, Sarita Vihar, New Delhi 110 076

University of Patanjali Haridwar

Immuno Diagnostics Pvt. Ltd.

Leading Immuno Assays Laboratory of Northern India

NABL ACCREDITED & ISO 9001:2008 CERTIFIED LABORATORY

NABL ACCREDITED M-0860

ISO 9001

CB 004

Reference No.	: - 1804131828	Age/Gender	: 9 Yrs/Male
Pt's Name	: Master. SARTHAK		
Referred By	: Dr. SACHIN TYAGI		RKE-SELF
Sample Collection Date/Time	: 12-Apr-2018	Date	:12-Apr-2018
Sample Receiving Date/Time	: 12-Apr-2018 10:49AM	Approved Date	:12-Apr-2018 12:51PM
Sample From	: RKE-SELF	Report Print Time	:12-Apr-2018 03:27PM

Test Description	Observed Value	Biological Reference Interval

Immunology

Tissue Transglutaminase (TTG) IgA*

TTG (Tissue Transglutaminase) IgA*	1.70	U/mL
Chemiluminescence technology (CLIA)		

Negative : < 12.0
Weak Positive : 12 - 18
Positive : > 18.0

Unit: U/mL

Comment :-

The indentification of tissue transglutaminase (tTG) as the major target antigen of EMA provided the opportunity of a more easy and reliable diagnosis of celiac disease. tTG is an enzyme that upon wounding is released from cells where it is thought to aid in tissue repair. Anti-tTG antibodies show higher sensitivity and specificity than anti-Gliadin antibodies. Furthermore they correlate tightly with the activity of the disease and thus are especially useful for diet monitoring.

*** End Of Report ***

Dr. Vimla Patni
M.B.B.S., M.D. (Path & Micro)
Hony. Consultant Pathologist

Dr. Ajay Kumar
Ph.D. (BARC)
Specialization in Thyroid Physiology

Dr. Malti Goyal
M.B.B.S., M.D. (Path)
Hony. Consultant Pathologist

All results should be co-releated clinically; if results are alarming or unexpected, contact the laboratory immediately. Not valid for Medico-Legal. Result pertain to the specimen submitted. The Tests with an * are not accredited by NABL.

University of Patanjali Haridwar

Immuno Diagnostics Pvt. Ltd.

Leading Immuno Assays Laboratory of Northern India

NABL ACCREDITED & ISO 9001:2008 CERTIFIED LABORATORY

NABL ACCREDITED M-0850

ISO 9001

DAC CB 004

Reference No.	: - 1803135200	Age/Gender	: 9 Yrs/Male
Pt's Name	: Master. SARTHAK SOM		RKE-SR
Referred By	: ~~Self~~ Dr. Sachin Kumar Tyagi		
Sample Collection Date/Time	: 28-Mar-2018	Date	28-Mar-2018
Sample Receiving Date/Time	: 28-Mar-2018 03:19AM	Approval Date	28-Mar-2018 05:52AM
Sample From	: S.R. PATH LAB	Report Print Time	:28-Mar-2018 11:00AM

Test Description	Observed Value	Biological Reference Interval
Immunology		
Tissue Transglutaminase (TTG) IgA*		
TTG (Tissue Transglutaminase) IgA* Chemiluminescence technology (CLIA)	0.60	U/mL

Negative : < 12.0
Weak Positive : 12 - 18
Positive : > 18.0

Unit: U/mL

Comment :-
The indentification of tissue transglutaminase (tTG) as the major target antigen of EMA provided the opportunity of a more easy and reliable diagnosis of celiac disease. tTG is an enzyme that upon wounding is released from cells where it is thought to aid in tissue repair. Anti-tTG antibodies show higher sensitivity and specificity than anti-Gliadin antibodies. Furthermore they correlate tightly with the activity of the disease and thus are especially useful for diet monitoring.

*** End Of Report ***

Vimla Patni

Dr. Vimla Patni
M.B.B.S., M.D. (Path & Micro)
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Hony. Consultant Pathologist

109, Pocket D&E Shopping Complex, Sarita Vihar, New Delhi-110 076

All results should be co-relealed clinically; if results are alarming or unexpected, contact the laboratory immediately. Not valid for Medico-Legal. Result pertain to the specimen submitted. The Tests with an * are not accredited by NABL

University of Patanjali Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – I , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 16656-2018 HIN (एच0आई0एन0): 1512727257

Full Name. (पूरा नाम): SARTHAK SOM Age & Gender (आयु एवं लिंग): 9, M

Full Address. (पूरा पता) SAMRAT VIKRAM COLONEY LANE No-4 B SAHARANPUR

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 8 5 3 4 0 1 9 0 0 0

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति)

Disease (रोग): Silick Deeseg ~~Critical~~ Celiac Disease

Duration of Disease (रोग की अवधि): 3 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): ~~yes~~ No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

जब हम यहाँ आये थे तो मैं गेहूँ नहीं लेता था ~~अब~~ मैंने 10 दिन से षटकर्म चिकित्सा और योग से मेरी ये परेशानी पूरी तरह ठीक हूँ। अब मैं गेहूँ से बनी सभी चीजें खाँ पा रहा हूँ अभी मुझे गेहूँ से कोई तकलीफ नहीं लग रही है। मेरी चिकित्सा डा० सचिन त्यागी जी के निदेशन मे चली मैं पूरी तरह स्वस्थ हूँ और मैं सभी का धन्यवाद करता हूँ

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 6/4/18 Patient Signature (रोगी हस्ताक्षर) SARTHAK

Dr.Signature

University of Patanjali Haridwar

PATIENT NAME : SEEMA GUPTA

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15096822255
Prescription No: 3
Clinic & Centre No: HEADOFFICE
ID Proof:
Reg No: 98061-2017 **Doctor :** DR SACHIN TYAGI - E00428 **Visit Date:** 03/11/2017
Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-1496-2017 **Room No:** 0
Patient Name: (Mr/Ms/Mrs.) Mr. Seema Gupta **Age:** 47 **Sex:** Female
Address: Bhagwat Nagar Kankrbagh Patna Patna Bihar Phone:9431494468
Landline No. : 9431494468 **Mobile No. :** 9431494468 **E-mail :**

Follow-up Date: 03/12/2017

1	MEDOHAR VATI	50	GM	Take 2 tablet in the after morning and evening with lukewarm water.

Patient Complaint:
C/O - Hypothyroidism, Hypertension, Obesity, Weakness, Celiac Disease Bp - 140/80 Mm 0F Hg Wt - 75 Kg P/H/O - H1N1 +Ve

Diagnosis:
Celiac Disease, Stholya / Obesity

Remarks: ON EXAMINATION - DISCHARGES + VAGINAL WALLS - NORMAL
|ADMITTED|ACCU.PP--STO,LIV,INT,CALF,THO,U.T,B.P

REATMENT WILL BE START FROM --04/11/ TO 10/11/2017

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	SUTRA NETI	RUBBER NETI
7	SHATKARMA	TRATKA	TRATAKA
8	SHATKARMA	YOG-NIDRA	YOG-NIDRA

Printed on: August 19, 2018

University of Patanjali Haridwar

योग संदेश में प्रकाशन हेतु

चिकित्सक का नाम- डॉ० जीवन कुमार भोगी

रोगी का नाम- सीमा गुप्ता आयु: 48 लिंग: F

रोगी का पता- चैतन्य नगर, भागवत नगर, कंकड़ बाग, पटना, बिहार-

रोगी के लक्षण- Cilic disis, Thiriod, B.P. Uric Acid

रोग के लक्षण- Cilic disses — Loss Motion बहुत ज्यादा होती थी- तथा कमजोरी बहुत रहती थी, जिससे चिड़चिड़ापन, अनिद्रा

उपचार अवधि- 7 दिन /माह दि0 22-3-18 से दि0 28-3-18 तक

रोगी द्वारा सेवन औषधियां: No Medicin

Shatkarma Treatment
(1) Shankh P
(2) Kunjar K
(3) Jal Nati
(4) Sutra Nati
(5) Trataca
(6) Yognima
(7) Acupuncture
(8) Steam

University of Patanjali * Haridwar *

रोगी की पूर्व परीक्षण रिपोर्ट्स- पिछली रिपोर्ट्स Attached

नई रिपोर्ट्स Attached

रोग में सुधार प्रतिशत- 100 %

रोगी का उपचार सम्बन्धी कथन- जब मैं यहाँ आई थी तब मुझे गेहूँ से बनी कोई चीज नहीं खा पाती थी परन्तु अब मैं पूरी तरह गेहूँ से बनी चीजें खा रही हूँ और मेरे शरीर में भी मुझे काफी परिवर्तन महसूस हो रहा है मेरी चिकित्सा डा. सचिन त्यागी के निर्देशन में हुई तथा सत्कर्मों के सभी सदस्यों मेरी बहुत सहयोग किये, जिनका मैं सदा आभारी रहूँगी, जिन्होंने मेरी इतनी उत्साह बढ़ाया।

चिकित्सक का अनुभव-

When the Patient stat, Seema Gupta came in Yog and Shatkama Chikitsa Dept. She was having Chronic diarrhoea with high TTG and other Physical and mental issues. I prescribed yog and Shatkama treatment for one week, after Shatkama Procedure Patient got 100% result.

दि०

29/08/18

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

सीमा गुप्ता

University of Patanjali Haridwar

Certificate No. M-0771

SAKRA WORLD HOSPITAL

UHID	SW01.0000214604	Bill No.	CS0925205
Name	Mrs SEEMA GUPTA	Order No	SW1700100985
Age/Sex	46 Year(s)/ Female	Order Date	12-Sep-2017 11:56 AM
Referred By	Dr SACHIN S SHETTY	Result Entry Date	13-Sep-2017 14:15

LABORATORY MEDICINE -HISTOLOGY

Specimen : TISSUE

HISTOPATHOLOGY SMALL TISSUE (1)

Accession No : 011170912004

Sample Collection Date : 12-Sep-2017 12:46:11
Verification Date : 13-Sep-2017 02:15:58

CLINICAL HISTORY:
Chronic diarrhoea with high TTG

SPECIMEN TYPE:
D2 biopsy

GROSS DESCRIPTION:
4 fragments of tissue, all embedded
GROSSING DONE BY:Dr Pallavi Rao
MICROSCOPIC DESCRIPTION:
Duodenal mucosal fragments showing focal villous blunting with increased chronic inflammatory cells in the lamina propria. Intraepithelial lymphocytes are significantly increased. Crypt hyperplasia is also noted. There is no neoplasia.

IMPRESSION:
Variable partial villous atrophy, compatible with Celiac disease, Modified Marsh type IIIa

BIOPSY NO:17-2221

Remarks :

University of Patanjali Haridwar

Immuno Diagnostics Pvt. Ltd.

Leading Immuno Assays Laboratory of Northern India

NABL ACCREDITED & ISO 9001:2008 CERTIFIED LABORATORY

NABL ACCREDITED M-0860

ISO 9001

CB 004

Reference No.	: - 1803134402	Age/Gender	: 48 Yrs/Female
Pt's Name	: Mrs. SEEMA GUPTA		RKE-SR
Referred By	: Self		
Sample Collection Date/Time	: 22-Mar-2018	Date	:23-Mar-2018
Sample Receiving Date/Time	: 23-Mar-2018 02:31AM	Approval Date	:23-Mar-2018 05:33AM
Sample From	: S.R. PATH LAB	Report Print Time	:23-Mar-2018 04:21PM

Immunology

Test Description	Observed Value	Biological Reference Interval
Tissue Transglutaminase (TTG) IgA*		
TTG (Tissue Transglutaminase) IgA* Chemiluminescence technology (CLIA)	0.50	U/mL

Negative : < 12.0
Weak Positive : 12 - 18
Positive : > 18.0

Unit: U/mL

Comment :-
The indentification of tissue transglutaminase (tTG) as the major target antigen of EMA provided the opportunity of a more easy and reliable diagnosis of celiac disease. tTG is an enzyme that upon wounding is released from cells where it is thought to aid in tissue repair. Anti-tTG antibodies show higher sensitivity and specificity than anti-Gliadin antibodies. Furthermore they correlate tightly with the activity of the disease and thus are especially useful for diet monitoring.

*** End Of Report ***

Dr. Vimla Patni
M.B.B.S., M.D. (Path & Micro)
Hony Consultant Pathologist

Dr. Ajay Kumar
M.D. (BARC)
Specialisation in Thyroid Physiology

Dr. Malti Goyal
M.B.B.S., M.D. (Path)
Hony Consultant Pathologist

109, Pocket D&E Shopping Complex, Sarita Vihar, New Delhi-110 076

All results should be co-relocated clinically. If results are alarming or unexpected, contact the laboratory immediately. Not valid for Legal. Result pertain to the specimen submitted. The Tests with an * are not accredited by NABL.

University of Patanjali Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – I , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 17621-2018 HIN (एच0आई0एन0): 150968222 55

Full Name. (पूरा नाम): Seema Gupta Age & Gender (आयु एवं लिंग): 48 F

Full Address. (पूरा पता) Chaytany Nagar, Bhagwad Nagar, Kankar bay, Patna - 800026

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9 4 3 1 4 9 4 4 6 8

Occupation (व्यवसाय): House wife Marital Status (वैवाहिक स्थिति)

Disease (रोग): Celic disise, Thiriod, Uric Acid, obicity

Duration of Disease (रोग की अवधि): 1 Years 23 years, 3 yrs, 20 yrs

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Allopathy Thiriod, B.P. Medicine

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 20, 3,

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
जब मैं पतंजली आई थी तब मुझे इतनी सारी बिमारियाँ थी मुझे Celic disise, सांस की Problum में भी आराम हुआ है कमजोरी अब नहीं लग रही है मेरा यहाँ पर सात दिन सत्कर्मा चला है Dr Sachin Tayagi के निर्देशन में चला जिससे मेरी ये सभी समस्याएं समाप्त हुई

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 29-03-2018 **Patient Signature** (रोगी हस्ताक्षर) सीमा गुप्ता

Dr.Signature

University of Patanjali Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 98061-2017 HIN (एच0आई0एन0): 150968222-55

Full Name. (पूरा नाम): Seema Gupta Age & Gender (आयु एवं लिंग): 48 F

Full Address. (पूरा पता) Chatanaya Nagar, Bhagwad Nagar, Patna - 26

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9 4 3 1 4 9 4 4 6 8

Occupation (व्यवसाय): House Wife Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Celic Dises

Duration of Disease (रोग की अवधि): Three Month

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

लाभ नाक का छिद्र खुल गया
Celic dises समाप्त हो गई
शरीर बहुत हल्का महसूस हो रहा है

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 15-11-2017

सीमा गुप्ता
Signature (हस्ताक्षर)

Dr. Sig. — [signature]

University of Patanjali Haridwar



PATIENT NAME : SHIVANI SHARMA

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation

Note: Not for Medico Legal Purpose

HIN: 14808817363
Prescription No: 1
Clinic & Centre No: HEADOFFICE
ID Proof:
Reg No: 23886-2017 **Doctor :** DR SACHIN TYAGI - E00428 **Visit Date:** 30/08/2017
Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-392-2017 **Room No:** 0
Patient Name: (Mr/Ms/Mrs.) Mr Shivani Sharma **Age:** 24 **Sex:** Female
Address: 99 Raj Bagh Colony Sahibabad Ghaziabad Uttar Pradesh
Landline No. : **Mobile No. :** 09711344404 **E-mail :**

Follow-up Date: 29/09/2017

Patient Complaint:
C/O Celiac Disease. H/O Epilepsy(From 2008)

1	SARVAKALPA KWATH	300 GM	Take 1 spoon medicine in 400 ml of water and boil till it reduces to 100 ml. Filter and drink on an empty stomach in the morning and evening

Diagnosis:
Udara Roga / Abdominal Disease, Apasmara / Epilepsy And Major Psychosis

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYA, BHRAMRI, UDGITH, UJJAI

Remarks: TREATMENT WILL START FROM 26TH OF MARCH 2017 TO 01ST OF APRIL 2017

ACUP LIV, STO, INT, CALF, PITU, BRAIN

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*ENIMA*	ENIMA
3	SHATKARMA	*JAL NETI*	SALT + WATER
4	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
5	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Patient had CELIAC DISEASE from Approx two years :- Patient visited here (yog & Shatkarma dept.) on 2/4/17 and above date :- Through only and only yog and Shatkarma treatment Patient got 100% cured.

Printed on: August 30, 2017

University of Patanjali ★ Haridwar ★

(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)

Patanjali Ayurved Hospital, Haridwar

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 23886-2017 HIN (एच0आई0एन0): 14608817363

Full Name (पूरा नाम): शेवानी शर्मा Age & Gender (आयु एवं लिंग): 23

Full Address, E-mail & Mobile No. (पूरा पता एवं मोबाईल नं0): 9711344404
99 Raj Bagh colony Sahibabad

9 7 1 1 3 4 4 4 0 4

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति)

Disease (रोग): wheat

Duration of Disease (रोग की अवधि): 6 वर्ष

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): हाँ

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 4 महीने

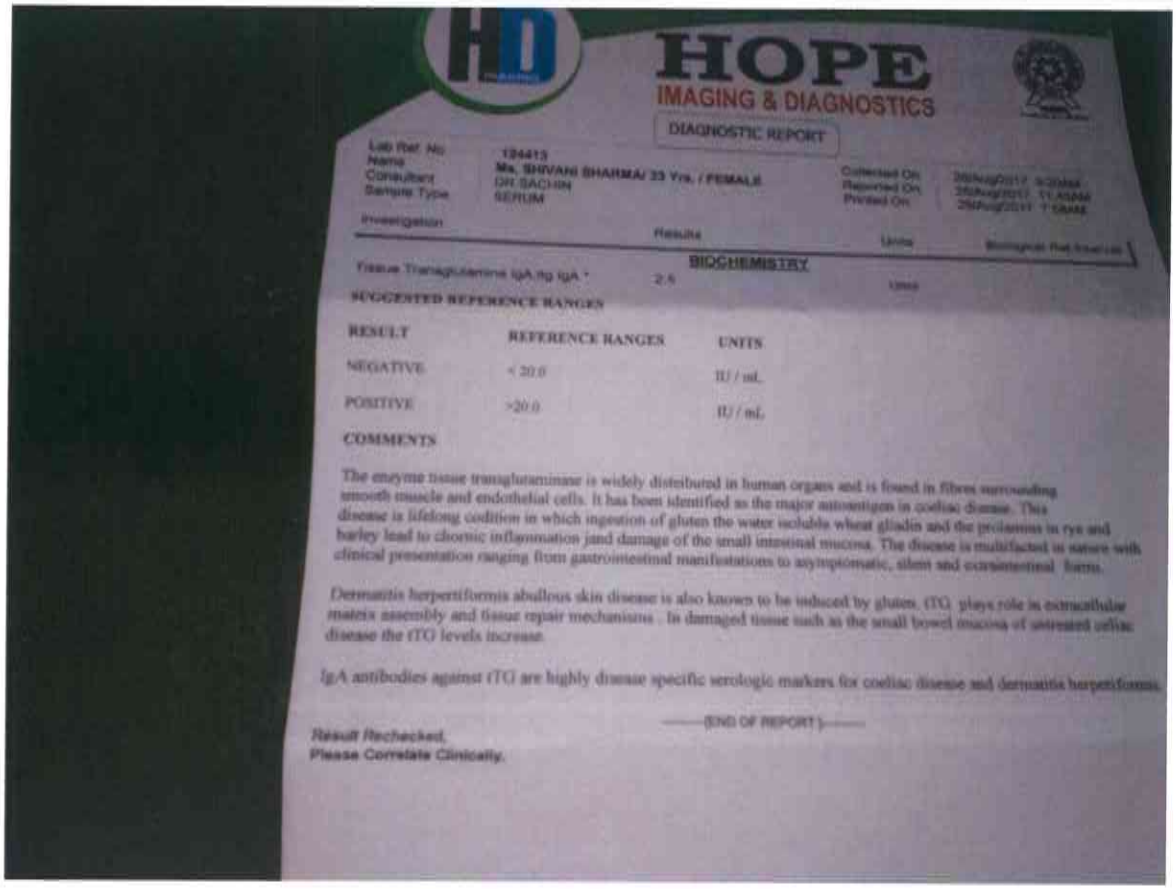
Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) यहा आकार मेरी तबियत ठीक हो गई है। और मुझे यहा पर खाना खाने को नही देते है।

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 11/8/17

Shivani Sharma
Signature (हस्ताक्षर)

University of Patanjali Haridwar



HOPE
IMAGING & DIAGNOSTICS

DIAGNOSTIC REPORT

Lab Ref. No: 124413
Name: Ms. SHIVANI SHARMA/ 33 Yrs. / FEMALE
Consultant: DR SACHIN
Sample Type: SERUM
Collected On: 26/Aug/2017 9:20AM
Reported On: 26/Aug/2017 11:40AM
Printed On: 26/Aug/2017 11:58AM

Investigation	Results	Units	Biological Ref. Interval
BIOCHEMISTRY			
Tissue Transglutamine IgA,Hg IgA *	2.5	U/ml	

SUGGESTED REFERENCE RANGES

RESULT	REFERENCE RANGES	UNITS
NEGATIVE	< 20.0	IU / mL
POSITIVE	>20.0	IU / mL

COMMENTS

The enzyme tissue transglutaminase is widely distributed in human organs and is found in fibres surrounding smooth muscle and endothelial cells. It has been identified as the major autoantigen in coeliac disease. This disease is lifelong codition in which ingestion of gluten the water ioclubls wheat gliadin and the prolamins in rye and barley lead to chronic inflammation jand damage of the small intestinal mucosa. The disease is multifacted in nature with clinical presentation ranging from gastrointestinal manifestations to asymptomatic, silent and extraintestinal forms.

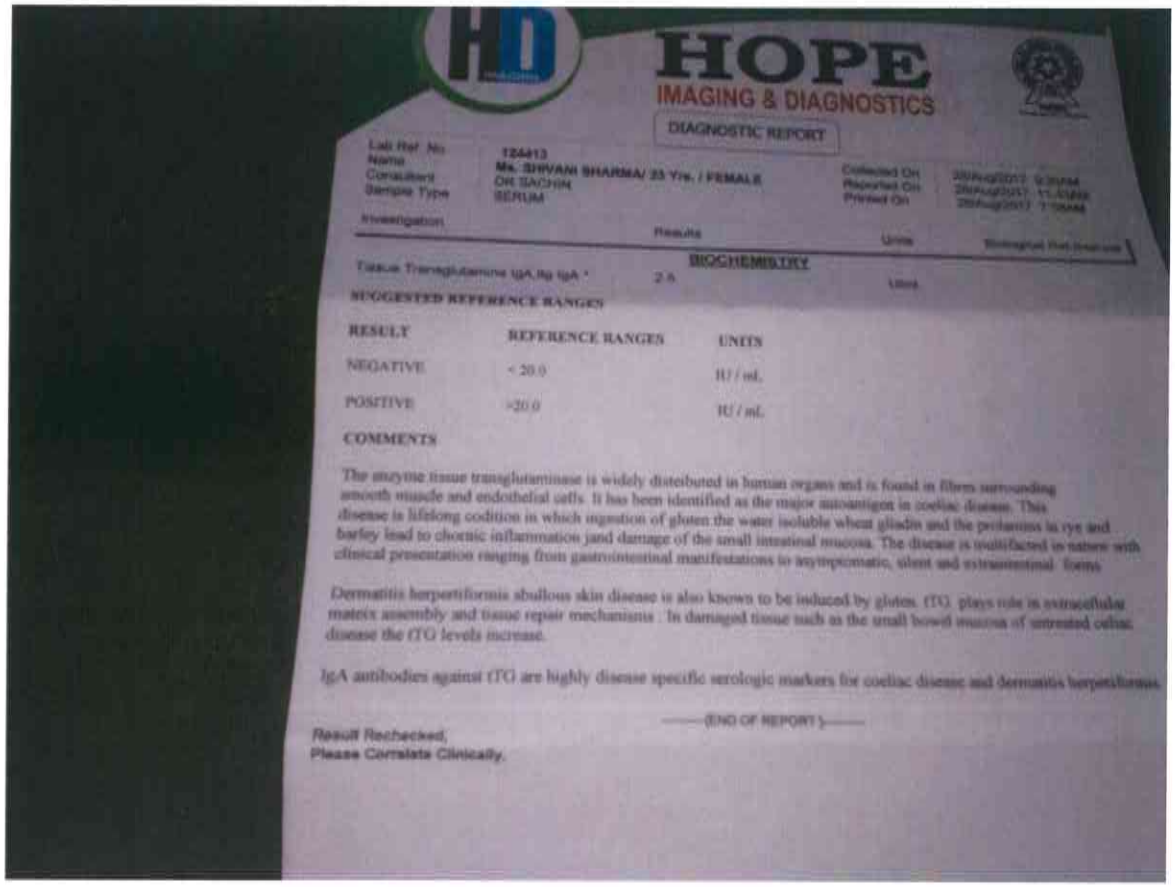
Dermatitis herpetiformis abullous skin disease is also known to be induced by gluten. tTG plays role in extracellular matrix assembly and tissue repair mechanisms . In damaged tissue such as the small bowel mucosa of untreated celiac disease the tTG levels increase.

IgA antibodies against tTG are highly disease specific serologic markers for coeliac disease and dermatitis herpetiformis.

——(END OF REPORT)——

Result Rechecked.
Please Correlate Clinically.

University of ★ Haridwar



HOPE
IMAGING & DIAGNOSTICS

DIAGNOSTIC REPORT

Lab Ref. No: 124413
Name: Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant: DR.SACHIN
Sample Type: SERUM
Collected On: 28/Aug/2017 9:30AM
Reported On: 28/Aug/2017 11:43AM
Printed On: 28/Aug/2017 1:09PM

Investigation	Results	Units	Biological Ref. Interval
BIOCHEMISTRY			
Tissue Transglutamine IgA,Ig IgA *	2.5	U/ml	

SUGGESTED REFERENCE RANGES

RESULT	REFERENCE RANGES	UNITS
NEGATIVE	< 20.0	IU / mL
POSITIVE	>20.0	IU / mL

COMMENTS

The enzyme tissue transglutaminase is widely distributed in human organs and is found in fibers surrounding smooth muscle and endothelial cells. It has been identified as the major autoantigen in coeliac disease. This disease is lifelong codition in which ingestion of gluten the water insoluble wheat gliadin and the prolamins in rye and barley lead to chronic inflammation jand damage of the small intestinal mucosa. The disease is multifacted in nature with clinical presentation ranging from gastrointestinal manifestations to asymptomatic, silent and extraintestinal forms.

Dermatitis herpetiformis abullous skin disease is also known to be induced by gluten. tTG plays role in extracellular matrix assembly and tissue repair mechanisms . In damaged tissue such as the small bowel mucosa of untreated celiac disease the tTG levels increase.

IgA antibodies against tTG are highly disease specific serologic markers for coeliac disease and dermatitis herpetiformis.

(END OF REPORT)

Result Rechecked,
Please Correlate Clinically.

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@rediffmail.com Web : www.divyayoga.com

Sample No.: 1393
Patient ID: 14608817363
Name: Mrs.SHIVANI SHARMA

Dr.: SACHIN TYAGI
Age: 24

Date: 08/04/2017
Sex: Female

CBC

TEST	RESULT	UNIT	NORMAL RANGE
HGB	9.5	[g/dL]	(12.0 - 17.0)
WBC	3.11	[10^3/uL]	(4,000 - 11,000)
DIFFRENTIAL LEUKOCYTE COUNT(DLC)			
NEUT	50.2	[%]	(40 - 80)
LYMPH	37.9	[%]	(20 - 40)
MONO	7.4	[%]	(2.0 - 10.0)
EO	4.2	[%]	(1.0 - 6.0)
BASO	0.3	[%]	(0.0 - 2.0)
RBC	4.52	[10^6/uL]	(3.80 - 5.50)
HCT	33.3	[%]	(36.0 - 50.0)
MCV	73.7	[fL]	(83.0 - 110.0)
MCH	21.0	[pg]	(33.0 - 37.0)
MCHC	28.5	[g/dL]	(31.0 - 37.0)
PLT	220	[10^3/uL]	(150 - 400)

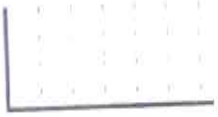
RBC



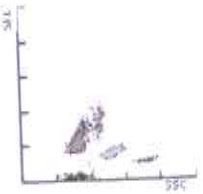
PLT



WBC



DIFF



WBC IP Message(s)
Leukocytopenia

RBC IP Message(s)
Hypochromia

Iron Deficiency?

PLT IP Message(s)

Technologist

Pathologist

Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Hematology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
- XL 600 & XL 300 - Fully Automated Biochemistry Analyser.
- BIORAD D-IO Fully Automated device for Glycosylated Hemoglobin.
- EASYLYTE -Ion selective Electrolyte Analyser.

Not for Medico Legal Purpose

University of Patanjali * Haridwar *

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India

Phone: 01334 - 240008, 248888, 248999, 245737 Fax: 01334 - 244805, 240664 E-mail : divyayoga@rediffmail.com Web. : www.divyayoga.com

Sample No.: 1393 Dr.: SACHIN TYAGI Date: 08/04/2017

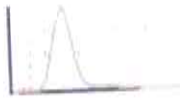
Patient ID: 14608817363 Age: 24 Sex: Female

Name: Mrs.SHIVANI SHARMA

CBC

TEST	RESULT	UNIT	NORMAL RANGE
HGB	9.5	[g/dL]	(12.0 - 17.0)
WBC	3.11	[10^3/uL]	(4,000 - 11,000)
DIFFRENTIAL LEUKOCYTE COUNT(DLC)			
NEUT	50.2	[%]	(40 - 80)
LYMPH	37.9	[%]	(20 - 40)
MONO	7.4	[%]	(2.0 - 10.0)
EO	4.2	[%]	(1.0 - 6.0)
BASO	0.3	[%]	(0.0 - 2.0)
RBC	4.52	[10^6/uL]	(3.80 - 5.50)
HCT	33.3	[%]	(36.0 - 50.0)
MCV	73.7	[fL]	(83.0 - 110.0)
MCH	21.0	[pg]	(33.0 - 37.0)
MCHC	28.5	[g/dL]	(31.0 - 37.0)
PLT	220	[10^3/uL]	(150 - 400)

RBC



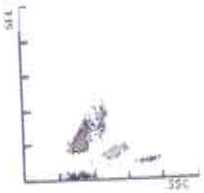
PLT



WBC



DIFF



WBC IP Message(s)
Leukocytopenia

RBC IP Message(s)
Hypochromia

Iron Deficiency?

PLT IP Message(s)

Technologist

Pathologist

Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
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Not for Medico Legal Purpose

University of Patanjali Haridwar

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Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@divyayoga.com Web: www.divyayoga.com

Reg. No.: 1142/14608817363

Name of Patient: Mr./Mrs./Ms.: SHIVANI SHARMA

Age/Sex: 24Yrs/F

Dated: 02/04/2017

Address:

Referred by: Dr. SACHIN TYAGI

PARAMETER	RESULT	NORMAL RANGE
E.S.R. :- (Westergreen Method)	06	Male (0 – 15 mm) Female (0 – 20 mm)

BLOOD GROUP:-

ABO "A"
Rh Factor Positive

Technologist **Pathologist**

: Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
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Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@divyayoga.com Web. : www.divyayoga.com

Reg. No. : 1142/14608817363

Name of Patient (Mr./Mrs./Ms.) : SHIVANI SHARMA

Dated : 02/04/2017

Age/Sex : 24Yrs/F

Address :

Referred by : Dr. SACHIN TYAGI

PARAMETER	RESULT	NORMAL RANGE
E.S.R. :- (Westergreen Method)	06	Male (0 – 15 mm) Female (0 – 20 mm)

BLOOD GROUP:-

ABO "A"
Rh Factor Positive

Technologist **Pathologist**

: Lab Equipped with :

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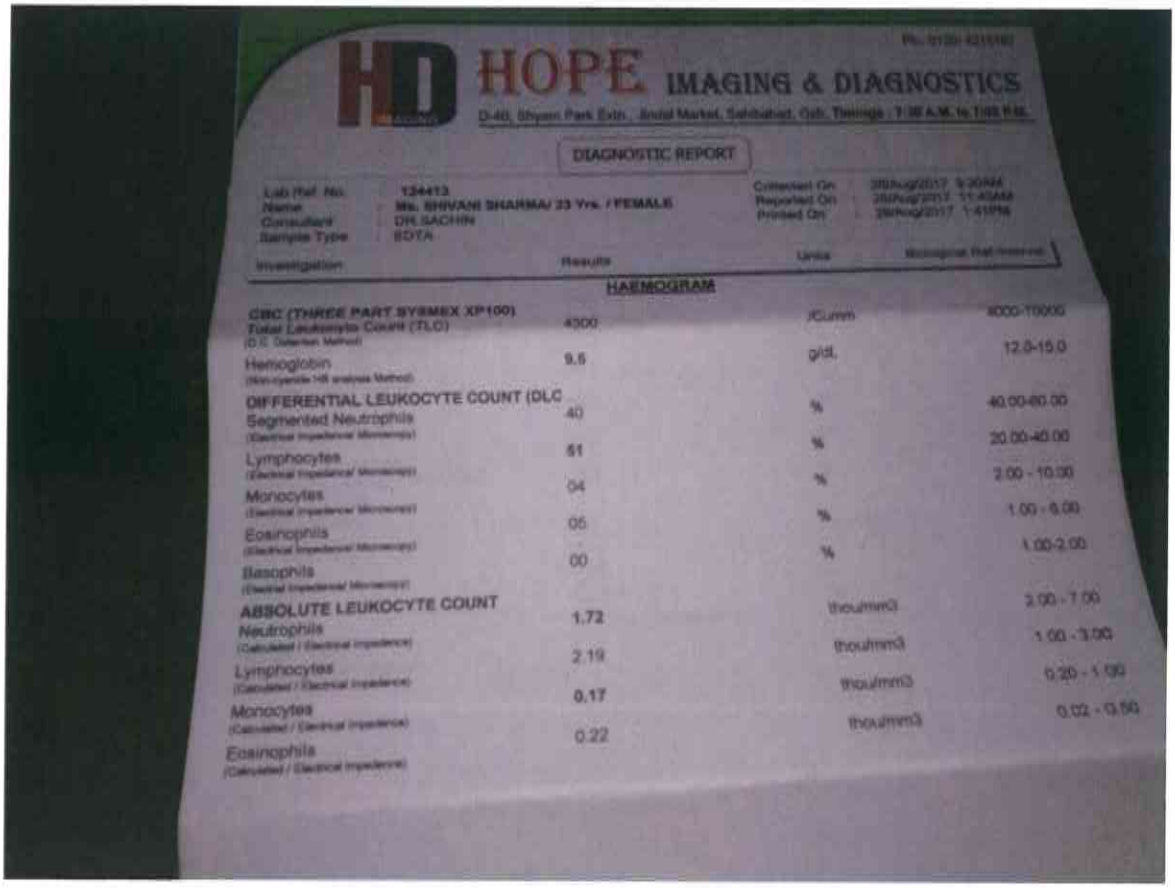
Not for Medico Legal Purpose

University of Patanjali Haridwar



HOPE IMAGING & DIAGNOSTICS

D-40, Shyam Park Extn., Jindal Market, Sahibabad, Gzb. Timings : 7.30 A.M. to 7.00 P.M.

DIAGNOSTIC REPORT

Lab Ref. No. : 134413
Name : Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant : DR.SACHIN
Sample Type : EDTA

Collected On : 28/Aug/2017 9:20AM
Reported On : 28/Aug/2017 11:40AM
Printed On : 28/Aug/2017 1:41PM

Investigation	Results	Units	Biological Ref. Interval
HAEMOGRAM			
CBC (THREE PART SYSMEX XP100)			
Total Leukocyte Count (TLC) (D.C. Detection Method)	4300	/Cumm	4000-11000
Hemoglobin (Sodium Lauryl Sulphate Method)	9.5	g/dL	12.0-15.0
DIFFERENTIAL LEUKOCYTE COUNT (DLC			
Segmented Neutrophils (Electrical Impedance/ Microscopy)	40	%	40.00-80.00
Lymphocytes (Electrical Impedance/ Microscopy)	51	%	20.00-40.00
Monocytes (Electrical Impedance/ Microscopy)	04	%	2.00 - 10.00
Eosinophils (Electrical Impedance/ Microscopy)	05	%	1.00 - 6.00
Basophils (Electrical Impedance/ Microscopy)	00	%	1.00-2.00
ABSOLUTE LEUKOCYTE COUNT			
Neutrophils (Calculated / Electrical Impedance)	1.72	thou/mm3	2.00 - 7.00
Lymphocytes (Calculated / Electrical Impedance)	2.19	thou/mm3	1.00 - 3.00
Monocytes (Calculated / Electrical Impedance)	0.17	thou/mm3	0.20 - 1.00
Eosinophils (Calculated / Electrical Impedance)	0.22	thou/mm3	0.02 - 0.50

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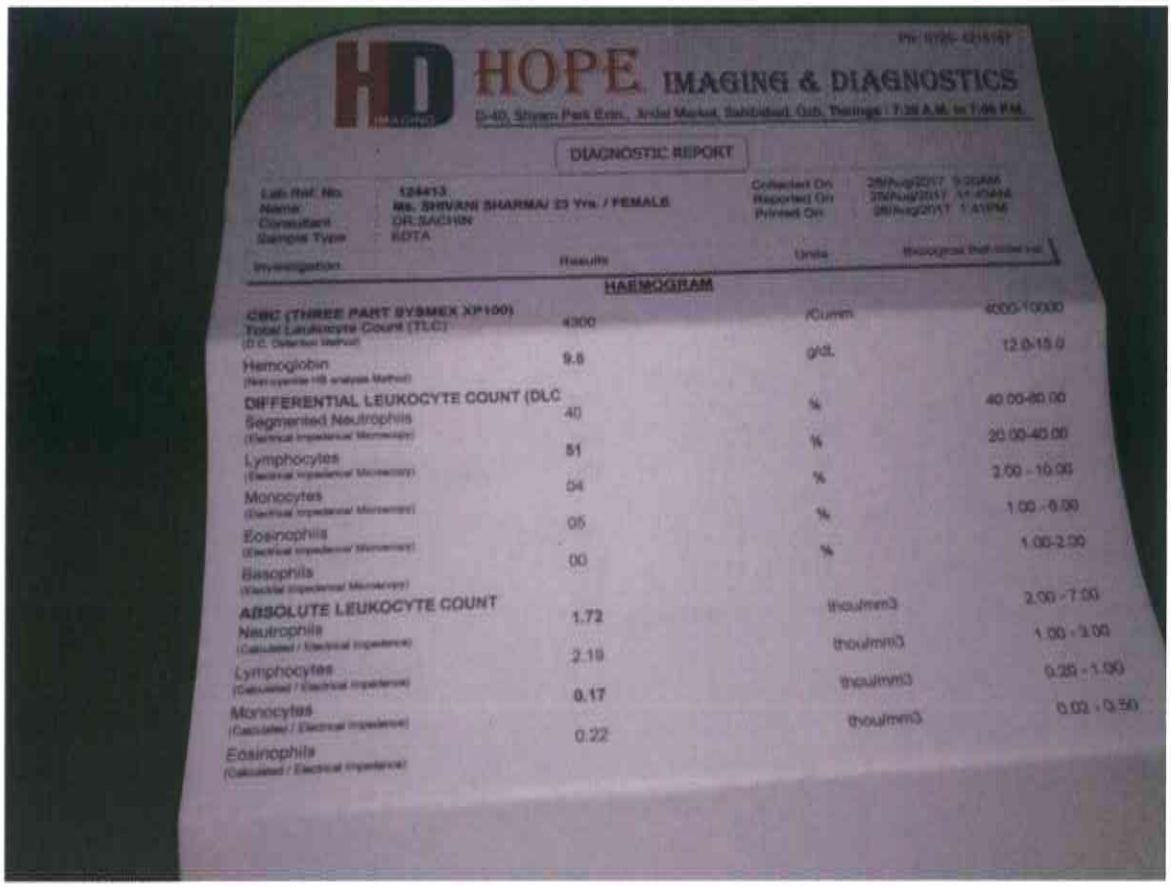

HOPE IMAGING & DIAGNOSTICS

D-40, Shyam Park Extn., Ardel Market, Sahibabad, Gzb, Timings : 7.30 A.M. to 7.00 P.M.

DIAGNOSTIC REPORT

Lab Ref. No. 124413
Name Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant DR.SACHIN
Sample Type EDTA

Collected On 28/Aug/2017 9:20AM
Reported On 28/Aug/2017 11:40AM
Printed On 28/Aug/2017 1:41PM

Investigation	Results	Units	Biological Ref. Interval
HAEMOGRAM			
CBC (THREE PART SYSMEX XP100)			
Total Leukocyte Count (TLC) (D.C. Detector Method)	4300	/Cumm	4000-10000
Hemoglobin (Non-cyanide HB analysis Method)	9.8	g/dL	12.0-15.0
DIFFERENTIAL LEUKOCYTE COUNT (DLC			
Segmented Neutrophils (Electrical Impedance/ Microscopy)	40	%	40.00-80.00
Lymphocytes (Electrical Impedance/ Microscopy)	51	%	20.00-40.00
Monocytes (Electrical Impedance/ Microscopy)	04	%	2.00 - 10.00
Eosinophils (Electrical Impedance/ Microscopy)	05	%	1.00 - 6.00
Basophils (Electrical Impedance/ Microscopy)	00	%	1.00-2.00
ABSOLUTE LEUKOCYTE COUNT			
Neutrophils (Calculated / Electrical Impedance)	1.72	thou/mm3	2.00 - 7.00
Lymphocytes (Calculated / Electrical Impedance)	2.19	thou/mm3	1.00 - 3.00
Monocytes (Calculated / Electrical Impedance)	0.17	thou/mm3	0.20 - 1.00
Eosinophils (Calculated / Electrical Impedance)	0.22	thou/mm3	0.02 - 0.50

University of Patanjali * Haridwar *

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@rediffmail.com Web. : www.divyayoga.com

RR197/14608817363

Name of Patient : Mr./Mrs./Ms. : SHIVANI SHARMA

Dated : 11/08/2017

Address :

Age/Sex : 24Yer/F

Referred by : Dr. SACHIN TYAGI

PARAMETER	RESULT	NORMAL RANGE
Haemoglobin :-	9.3	(12.0 – 17.0 gm/dl)

Technologist

Pathologist

: Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
- XL 600 & XL 300 - Fully Automated Biochemistry Analyser.
- BIORAD D-IO Fully Automated device for Glycosylated Hemoglobin.
- EASY LYTE -Ion selective Electrolyte Analyser.

University of Patanjali Haridwar

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Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail : divyayoga@rediffmail.com Web : www.divyayoga.com

Reg. No. 6187/14608817363

Name of Patient : Mr./Mrs./Ms. : SHIVANI SHARMA

Dated : 11/08/2017

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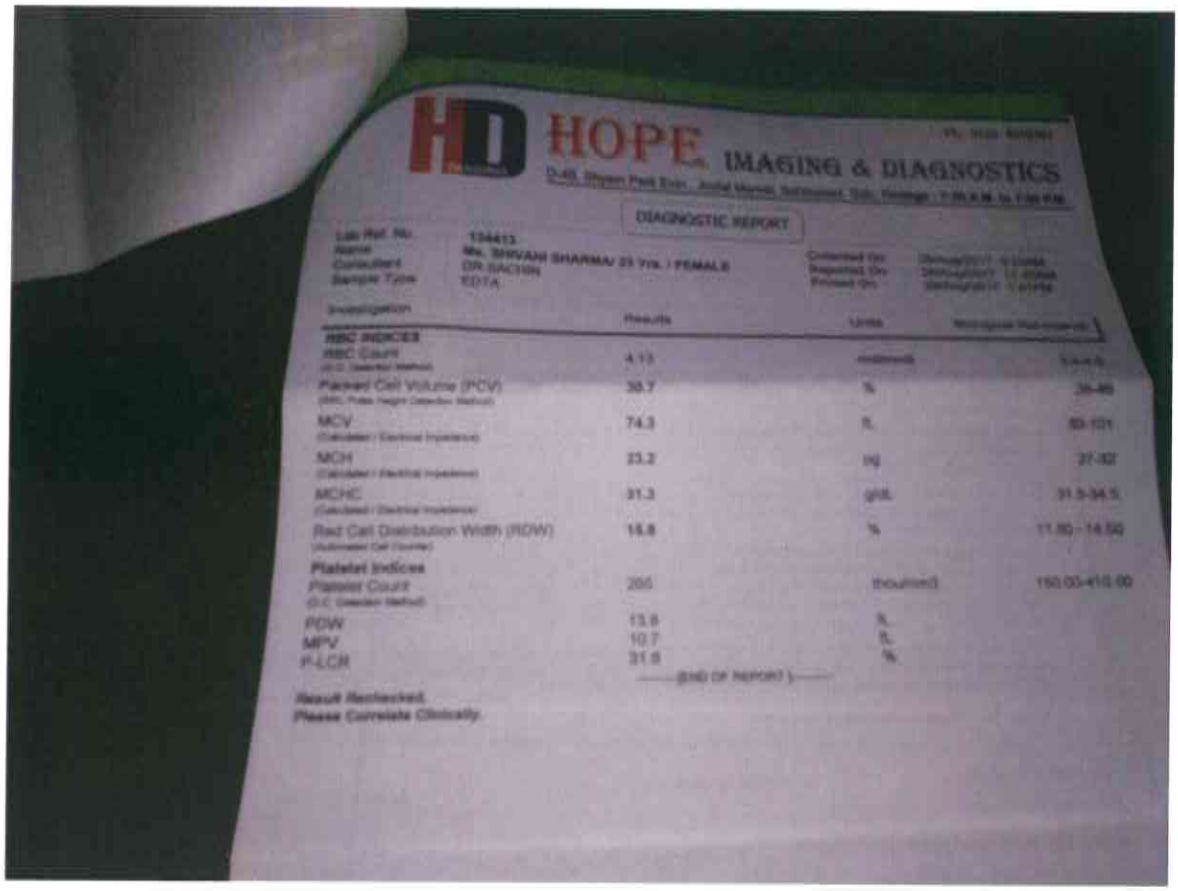


HOPE IMAGING & DIAGNOSTICS

DIAGNOSTIC REPORT

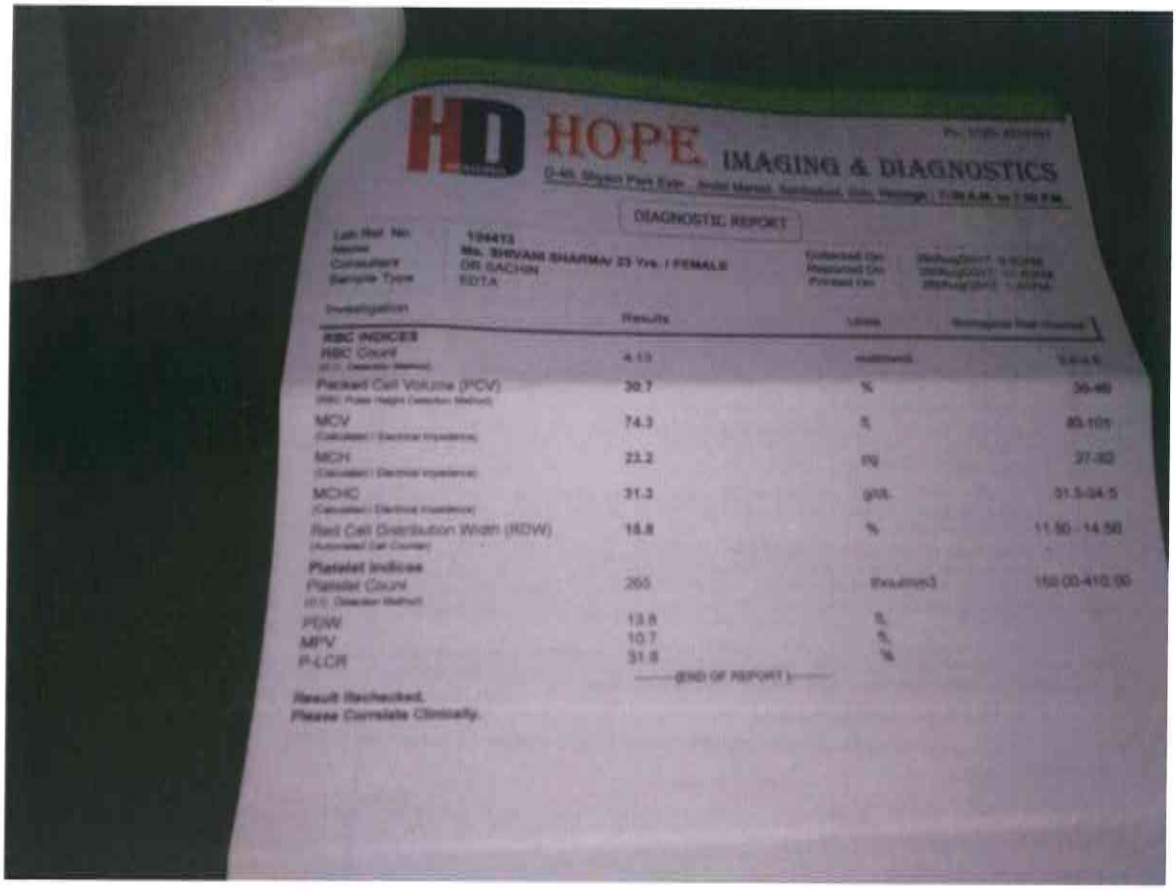
Lab Ref. No: 134413
Name: Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant: DR SACHIN
Sample Type: EDTA

Investigation	Results	Units	Biological Ref. Interval
RBC INDICES			
RBC Count	4.13	millions/c	3.8-4.8
Packed Cell Volume (PCV)	30.7	%	36-46
MCV	74.3	fL	83-101
MCH	23.2	pg	27-32
MCHC	31.3	g/dL	31.5-34.5
Red Cell Distribution Width (RDW)	16.8	%	11.60 - 14.60
Platelet Indices			
Platelet Count	205	thousand/c	150.00-410.00
PDW	13.8	fL	
MPV	10.7	fL	
P-LCR	31.8	%	

(END OF REPORT)

Result Rechecked.
Please Correlate Clinically.

University of Patanjali Haridwar



HOPE IMAGING & DIAGNOSTICS

DIAGNOSTIC REPORT

Lab Ref. No: 104413
Name: Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant: DR SACHIN
Sample Type: EDTA

Investigation	Results	Units	Biological Ref. Interval
RBC INDICES			
RBC Count	4.13	million/cmm	3.8-4.8
Packed Cell Volume (PCV)	30.7	%	36-46
MCV	74.3	fL	83-101
MCH	23.2	pg	27-32
MCHC	31.3	g/dL	31.5-34.5
Red Cell Distribution Width (RDW)	15.8	%	11.50 - 14.50
Platelet Indices			
Platelet Count	265	thousand/cmm	150.00-410.00
PDW	13.8	fL	
MPV	10.7	fL	
P-LCR	31.8	%	

(END OF REPORT)

Result Rechecked.
Please Correlate Clinically.

University of Patanjali Haridwar

(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)

Patanjali Ayurved Hospital, Haridwar

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 23886-2017 HIN (एच0आई0एन0): 14608817363

Full Name (पूरा नाम): शिवानी शर्मा Age & Gender (आयु एवं लिंग):

Full Address, E-mail & Mobile No. (पूरा पता एवं मोबाईल नं0): 9711344404

११ राज बाग कालोनी साहिबाबाद गाजियाबाद उ० प्र०

Occupation (व्यवसाय): शिक्षा Marital Status (वैवाहिक स्थिति) अनमेरिड

Disease (रोग): बीट एलर्जी

Duration of Disease (रोग की अवधि): बारह वर्ष

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): है

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 12 Y

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) मुझे यहाँ पर अकार अच्छा लगा है। जिस काम से मैं यहा पर आई थी। मेरा वो काम हो गया है। सब लोगो को मेरा धन्यावाद

Percentage (प्रतिशत): 90%

Dated (दिनाँक): 10/4/2017

Shivani Sharma

Signature (हस्ताक्षर)

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(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)

Patanjali Ayurved Hospital, Haridwar

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 23886-2017 HIN (एच0आई0एन0): 14608817363

Full Name (पूरा नाम): शेवानी शर्मा Age & Gender (आयु एवं लिंग): 23

Full Address, E-mail & Mobile No. (पूरा पता एवं मोबाईल नं0): 9711344404
99 Raj Bagh colony Sahibabad

9 7 1 1 3 4 4 4 0 4

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति)

Disease (रोग): wheat

Duration of Disease (रोग की अवधि): 6 वर्ष

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): हाँ

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 4 महीने

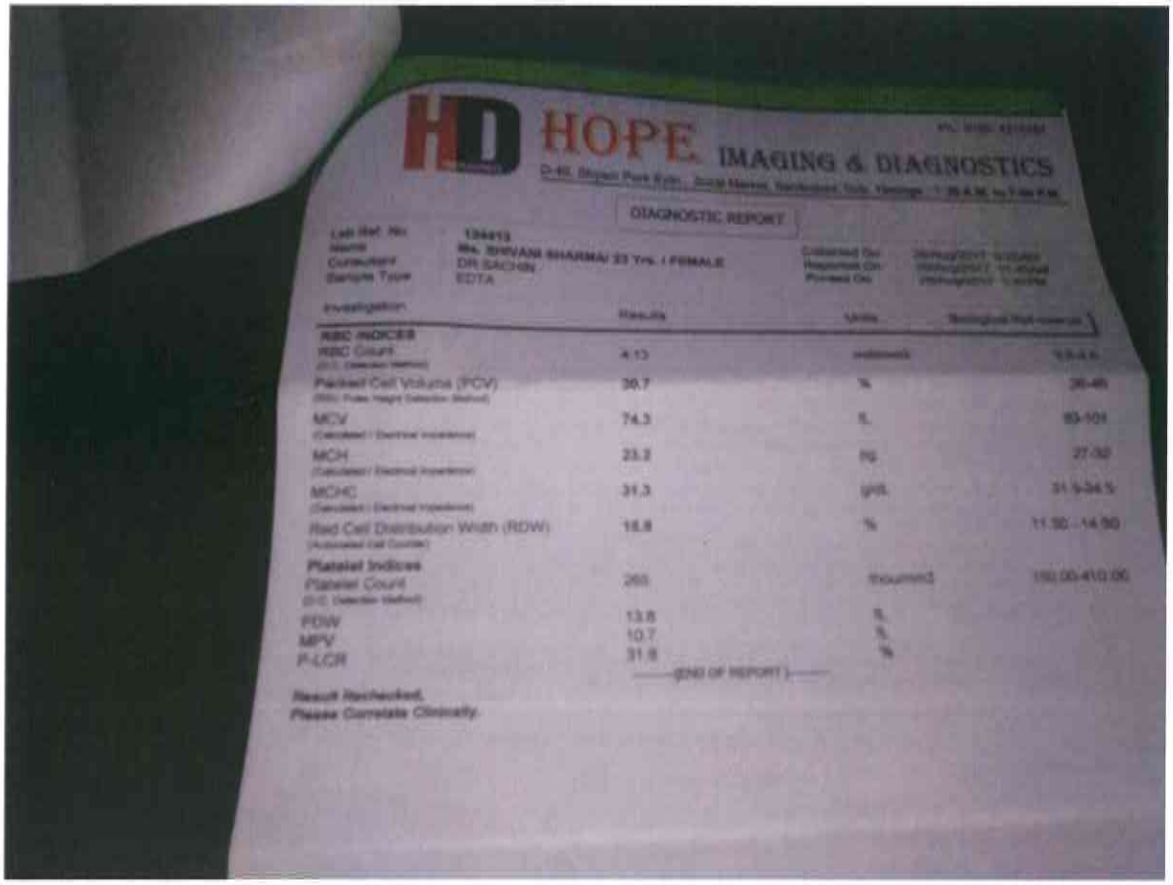
Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ) यहा आकार मेरी तबियत ठीक हो गई है। और मुझे यहा पर खाना खाने को नही देते है।

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 11/8/17

Signature (हस्ताक्षर) Shivani Sharma

University of Patanjali Haridwar



HOPE IMAGING & DIAGNOSTICS

DIAGNOSTIC REPORT

Lab Ref. No: 134613
Name: Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant: DR SACHIN
Sample Type: EDTA

Investigation	Results	Units	Biological Reference
RBC INDICES			
RBC Count (D.C. Detection Method)	4.13	millions	[illegible]
Packed Cell Volume (PCV) (RBC Pulse Height Detection Method)	30.7	%	36-46
MCV (Calculated / Electrical Impedance)	74.3	fL	83-101
MCH (Calculated / Electrical Impedance)	23.2	pg	27-32
MCHC (Calculated / Electrical Impedance)	31.3	g/dL	31.5-34.5
Red Cell Distribution Width (RDW) (Automated Cell Counter)	16.8	%	11.50 - 14.50
Platelet Indices			
Platelet Count (D.C. Detection Method)	265	thousand	150.00-410.00
PDW	13.8	fL	
MPV	10.7	fL	
P-LCR	31.8	%	

(END OF REPORT)

Result Rechecked.
Please Correlate Clinically.

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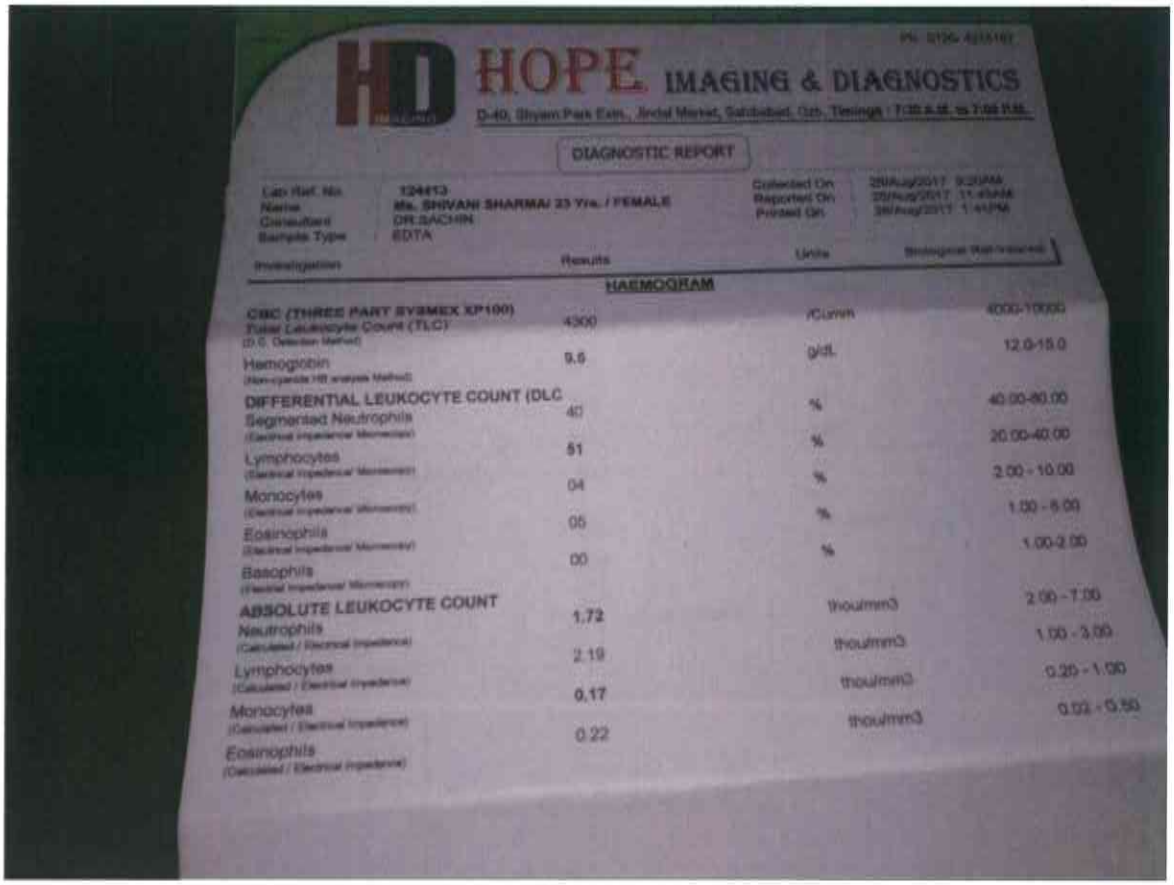

HOPE IMAGING & DIAGNOSTICS

D-40, Shyam Park Extn., Jindal Market, Sahibabad, Opp. Tiranga | 7:00 a.m. to 7:00 P.M.

DIAGNOSTIC REPORT

Lab Ref. No.	124413	Collected On	25/Aug/2017 9:20AM
Name	Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE	Reported On	25/Aug/2017 11:45AM
Consultant	DR.SACHIN	Printed On	28/Aug/2017 1:41PM
Sample Type	EDTA		

Investigation	Results	Units	Biological Reference
HAEMOGRAM			
CBC (THREE PART SYSMEX XP100)			
Total Leukocyte Count (TLC) (D.C. Detection Method)	4300	/Cumm	4000-10000
Hemoglobin (Non-cyanide HB analysis Method)	9.6	g/dL	12.0-15.0
DIFFERENTIAL LEUKOCYTE COUNT (DLC			
Segmented Neutrophils (Electrical impedance/ Microscopy)	40	%	40.00-80.00
Lymphocytes (Electrical impedance/ Microscopy)	51	%	20.00-40.00
Monocytes (Electrical impedance/ Microscopy)	04	%	2.00 - 10.00
Eosinophils (Electrical impedance/ Microscopy)	05	%	1.00 - 6.00
Basophils (Electrical impedance/ Microscopy)	00	%	1.00-2.00
ABSOLUTE LEUKOCYTE COUNT			
Neutrophils (Calculated / Electrical impedance)	1.72	thou/mm3	2.00 - 7.00
Lymphocytes (Calculated / Electrical impedance)	2.19	thou/mm3	1.00 - 3.00
Monocytes (Calculated / Electrical impedance)	0.17	thou/mm3	0.20 - 1.00
Eosinophils (Calculated / Electrical impedance)	0.22	thou/mm3	0.02 - 0.50

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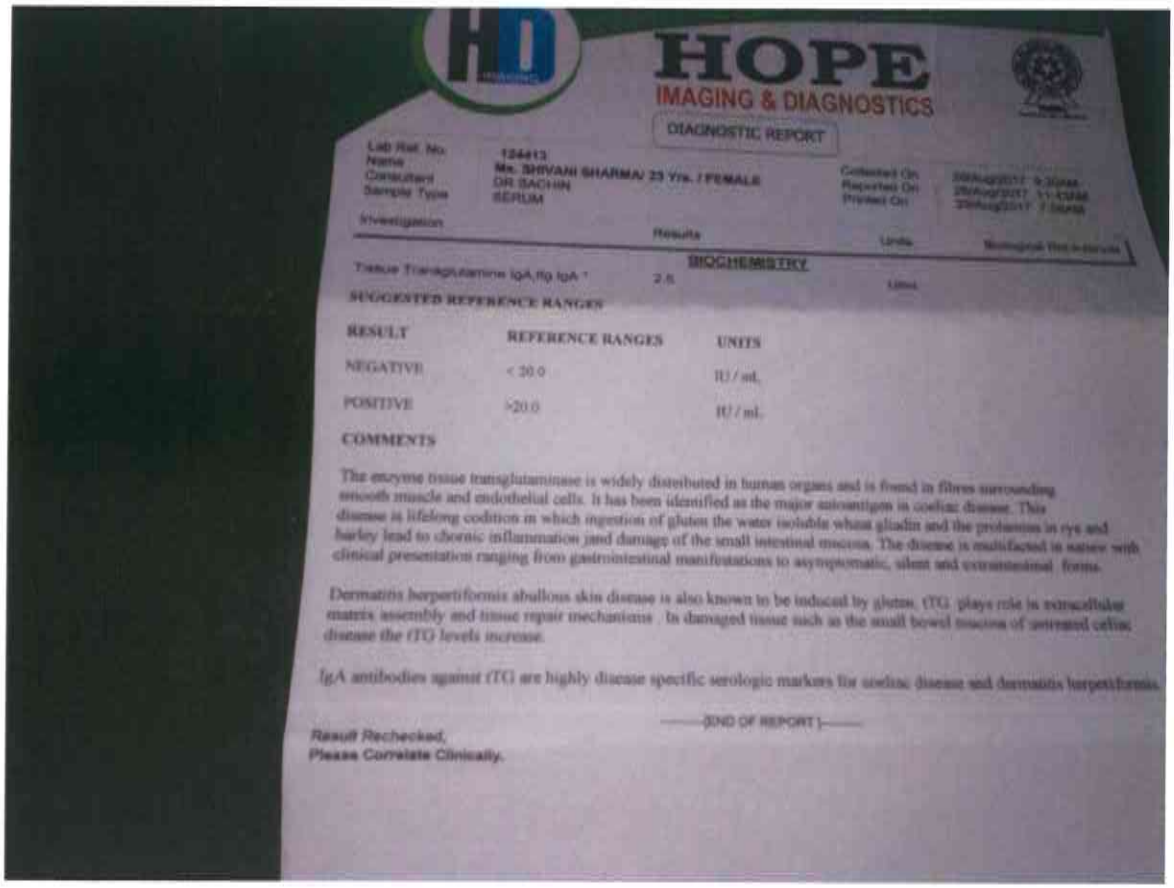


HOPE
IMAGING & DIAGNOSTICS

DIAGNOSTIC REPORT

Lab Ref. No. 124413
Name Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant DR SACHIN
Sample Type SERUM

Collected On 28/Aug/2017 9:30AM
Reported On 28/Aug/2017 11:43AM
Printed On 28/Aug/2017 1:58PM

Investigation	Results	Units	Biological Ref. Interval
BIOCHEMISTRY			
Tissue Transglutamine IgA,Rg IgA *	2.6	U/mL	

SUGGESTED REFERENCE RANGES

RESULT	REFERENCE RANGES	UNITS
NEGATIVE	< 20.0	IU / mL
POSITIVE	>20.0	IU / mL

COMMENTS

The enzyme tissue transglutaminase is widely distributed in human organs and is found in fibres surrounding smooth muscle and endothelial cells. It has been identified as the major autoantigen in coeliac disease. This disease is lifelong codition in which ingestion of gluten the water isoluble wheat gliadin and the prolamins in rye and barley lead to chronic inflammation and damage of the small intestinal mucosa. The disease is multifacted in nature with clinical presentation ranging from gastrointestinal manifestations to asymptomatic, silent and extraintestinal forms.

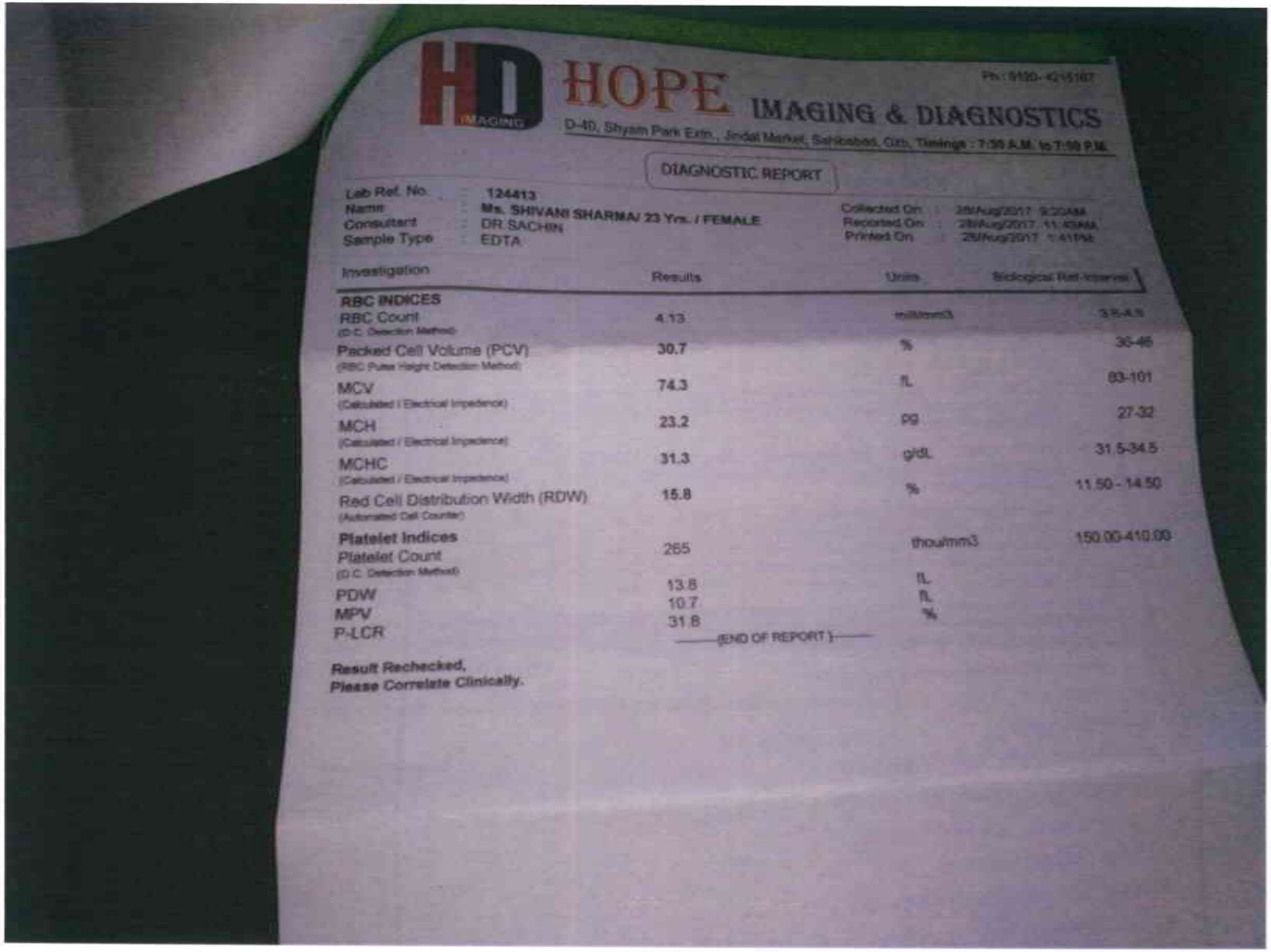
Dermatitis herpetiformis abullous skin disease is also known to be induced by gluten. tTG plays role in extracellular matrix assembly and tissue repair mechanisms . In damaged tissue such as the small bowel mucosa of untreated coeliac disease the tTG levels increase.

IgA antibodies against tTG are highly disease specific serologic markers for coeliac disease and dermatitis herpetiformis.

----------(END OF REPORT)----------

Result Rechecked,
Please Correlate Clinically.

University of Patanjali
Haridwar



HD IMAGING

HOPE IMAGING & DIAGNOSTICS

Ph : 9130- 4215187

D-40, Shyam Park Extn., Jindal Market, Sahibabad, Gzb. Timings : 7:30 A.M. to 7:00 P.M.

DIAGNOSTIC REPORT

Lab Ref. No. : 124413
Name : Ms. SHIVANI SHARMA/ 23 Yrs. / FEMALE
Consultant : DR SACHIN
Sample Type : EDTA

Collected On : 28/Aug/2017 9:20AM
Reported On : 28/Aug/2017 11:40AM
Printed On : 28/Aug/2017 1:41PM

Investigation	Results	Units	Biological Ref. Interval
RBC INDICES			
RBC Count (D.C. Detection Method)	4.13	million/cmm	3.8-4.8
Packed Cell Volume (PCV) (RBC Pulse Height Detection Method)	30.7	%	36-46
MCV (Calculated / Electrical Impedence)	74.3	fL	83-101
MCH (Calculated / Electrical Impedence)	23.2	pg	27-32
MCHC (Calculated / Electrical Impedence)	31.3	g/dL	31.5-34.5
Red Cell Distribution Width (RDW) (Automated Cell Counter)	15.8	%	11.50 - 14.50
Platelet Indices			
Platelet Count (D.C. Detection Method)	265	thou/mm3	150.00-410.00
PDW	13.8	fL	
MPV	10.7	fL	
P-LCR	31.8	%	

(END OF REPORT)

Result Rechecked,
Please Correlate Clinically.

University of Patanjali Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240006, 248888, 248999, 246737 Fax: 01334 - 244805, 240064 E-mail : divyayoga@rediffmail.com Web : www.divyayoga.com

RG187/14608817363

Name of Patient : Mr./Mrs./Ms. : SHIVANI SHARMA

Dated : 11/08/2017

Address : Dr. SACHIN TYAGI

Age/Sex : 24Yer/F

Referred by :

PARAMETER	RESULT	NORMAL RANGE
Haemoglobin :-	9.3	(12.0 – 17.0 gm/dl)

Technologist

Pathologist

: Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
- XL 600 & XL 300 - Fully Automated Biochemistry Analyser.
- BIORAD D-IO Fully Automated device for Glycosylated Hemoglobin.
- EASYLYTE -Ion selective Electrolyte Analyser.

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योग संदेश में प्रकाशन हेतु

चिकित्सक का नाम- डॉ० सचिन त्यागी

रोगी का नाम- शिवानी शर्मा आयु: 23 लिंग: महिला

रोगी का पता- 99 राज बाग कालोनी साहिबाबाद गाजियाबाद उत्तर प्रदेश

रोगी के लक्षण- बीट एलर्जी

रोग के लक्षण- गेहूँ की कोई भी चीज न खाना पाना उल्टी चिड़चिड़ा, पन, गुस्सा, आलस्य, नींद न आना

उपचार अवधि- 7... दिन /माह दि0..5/8/17 से दि0..11/8/17 तक

रोगी द्वारा सेवन औषधियां: कोई औषधि नहीं

षट्कर्म चिकित्सा
1. शंखप्रक्षालन
2. कुञ्जरक्रिया
3. जलनेति क्रिया
4. सूत्रनेति क्रिया
5. वाष्प
6. त्राटक
7. योगनिद्रा
8. एक्यूप्रेशर

University of Patanjali ★ Haridwar ★

रोगी की पूर्व परीक्षण रिपोर्ट्स- पिछली रिपोर्ट्स Attached

नई रिपोर्ट्स Attached

रोग में सुधार प्रतिशत- 100 %

रोगी का उपचार सम्बन्धी कथन- मुझे बीट एलर्जी 15 वर्षों से थी और मैंने इसका उपचार कई संस्थानों में कराया परन्तु सभी डॉक्टर यह कहते थे कि यह ठीक नहीं हो सकता तुम्हें कभी गेहूँ या गेहूँ से बनी कोई भी चीज नहीं लेनी है। पर मैं बहुत परेशान थी कि यह समस्या मेरी कब ठीक होगी होगी भी या नहीं परन्तु किसी परिचित ने मुझे यह कहा कि आप एक बार पतंजलि योगपीठ के षट्कर्म विभाग में जाओ उसके कुछ दिनों बाद मैं यहाँ पर आकार षट्कर्म विभाग में डॉ० सरिन त्यागी जी के मिली जिन्होंने मुझे पूरी तरह हॉयलाडिया की तुम ठीक हो जाओगी और मैंने षट्कर्म की चिकित्सा पूरे 7 दिन की जिससे मैं पूरी तरह स्वस्थ हूँ और अब गेहूँ की चीज भी खा पा रही हूँ मेरी और भी बिमारियाँ ठीक हुई

चिकित्सक का अनुभव- जैसे गुस्सा, पिड़कपड़ा पन, नींद आलस्य यह सभी समस्या दूर होगयी मैं पतंजलि योगपीठ, डॉ० सरिन त्यागी जी व षट्कर्म कृतार्थ का धन्यवाद करती हूँ। धन्यवाद

when Patient Came in Patanjali yogpeeth. She Does Not able to eat wheat, She Does Having Clear Disease, Through yoy and Sleeper treatment She is Fine now and eating Everything.

दि० 11/09/18

चिकित्सक के हस्ताक्षर

Shirani Sharma

रोगी के हस्ताक्षर

University of Patanjali Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India

Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail : divyayoga@rediffmail.com Web : www.divyayoga.com

Sample No.: 1393 Dr.: SACHIN TYAGI Date: 08/04/2017

Patient ID: 14608817363 Age: 24 Sex: Female

Name: Mrs.SHIVANI SHARMA

CBC

TEST	RESULT	UNIT	NORMAL RANGE
HGB	9.5	[g/dL]	(12.0 - 17.0)
WBC	3.11	[10^3/uL]	(4,000 - 11,000)
DIFFRENTIAL LEUKOCYTE COUNT(DLC)			
NEUT	50.2	[%]	(40 - 80)
LYMPH	37.9	[%]	(20 - 40)
MONO	7.4	[%]	(2.0 - 10.0)
EO	4.2	[%]	(1.0 - 6.0)
BASO	0.3	[%]	(0.0 - 2.0)
RBC	4.52	[10^6/uL]	(3.80 - 5.50)
HCT	33.3	[%]	(36.0 - 50.0)
MCV	73.7	[fL]	(83.0 - 110.0)
MCH	21.0	[pg]	(33.0 - 37.0)
MCHC	28.5	[g/dL]	(31.0 - 37.0)
PLT	220	[10^3/uL]	(150 - 400)

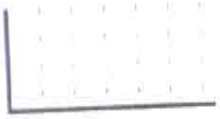
RBC



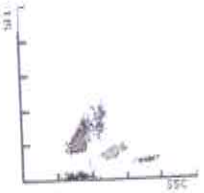
PLT



WBC



DIFF



WBC IP Message(s)
Leukocytopenia

RBC IP Message(s)
Hypochromia

Iron Deficiency?

PLT IP Message(s)

Technologist

Pathologist

Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
- XL 600 & XL 300 - Fully Automated Biochemistry Analyser.
- BIORAD D-IO Fully Automated device for Glycosylated Hemoglobin.
- EASYLYTE -Ion selective Electrolyte Analyser.

Not for Medico Legal Purpose

University of Patanjali Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@divyayoga.com Web : www.divyayogt.com

Reg. No. : 1142/14608817363

Name of Patient : Mr./Mrs./Ms. : SHIVANI SHARMA

Age/Sex : 24Yrs/F

Dated : 02/04/2017

Address :

Referred by : Dr. SACHIN TYAGI

PARAMETER	RESULT	NORMAL RANGE
E.S.R. :- (Westergreen Method)	06	Male (0 – 15 mm) Female (0 – 20 mm)

BLOOD GROUP:-

ABO "A"
Rh Factor Positive

Technologist

Pathologist

: Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
- XL 600 & XL 300 - Fully Automated Biochemistry Analyser.
- BIORAD D-10 Fully Automated device for Glycosylated Hemoglobin.
- EASYLYTE -Ion selective Electrolyte Analyser.

Not for Medico Legal Purpose

University of Patanjali Haridwar

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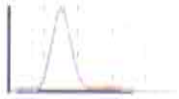
Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail : divyayoga@rediffmail.com Web. www.divyayoga.com

Sample No.: 1142 Dr.: SACHIN TYAGI Date: 02/04/2017
Patient ID: 14608617363 Age: 24 Sex: Female
Name: Mrs.SHIVANI SHARMA

CBC

TEST	RESULT	UNIT	NORMAL RANGE
HGB	9.0	[g/dL]	(12.0 - 17.0)
WBC	4.14	[10^3/uL]	(4.000 - 11.000)
DIFFRENTIAL LEUKOCYTE COUNT(DLC)			
NEUT	56.0	[%]	(40 - 80)
LYMPH	30.2	[%]	(20 - 40)
MONO	6.8	[%]	(2.0 - 10.0)
EO	6.5 +	[%]	(1.0 - 6.0)
BASO	0.5	[%]	(0.0 - 2.0)
RBC	4.22	[10^6/uL]	(3.80 - 5.50)
HCT	31.1	[%]	(36.0 - 50.0)
MCV	73.7 -	[fL]	(83.0 - 110.0)
MCH	21.3 -	[pg]	(33.0 - 37.0)
MCHC	28.9 -	[g/dL]	(31.0 - 37.0)
PLT	207	[10^3/uL]	(150 - 400)

RBC



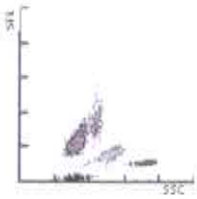
PLT



WBC



DIFF



WBC IP Message(s)
Eosinophilia

RBC IP Message(s)
Hypochromia

Iron Deficiency?

PLT IP Message(s)

Technologist

Pathologist

: Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
- XL 600 & XL 300 - Fully Automated Biochemistry Analyser.
- BIORAD D-10 Fully Automated device for Glycosylated Hemoglobin.
- EASYLYTE -Ion selective Electrolyte Analyser.

Not for Medico Legal Purpose

University of Patanjali * Haridwar *

COMMON COLD DISEASE

(सामान्य जुकाम)

PATIENT NAME : ANJALI SHARAM

University of Patanjali
Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – I , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 30794/19 HIN (एच0आई0एन0): 15582418944

Full Name. (पूरा नाम): Anjali Sharma Age & Gender (आयु एवं लिंग): 17 Female

Full Address. (पूरा पता) Hanuman Vatika Colony Lalrot (Dausa)

E-mail. (ई–मेल) anjalisharma61077@gmail.com

Mobile No. (मोबाईल नं0) 9 4 1 4 8 4 4 6 8 8

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति) No

Disease (रोग): jhukam

Duration of Disease (रोग की अवधि): 3 Year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

योग से शरीर हल्का व शांत रहता है। षट्कर्म से जो रोग है उसमें फायदा है। जैसे जुकाम में मुझे पहले बहुत था लेकिन अब पहले से अच्छी है अब ठीक फिल कर रही है।

Percentage (प्रतिशत): 85%

Dated (दिनांक): 25/5/19 Patient Signature (रोगी हस्ताक्षर) Anjali Sharma

Dr.Signature

University of Patanjali * Haridwar *

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Anjali Sharma, HIN 155824/8944 है। मुझे शुरू में जुकाम की परेशानी रहती थी, जिसके लिए मैंने 2019 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे जुकाम की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे रिश्तेदार के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : जुकाम, एलर्जी, छिंके आना, सिरदर्द आँखों में जलन

मैं 20/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr Sachin को दिखाया।

मरीज़ को दवाइयाँ दी गईं:

विभाग (में दिखाया) : योग एवं प्रकृति

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 25/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 85 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब छिंके नहीं आती और ना ही सिरदर्द होता है और ना ही आँखों में जलन होती है।

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य टीम एवं प्रकृति का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: anjalisharma6107@gmail.com मोबाइल व व्हाट्सप्प नंबर: 8502010481

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 25/5/19

मरीज़ के हस्ताक्षर Anjali Sharma

वैद्य के हस्ताक्षर 25/5/19

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Kumar

रोगी का नाम - Anjali Sharma आयु - 17 लिंग - female

रोगी का पता - Hanuman Vatika Colony Jalsut (Dauli)

रोगी के लक्षण - जुकाम, सिरदर्द, आँखो मे जलन, छिन्ती आना

रोग के लक्षण - नाक का बंद रहना, आँखो से झिलमिल, दिखाई देना सिर दर्द होना,

रोगी की पूर्व परीक्षण रिपोर्ट्स - R.N.R पिछली रिपोर्ट्स / फोटो R.N.R

नई रिपोर्ट्स / फोटो R.N.R

रोग में सुधार प्रतिशत - 85%.

चिकित्सक का अनुभव - Patient got 85%. Result through yog and Sketian treatment.

रोगी का उपचार संबधी कथन - अब छिके नही आती है ना ही सिरदर्द रहता है और ना ही आंखो मे जलन रहती है। मुझे अच्छा महसूस हो रहा है, जुकाम में भी बहुत आराम हुआ है।

दिनांक - 25/5/19

चिकित्सक के हस्ताक्षर 25/5/19

रोगी के हस्ताक्षर Anjali Sharma

University of Patanjali ★ Haridwar ★

निःशुल्क परामर्श

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No: AH-2017-0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रात: 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 5 HIN NO : 15582418944

Prescription No: 1

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 30794-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 19/05/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-716-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANJALI SHARMA आयु Age 17 Year लिंग Sex Female

पता Address DIDWANA LALSOT,DAUSA ,Dausa ,Rajasthan ,India

फोन Landline No. : ..... मो. Mobile No. : 9414844688 ईमेल E-mail : .....

6377170158

Patient Complaint:
C/O Constipation,Cold And Cough,Eye Red Ness,Weakness,

Diagnosis:
Pratishyay / Commom Cold, Vibandha / Constipation

Since - 3yr
BP
Sugar
Thyroid NO

Follow-up Date: 18/06/2019

1	MULETHI KWATH	100	GM	Take 1 tsp of medicine and boil it in 4 cups of water. Boil till it reduces to 1 cup. Strain and take it twice a day an hour before meal. For 30 Days
	SWASARI KWATH	200	GM	

Pranayam / Asanas: ANULOM-VILOM, BHRAMRI, KAPALBHATI, BHASTRIKA, BAHYAPRANAYAAM, UDGITH, UJJAI, MANDHUKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN, MARKATASAN

Remarks: TRATMENT WILL BE START FROM DATE - 20/05/2019 TO 26/05/2019

ACUP POINT- STO,LIV,INT,CALF,COLD AND COUGH, ALLL CHANNLES

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE - 23/05/19 TO 26/5/19	ACUPRESSURE
2	SHATKARMA	JAL NETI	TRIFLA + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	SUTRA NETI	RUBBER NETI
7	SHATKARMA	TRATKA	TRATAKA
8	SHATKARMA	YOG-NIDRA	YOG-NIDRA

23/05 To 26/5

5660 / 4 days
9110 / 3 days

PRO Vinay 59

पतंजलि योगपीठ-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth-1, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 240008, 240080, 240095, 240737 फैक्स Fax : 01334 - 244005, 240064 E-mail : divyayoga@divyayoga.com, patient.care@divyayoga.com Web : www.divyayoga.com

University of Patanjali Haridwar

CONSTIPATIONDISEASE

(कब्ज रोग)

PATIENT NAME : ANJU GUPTA

University of Patanjali Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 40706-2019 HIN (एच0आई0एन0): 15605(R2051

Full Name. (पूरा नाम): Anju Gupta Age & Gender (आयु एवं लिंग): 43 Female

Full Address. (पूरा पता) Momara Gani Ayodhya

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9 6 2 1 1 9 0 7 2 6

Occupation (व्यवसाय): [illegible] Marital Status (वैवाहिक स्थिति) [illegible]

Disease (रोग): [illegible]

Duration of Disease (रोग की अवधि): 10-12 वर्ष

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Aelopethic

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 10 years

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
[illegible]

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 22/6/19 **Patient Signature** (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम [illegible] , HIN [illegible] है। मुझे शुरू में [illegible] की परेशानी रहती थी, जिसके लिए मैंने [illegible] दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे [illegible] की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे [illegible] के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : [illegible]

मैं 14/06/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य [illegible] को दिखाया।

मरीज़ को दवाइयाँ दी गईं: [illegible]

विभाग (में दिखाया) : [illegible]

योग (किया या नहीं): [illegible]

संतुलित आहार (लिया या नहीं): [illegible]

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए [illegible] दिनांक / माह /वर्ष हो गए और आज अब मैं 80% % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: [illegible]

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य [illegible] का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 9629190726

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

22/6/19
दिनांक / माह /वर्ष:

[illegible]
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - डा० सुरेश कुमार त्यागी

रोगी का नाम - [illegible] आयु - 43 वर्ष लिंग - पुरुष

रोगी का पता - [illegible]

~~रोगी के लक्षण~~ रोग - [illegible]

रोग के लक्षण - [illegible]

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR

पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो RNR

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव -

रोगी का उपचार संबंधी कथन - [illegible]

दिनांक -

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_save.

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No. AH-2017-0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 4 HIN NO : 15605682051

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

Prescription No: 1

पंजीकरण संख्या Reg. No. 40706-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 15/06/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-972-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANJU GUPTA आयु Age 43 Year लिंग Sex Female

पता Address MOMARA GANJ ,AYODHYA ,Uttar Pradesh ,India

फोन Landline No. : ..... मो. Mobile No. : 9621190726 ईमेल E-mail : ?

Patient Complaint:
C/O Pain In Abd Vomiting, Swelling In Hand & Leg, Pain In Chest, Pain In Knee, Pain In Back HTN

Diagnosis:
Vibandha / Constipation
High Blood Pressure
Since 12 Yrs

Follow-up Date: 15/07/2019

1	ABHYARISHTA	450	Mix 4 spoon full of Medicine in an equal amount of lukewarm water and take it in the morning and evening after meals.

Pranayam / Asanas: MANDHUKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN, MARKATASAN

Remarks:

TREATMENT WILL BE START FROM - 10-06-2019 TO 22-06-2019

ACU.P-STO,LIV,INT,CALF

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + ~~SALT~~ WATER
5	SHATKARMA	*TRATKA*	TRATAKA
6	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

रक्तचाप B.P. ✓
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar ✗
अन्य Other Thyx
Allo

Mild Salt PRO Vinay Ji

5040 / 4 Days
8040 / 7 Days

Sachin Tyagi 15/6/19

15-Jun-19 10:43 AI

University of Patanjali ★ Haridwar ★

DEPRESSION DISEASE

(मानसिक रोग)

PATIENT NAME : ANKITA CHAUHAN

University of Patanjali ★ Haridwar

Patient: **CHAUHAN, ANKITA**

Age: 32 years Gender: F
Date of Birth: Apr 24 1986
HC #: **1470378280HJ**
Patient's Phone: (847) 525-3505

Ordered by: K ALI DR. TEHMINA
Copy To:

Lab No: **2019-YS0210701**
Reference #:
Patient ID:
Referring Site ID:

Date of Service: Jan 21 2019 13:56
Reported on: Jan 22 2019 12:04

LifeLabs

Address: 150 International Blvd
Toronto, Ontario
Canada M9W 6J6
Telephone: 877 849 3637
Toll Free: 877 849 3637
Fax: 905 796 8861

Test	Flag	Result	Reference Range	Units	Lab Lic. #
Hematology					#5687
WBC		5.9	4.0 - 11.0	x E9/L	
RBC		4.70	4.00 - 5.10	x E12/L	
Hemoglobin		132	120 - 160	g/L	
Hematocrit		0.403	0.350 - 0.450	L/L	
MCV		84	80 - 100	fL	
MCH		27.6	27.5 - 33.0	pg	
MCHC		328	305 - 360	g/L	
RDW		12.4	11.5 - 14.5	%	
Platelet Count		223	150 - 400	x E9/L	
Differential					
Neutrophils		3.2	2.0 - 7.5	x E9/L	
Lymphocytes		1.9	1.0 - 3.5	x E9/L	
Monocytes		0.6	0.2 - 1.0	x E9/L	
Eosinophils		0.2	0.0 - 0.5	x E9/L	
Basophils		0.1	0.0 - 0.2	x E9/L	
Immature Granulocytes		0.0	0.0 - 0.1	x E9/L	
Nucleated RBC		0		/100 WBC	

LifeLabs is now reporting five new CBC parameters : Reticulocyte Hgb, IRF, IPF, NRBC, and IG. All parameters will be automatically reported when applicable. For more information please visit LifeLabs.com, click on "Healthcare Providers" and refer to an article called "New Hematology Instrumentation and Parameters" under the "News and Notices" section

Biochemical Investigation of Anemias				
Vitamin B12		301	138-652	pmol/L
Ferritin		26	5-272	ug/L
General Chemistry				
Hemoglobin A1C/Total Hemoglobin		5.0	<6.0	%

CDA 2013 Guidelines

Screening and Diagnosis
<5.5 % Normal
5.5% - 5.9 % At risk
6.0% - 6.4 % Prediabetes
>OR = 6.5 % Diabetes Mellitus

If HbA1c >OR= 6.5 % and asymptomatic, confirm using Fasting Glucose, HbA1c or 75g OGTT

FINAL RESULTS

IMPORTANT: This report contains confidential information intended for view by authorized person(s) only and should be disposed of securely (e.g. shredding) before discarding
Note to Health Care Providers: This report has been printed by the patient.
Note to patients: Please contact your Health Care Provider if you have any questions regarding the results on this report

University of Patanjali ★ Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 14589-2019 HIN (एच0आई0एन0): 15529032997

Full Name. (पूरा नाम): Ankita Chauhan Age & Gender (आयु एवं लिंग): 32 F

Full Address. (पूरा पता): Ohana Hospital, Dosarka, Distt. Ambala Haryana – 133202

E-mail. (ई–मेल) ankita.chauhan86@gmail.com

Mobile No. (मोबाईल नं0) 9 9 9 6 4 3 2 3 8 8

Occupation (व्यवसाय): Software Engineer Ph. Canada. 01-6475253505 Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Hypothyroidism, Stress & Muscular Stiffness

Duration of Disease (रोग की अवधि): over 1 year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Medicine for Thyroid only

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 2 months

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
TSH is normal & stress levels are lower than before.
Improvement in overall muscular flexibility & strength

Percentage (प्रतिशत): 95%

Dated (दिनॉक): April 13, 2019 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali Haridwar

Patient: **CHAUHAN, ANKITA**

Age 32 years Gender F
Date of Birth Apr 24 1986
HC # **1470378280HJ**
Patient's Phone (647) 525-3505

Ordered by K. ALI DR. TEHMINA
Copy To

Lab No **2019-YS0210701**
Reference #
Patient ID
Referring Site ID

Date of Service Jan 21 2019 13:56
Reported on Jan 22 2019 12:04

LifeLabs
Address 100 International Blvd
Toronto, Ontario
Canada M9W 6J6
Telephone (877) 849-3637
Toll Free (877) 849-3637
Fax (905) 795-9891

Test	Flag	Result	Reference Range - Units	Lab Lic. #
General Chemistry				
		Monitoring <OR= 7.0 % Target in adults without comorbidities. Other targets may be more appropriate in children, elderly and patients with comorbidities		
		Results may not accurately reflect mean blood glucose in patients with hemoglobin variants, disorders associated with abnormal erythrocyte turnover, severe renal and liver disorders		
Creatinine		51	50-100 umol/L	
Glomerular Filtration Rate (eGFR)		>120 Normal eGFR is described as greater than or equal to 90 ml/min/1.73 m2 For patients of African descent, the reported eGFR must be multiplied by 1.15. Effective May 4 2015, eGFR is calculated using the CKD-EPI 2009 equation KDIGO 2012 guidelines highlight the importance of eGFR and urine albumin creatinine ratio (ACR) in screening, diagnosis and management of CKD. Results for eGFR should be interpreted in concert with ACR.		
Thyroid Function				
Thyroid Stimulating Hormone (TSH)	HI	4.63	0.32-4.00 mIU/L	
Bone Markers				
25-Hydroxyvitamin D	LO	53 Season, race and dietary intake affect 25-Hydroxy Vitamin D levels. Highest levels are found in the summer months and lowest levels during the winter. 25 - 74 nmol/L Vitamin D Insufficient	75 - 250 nmol/L	

FINAL RESULTS

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Note to Health Care Providers: This report has been printed by the patient.

Note to patients: Please contact your Health Care Provider if you have any questions regarding the results on this report.

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Ankita Chauhan , HIN 155290032997 है। मुझे शुरू में Thyroid, Depression, Muscular Stiffness की परेशानी रहती थी, जिसके लिए मैंने July 2018 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे Dr Sonya Chauhan की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे Mother, Dr Sonya Chauhan के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Hypothyroidism, Stress, Anxiety, Muscular Stiffness

में 6 April, 2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Dr. Sachin K Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: No

विभाग (में दिखाया) : Dr Vikram Gupta (Panchkarma)
Dr Sachin K. Tyagi (Shatkarma)

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 7 days दिनांक / माह /वर्ष हो गए और आज अब मैं 95 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: Improvement in overall muscular stiffness. Decline in stress and anxiety. More energetic and cheerful than before.

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Dr Sachin K Tyagi का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: ankita.chauhan88@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 9996432387 +1 6475253505

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 13 April, 2019

Ankita Chauhan
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin K Tyagi

रोगी का नाम - Anita Chauhan आयु - 32 लिंग - Female

रोगी का पता - C/o Rana Hospital, Dosarka, Distt Ambala Haryana - 133202

रोगी के लक्षण - Stress, Anxiety, Depression, Thyroidism & Muscular Stiffness

रोग के लक्षण - Insomnia, pain in neck, shoulder and back

रोगी की पूर्व परीक्षण रिपोर्ट्स - Yes

पिछली रिपोर्ट्स / फोटो Yes

नई रिपोर्ट्स / फोटो

रोग में सुधार प्रतिशत - 95%

चिकित्सक का अनुभव - Patient got 95% Result through yoga and Pre Hanna treatment.

रोगी का उपचार संबंधी कथन - Improvement in overall mental and physical stress. Muscular tension relieved. Yoga and pranayama has helped me in healing my ailments. Doctor and entire staff was very helpful and dedicated towards patients. From my experience at Patanjali, I would highly recommend Yoga and pranayama therapy to everyone.

Anita Chauhan

रोगी के हस्ताक्षर

दिनांक - 13 April, 2019.

चिकित्सक के हस्ताक्षर

University of Patanjali Haridwar

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_saveAp.

नि:शुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL
बहिरंग चिकित्सा विभाग O.P.D.

Reg. No. AH-2017-0025

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 12 HIN NO : 15529032997

Prescription No: Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 14589-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 06/04/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-413-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANKITA CHAUHAN आयु Age 32 Year लिंग Sex Female

पता Address RANA HOSPITAL DOSARKA ,Ambala ,Haryana ,India (Torentto) → Part

फोन Landline No. : +6475253505 (whatt) मो. Mobile No. 9996432388 → Part ईमेल E-mail : ANKITA.CHAUHAN86@GMAIL.COM

Patient Complaint:
K/C/O Depressive, Anxiety Hypothyroidism , Problem In Conceving

Last 6 year

Diagnosis:
Buddhivibhransha / Anxiety, Manoavsada / Depression, Krichchhonmilan / Dry Eye

Last 1 year

90-95% improvement

Last 1 year

in Depression Hypothyroidism

Follow-up Date: 06/05/2019

1 BADAM ROGAN 60 ML 2 drpos in each nostril at bed time

ADMISSION IN I.P.D

Pranayam / Asanas: , ANULOM VILOM, BAHYAPRANAYAM, BHASTRIKA, BHRAMARI, BHUJANGASANA, KAPALBHANTI, LIGHT EXERCISE, MAKRASANA, PRANAV JAP, SARVANGASANA, SHAVASANA, UDGEETH, UJJAYI, UTTANPADASANA

Remarks: TREATMENT START07/04/19 TO 13/04/19

ACUP POINT ALL DIGESTIVE POINT, CALF, P.GLAND

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Madha Kwath +

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

7 day (9110) Total

4 day (5660) Total

PRO Vinay 59

Refer to Panchkam for Shirodhar, Abhyanga Sudha

Dr. Shivani for five day

Dr. Ketan

6/4/19

06-Apr-19 4:30 PM

पतंजलि योगपीठ फेज-1, महर्षि दयानन्द ग्राम, दिल्ली हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 240008, 248888, 248999, 246737 फैक्स Fax : 01334 - 244805, 240664 E-mail : divyayoga@divyayoga.com, patientcare@divyayoga.com Web : www.divyayoga.com

University of Patanjali Haridwar

DIABETES

(मधुमेह)

PATIENT NAME : ANPURNA SINGH

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH-2017-0075)

Sample No.:	8152	Dr.: SACHIN TYAGI	Date: 05/08/2018
Patient ID:	15329353984	Age: 45	Sex: Female
Name: Mrs.ANPURNA SINGH			

CBC

TEST	RESULT	UNIT	NORMAL RANGE
HGB	12.9	[g/dL]	(12.0 - 17.0)
WBC	5.88	[10^3/uL]	(4.000 - 11.000)
DIFFRENTIAL LEUKOCYTE COUNT(DLC)			
NEUT	45.9	[%]	(40 - 80)
LYMPH	35.7	[%]	(20 - 40)
MONO	3.9	[%]	(2.0 - 10.0)
EO	13.8 +	[%]	(1.0 - 6.0)
BASO	0.7	[%]	(0.0 - 2.0)
RBC	4.38	[10^6/uL]	(3.80 - 5.50)
HCT	37.8	[%]	(36.0 - 50.0)
MCV	86.3	[fL]	(83.0 - 110.0)
MCH	29.5	[pg]	(33.0 - 37.0)
MCHC	34.1	[g/dL]	(31.0 - 37.0)
PLT	190	[10^3/uL]	(150 - 400)

RBC



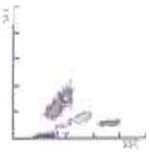
PLT



WBC



DIFF



WBC IP Message(s)
Eosinophilia

RBC IP Message(s)

PLT IP Message(s)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 246888, 246999, 246737 Fax: 01334 - 244808, 240684 E-Mail: divyayoga@divyayoga.com Web: www.divyayoga.com

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University of Patanjali Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH-2017-0025)

Reg. No.: 8152/15329353984		Dated:	05/08/2018
Name of Patient : Mr./Mrs./Ms. :	ANPURNA SINGH	Age/Sex :	45Yer/F
Address : Dr. SACHIN.TYAGI			
Referred by :			

TEST	VALUE	NORMAL RANGE
Fasting Blood Sugar	128.0	mg/dl (70 – 110)
P.P Blood Sugar	258.0	mg/dl (110 – 140)
E.S.R. :- (Westergreen Method)	41	Male (0 – 15 mm) Female (0 – 20 mm)

GLYCOSYLATED HAEMOGLOBIN (HbA1c) :-

HbA1c :- 6.9%

REFRENCE VALUE :-

< 3.9 – 6.5 % Non Diabetic Level(Normal)

< 6.5-7.0 % Diabetic (Good Control)

> 7.0– 7.8 % (Action Suggested)

> 7.8 % Poor control

Technologist

Pathologist

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http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_save/

निःशुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय Token 6 HIN NO : 15329353984

PATANJALI AYURVEDA HOSPITAL

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

Prescription No: 1

पंजीकरण संख्या Reg. No. 55039-2018 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 30/07/2018

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-918-2018 कक्ष संख्या Room No. 0

रोगी : श्री/श्रीमती Patient : Mr./Mrs. ANPURNA SINGH आयु Age 45 Year लिंग Sex Female

पता Address KANPUR ,Kanpur(Nagar) ,Uttar Pradesh ,India

फोन Landline No. : ..... मो. Mobile No. : 09336314013 ईमेल E-mail : .....

Follow-up Date: 29/08/2018

Patient Complaint:
H/O Diabetes Tyap-2 Eye Problem,Hearing Loss, Constipation,Acidity,Ear Itching, Insomnia,Knee Pain

Diagnosis:
Madhunasha / Diabetes / Sugar, Badhirya/Hearing Loss, Vibandha / Constipation, Amla Pitta / Hyperacidity, Nidra Nasha / Insomnia

1	MADHUNASHINI VATI	60	PC	Chew 2 tablets in the morning and evening on an empty stomach with water.

Admission in I.P.D

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, UDGITH, UJJAI, MANDHUKASAN, SASKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN, MARKATASAN, BHRAMRI, SHAVASANA

Remarks: TREATMENT WILL BE START FROM - 30/07/2018 TO 05/08/2018
ACU POINT -
STO,LIV,INT,CALF,EYE,EAR,KNEE,PAN,BRAIN,P.GLAND,ALL CHANLES

रक्तचाप B.P. - 120/80 mmHg
नाड़ी Pulse - 96 bpm
तापमान Temperature 98.6°F
रक्त शर्करा Blood Sugar H/O
अन्य Other B. Sugar

Ach
- C.B.C, ESR
- B. Sugar PP and Fasting
- Lipid Profile, K.F.T
- HbA1c

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI	TRIFLA + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	SUTRA NETI	RUBBER NETI
7	SHATKARMA	TRATKA	TRATAKA
8	SHATKARMA	YOG-NIDRA	YOG-NIDRA
9	"	(6) - Sutra Neti 6/31/07 to 6/08/18	Rubber

University of Patanjali Haridwar

Dr Lal PathLabs

National Reference Lab: Sector 18, Block-E, Rohini, New Delhi - 110 085
Tel: 011 - 3040-3210, Fax: 011 - 3040-3204
E-mail: lalpathlabs@lalpathlabs.com Web: www.lalpathlabs.com

[illegible] RIKHANA ROAD (KANPUR) CC
KANPUR UTP
KANPUR

(Hony) Brig. Dr. Arvind Lal
M.B.B.S., D.C.P.
Chairman & Chief

Dr. Vandana Lal
M.D.(INTE), DCAP
Chief of Technology

Name	Mrs. ANNPURNA			Collected	: 4/1/2017 6:48:00PM
Reg No	236287622	Age: 43 Years	Gender: Female	Received	: 4/1/2017 7:13:22PM
				Reported	: 4/1/2017 11:21:51PM
Ac Status	P	Ref By : SELF		Report Status	: Final

Test Name	Results	Units	Bio. Ref. Interval
[illegible] FASTING (F), PLASMA	114.00	mg/dL	70.00 - 100.00

----------End of report ----------

If test results are alarming or unexpected, Client is advised to contact the laboratory immediately for possible remedial action.
@ Tests conducted at National Reference Lab, New Delhi, a CAP (7171001), ISO (FS 60411) and NABL (M-0061) accredited laboratory

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Dr Lal PathLabs

National Reference Lab: Sector 18, Block-B, Rohini, New Delhi - 110 085
Tel: 011 - 3040-3210, Fax: 011 - 3040-3204
E-mail: lalpathlabs@lalpathlabs.com Web: www.lalpathlabs.com

[illegible] HARIANA ROAD (KANPUR) CC
[illegible] UTP

(Hony) Brig. Dr. Arvind Lal
M.B.B.S., D.C.P.

Dr. Vandana Lal
M.D.(PATH), DCAP

Name	Mrs. ANNPURNA			Collected	: 4/1/2017 6:35:00PM
				Received	: 4/1/2017 6:53:12PM
[illegible]	236287615	Age: 43 Years	Gender: Female	Reported	: 5/1/2017 9:52:11AM
[illegible]	P	Ref By : SELF		Report Status	: Final

Test Name	Results	Units	Bio. Ref. Interval
URINE EXAMINATION, ROUTINE; URINE, R/E (Automated Strip Test, Microscopy)			
[illegible]			
[illegible]	Light Yellow		Pale yellow
[illegible] Gravity	1.025		1.001 - 1.030
[illegible]	5.5		5.0 - 8.0
[illegible]			
[illegible]	Nil		Nil
[illegible]	Present 2+(0.5 g/dL)		Nil
[illegible] Rechecked, [illegible]			
[illegible]	Nil		Nil
[illegible]	Nil		Nil
[illegible]	Normal		Normal
[illegible] Esterase	Negative		Negative
[illegible]	Negative		Negative
Microscopy			
[illegible]	Negative		Negative
[illegible] Cells	2-3 WBC/HPF		0-5 WBC / hpf
[illegible] Cells	++(in fair numbers)		Few
[illegible]	Nil		Nil /lpf
[illegible]	Nil		Nil
[illegible]	Nil		-
[illegible] Rechecked, [illegible] Correlate Clinically			

If test results are alarming or unexpected, Client is advised to contact the laboratory immediately for possible remedial action.
@ Tests conducted at National Reference Lab, New Delhi, a CAP (7171001), ISO (FS 60411) and NABL (M-0061) accredited laboratory

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Lal PathLabs

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E-mail: lalpathlabs@lalpathlabs.com Web: www.lalpathlabs.com

ANA ROAD (KANPUR) CC

(Mrs.) Mrs. ANNPURNA

236287615 Age: 43 Years Gender: Female

IP Ref By : SELF

Collected : 4/1/2017 6:35:00PM
Received : 4/1/2017 6:53:12PM
Reported : 5/1/2017 9:52:11AM
Report Status Final

Test Name	Results	Units	Bio. Ref. Interval
HbA1c (GLYCOSYLATED HEMOGLOBIN), BLOOD	7.0	%	

Note: 1. Since HbA1c reflects long term fluctuations in the blood glucose concentration, a diabetic patient who is recently under good control may still have a high concentration of HbA1c. Converse is true for a diabetic previously under good control but now poorly controlled.

2. Target goals of < 7.0 % may be beneficial in patients with short duration of diabetes, long life expectancy and no significant cardiovascular disease. In patients with significant complications of diabetes, limited life expectancy or extensive co-morbid conditions, targeting a goal of < 7.0 % may not be appropriate.

Comments

HbA1c provides an index of average blood glucose levels over the past 8 - 12 weeks and is a much better indicator of long term glycemic control as compared to blood and urinary glucose determinations.

ADA criteria for correlation between HbA1c & Mean plasma glucose levels

HbA1c (%)	Mean Plasma Glucose (mg/dL)
6	126
7	154
8	183
9	212
10	240
11	269
12	298

If test results are alarming or unexpected, Client is advised to contact the laboratory immediately for possible remedial action.
Tests conducted at National Reference Lab, New Delhi, a CAP (7171001), ISO (FS 604111) and NABL (M-0061) accredited laboratory.

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Certificate No. (AH-2017-0025)

8162/15329353984

Name of Patient : Mr./Mrs./Ms. : ANPURNA SINGH

Dated : 05/08/2018

Age/Sex : 45Yer/F

Address :

Referred by : Dr. SACHIN.TYAGI

LIPID PROFILE

TEST	VALUE	NORMAL VALUE
Serum Cholesterol	193.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
HDL Cholesterol	35.3	mg% (35 – 60)
LDL Cholesterol	139.0	mg% (Desirable < 130) (Border Line 130 – 159) (High > 160)
Serum Triglycerides	132.0	mg% (10 – 190)
Serum VLDL	26.4	mg% (5 - 40)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
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Certificate No. (AH-2017-0025)

Reg. No.: 8152/15329353984

Name of Patient : Mr./Mrs./Ms. : ANPURNA SINGH

Dated : 05/08/2018

Age/Sex : 45Yer/F

Address :

Referred by : Dr. SACHIN.TYAGI

KIDNEY FUNCTION TEST

TEST	VALUE	NORMAL RANGE
Serum Cholesterol	193.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
Serum Urea	14.6	(15 - 45 mg/dl)
Serum Creatinine	0.8	(0.7 - 1.5 mg/dl)
Serum Uric acid	5.7	(2.0 - 7.0 mg/dl)
Serum Alkaline Phosphate	59.0	U/L (53 - 128)
Serum Total Protein	6.5	(5.5 - 8.0 gm/dl)
Serum Albumin	4.1	(3.5 - 5.5 gm/dl)
Serum Globulin	2.4	mg% (2.3 – 2.6)
A/GRatio	1.7:1	(1.2 - 2: 1)
Serum Na+ (Sodium)	141.9	Mmol/L (135 – 145)
Serum K+ (Potassium)	4.1	Mmol/L (3.5 –5.0)
Serum Ca++ (Calcium)	5.2	MEq/ L (4.5 – 5.5)

Technologist

Pathologist

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Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 55039 HIN (एच0आई0एन0): 153293539804

Full Name. (पूरा नाम): Anupurna Singh Age & Gender (आयु एवं लिंग): 45 F

Full Address. (पूरा पता) 60/20 Purani Dal mandi Kanpur

anupurna.123@gmail.com E-mail. (ई–मेल)

9336314013 Mobile No. (मोबाईल नं0) 9 3 3 6 3 1 4 0 1 3

Occupation (व्यवसाय): Business Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Diabetes

Duration of Disease (रोग की अवधि): 4 years Back

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

Good Experience

Percentage (प्रतिशत): 50%

Dated (दिनाँक): 05/04/18 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali ★ Haridwar ★

FATTY LIVER

(फैटी लीवर)

PATIENT NAME :VIVEK KUMAR SHUKLA

University of Patanjali ★ Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 74594-2019 HIN (एच0आई0एन0): 15731041607

Full Name. (पूरा नाम): Vivek kumar Shukla Age & Gender (आयु एवं लिंग): 32

Full Address. (पूरा पता) 2-3 Auckland Ville Dorjeeling

E-mail. (ई–मेल) vivekshukla.12@hotmail.com

Mobile No. (मोबाईल नं0) 9654111120

Occupation (व्यवसाय): Service Marital Status (वैवाहिक स्थिति) M

Disease (रोग): Fatty Liver

Duration of Disease (रोग की अवधि): 7-8 months

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
feeling much relaxed and better after 4 days
never checked the reports but feeling bette-

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 14/11/19 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of ... Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Vivek Kumar Shukla, HIN 15731041607 है। मुझे शुरू में Fatty liver (pain and weakness) की परेशानी रहती थी, जिसके लिए मैंने 7/11/2019 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे Fatty liver की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमें हमारे N/A के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Pain, Heaviness in right side of abdomen Hyper Acidity

मैं 7/11/2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr. Sachin Ke. Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गईं: No

विभाग (में दिखाया) : KAYA CHIKITSA (27No) OPD 2, SHATKARMA

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 11/11/2019 दिनांक / माह /वर्ष हो गए और आज अब मैं 80 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: No pain, No Burning Sensation, Feeling much better.

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य Dr. Sachin Ke. Tyagi का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: मोबाइल व व्हाट्सप्प नंबर: 9654111208

रिपोर्ट्स उपलब्ध कराई गयी हाँ (✓) या नहीं ()। वीडियो उपलब्ध कराई गयी हाँ ( ) या नहीं ( )।

मरीज की स्वीकृति: मरीज अपनी वीडियो / फोटो सोशल मीडिया / फेसबुक में प्रकाशन हेतु तैयार है।
हाँ (✓) या नहीं ( )

दिनांक / माह /वर्ष: 11/11/2019 मरीज़ के हस्ताक्षर वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Kumar Thayi

रोगी का नाम - Vivek Kumar आयु - 37 लिंग - M

रोगी का पता - 2-3 Auckland Villa Darjeeling W.B

रोग - Fatty Liver

रोग के लक्षण - Pain in Right Sinte in Abd & Heavness

रोगी की पूर्व परीक्षण रिपोर्ट्स - LFT पिछली रिपोर्ट्स / फोटो Yes

नई रिपोर्ट्स / फोटो

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव -

Patient got 80% Regard to his [illegible] [illegible] [illegible] [illegible] [illegible]

रोगी का उपचार संबधी कथन -

had fatty liver, burning sensation, pain now which is much better.

दिनांक -

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

HEADACHE

(सिरदर्द)

ABHA JAKHMOLA

University of Patanjali
Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 43434-2019 HIN (एच0आई0एन0): 15611928243

Full Name. (पूरा नाम): ARMA YAGYESH JAKHMOLA Age & Gender (आयु एवं लिंग): 29 F

Full Address. (पूरा पता) HN 201/A-15 MATRUASHISH SOCIETY, Sec-10, SHANTI NAGAR MIRA ROAD (E), THANE, MAHARASHTRA

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 7 4 0 0 2 7 1 9 4 6

Occupation (व्यवसाय): Corporate Lawyer Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Headache

Duration of Disease (रोग की अवधि): 10 Years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

Very Good Effect

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 27/June/19 **Patient Signature** (रोगी हस्ताक्षर) Ayjakhmola

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15611928243
Prescription No: 1
Clinic & Centre No: HEADOFFICE

ID Proof:

Reg No: 43434-2019 Doctor : DR SACHIN TYAGI - E00428 Visit Date: 22/06/2019

Department: SHATKARM CLINIC AND RESEARC Annual No: SHAT-1055-2019 Room No: 0

Patient Name: (Mr/Ms/Mrs.) Mr. Abha Jakhmola Age: 29 Sex: Female

Address: Sec.-10-A-15/201 Matru Ashish, Shanti Nagar Thane Maharashtra

Landline No. : Mobile No. : 8097667461 E-mail :

Follow-up Date: 22/07/2019

Patient Complaint:
C/O Rogi Avlokan Hetu

1	UDRAMRIT VATI	40	GM	Take 02 tab of medicine After meal with water / milk For 30 Days

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation

Pranayam / Asanas: , ARDH DHANURASANA, ARDH HALASAN, ARDHMATSYENDRASNA, CHAKRASANA, DHANURASAN, PADVRITTASANA, SUPTA VAJRASANA, SURYANAMASKAR, USHTRASANA

Remarks: TREATMENT START23/06/19 TO 27/06/19

ACUP POINT ALL DIGESTIVE POINT ,CALF

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	TRATKA	TRATAKA
6	SHATKARMA	YOG-NIDRA	YOG-NIDRA

Printed on: June 27, 2019

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पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम आभा जखमोला , HIN 15611928243 है। मुझे शुरू में सर दर्द की परेशानी रहती थी, जिसके लिए मैंने N/A दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे N/A की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे _____ के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : [illegible]

मैं 22/6/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य डॉ० [illegible] को दिखाया।

मरीज़ को दवाइयाँ दी गई: नहीं

विभाग (में दिखाया) : दिखाया

योग (किया या नहीं): किया

संतुलित आहार (लिया या नहीं): लिया

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 5 दिन दिनांक / माह /वर्ष हो गए और आज अब मै 99 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब मैं अलका महसूस कर रही हूँ और जो कारीगर रहता था वह भी ठीक है

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य डॉ० [illegible] का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: abha.baloni13@gmail.com

मोबाइल व व्हाट्सप्प नंबर: 7400271946

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 27/Jun/19

Ayjakhmola
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - डा. सचिन

रोगी का नाम - श्रीमती जयतमोत्सा आयु - २९ लिंग - महिला

रोगी का पता - २०१/A-15, मातु श्रीआशा सोसायटी, सेक्टर 10, शांति नगर, मीरा रोड, थाने, महाराष्ट्र

रोग के लक्षण - सिर दर्द

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNO पिछली रिपोर्ट्स / फोटो RNO

नई रिपोर्ट्स / फोटो RNO

रोग में सुधार प्रतिशत - 100%

चिकित्सक का अनुभव - ~~अच्छा~~ Patient got 100% Result through yog and Shatkarma both

रोगी का उपचार संबधी कथन - बहुत अच्छा यहाँ से काफी आराम। मुझे योग करके पहले से बहुत बेहतर लग रहा है। और काफी जानकारी भी मिली। उदासी अब ना के बराबर है एवं काफी चुस्त शरीर महसूस होने लगा है। यहाँ से जाकर मैं रोज योग अभ्यास करूंगी।

दिनांक -

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

HIGH BLOOD PRESSURE

(उच्च रक्तचाप)

PATIENT NAME : SAROJ CHAUHAN

University of Patanjali Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 14538/16 HIN (एच0आई0एन0): 15519037260

Full Name. (पूरा नाम): Saroj Chauhan Age & Gender (आयु एवं लिंग): 52 F

Full Address. (पूरा पता) RAMA HOSPITAL.
DOSERKA. P.O Dhesh. Ambala. Haryana.

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9 4 1 6 1 7 9 3 0 3

Occupation (व्यवसाय): BAMS Doctor Marital Status (वैवाहिक स्थिति) Normal.

Disease (रोग): Psoriasis Hypothyroidism High B.P Tension

Duration of Disease (रोग की अवधि): From 04 year B.P 1 year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): 4 year 5 year
Normal B.P Telmisan Thyroid Eltroxin 10 mm

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 year 5 years

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
1) Psoriasis 30%
2) B.P 90%
3) Thyroid 50%

Percentage (प्रतिशत): 90%

Dated (दिनाँक): 13/11/2019 Patient Signature (रोगी हस्ताक्षर) Sharma

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Saroj Chauhan, HIN 155290322260 है। मुझे शुरू में Psoriasis, BP, Hypertension, Depression से परेशानी रहती थी, जिसके लिए मैंने 1990 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे Psoriasis की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमें हमारे रिश्तेदार के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Skin rashes, itching, redness, vanila & red patches, mood disorder, stress and sleeplessness.

मैं 6 April, 2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr. Sachin K Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गईं: —

विभाग (में दिखाया) : Dr. Vikram Gupta (Panchkarma)
Dr. Sachin K. Tyagi (Shatkarma)

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes.

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 7 days. दिनांक / माह /वर्ष हो गए और आज अब मैं 30 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: Relieve & improvement in skin redness and itching. Blood pressure kidney control without medication.

जिसके लिए मैं वैद्य जी, परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य Dr. Sachin K. Tyagi & team का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: ankita.chauhan8@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 94161-79303, 99964-32388

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 13 April, 2019

मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali * Haridwar *

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Archin K Tyagi

रोगी का नाम - Saroj Chauhan आयु - 64 लिंग - Female

रोगी का पता - Rana Hospital, Dasarka, Distt - Ambala. Haryana - 133202

रोगी के लक्षण - Skin disease, Hypertension, High blood Pressure, Hypothyroidism

रोग के लक्षण - Sleeplessness, Tiredness, Depression.

रोगी की पूर्व परीक्षण रिपोर्ट्स - Yes पिछली रिपोर्ट्स / फोटो Yes

नई रिपोर्ट्स / फोटो Yes

रोग में सुधार प्रतिशत - 30 % (Psoriasis) 70% (Thyroid)
90% (Hypertension & BP) 63% (overall)

चिकित्सक का अनुभव - Patient got 30 to 90 %. Result in her various Health issue, through Yog and Shatkarm therapy

रोगी का उपचार संबंधी कथन - I am very pleased with my overall experience at Patanjali Yogpeeth. I am grateful for the care and treatment provided. ~~It has improve~~ The yoga and pranayama teachings have helped me in healing my 30 year old Psoriasis and mental stress. I would highly recommend it to everyone to learn yoga and pranayama principles and live a healthy life.

दिनांक - 13 April, 2019

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

INSOMNIA DISEASE

(अनिद्रा रोग)

PATIENT NAME : VARUN SURA



Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 2+637-2019 HIN (एच0आई0एन0): 155721922 90

Full Name. (पूरा नाम): Varun Suri Age & Gender (आयु एवं लिंग): 31 M

Full Address. (पूरा पता) Flat no 202 Ram Sanki Enclave Road no 5 Rajendra Nagar Patna 800016

Suri Varun21@gmail.com E-mail. (ई–मेल)

8084688899 Mobile No. (मोबाईल नं0)

Occupation (व्यवसाय): Business Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Addiction

Duration of Disease (रोग की अवधि): 15 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Re Addiction

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 12 years

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Excellent जब यहां आया था तो मैं तीव्र धोता था Rajnigandha खाता था जब मैं यहां से जा रहा हूँ तो सब छोड़ रहा हूँ

Percentage (प्रतिशत): 100%

Dated (दिनांक): 14/5/2019 Patient Signature (रोगी हस्ताक्षर): Varun

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15572182240
Prescription No: 1
Clinic & Centre No: HEADOFFICE **ID Proof:**
Reg No: 27637-2019 **Doctor :** DR SACHIN TYAGI - E00428 **Visit Date:** 07/05/2019
Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-627-2019 **Room No:** 0
Patient Name: (Mr/Ms/Mrs.) Mr. Varun Sura **Age:** 31 **Sex:** Male
Address: F No -202, Ram Janki Enclave, Patna Patna Bihar
Landline No. : **Mobile No. :** 8084638899 **E-mail :**

Follow-up Date: 06/06/2019

Patient Complaint:
C/O Anindra ,Alchoholic, Smoking, Since 15Years,Gastric

1	MEDHA VATI	40	PC	Take 1-1 Tablet each half-an-hour after breakfas, lunch and dinner with lukewarm water

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation, Nidra Nasha / Insomnia

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI, SHAVASANA
Remarks: TREATMENT START08/05/19 TO 14/05/19

ACUP POINT ALL DIGESTIVE POINT, CALF, P GLAND

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Printed on: May 24, 2019

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Varun Suri , HIN 1552/1922 40 है। मुझे शुरू में [illegible] की परेशानी रहती थी. जिसके लिए मैंने Disha Re Add. No. 1079 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे [illegible] की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे [illegible] के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : N/A

मैं 7/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Sachin Kumar Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: N/A

विभाग (में दिखाया) : [illegible]

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए [illegible] 14/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 100 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: [illegible]

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Sachin Kr Tyagi Ji Patanjali [illegible] का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: Shivarun21@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 8084638899

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं (✓)। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 14/5/19 **मरीज़ के हस्ताक्षर** **वैद्य के हस्ताक्षर**

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Kr. Tyagi

रोगी का नाम - Varun Suri आयु - 31 लिंग - Male

रोगी का पता - Flat no 202 Ram Janki Enclave Road no 5 Rajendra Nagar Patna 800016

रोगी ~~के लक्षण~~ - नींद की Problem नहीं

रोग के लक्षण - दारू पिने का मैल रहता था

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो RNR

रोग में सुधार प्रतिशत - 100%

चिकित्सक का अनुभव - Patient got 100% Result through Yog and Sleticuma.

रोगी का उपचार संबंधी कथन -

जब मैं यहां आया था तो मैं शराब पिता था जब मैं यहां से चिकित्सा के बाद सब छूट गया

दिनांक - [signature]

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

[signature]

University of Patanjali * Haridwar *

MIGRAIN DISEASE

(माइग्रेन रोग)

PATIENT NAME : POOJA YADAV



100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 38619-2019 HIN (एच0आई0एन0): 15599913989

Full Name. (पूरा नाम): Pooja Yadav Age & Gender (आयु एवं लिंग): 41 F

Full Address. (पूरा पता) GTR No - 6/4 Salbagan Army Cantt Agartala West Tripura (Tripura, India)

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 8 2 9 0 5 2 3 4 5 7

Occupation (व्यवसाय): House wife Marital Status (वैवाहिक स्थिति) Yes

Disease (रोग): Migraine, Pain in a both knee

Duration of Disease (रोग की अवधि): 2 months

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Yes

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 months

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Migraine जो कई वर्षों से था और Joint pain जो पिछले दो महीने से Acute रूप से परेशान कर रहा था जमीन पर बैठना असंभव हो चला था इसमें आशातीत आराम मिला अब जमीन पर बैठ कर योग कर सकती हूँ जो पहले असंभव था सरदर्द में तो आने के बाद कभी नहीं हुआ और हल्कापन महसूस हो रहा है।

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 16/6/19 Patient Signature (रोगी हस्ताक्षर): Pooja Yadav

Dr.Signature

Universal ... Haridwar

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15599913989
Prescription No: 1
Clinic & Centre No: HEADOFFICE

Reg No: 38619-2019 **Doctor :** DR SACHIN TYAGI - E00428 **ID Proof:** **Visit Date:** 09/06/2019

Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-922-2019 **Room No:** 0

Patient Name: (Mr/Ms/Mrs.) Mr. Pooja Yadav **Age:** 41 **Sex:** Female

Address: Qtrn. O-6/4 Salbagan Army Cantt Agartala West Tripura Tripura

Landline No. : **Mobile No. :** 8290523457 **E-mail :**

Follow-up Date: 09/07/2019

Patient Complaint:
Sandhisul Noh/O Dm Htn Tb,Migraine,Gastric,Over Wt- 72,Pain In Both Knee

1	PEEDANTAK TAILA	100	ML	Massage the Oil on the affected area. twice/thrice in a day

Diagnosis:
Sandhi Gata Vata / Arthritis,
Ardhabvedhak / Migraine

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BHRAMRI, UDGITH, UJJAI, PRANAV, BAHYAPRANAYAAM

Remarks:
TREATMENT WILLBE START FROM - 10-06-2019 TO 16-06-2019

ACU.P-STO,LIV,INT,CALF,BRAIN,P GLAND, ALL CHANNLES

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Printed on: June 16, 2019



पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Pooja Yadav , HIN 15599913479 है। मुझे शुरू में Knee Pain की परेशानी रहती थी, जिसके लिए मैंने 5/04/19 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे Arthritis की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे _____ के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Pain in Knee or Migraine

मैं 9/06/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Dr Sachin Kr Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: No

विभाग (में दिखाया) : Kay ~~[illegible]~~ चिकित्सा (Shatkarm dept)

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 7 days(दिनांक / माह /वर्ष हो गए और आज अब मैं 80 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: Light Pain in Knee but I am able to sit on the ~~[illegible]~~ floor

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Dr. Sachin Kr. tyagi and all members का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 8290523457

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। ✓

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()। ✓

दिनांक / माह /वर्ष: 16/06/19

Pooja Yadav
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kr Tyagi

रोगी का नाम - Mrs Pooja Yadav आयु - 21 लिंग - F

रोगी का पता - Qtrno. 6/4 Salbagan Army Cantt Agartala West Tripura

रोगी के ~~लक्षण~~ रोग - ~~Asthma~~ Mile Arthritis

रोग के लक्षण - Severe migraine headache once a week, Knee & leg with general body pain

रोगी की पूर्व परीक्षण रिपोर्ट्स - R & R पिछली रिपोर्ट्स / फोटो R N B

नई रिपोर्ट्स / फोटो R N R

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव - Patient got 80% Result through Yoga and Medicine both.

रोगी का उपचार संबंधी कथन - जब मैं यहाँ पहुँची तो सीढ़ियाँ चढ़ना कठिन, ज़मीन पर पालथी मार कर बैठना असंभव था। षटकर्म क्रिया के पश्चात शरीर में हल्कापन पहले दिन से ही महसूस हुआ और तीसरे दिन से ज़मीन पर बैठ कर योग करना संभव हो गया। अब 80% बेहतर महसूस कर रही हूँ। यहाँ की सभी चिकित्साएं, व्यवहार आदि अत्यंत लाभकारी है।

दिनांक - 16/6/19

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

OBESITY

(मोटापा)

PATIENT NAME : GAURAV SHARMA

University of Patanjali
Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण नं0): 30798/19 HIN (एच0आई0एन0): 15582421338

Full Name. (पूरा नाम): Gaurav Sharma Age & Gender (आयु एवं लिंग): 15 Male

Full Address. (पूरा पता): Hanuman Vatika Colony Lalsot (Dausa)

E-mail. (ई–मेल): Sharmagaurav2654@gmail.com

Mobile No. (मोबाईल नं0): 9 4 1 4 8 4 4 6 8 8

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति): NO

Disease (रोग): 2 Year Constipation

Duration of Disease (रोग की अवधि): 2 Year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): NO

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): NO

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

योग से शरीर शांत व हल्का रहता है घटकर्म से होने वाले रोग में फायदा है

Percentage (प्रतिशत): 100%

Dated (दिनांक): 25/5/19 Patient Signature (रोगी हस्ताक्षर): Gaurav

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम गौरव शर्मा , HIN 1558242/338 है। मुझे शुरू में मोटापे की परेशानी रहती थी, जिसके लिए मैंने 21/6/18 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे मोटापे की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे रिश्तेदार के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : मोटापा, चलने मे परेशानी, भारीपन, आलस्य

मैं 20/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Sachin को दिखाया।

मरीज़ को दवाइयाँ दी गई:

विभाग (में दिखाया) : योग व पतंजलि

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 25/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 100 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब मुझे भारीपन नहीं है ना ही आलस्य और ना ही चलने मे परेशानी है

जिसके लिए मे वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य योग व पतंजलि का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: Sharmagaurav2654@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 6377178158

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 25/5/19

मरीज़ के हस्ताक्षर Gaurav

वैद्य के हस्ताक्षर Sachin 28/7/19

University of Patanjali Haridwar



चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kumar

रोगी का नाम - Gaurav Sharma आयु - 15 लिंग - male

रोगी का पता - Hanuman Vatika Colony Lalsot (Dausa)

रोगी के लक्षण - मोटापा, चलने मे परेशानी, आलस्य, भारीपन
कब्ज

रोगी के लक्षण - जल्दी थक जाना, शरीर मे भारीपन, भुक्खाई आना।

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR

पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो - RNR

रोग में सुधार प्रतिशत - 100 %

चिकित्सक का अनुभव -

Patient got 100% Result through yog and Sheetkam

रोगी का उपचार संबधी कथन - अब ना ही आलस्य है ना ही चलने मे परेशानी और ना ही भारीपन है। शरीर मे हल्कापन महसूस होना, वजन भी गया है। 1 kg weight loss, अच्छे से ध्यान लगने लगा, पेट अच्छे से साफ हो रहा है।

दिनांक - 25/5/19

चिकित्सक के हस्ताक्षर 25/5/19

Gaurav
रोगी के हस्ताक्षर

University of Patanjali Haridwar

निःशुल्क परामर्श

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No. AH-2017-0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 6 HIN NO : 15582421338

Prescription No: 1 Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 30798-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 19/05/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-717-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. GAURAV SHARMA आयु Age 15 Year लिंग Sex Male

पता Address DIDWANA LALSOT,DAUSA ,Dausa ,Rajasthan ,India

फोन Landline No. : ..... मो. Mobile No. : 9414844688 ईमेल E-mail : ?

6377178058

Patient Complaint:
C.O Over Weight, Wt- 47

Diagnosis:
Stholya / Obesity

BP Sugar Thyroid No

1	SARVAKALPA KWATH	200 GM	Take 1 tea spoons of all the above medicines mix it with 400 ml of water and boil till it reduces to 100 ml, filter and take on an empty stomach in the morning and evening.
	KAYAKALPA KWATH	100 GM	
	TRIPHALA CHURNA	100 GM	

Follow-up Date: 18/06/2019

Remarks: TREATMENT START - 20/05/2019 TO 26/05/2019

ACUP POINT - STO,LIV,INT,CALF,OBESITY

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE – 23/05 To 26/05	ACUPRESSURE
2	SHATKARMA	JAL NETI	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	TRATKA 23/05 To 26/5/19	TRATAKA
7	SHATKARMA	YOG-NIDRA	YOG-NIDRA

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

Vinay Ji

5240 / 4 Days
8390 / 7 Days

पतंजलि योगपीठ-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth-1, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 248008, 248888, 248999, 246737 फैक्स Fax : 01334 - 244605, 246684 E-mail : divyayoga@divyayoga.com, patient.care@divyayoga.com Web : www.divyayoga.com

19-May-19 10:28 AM

Note : Not for Medico Legal Purpose

University of Patanjali Haridwar

SKIN DISESAE

(त्वचा रोग)

PATIENT NAME : ABHISHEK KUMAR

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No: AH-2017-0025

Reg: 3143/15222092586 | Dated: 03/04/2018

Name of Patient : Mr. Mrs. Ms. : ABHISHEK KUMAR | Age/Sex: ~~49Yer/M~~ 21 yr / m

Address :

Referred by : Dr. SACHIN.TYAGI

KIDNEY FUNCTION TEST

TEST	VALUE	NORMAL RANGE
Serum Cholesterol	161.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
Serum Urea	25.0	(15 - 45 mg/dl)
Serum Creatinine	1.1	(0.7 - 1.5 mg/dl)
Serum Uric acid	6.4	(2.0 - 7.0 mg/dl)
Serum Alkaline Phosphate	71.0	U/L (53 - 128)
Serum Total Protein	6.4	(5.5 - 8.0 gm/dl)
Serum Albumin	4.1	(3.5 - 5.5 gm/dl)
Serum Globulin	2.3	mg% (2.3 – 2.6)
A/GRatio	1.8:1	(1.2 - 2: 1)
Serum Na+ (Sodium)	136.8	Mmol/L (135 – 145)
Serum K+ (Potassium)	3.7	Mmol/L (3.5 –5.0)
Serum Ca++ (Calcium)	5.2	MEq/ L (4.5 – 5.5)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar 249405, Uttarakhand, India
Phone: 01334 - 240008, 246868, 246999, 246737, Fax: 01334 - 244905, 240664, E-mail: divyayoga@divyayoga.com, Web: www.divyayoga.com

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University of Patanjali Haridwar

योग संदेश में प्रकाशन हेतु

चिकित्सक का नाम- डा० सचिन त्यागी

रोगी का नाम- अभिषेक कुमार आयु: 21 लिंग: पुरुष

रोगी का पता- उत्तरवारी पोखर, बेतिया, पश्चिम चम्पारन, बिहार

रोगी के लक्षण- दवाइयों की एलर्जी, चर्म रोग, छाती में दर्द।

रोग के लक्षण- पेट का भारीपन, मानसिक तनाव, शरीर में दर्द शरीर का काँपना, उलटी।

उपचार अवधि- ....7.. दिन ~~माह~~ दि0...27/3/18 से दि0.....4-4-18 तक

रोगी द्वारा सेवन औषधियां: दिव्य कायाकल्प वटी, कायाकल्प तेल, कैंसोर मुगुल। विधि C 4/04/18 को ली चिकित्सा के समय मैंने कोई औषधि नहीं ली।

पदकर्म चिकित्सा - (1) शंखप्रक्षालन
(2) कुंजर क्रिया
(3) जलनेति
(4) ~~[illegible]~~ एक्यूप्रेशर
(5) योगनिद्रा
(6) लार्वन
(7) योग

University of Patanjali Haridwar

रोगी की पूर्व परीक्षण रिपोर्ट्स- पिछली रिपोर्ट्स अटैच्ड

नई रिपोर्ट्स अटैच्ड

रोग में सुधार प्रतिशत- 100 %

रोगी का उपचार सम्बन्धी कथन- षटकर्म बहुत ही अच्छी किया है। षटकर्म के कारण मैं बहुत अच्छा महसूस कर रहा हूँ। सारी मानसिक तनाव दूर हो गए। मेरी दवाओं की एलर्जी में खतम हो गई। चर्मरोग भी मेरा खतम हो गया। पेट का भारीपन खतम हो गया। जब मैं यहाँ पतंजली आयुर्वेद आया था तो मैं बहुत बिमार था पर यहाँ पर इलाज के बाद मैं पुरी तरह ठीक होकर जा रहा हूँ। मेरा इलाज डा० सचिन आर्य के निर्देशों में हुआ और मैं उनका शुक्रगुजार हूँ कि मैं पुरी तरह ठीक होकर जा रहा हूँ।

चिकित्सक का अनुभव-

Patient got 100% Result in his Skin Disease, through yog and Sahana chikitsa.

दि०

4/04/18

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 1942 – 2018 HIN (एच0आई0एन0): 182220920586

Full Name. (पूरा नाम): ABHISHEK KUMAR Age & Gender (आयु एवं लिंग): 21 m

Full Address. (पूरा पता) UTTARWARI POKHRA, BETTIAH
WEST CHAMPARAN, BIHAR

E-mail. (ई–मेल) kumarabhi1234@gmail.com

Mobile No. (मोबाईल नं0) 7 7 6 4 9 4 2 2 6 9

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति) unmarried

Disease (रोग): Drug allergy, Skin disease, Chest pain, wounds

Duration of Disease (रोग की अवधि): Since 2 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Yes, allopathy

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 week

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

I'm feeling well, and relax, Drug allergy also cured
Skin disease, Chest pain and wounds are also cured By Shatkarma

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 4 – 4 – 2018 Patient Signature (रोगी हस्ताक्षर) Abhishek kumar

Dr.Signature

University of Patanjali Haridwar

नि.शुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Token 2 HIN NO : 15222092586

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रात: 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PAC-534244392560

Prescription No: 1

पंजीकरण संख्या Reg. No. 19481/2018 चिकित्सक Vd. Dr. Abhishek Bhushan Sharma दिनांक Date 04/04/2018

विभाग Deptt. KAYACHIKITSA वार्षिक संख्या Annual No. KA-8840-2018 कक्ष संख्या Room No. 12

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ABHISHEK KUMAR आयु Age 21 Year लिंग Sex Male

पता Address BETTIAH WEST West Champaran Bihar India

फोन Landline No. : मो. Mobile No. :7766942269 ईमेल E-mail : KUMARABHISHEK1234@GMAIL.COM

Patient Complaint:
C/O Chest Pain, Stomach Heavyness, Skin L.Esion All Over Body

Diagnosis:
Twak Vikar/Skin Disease

Follow-up Date: 04/05/2018

1	HARIDRA KHAND	1-1 चम्च	20	GM	Take 1 tsp with milk / water / honey Before meal For 3 Days
	MANJISHTHA CHURNA		20	GM	
2	KAYAKALP VATI	2-2	5	GM	Take 2 tab of medicine After meal with water / milk For 3 Days
	KAISHORE GUGGUL	2-2	5	GM	

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI

Remarks: TREATMENT START 29/03/18 TO 04/04/18

ACUP POINT ALL DIGESTIVE POINT, CALF ALL CHANNELS

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	TRATKA	TRATAKA
6	SHATKARMA	YOG-NIDRA	YOG-NIDRA

रक्तचाप B.P
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

पतंजलि योगपीठ फेज 1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग 58, निकट बहादराबाद, हरिद्वार 249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 240908, 240888, 240999, 246737 फैक्स Fax : 01334 - 244805, 240664 E-mail : divyayoga@divyayoga.com, patientcare@divyayoga.com Web : www.divyayoga.com

Note : Not for Medico Legal Purpose

University of Patanjali Haridwar

THYROID

(थाइरोइड)

PATIENT NAME : ANJALI BHARDWAJ

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH 2017-0023)

Reg. No.: 3562/15479540522

Name of Patient : Mr./Mrs./Ms. : ANJALI BHARDWAJ

Dated : 20/01/2019

Age/Sex : 45Yer/F

Address : Dr. ARUN K. PANDEY

Referred by :

TEST	VALUE	NORMAL RANGE
T3	0.4ng/ml	(0.4 -1.8 ng/mL)
T4	2.8µg/dL	(4.4 – 10.8 µg/dL)
TSH	10.0µIU/mL	(0.4 - 4.2µIU/mL)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240064 E-mail: divyayoga@divyayoga.com Web: www.divyayoga.com

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University of Patanjali Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 3392-2019 HIN (एच0आई0एन0): 154795405222

Full Name. (पूरा नाम): Anjali Bhardwaj Age & Gender (आयु एवं लिंग): 45 F

Full Address. (पूरा पता) Anjali Bhardwaj, H. No - 379, Sector - 2, Kurukshetra, Haryana, 136118

E-mail. (ई–मेल) Anjalib1336@yahoo.com

Mobile No. (मोबाईल नं0) 7329497626 67

Occupation (व्यवसाय): home maker Marital Status (वैवाहिक स्थिति) married

Disease (रोग): Thyroid, fatty liver, weight gain

Duration of Disease (रोग की अवधि): 1-2 Thyroid for 15 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): I've got 2 days of Panchkarma treatment

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि):

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

1. weight loss
2. Relief in allergies
3. Light breakfast
Over all feel good

Percentage (प्रतिशत): 85%

Dated (दिनाँक): 6/2/19 Patient Signature (रोगी हस्ताक्षर) Anjali

Dr.Signature

University of Patanjali * Haridwar *

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No (AH-2017-0025)

Reg. No: 3850/15479540522

Name of Patient : Mr./Mrs./Ms.: ANJALI BHARDWAJ

Dated: 05/02/2019

Age/Sex: 45Yer/F

Address:

Referred by: Dr. SACHIN TYAGI

TEST	VALUE	NORMAL RANGE
T3	0.7ng/ml	(0.4 -1.8 ng/mL)
T4	5.6µg/dL	(4.4 – 10.8 µg/dL)
TSH	0.4µIU/mL	(0.4 - 4.2µIU/mL)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi Hardwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone 01334 - 240008, 248888, 248999, 246737 Fax 01334 - 244805, 246663 E-mail: divyavoga@divyayoga.com Web: www.divyayoga.com

Not for Medico Legal Purpose

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम अंजलि भारद्वाज, HIN 15479540522 है। मुझे शुरू में thyroid की परेशानी रहती थी, जिसके लिए मैंने 20/1/19 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे thyroid की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे friend के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : weight gain
low energy
all the time feeling low

मैं 20/1/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr. Sachin Pandey Tapasvi को दिखाया।

मरीज़ को दवाइयाँ दी गई:

विभाग (में दिखाया) : - Shatkarma

योग (किया या नहीं): - Yes.

संतुलित आहार (लिया या नहीं): - NO - I did not get good food here.

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 16 days दिनांक / माह /वर्ष हो गए और आज अब मैं 85 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: - weight loss
feel good here energetic than before.

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य whole Team of Shatkarma का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: - Anjali6133@yahoo.com मोबाइल व व्हाट्सप्प नंबर:- 732-447-6267

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष:
6/2/19

मरीज़ के हस्ताक्षर
Anjali Bharatbaj

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम – Dr. Sachin tayagi

रोगी का नाम - Anjali Bhandhwaj आयु - 45 लिंग - F

रोगी का पता – Anjali Bhandhwaj
H.No - 374. Sector - 2 Kurukshetra
Haryana.

रोगी के लक्षण – Low energy
lot of weight gain
Allergy

रोग के लक्षण –

रोगी की पूर्व परीक्षण रिपोर्ट्स - Yes पिछली रिपोर्ट्स / फोटो -

नई रिपोर्ट्स / फोटो -

रोग में सुधार प्रतिशत –

चिकित्सक का अनुभव – → 85%.

Patient was having obesity, cough Allergy, Sneezing and milk Product Allergy. after treatment she is feeling very good and got 85% Result.

रोगी का उपचार संबधी कथन -

All team number of Shatkarma department is very friendly. While doing treatment I never felt that I was sick. Very good atmosphere I love it.

दिनांक -

चिकित्सक के हस्ताक्षर [signature] Anjali Bhandhwaj रोगी के हस्ताक्षर

University of Patanjali Haridwar



PRO

C-110-*-*

SLK-585-2019

ANJALI BHARDWAJ

45 - FEMALE

20/01/2019

01/02/2019

AVATU GRANTHI VIKAR / THYROID

DR. DAYASHANKAR SINGH

SATISFACTORY

HIN: 15479540522

Patient Complaint:
Waight Gain,Whole Body Pain,Palpitation,Headache 6 Yrs

Diagnosis:
Avatu Granthi Vikar / Thyroid, Sthplya / Obesity

Follow-up Date: 03/03/2019

1	TRIKUTA CHURNA	50	GM	Mix all the medicines and prepare 60 doses from it take in the morning and evening half-an-hour before Breakfast and Dinner with Water / Honey /cream of Milk.
	PRAVAAL PISHTI	10	GM	
	GODANTI BHASMA	10	GM	
	BAHERA CHURNA	20	GM	
2	SARVAKALPA KWATH	200	GM	Take 1 tea spoons of all the above medicines mix it with 400 ml of water and boil till it reduces to 100 ml, filter and take on an empty stomach in the morning and evening.
	KAYAKALPA KWATH	100	GM	
	TRIPHALA CHURNA	100	GM	
3	MEDOHAR VATI	50	GM	Take 2 tablet in the after morning and evening with lukewarm water.
4	TRIPHALA GUGGULU	40	GM	Take 2-2 tablets of each in the morning in the evening before lunch and dinner with lukewarm water.
	AAROGYAVARDHINI VATI	40	GM	
	KANCHNAR GUGGUL	40	GM	
5	GODHAN ARK	20	ML	Take each in the morning and evening on an empty stomach.
	GHRITAKUMARI SWARAS	20	ML	

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, BHAHA PRANAYAM, ANULOM-VILOM, BHRAMRI, UDGITH, UJJAI, PRANAV, BHUJANGASAN, MARKATASAN, SINGHASAN

Remarks:

University of Patanjali Haridwar

नि:शुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL
बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token HIN NO : 15479540522

Prescription No. 1 क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 3392-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 21/01/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-52-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANJALI BHARDWAJ आयु Age 45 Year लिंग Sex Female

पता Address SEC-2 HNO-374 ,Kurukshetra ,Haryana ,India

फोन Landline No. : +17324476267 मो. Mobile No. : 9416915374 ईमेल E-mail : ANJALIB133@YAHOO.COM

Patient Complaint:
C/O Fatty Liver Grade1, Gastric Acidity,Constipation, Indigestion,Snizzing, Obesity

Diagnosis:
Avatu Granthi Vikar / Thyroid, Stholya / Obesity, Vibandha / Constipation, Yakrita Shotha / Fatty Liver

Since 15 Yrs
Since 15 Yrs
Since 3 Yrs
Since 2 Yrs

Follow-up Date: 22/02/2019

1	MEDOHAR VATI	50	GM	Take 2 tablet in the after morning and evening with lukewarm water.

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, BHAHA PRANAYAM, ANULOM-VILOM, BHRAMRI, UDGITH, UJJAI, PRANAV, BHUJANGASAN, MARKATASAN, SINGHASAN, MANDHUKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN

Remarks: TREATMENT START 22/01/19 TO 26/01/19

ACUP POINT ALL DIGESTIVE POINT,CALF,THRIOD

रक्तचाप B.P. X
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar X
अन्य Other
Allow

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA* — Trifala X m.k.	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

पतंजलि योगपीठ फेज-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड 9 PM
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 246000, 246000, 246000, 246737 फैक्स Fax : 01334 - 246000, 246000 E-mail : divyayoga@divyayoga.com, patient.care@divyayoga.com Web : www.divyayoga.com

Note : Not for Medico Legal Purpose

University of Patanjali Haridwar

PHOTOGRAPHS OF VARIOUS YOGIC INTERVENTIONS

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

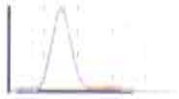
PATANJALI AYURVED HOSPITAL
(Multidimensional Service Unit of Divya Yog Mandir Trust)
Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail : divyayoga@rediffmail.com Web. www.divyayoga.com

Sample No.: 1142 Dr.: SACHIN TYAGI Date: 02/04/2017
Patient ID: 14608617363 Age: 24 Sex: Female
Name: Mrs.SHIVANI SHARMA

CBC

TEST	RESULT	UNIT	NORMAL RANGE
HGB	9.0	[g/dL]	(12.0 - 17.0)
WBC	4.14	[10^3/uL]	(4.000 - 11.000)
DIFFRENTIAL LEUKOCYTE COUNT(DLC)			
NEUT	56.0	[%]	(40 - 80)
LYMPH	30.2	[%]	(20 - 40)
MONO	6.8	[%]	(2.0 - 10.0)
EO	6.5 +	[%]	(1.0 - 6.0)
BASO	0.5	[%]	(0.0 - 2.0)
RBC	4.22	[10^6/uL]	(3.80 - 5.50)
HCT	31.1	[%]	(36.0 - 50.0)
MCV	73.7 -	[fL]	(83.0 - 110.0)
MCH	21.3 -	[pg]	(33.0 - 37.0)
MCHC	28.9 -	[g/dL]	(31.0 - 37.0)
PLT	207	[10^3/uL]	(150 - 400)

RBC



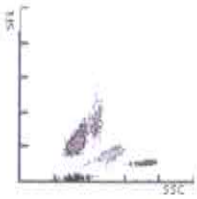
PLT



WBC



DIFF



WBC IP Message(s)
Eosinophilia

RBC IP Message(s)
Hypochromia

Iron Deficiency?

PLT IP Message(s)

Technologist

Pathologist

: Lab Equipped with :

- SYSMEX 2000i - Fully Automatic Heamatology Analyser
- GRIFOLS - Fully Automated Elisa Device (Tumour Marker & Hormone assay.
- Nephlometer - For Specific Protein assay.
- XL 600 & XL 300 - Fully Automated Biochemistry Analyser.
- BIORAD D-10 Fully Automated device for Glycosylated Hemoglobin.
- EASYLYTE -Ion selective Electrolyte Analyser.

Not for Medico Legal Purpose

University of Patanjali * Haridwar *

COMMON COLD DISEASE

(सामान्य जुकाम)

PATIENT NAME : ANJALI SHARAM

University of Patanjali
Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – I , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 30794/19 HIN (एच0आई0एन0): 15582418944

Full Name. (पूरा नाम): Anjali Sharma Age & Gender (आयु एवं लिंग): 17 Female

Full Address. (पूरा पता) Hanuman Vatika Colony Lalrot (Dausa)

E-mail. (ई–मेल) anjalisharma61077@gmail.com

Mobile No. (मोबाईल नं0) 9 4 1 4 8 4 4 6 8 8

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति) No

Disease (रोग): jhukam

Duration of Disease (रोग की अवधि): 3 Year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

योग से शरीर हल्का व शांत रहता है। षट्कर्म से जो रोग है उसमें फायदा है। जैसे जुकाम में मुझे पहले बहुत था लेकिन अब पहले से अच्छी है अब ठीक फिल कर रही है।

Percentage (प्रतिशत): 85%

Dated (दिनांक): 25/5/19 Patient Signature (रोगी हस्ताक्षर) Anjali Sharma

Dr.Signature

University of Patanjali * Haridwar *

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Anjali Sharma, HIN 155824/8944 है। मुझे शुरू में जुकाम की परेशानी रहती थी, जिसके लिए मैंने 2019 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे जुकाम की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे रिश्तेदार के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : जुकाम, एलर्जी, छिंके आना, सिरदर्द आँखों में जलन

मैं 20/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr Sachin को दिखाया।

मरीज़ को दवाइयाँ दी गईं:

विभाग (में दिखाया) : योग एवं प्रकृति

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 25/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 85 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब छिंके नहीं आती और ना ही सिरदर्द होता है और ना ही आँखों में जलन होती है।

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य टीम एवं प्रकृति का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: anjalisharma6107@gmail.com मोबाइल व व्हाट्सप्प नंबर: 8502010481

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 25/5/19

मरीज़ के हस्ताक्षर Anjali Sharma

वैद्य के हस्ताक्षर 25/5/19

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Kumar

रोगी का नाम - Anjali Sharma आयु - 17 लिंग - female

रोगी का पता - Hanuman Vatika Colony Jalsut (Dauli)

रोगी के लक्षण - जुकाम, सिरदर्द, आँखो मे जलन, छिन्ती आना

रोग के लक्षण - नाक का बंद रहना, आँखो से झिलमिल, दिखाई देना सिर दर्द होना,

रोगी की पूर्व परीक्षण रिपोर्ट्स - R.N.R पिछली रिपोर्ट्स / फोटो R.N.R

नई रिपोर्ट्स / फोटो R.N.R

रोग में सुधार प्रतिशत - 85%.

चिकित्सक का अनुभव - Patient got 85%. Result through yog and Sketian treatment.

रोगी का उपचार संबधी कथन - अब छिके नही आती है ना ही सिरदर्द रहता है और ना ही आंखो मे जलन रहती है। मुझे अच्छा महसूस हो रहा है, जुकाम में भी बहुत आराम हुआ है।

दिनांक - 25/5/19

चिकित्सक के हस्ताक्षर 25/5/19

रोगी के हस्ताक्षर Anjali Sharma

University of Patanjali ★ Haridwar ★

निःशुल्क परामर्श

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No: AH-2017-0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रात: 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 5 HIN NO : 15582418944

Prescription No: 1

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 30794-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 19/05/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-716-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANJALI SHARMA आयु Age 17 Year लिंग Sex Female

पता Address DIDWANA LALSOT,DAUSA ,Dausa ,Rajasthan ,India

फोन Landline No. : ..... मो. Mobile No. : 9414844688 ईमेल E-mail : .....

6377170158

Patient Complaint:
C/O Constipation,Cold And Cough,Eye Red Ness,Weakness,

Diagnosis:
Pratishyay / Commom Cold, Vibandha / Constipation

Since - 3yr
BP
Sugar
Thyroid NO

Follow-up Date: 18/06/2019

1	MULETHI KWATH	100	GM	Take 1 tsp of medicine and boil it in 4 cups of water. Boil till it reduces to 1 cup. Strain and take it twice a day an hour before meal. For 30 Days
	SWASARI KWATH	200	GM	

Pranayam / Asanas: ANULOM-VILOM, BHRAMRI, KAPALBHATI, BHASTRIKA, BAHYAPRANAYAAM, UDGITH, UJJAI, MANDHUKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN, MARKATASAN

Remarks: TRATMENT WILL BE START FROM DATE - 20/05/2019 TO 26/05/2019

ACUP POINT- STO,LIV,INT,CALF,COLD AND COUGH, ALLL CHANNLES

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE - 23/05/19 TO 26/5/19	ACUPRESSURE
2	SHATKARMA	JAL NETI	TRIFLA + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	SUTRA NETI	RUBBER NETI
7	SHATKARMA	TRATKA	TRATAKA
8	SHATKARMA	YOG-NIDRA	YOG-NIDRA

23/05 To 26/5

5660 / 4 days
9110 / 3 days

PRO Vinay 59

पतंजलि योगपीठ-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth-1, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 240008, 240080, 240095, 240737 फैक्स Fax : 01334 - 244005, 240064 E-mail : divyayoga@divyayoga.com, patient.care@divyayoga.com Web : www.divyayoga.com

University of Patanjali Haridwar

CONSTIPATIONDISEASE

(कब्ज रोग)

PATIENT NAME : ANJU GUPTA

University of Patanjali Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 40706-2019 HIN (एच0आई0एन0): 15605(R2051

Full Name. (पूरा नाम): Anju Gupta Age & Gender (आयु एवं लिंग): 43 Female

Full Address. (पूरा पता) Momara Gani Ayodhya

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9 6 2 1 1 9 0 7 2 6

Occupation (व्यवसाय): [illegible] Marital Status (वैवाहिक स्थिति) [illegible]

Disease (रोग): [illegible]

Duration of Disease (रोग की अवधि): 10-12 वर्ष

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Aelopethic

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 10 years

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
[illegible]

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 22/6/19 **Patient Signature** (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम [illegible] , HIN [illegible] है। मुझे शुरू में [illegible] की परेशानी रहती थी, जिसके लिए मैंने [illegible] दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे [illegible] की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे [illegible] के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : [illegible]

मैं 14/06/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य [illegible] को दिखाया।

मरीज़ को दवाइयाँ दी गईं: [illegible]

विभाग (में दिखाया) : [illegible]

योग (किया या नहीं): [illegible]

संतुलित आहार (लिया या नहीं): [illegible]

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए [illegible] दिनांक / माह /वर्ष हो गए और आज अब मैं 80% % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: [illegible]

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य [illegible] का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 9629190726

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

22/6/19
दिनांक / माह /वर्ष:

[illegible]
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - डा० सुरेश कुमार त्यागी

रोगी का नाम - [illegible] आयु - 43 वर्ष लिंग - पुरुष

रोगी का पता - [illegible]

~~रोगी के लक्षण~~ रोग - [illegible]

रोग के लक्षण - [illegible]

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR

पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो RNR

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव -

रोगी का उपचार संबंधी कथन - [illegible]

दिनांक -

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_save.

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No. AH-2017-0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 4 HIN NO : 15605682051

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

Prescription No: 1

पंजीकरण संख्या Reg. No. 40706-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 15/06/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-972-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANJU GUPTA आयु Age 43 Year लिंग Sex Female

पता Address MOMARA GANJ ,AYODHYA ,Uttar Pradesh ,India

फोन Landline No. : ..... मो. Mobile No. : 9621190726 ईमेल E-mail : ?

Patient Complaint:
C/O Pain In Abd Vomiting, Swelling In Hand & Leg, Pain In Chest, Pain In Knee, Pain In Back HTN

Diagnosis:
Vibandha / Constipation
High Blood Pressure
Since 12 Yrs

1	ABHYARISHTA	450	Mix 4 spoon full of Medicine in an equal amount of lukewarm water and take it in the morning and evening after meals.

Follow-up Date: 15/07/2019

Pranayam / Asanas: MANDHUKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN, MARKATASAN

Remarks:

TREATMENT WILL BE START FROM - 10-06-2019 TO 22-06-2019

ACU.P-STO,LIV,INT,CALF

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + ~~SALT~~ WATER
5	SHATKARMA	*TRATKA*	TRATAKA
6	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

रक्तचाप B.P. ✓
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar ✗
अन्य Other Thyx
Allo

Mild Salt PRO Vinay Ji

5040 / 4 Days
8040 / 7 Days

Sachin Tyagi 15/6/19

15-Jun-19 10:43 AI

University of Patanjali ★ Haridwar ★

DEPRESSION DISEASE

(मानसिक रोग)

PATIENT NAME : ANKITA CHAUHAN

University of Patanjali ★ Haridwar

Patient: **CHAUHAN, ANKITA**

Age: 32 years Gender: F
Date of Birth: Apr 24 1986
HC #: **1470378280HJ**
Patient's Phone: (847) 525-3505

Ordered by: K ALI DR. TEHMINA
Copy To:

Lab No: **2019-YS0210701**
Reference #:
Patient ID:
Referring Site ID:

Date of Service: Jan 21 2019 13:56
Reported on: Jan 22 2019 12:04

LifeLabs

Address: 150 International Blvd
Toronto, Ontario
Canada M9W 6J6
Telephone: 877 849 3637
Toll Free: 877 849 3637
Fax: 905 796 8861

Test	Flag	Result	Reference Range	Units	Lab Lic. #
Hematology					#5687
WBC		5.9	4.0 - 11.0	x E9/L	
RBC		4.70	4.00 - 5.10	x E12/L	
Hemoglobin		132	120 - 160	g/L	
Hematocrit		0.403	0.350 - 0.450	L/L	
MCV		84	80 - 100	fL	
MCH		27.6	27.5 - 33.0	pg	
MCHC		328	305 - 360	g/L	
RDW		12.4	11.5 - 14.5	%	
Platelet Count		223	150 - 400	x E9/L	
Differential					
Neutrophils		3.2	2.0 - 7.5	x E9/L	
Lymphocytes		1.9	1.0 - 3.5	x E9/L	
Monocytes		0.6	0.2 - 1.0	x E9/L	
Eosinophils		0.2	0.0 - 0.5	x E9/L	
Basophils		0.1	0.0 - 0.2	x E9/L	
Immature Granulocytes		0.0	0.0 - 0.1	x E9/L	
Nucleated RBC		0		/100 WBC	

LifeLabs is now reporting five new CBC parameters : Reticulocyte Hgb, IRF, IPF, NRBC, and IG. All parameters will be automatically reported when applicable. For more information please visit LifeLabs.com, click on "Healthcare Providers" and refer to an article called "New Hematology Instrumentation and Parameters" under the "News and Notices" section

Biochemical Investigation of Anemias				
Vitamin B12		301	138-652	pmol/L
Ferritin		26	5-272	ug/L
General Chemistry				
Hemoglobin A1C/Total Hemoglobin		5.0	<6.0	%

CDA 2013 Guidelines

Screening and Diagnosis
<5.5 % Normal
5.5% - 5.9 % At risk
6.0% - 6.4 % Prediabetes
>OR = 6.5 % Diabetes Mellitus

If HbA1c >OR= 6.5 % and asymptomatic, confirm using Fasting Glucose, HbA1c or 75g OGTT

FINAL RESULTS

IMPORTANT: This report contains confidential information intended for view by authorized person(s) only and should be disposed of securely (e.g. shredding) before discarding
Note to Health Care Providers: This report has been printed by the patient.
Note to patients: Please contact your Health Care Provider if you have any questions regarding the results on this report

University of Patanjali ★ Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 14589-2019 HIN (एच0आई0एन0): 15529032997

Full Name. (पूरा नाम): Ankita Chauhan Age & Gender (आयु एवं लिंग): 32 F

Full Address. (पूरा पता): Ohana Hospital, Dosarka, Distt. Ambala Haryana – 133202

E-mail. (ई–मेल) ankita.chauhan86@gmail.com

Mobile No. (मोबाईल नं0) 9 9 9 6 4 3 2 3 8 8

Occupation (व्यवसाय): Software Engineer Ph. Canada. 01-6475253505 Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Hypothyroidism, Stress & Muscular Stiffness

Duration of Disease (रोग की अवधि): over 1 year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Medicine for Thyroid only

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 2 months

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
TSH is normal & stress levels are lower than before.
Improvement in overall muscular flexibility & strength

Percentage (प्रतिशत): 95%

Dated (दिनॉक): April 13, 2019 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali Haridwar

Patient: **CHAUHAN, ANKITA**

Age 32 years Gender F
Date of Birth Apr 24 1986
HC # **1470378280HJ**
Patient's Phone (647) 525-3505

Ordered by K. ALI DR. TEHMINA
Copy To

Lab No **2019-YS0210701**
Reference #
Patient ID
Referring Site ID

Date of Service Jan 21 2019 13:56
Reported on Jan 22 2019 12:04

LifeLabs
Address 100 International Blvd
Toronto, Ontario
Canada M9W 6J6
Telephone (877) 849-3637
Toll Free (877) 849-3637
Fax (905) 795-9891

Test	Flag	Result	Reference Range - Units	Lab Lic. #
General Chemistry				
		Monitoring <OR= 7.0 % Target in adults without comorbidities. Other targets may be more appropriate in children, elderly and patients with comorbidities		
		Results may not accurately reflect mean blood glucose in patients with hemoglobin variants, disorders associated with abnormal erythrocyte turnover, severe renal and liver disorders		
Creatinine		51	50-100 umol/L	
Glomerular Filtration Rate (eGFR)		>120 Normal eGFR is described as greater than or equal to 90 ml/min/1.73 m2 For patients of African descent, the reported eGFR must be multiplied by 1.15. Effective May 4 2015, eGFR is calculated using the CKD-EPI 2009 equation KDIGO 2012 guidelines highlight the importance of eGFR and urine albumin creatinine ratio (ACR) in screening, diagnosis and management of CKD. Results for eGFR should be interpreted in concert with ACR.		
Thyroid Function				
Thyroid Stimulating Hormone (TSH)	HI	4.63	0.32-4.00 mIU/L	
Bone Markers				
25-Hydroxyvitamin D	LO	53 Season, race and dietary intake affect 25-Hydroxy Vitamin D levels. Highest levels are found in the summer months and lowest levels during the winter. 25 - 74 nmol/L Vitamin D Insufficient	75 - 250 nmol/L	

FINAL RESULTS

IMPORTANT: This report contains confidential information intended for view by authorized person(s) only and should be disposed of securely (e.g. shredding) before discarding.

Note to Health Care Providers: This report has been printed by the patient.

Note to patients: Please contact your Health Care Provider if you have any questions regarding the results on this report.

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Ankita Chauhan , HIN 155290032997 है। मुझे शुरू में Thyroid, Depression, Muscular Stiffness की परेशानी रहती थी, जिसके लिए मैंने July 2018 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे Dr Sonya Chauhan की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे Mother, Dr Sonya Chauhan के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Hypothyroidism, Stress, Anxiety, Muscular Stiffness

में 6 April, 2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Dr. Sachin K Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: No

विभाग (में दिखाया) : Dr Vikram Gupta (Panchkarma)
Dr Sachin K. Tyagi (Shatkarma)

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 7 days दिनांक / माह /वर्ष हो गए और आज अब मैं 95 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: Improvement in overall muscular stiffness. Decline in stress and anxiety. More energetic and cheerful than before.

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Dr Sachin K Tyagi का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: ankita.chauhan88@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 9996432387 +1 6475253505

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 13 April, 2019

Ankita Chauhan
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin K Tyagi

रोगी का नाम - Anita Chauhan आयु - 32 लिंग - Female

रोगी का पता - C/o Rana Hospital, Dosarka, Distt Ambala Haryana - 133202

रोगी के लक्षण - Stress, Anxiety, Depression, Thyroidism & Muscular Stiffness

रोग के लक्षण - Insomnia, pain in neck, shoulder and back

रोगी की पूर्व परीक्षण रिपोर्ट्स - Yes

पिछली रिपोर्ट्स / फोटो Yes

नई रिपोर्ट्स / फोटो

रोग में सुधार प्रतिशत - 95%

चिकित्सक का अनुभव - Patient got 95% Result through yoga and Pre Hanna treatment.

रोगी का उपचार संबंधी कथन - Improvement in overall mental and physical stress. Muscular tension relieved. Yoga and pranayama has helped me in healing my ailments. Doctor and entire staff was very helpful and dedicated towards patients. From my experience at Patanjali, I would highly recommend Yoga and pranayama therapy to everyone.

Anita Chauhan

रोगी के हस्ताक्षर

दिनांक - 13 April, 2019.

चिकित्सक के हस्ताक्षर

University of Patanjali Haridwar

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_saveAp.

नि:शुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL
बहिरंग चिकित्सा विभाग O.P.D.

Reg. No. AH-2017-0025

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 12 HIN NO : 15529032997

Prescription No: Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 14589-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 06/04/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-413-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANKITA CHAUHAN आयु Age 32 Year लिंग Sex Female

पता Address RANA HOSPITAL DOSARKA ,Ambala ,Haryana ,India (Torentto) → Part

फोन Landline No. : +6475253505 (whatt) मो. Mobile No. 9996432388 → Part ईमेल E-mail : ANKITA.CHAUHAN86@GMAIL.COM

Follow-up Date: 06/05/2019

Patient Complaint:
K/C/O Depressive, Anxiety Hypothyroidism , Problem In Conceving — Last 6 year

Diagnosis:
Buddhivibhransha / Anxiety, Manoavsada / Depression, Krichchhonmilan / Dry Eye — Last 1 year

90-95% improvement

Last 1 year

In Depression Hypothyroidism

1 BADAM ROGAN 60 ML 2 drpos in each nostril at bed time

ADMISSION IN I.P.D

Pranayam / Asanas: , ANULOM VILOM, BAHYAPRANAYAM, BHASTRIKA, BHRAMARI, BHUJANGASANA, KAPALBHANTI, LIGHT EXERCISE, MAKRASANA, PRANAV JAP, SARVANGASANA, SHAVASANA, UDGEETH, UJJAYI, UTTANPADASANA

Remarks: TREATMENT START07/04/19 TO 13/04/19

ACUP POINT ALL DIGESTIVE POINT, CALF, P.GLAND

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Madha Kwath +

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

7 day (9110) Total

4 day (5660) Total

PRO Vinay 59

Refer to Panchkam for Shirodhar, Abhyanga Sudha

Dr. Shivani for five day

Dr. Kelas

6/4/19

06-Apr-19 4:30 PM

University of Patanjali Haridwar

DIABETES

(मधुमेह)

PATIENT NAME : ANPURNA SINGH

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH-2017-0075)

Sample No.:	8152	Dr.: SACHIN TYAGI	Date: 05/08/2018
Patient ID:	15329353984	Age: 45	Sex: Female
Name: Mrs.ANPURNA SINGH			

CBC

TEST	RESULT	UNIT	NORMAL RANGE
HGB	12.9	[g/dL]	(12.0 - 17.0)
WBC	5.88	[10^3/uL]	(4.000 - 11.000)
DIFFRENTIAL LEUKOCYTE COUNT(DLC)			
NEUT	45.9	[%]	(40 - 80)
LYMPH	35.7	[%]	(20 - 40)
MONO	3.9	[%]	(2.0 - 10.0)
EO	13.8 +	[%]	(1.0 - 6.0)
BASO	0.7	[%]	(0.0 - 2.0)
RBC	4.38	[10^6/uL]	(3.80 - 5.50)
HCT	37.8	[%]	(36.0 - 50.0)
MCV	86.3	[fL]	(83.0 - 110.0)
MCH	29.5	[pg]	(33.0 - 37.0)
MCHC	34.1	[g/dL]	(31.0 - 37.0)
PLT	190	[10^3/uL]	(150 - 400)

RBC



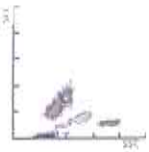
PLT



WBC



DIFF



WBC IP Message(s)
Eosinophilia

RBC IP Message(s)

PLT IP Message(s)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 246888, 246999, 246737 Fax: 01334 - 244808, 240684 E-Mail: divyayoga@divyayoga.com Web: www.divyayoga.com

Not for Medico Legal Purpose

University of Patanjali Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH-2017-0025)

Reg. No.: 8152/15329353984		Dated:	05/08/2018
Name of Patient : Mr./Mrs./Ms. :	ANPURNA SINGH	Age/Sex :	45Yer/F
Address : Dr. SACHIN.TYAGI			
Referred by :			

TEST	VALUE	NORMAL RANGE
Fasting Blood Sugar	128.0	mg/dl (70 – 110)
P.P Blood Sugar	258.0	mg/dl (110 – 140)
E.S.R. :- (Westergreen Method)	41	Male (0 – 15 mm) Female (0 – 20 mm)

GLYCOSYLATED HAEMOGLOBIN (HbA1c) :-

HbA1c :- 6.9%

REFRENCE VALUE :-

< 3.9 – 6.5 % Non Diabetic Level(Normal)

< 6.5-7.0 % Diabetic (Good Control)

> 7.0– 7.8 % (Action Suggested)

> 7.8 % Poor control

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax:,01334 - 244805, 240664 E-mail divyayoga@divyayoga.com Web www.divyayoga.com

Not for Medico Legal Purpose

University of Patanjali ★ Haridwar ★

http://172.16.0.4:8082/ChikitsalayaWeb/DoctorAppointment_save/

निःशुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय Token 6 HIN NO : 15329353984

PATANJALI AYURVEDA HOSPITAL

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

Prescription No: 1

पंजीकरण संख्या Reg. No. 55039-2018 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 30/07/2018

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-918-2018 कक्ष संख्या Room No. 0

रोगी : श्री/श्रीमती Patient : Mr./Mrs. ANPURNA SINGH आयु Age 45 Year लिंग Sex Female

पता Address KANPUR ,Kanpur(Nagar) ,Uttar Pradesh ,India

फोन Landline No. : ..... मो. Mobile No. : 09336314013 ईमेल E-mail : .....

Follow-up Date: 29/08/2018

Patient Complaint:
H/O Diabetes Tyap-2 Eye Problem,Hearing Loss, Constipation,Acidity,Ear Itching, Insomnia,Knee Pain

Diagnosis:
Madhunasha / Diabetes / Sugar, Badhirya/Hearing Loss, Vibandha / Constipation, Amla Pitta / Hyperacidity, Nidra Nasha / Insomnia

1	MADHUNASHINI VATI	60	PC	Chew 2 tablets in the morning and evening on an empty stomach with water.

Admission in I.P.D

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, UDGITH, UJJAI, MANDHUKASAN, SASKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN, MARKATASAN, BHRAMRI, SHAVASANA

Remarks: TREATMENT WILL BE START FROM - 30/07/2018 TO 05/08/2018
ACU POINT -
STO,LIV,INT,CALF,EYE,EAR,KNEE,PAN,BRAIN,P.GLAND,ALL CHANLES

रक्तचाप B.P. - 120/80 mmHg
नाड़ी Pulse - 96 bpm
तापमान Temperature 98.6°F
रक्त शर्करा Blood Sugar H/O
अन्य Other B. Sugar

Ach
- C.B.C, ESR
- B. Sugar PP and Fasting
- Lipid Profile, K.F.T
- HbA1c

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI	TRIFLA + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	SUTRA NETI	RUBBER NETI
7	SHATKARMA	TRATKA	TRATAKA
8	SHATKARMA	YOG-NIDRA	YOG-NIDRA
9	"	(6) - Sutra Neti 6/31/07 to 6/08/18	Rubber

University of Patanjali Haridwar

Dr Lal PathLabs

National Reference Lab: Sector 18, Block-E, Rohini, New Delhi - 110 085
Tel: 011 - 3040-3210, Fax: 011 - 3040-3204
E-mail: lalpathlabs@lalpathlabs.com Web: www.lalpathlabs.com

[illegible] RIKHANA ROAD (KANPUR) CC
KANPUR UTP
KANPUR

(Hony) Brig. Dr. Arvind Lal
M.B.B.S., D.C.P.
Chairman & Chief

Dr. Vandana Lal
M.D.(INTE), DCAP
Chief of Technology

Name	Mrs. ANNPURNA			Collected	: 4/1/2017 6:48:00PM
Lab No	236287622	Age: 43 Years	Gender: Female	Received	: 4/1/2017 7:13:22PM
				Reported	: 4/1/2017 11:21:51PM
Ac Status	P	Ref By : SELF		Report Status	: Final

Test Name	Results	Units	Bio. Ref. Interval
[illegible] FASTING (F), PLASMA	114.00	mg/dL	70.00 - 100.00

----------End of report ----------

If test results are alarming or unexpected, Client is advised to contact the laboratory immediately for possible remedial action.
@ Tests conducted at National Reference Lab, New Delhi, a CAP (7171001), ISO (FS 60411) and NABL (M-0061) accredited laboratory

University of Patanjali ★ Haridwar ★

Dr Lal PathLabs

National Reference Lab: Sector 18, Block-B, Rohini, New Delhi - 110 085
Tel: 011 - 3040-3210, Fax: 011 - 3040-3204
E-mail: lalpathlabs@lalpathlabs.com Web: www.lalpathlabs.com

[illegible] HARIANA ROAD (KANPUR) CC
[illegible] UTP

(Hony) Brig. Dr. Arvind Lal
M.B.B.S., D.C.P.

Dr. Vandana Lal
M.D.(PATH), DCAP

Name	Mrs. ANNPURNA			Collected	: 4/1/2017 6:35:00PM
				Received	: 4/1/2017 6:53:12PM
[illegible]	236287615	Age: 43 Years	Gender: Female	Reported	: 5/1/2017 9:52:11AM
[illegible]	P	Ref By : SELF		Report Status	: Final

Test Name	Results	Units	Bio. Ref. Interval
URINE EXAMINATION, ROUTINE; URINE, R/E (Automated Strip Test, Microscopy)			
[illegible]			
[illegible]	Light Yellow		Pale yellow
[illegible] Gravity	1.025		1.001 - 1.030
[illegible]	5.5		5.0 - 8.0
[illegible]			
[illegible]	Nil		Nil
[illegible]	Present 2+(0.5 g/dL)		Nil
[illegible] Rechecked, [illegible]			
[illegible]	Nil		Nil
[illegible]	Nil		Nil
[illegible]	Normal		Normal
[illegible] Esterase	Negative		Negative
[illegible]	Negative		Negative
Microscopy			
[illegible]	Negative		Negative
[illegible] Cells	2-3 WBC/HPF		0-5 WBC / hpf
[illegible] Cells	++(in fair numbers)		Few
[illegible]	Nil		Nil /lpf
[illegible]	Nil		Nil
[illegible]	Nil		-
[illegible] Rechecked, [illegible] Correlate Clinically			

If test results are alarming or unexpected, Client is advised to contact the laboratory immediately for possible remedial action.
@ Tests conducted at National Reference Lab, New Delhi, a CAP (7171001), ISO (FS 60411) and NABL (M-0061) accredited laboratory

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Lal PathLabs

National Reference Lab: Sector-18, Block-E, Rohini, New Delhi - 110 085
Tel: 011 - 3040-3210, Fax: 011 - 3040-3204
E-mail: lalpathlabs@lalpathlabs.com Web: www.lalpathlabs.com

ANA ROAD (KANPUR) CC

(Mrs.) Mrs. ANNPURNA

236287615 Age: 43 Years Gender: Female

IP Ref By : SELF

Collected : 4/1/2017 6:35:00PM
Received : 4/1/2017 6:53:12PM
Reported : 5/1/2017 9:52:11AM
Report Status Final

Test Name	Results	Units	Bio. Ref. Interval
HbA1c (GLYCOSYLATED HEMOGLOBIN), BLOOD	7.0	%	

Note: 1. Since HbA1c reflects long term fluctuations in the blood glucose concentration, a diabetic patient who is recently under good control may still have a high concentration of HbA1c. Converse is true for a diabetic previously under good control but now poorly controlled.

2. Target goals of < 7.0 % may be beneficial in patients with short duration of diabetes, long life expectancy and no significant cardiovascular disease. In patients with significant complications of diabetes, limited life expectancy or extensive co-morbid conditions, targeting a goal of < 7.0 % may not be appropriate.

Comments

HbA1c provides an index of average blood glucose levels over the past 8 - 12 weeks and is a much better indicator of long term glycemic control as compared to blood and urinary glucose determinations.

ADA criteria for correlation between HbA1c & Mean plasma glucose levels

HbA1c (%)	Mean Plasma Glucose (mg/dL)
6	126
7	154
8	183
9	212
10	240
11	269
12	298

If test results are alarming or unexpected, Client is advised to contact the laboratory immediately for possible remedial action.
Tests conducted at National Reference Lab, New Delhi, a CAP (7171001), ISO (FS 604111) and NABL (M-0061) accredited laboratory.

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PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH-2017-0025)

8162/15329353984

Name of Patient : Mr./Mrs./Ms. : ANPURNA SINGH

Dated : 05/08/2018

Age/Sex : 45Yer/F

Address :

Referred by : Dr. SACHIN.TYAGI

LIPID PROFILE

TEST	VALUE	NORMAL VALUE
Serum Cholesterol	193.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
HDL Cholesterol	35.3	mg% (35 – 60)
LDL Cholesterol	139.0	mg% (Desirable < 130) (Border Line 130 – 159) (High > 160)
Serum Triglycerides	132.0	mg% (10 – 190)
Serum VLDL	26.4	mg% (5 - 40)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail : divyayoga@divyayoga.com Web : www.divyayoga.com

Not for Medico Legal Purpose

University of Patanjali ★ Haridwar ★

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH-2017-0025)

Reg. No.: 8152/15329353984

Name of Patient : Mr./Mrs./Ms. : ANPURNA SINGH

Dated : 05/08/2018

Age/Sex : 45Yer/F

Address :

Referred by : Dr. SACHIN.TYAGI

KIDNEY FUNCTION TEST

TEST	VALUE	NORMAL RANGE
Serum Cholesterol	193.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
Serum Urea	14.6	(15 - 45 mg/dl)
Serum Creatinine	0.8	(0.7 - 1.5 mg/dl)
Serum Uric acid	5.7	(2.0 - 7.0 mg/dl)
Serum Alkaline Phosphate	59.0	U/L (53 - 128)
Serum Total Protein	6.5	(5.5 - 8.0 gm/dl)
Serum Albumin	4.1	(3.5 - 5.5 gm/dl)
Serum Globulin	2.4	mg% (2.3 – 2.6)
A/GRatio	1.7:1	(1.2 - 2: 1)
Serum Na+ (Sodium)	141.9	Mmol/L (135 – 145)
Serum K+ (Potassium)	4.1	Mmol/L (3.5 –5.0)
Serum Ca++ (Calcium)	5.2	MEq/ L (4.5 – 5.5)

Technologist

Pathologist

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Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240664 E-mail: divyayoga@divyayoga.com Web: www.divyayoga.com

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University of Patanjali ★ Haridwar ★

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 55039 HIN (एच0आई0एन0): 153293539804

Full Name. (पूरा नाम): Anupurna Singh Age & Gender (आयु एवं लिंग): 45 F

Full Address. (पूरा पता) 60/20 Purani Dal mandi Kanpur

anupurna.123@gmail.com E-mail. (ई–मेल)

9336314013 Mobile No. (मोबाईल नं0) 9 3 3 6 3 1 4 0 1 3

Occupation (व्यवसाय): Business Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Diabetes

Duration of Disease (रोग की अवधि): 4 years Back

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

Good Experience

Percentage (प्रतिशत): 50%

Dated (दिनाँक): 05/04/18 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of Patanjali ★ Haridwar ★

FATTY LIVER

(फैटी लीवर)

PATIENT NAME :VIVEK KUMAR SHUKLA

University of Patanjali ★ Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 74594-2019 HIN (एच0आई0एन0): 15731041607

Full Name. (पूरा नाम): Vivek kumar Shukla Age & Gender (आयु एवं लिंग): 32

Full Address. (पूरा पता) 2-3 Auckland Ville Dorjeeling

E-mail. (ई–मेल) vivekshukla.12@hotmail.com

Mobile No. (मोबाईल नं0) 9654111120

Occupation (व्यवसाय): Service Marital Status (वैवाहिक स्थिति) M

Disease (रोग): Fatty Liver

Duration of Disease (रोग की अवधि): 7-8 months

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
feeling much relaxed and better after 4 days
never checked the reports but feeling bette-

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 14/11/19 Patient Signature (रोगी हस्ताक्षर)

Dr.Signature

University of ... Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Vivek Kumar Shukla, HIN 15731041607 है। मुझे शुरू में Fatty liver (pain and weakness) की परेशानी रहती थी, जिसके लिए मैंने 7/11/2019 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे Fatty liver की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमें हमारे N/A के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Pain, Heaviness in right side of abdomen Hyper Acidity

मैं 7/11/2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr. Sachin Ke. Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गईं: No

विभाग (में दिखाया) : KAYA CHIKITSA (27No) OPD 2, SHATKARMA

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 11/11/2019 दिनांक / माह /वर्ष हो गए और आज अब मैं 80 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: No pain, No Burning Sensation, Feeling much better.

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य Dr. Sachin Ke. Tyagi का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: मोबाइल व व्हाट्सप्प नंबर: 9654111208

रिपोर्ट्स उपलब्ध कराई गयी हाँ (✓) या नहीं ()। वीडियो उपलब्ध कराई गयी हाँ ( ) या नहीं ( )।

मरीज की स्वीकृति: मरीज अपनी वीडियो / फोटो सोशल मीडिया / फेसबुक में प्रकाशन हेतु तैयार है।
हाँ (✓) या नहीं ( )

दिनांक / माह /वर्ष: 11/11/2019 मरीज़ के हस्ताक्षर वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Kumar Thayi

रोगी का नाम - Vivek Kumar आयु - 37 लिंग - M

रोगी का पता - 2-3 Auckland Villa Darjeeling W.B

रोग - Fatty Liver

रोग के लक्षण - Pain in Right Sinte in Abd & Heavness

रोगी की पूर्व परीक्षण रिपोर्ट्स - LFT पिछली रिपोर्ट्स / फोटो Yes

नई रिपोर्ट्स / फोटो

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव -

Patient got 80% Regard to his [illegible] [illegible] [illegible] [illegible] [illegible]

रोगी का उपचार संबधी कथन -

had fatty liver, burning sensation, pain now which is much better.

दिनांक -

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

HEADACHE

(सिरदर्द)

ABHA JAKHMOLA

University of Patanjali
Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 43434-2019 HIN (एच0आई0एन0): 15611928243

Full Name. (पूरा नाम): ARMA YAGYESH JAKHMOLA Age & Gender (आयु एवं लिंग): 29 F

Full Address. (पूरा पता) HN 201/A-15 MATRUASHISH SOCIETY, Sec-10, SHANTI NAGAR MIRA ROAD (E), THANE, MAHARASHTRA

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 7 4 0 0 2 7 1 9 4 6

Occupation (व्यवसाय): Corporate Lawyer Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Headache

Duration of Disease (रोग की अवधि): 10 Years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): No

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): No

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

Very Good Effect

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 27/June/19 **Patient Signature** (रोगी हस्ताक्षर) Ayjakhmola

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15611928243
Prescription No: 1
Clinic & Centre No: HEADOFFICE

ID Proof:

Reg No: 43434-2019 Doctor : DR SACHIN TYAGI - E00428 Visit Date: 22/06/2019

Department: SHATKARM CLINIC AND RESEARC Annual No: SHAT-1055-2019 Room No: 0

Patient Name: (Mr/Ms/Mrs.) Mr. Abha Jakhmola Age: 29 Sex: Female

Address: Sec.-10-A-15/201 Matru Ashish, Shanti Nagar Thane Maharashtra

Landline No. : Mobile No. : 8097667461 E-mail :

Follow-up Date: 22/07/2019

Patient Complaint:
C/O Rogi Avlokan Hetu

1	UDRAMRIT VATI	40	GM	Take 02 tab of medicine After meal with water / milk For 30 Days

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation

Pranayam / Asanas: , ARDH DHANURASANA, ARDH HALASAN, ARDHMATSYENDRASNA, CHAKRASANA, DHANURASAN, PADVRITTASANA, SUPTA VAJRASANA, SURYANAMASKAR, USHTRASANA

Remarks: TREATMENT START23/06/19 TO 27/06/19

ACUP POINT ALL DIGESTIVE POINT ,CALF

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	TRATKA	TRATAKA
6	SHATKARMA	YOG-NIDRA	YOG-NIDRA

Printed on: June 27, 2019

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम आभा जखमोला , HIN 15611928243 है। मुझे शुरू में सर दर्द की परेशानी रहती थी, जिसके लिए मैंने N/A दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे N/A की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे _____ के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : [illegible]

मैं 22/6/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य [illegible] को दिखाया।

मरीज़ को दवाइयाँ दी गई: नहीं

विभाग (में दिखाया) : दिखाया

योग (किया या नहीं): किया

संतुलित आहार (लिया या नहीं): लिया

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 5 दिन दिनांक / माह /वर्ष हो गए और आज अब मै 99 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब मैं अलमा महसूस कर रही हूँ और जो कारीगर रहता था वह भी ठीक है

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य [illegible] का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: abha.baloni13@gmail.com

मोबाइल व व्हाट्सप्प नंबर: 7400271946

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()।

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष: 27/Jun/19

Ayjakhmola
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - डा. सचिन

रोगी का नाम - श्रीमती जयतमोत्सा आयु - २९ लिंग - महिला

रोगी का पता - २०१/A-15, मातु श्रीआशा सोसायटी, सेक्टर 10, शांति नगर, मीरा रोड, थाने, महाराष्ट्र

रोग के लक्षण - सिर दर्द

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNO पिछली रिपोर्ट्स / फोटो RNO

नई रिपोर्ट्स / फोटो RNO

रोग में सुधार प्रतिशत - 100%

चिकित्सक का अनुभव - ~~अच्छा~~ Patient got 100% Result through yog and Shatkarma both

रोगी का उपचार संबधी कथन - बहुत अच्छा यहाँ से काफी आराम। मुझे योग करके पहले से बहुत बेहतर लग रहा है। और काफी जानकारी भी मिली। उदासी अब ना के बराबर है एवं काफी चुस्त शरीर महसूस होने लगा है। यहाँ से जाकर मैं रोज योग अभ्यास करूंगी।

दिनांक -

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

HIGH BLOOD PRESSURE

(उच्च रक्तचाप)

PATIENT NAME : SAROJ CHAUHAN

University of Patanjali Haridwar

100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 14538/16 HIN (एच0आई0एन0): 15519037260

Full Name. (पूरा नाम): Saroj Chauhan Age & Gender (आयु एवं लिंग): 52 F

Full Address. (पूरा पता) RAMA HOSPITAL.
DOSERKA. P.O Dhesh. Ambala. Haryana.

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 9 4 1 6 1 7 9 3 0 3

Occupation (व्यवसाय): BAMS Doctor Marital Status (वैवाहिक स्थिति) Normal.

Disease (रोग): Psoriasis Hypothyroidism High B.P Tension

Duration of Disease (रोग की अवधि): From 04 year B.P 1 year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): 4 year 5 year
Normal B.P Telmisan Thyroid Eltroxin 10 mm

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 year 5 years

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
1) Psoriasis 30%
2) B.P 90%
3) Thyroid 50%

Percentage (प्रतिशत): 90%

Dated (दिनाँक): 13/11/2019 Patient Signature (रोगी हस्ताक्षर) Sharma

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Saroj Chauhan, HIN 155290322260 है। मुझे शुरू में Psoriasis, BP, Hypertension, Depression से परेशानी रहती थी, जिसके लिए मैंने 1990 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे Psoriasis की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमें हमारे रिश्तेदार के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Skin rashes, itching, redness, vanila & red patches, mood disorder, stress and sleeplessness.

मैं 6 April, 2019 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr. Sachin K Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गईं: —

विभाग (में दिखाया) : Dr. Vikram Gupta (Panchkarma)
Dr. Sachin K. Tyagi (Shatkarma)

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes.

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 7 days. दिनांक / माह /वर्ष हो गए और आज अब मैं 30 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: Relieve & improvement in skin redness and itching. Blood pressure kidney control without medication.

जिसके लिए मैं वैद्य जी, परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य Dr. Sachin K. Tyagi & team का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: ankita.chauhan8@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 94161-79303, 99964-32388

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 13 April, 2019

मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali * Haridwar *

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Archin K Tyagi

रोगी का नाम - Saroj Chauhan आयु - 64 लिंग - Female

रोगी का पता - Rana Hospital, Dasarka, Distt - Ambala. Haryana - 133202

रोगी के लक्षण - Skin disease, Hypertension, High blood Pressure, Hypothyroidism

रोग के लक्षण - Sleeplessness, Tiredness, Depression.

रोगी की पूर्व परीक्षण रिपोर्ट्स - Yes पिछली रिपोर्ट्स / फोटो Yes

नई रिपोर्ट्स / फोटो Yes

रोग में सुधार प्रतिशत - 30 % (Psoriasis) 70% (Thyroid)
90% (Hypertension & BP) 63% (overall)

चिकित्सक का अनुभव - Patient got 30 to 90 %. Result in her various Health issue, through Yog and Shatkarm therapy

रोगी का उपचार संबंधी कथन - I am very pleased with my overall experience at Patanjali Yogpeeth. I am grateful for the care and treatment provided. ~~It has improve~~ The yoga and pranayama teachings have helped me in healing my 30 year old Psoriasis and mental stress. I would highly recommend it to everyone to learn yoga and pranayama principles and live a healthy life.

दिनांक - 13 April, 2019

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

INSOMNIA DISEASE

(अनिद्रा रोग)

PATIENT NAME : VARUN SURA



Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 2+637-2019 HIN (एच0आई0एन0): 155721922 90

Full Name. (पूरा नाम): Varun Suri Age & Gender (आयु एवं लिंग): 31 M

Full Address. (पूरा पता) Flat no 202 Ram Sanki Enclave Road no 5 Rajendra Nagar Patna 800016

Suri Varun21@gmail.com E-mail. (ई–मेल)

8084688899 Mobile No. (मोबाईल नं0)

Occupation (व्यवसाय): Business Marital Status (वैवाहिक स्थिति) Married

Disease (रोग): Addiction

Duration of Disease (रोग की अवधि): 15 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Re Addiction

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 12 years

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Excellent जब यहां आया था तो मैं टाइप धोता था Rajnigandha खाता था अब मैं यहां से ला रहा हूँ तो सब ठीक रहा है

Percentage (प्रतिशत): 100%

Dated (दिनांक): 14/5/2019 Patient Signature (रोगी हस्ताक्षर): [signature]

Dr.Signature [signature]

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15572182240
Prescription No: 1
Clinic & Centre No: HEADOFFICE **ID Proof:**
Reg No: 27637-2019 **Doctor :** DR SACHIN TYAGI - E00428 **Visit Date:** 07/05/2019
Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-627-2019 **Room No:** 0
Patient Name: (Mr/Ms/Mrs.) Mr. Varun Sura **Age:** 31 **Sex:** Male
Address: F No -202, Ram Janki Enclave, Patna Patna Bihar
Landline No. : **Mobile No. :** 8084638899 **E-mail :**

Follow-up Date: 06/06/2019

Patient Complaint:
C/O Anindra ,Alchoholic, Smoking, Since 15Years,Gastric

1	MEDHA VATI	40	PC	Take 1-1 Tablet each half-an-hour after breakfas, lunch and dinner with lukewarm water

Diagnosis:
Rogi Avlokan Hetu/Patient Under Observation, Nidra Nasha / Insomnia

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI, SHAVASANA
Remarks: TREATMENT START08/05/19 TO 14/05/19

ACUP POINT ALL DIGESTIVE POINT, CALF, P GLAND

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Printed on: May 24, 2019

University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Varun Suri , HIN 1552/1922 40 है। मुझे शुरू में [illegible] की परेशानी रहती थी. जिसके लिए मैंने Disha Re Add. No. 1079 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे [illegible] की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे [illegible] के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : N/A

मैं 7/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Sachin Kumar Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: N/A

विभाग (में दिखाया) : [illegible]

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए [illegible] 14/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 100 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: [illegible]

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Sachin Kr Tyagi Ji Patanjali [illegible] का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: Shivarun21@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 8084638899

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं (✓)। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 14/5/19 **मरीज़ के हस्ताक्षर** **वैद्य के हस्ताक्षर**

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम - Dr. Sachin Kr. Tyagi

रोगी का नाम - Varun Suri आयु - 31 लिंग - Male

रोगी का पता - Flat no 202 Ram Janki Enclave Road no 5 Rajendra Nagar Patna 800016

रोगी ~~के लक्षण~~ - नींद की Problem नहीं

रोग के लक्षण - दारू पिने का मैल रहता था

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो RNR

रोग में सुधार प्रतिशत - 100%

चिकित्सक का अनुभव - Patient got 100% Result through Yog and Sleticuma.

रोगी का उपचार संबंधी कथन -

जब मैं यहां आया था तो मैं शराब पिता था जब मैं यहां से चिकित्सा के बाद सब छूट गया

दिनांक - [signature]

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

[signature]

University of Patanjali * Haridwar *

MIGRAIN DISEASE

(माइग्रेन रोग)

PATIENT NAME : POOJA YADAV



100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 38619-2019 HIN (एच0आई0एन0): 15599913989

Full Name. (पूरा नाम): Pooja Yadav Age & Gender (आयु एवं लिंग): 41 F

Full Address. (पूरा पता) GTR No - 6/4 Salbagan Army Cantt Agartala West Tripura (Tripura, India)

E-mail. (ई–मेल)

Mobile No. (मोबाईल नं0) 8 2 9 0 5 2 3 4 5 7

Occupation (व्यवसाय): House wife Marital Status (वैवाहिक स्थिति) Yes

Disease (रोग): Migraine, Pain in a both knee

Duration of Disease (रोग की अवधि): 2 months

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Yes

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 months

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)
Migraine जो कई वर्षों से था और Joint pain जो पिछले दो महीने से Acute रूप से परेशान कर रहा था जमीन पर बैठना असंभव हो चला था इसमें आशातीत आराम मिला अब जमीन पर बैठ कर योग कर सकती हूँ जो पहले असंभव था सरदर्द में तो आने के बाद कभी नहीं हुआ और हल्कापन महसूस हो रहा है।

Percentage (प्रतिशत): 80%

Dated (दिनाँक): 16/6/19 Patient Signature (रोगी हस्ताक्षर): Pooja Yadav

Dr.Signature



Universal ... Haridwar

पतंजलि आयुर्वेद चिकित्सालय

PATANJALI AYURVEDA HOSPITAL

PATANJALI YOGPEETH PHASE - 1, MAHARISHI DAYANAND GRAM, DELHI - HARIDWAR NATIONAL HIGHWAY-58, NEAR BAHADRABAD, HARIDWAR, UTTARAKHAND - 249405 INDIA
Tel:1334240008/1334248888 Fax:1334244805 E-mail:patientcare@divyayoga.com

Free Consultation.

Note: Not for Medico Legal Purpose

HIN: 15599913989
Prescription No: 1
Clinic & Centre No: HEADOFFICE

Reg No: 38619-2019 **Doctor :** DR SACHIN TYAGI - E00428 **ID Proof:** **Visit Date:** 09/06/2019

Department: SHATKARM CLINIC AND RESEARC **Annual No:** SHAT-922-2019 **Room No:** 0

Patient Name: (Mr/Ms/Mrs.) Mr. Pooja Yadav **Age:** 41 **Sex:** Female

Address: Qtrn. O-6/4 Salbagan Army Cantt Agartala West Tripura Tripura

Landline No. : **Mobile No. :** 8290523457 **E-mail :**

Follow-up Date: 09/07/2019

Patient Complaint:
Sandhisul Noh/O Dm Htn Tb,Migraine,Gastric,Over Wt- 72,Pain In Both Knee

1	PEEDANTAK TAILA	100	ML	Massage the Oil on the affected area. twice/thrice in a day

Diagnosis:
Sandhi Gata Vata / Arthritis,
Ardhabvedhak / Migraine

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BHRAMRI, UDGITH, UJJAI, PRANAV, BAHYAPRANAYAAM

Remarks:
TREATMENT WILLBE START FROM - 10-06-2019 TO 16-06-2019

ACU.P-STO,LIV,INT,CALF,BRAIN,P GLAND, ALL CHANNLES

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA*	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

Printed on: June 16, 2019



पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम Pooja Yadav , HIN 15599913479 है। मुझे शुरू में Knee Pain की परेशानी रहती थी, जिसके लिए मैंने 5/04/19 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे Arthritis की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमें हमारे _____ के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : Pain in Knee or Migraine

मैं 9/06/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Dr Sachin Kr Tyagi को दिखाया।

मरीज़ को दवाइयाँ दी गई: No

विभाग (में दिखाया) : Kay ~~[illegible]~~ चिकित्सा (Shatkarm dept)

योग (किया या नहीं): Yes

संतुलित आहार (लिया या नहीं): Yes

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 7 days(दिनांक / माह /वर्ष हो गए और आज अब मैं 80 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: Light Pain in Knee but I am able to sit on the ~~[illegible]~~ floor

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य Dr. Sachin Kr. tyagi and all members का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी:

मोबाइल व व्हाट्सप्प नंबर: 8290523457

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। ✓

वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()। ✓

दिनांक / माह /वर्ष: 16/06/19

Pooja Yadav
मरीज़ के हस्ताक्षर

वैद्य के हस्ताक्षर

University of Patanjali ★ Haridwar ★

चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kr Tyagi

रोगी का नाम - Mrs Pooja Yadav आयु - 21 लिंग - F

रोगी का पता - Qtrno. 6/4 Salbagan Army Cantt Agartala West Tripura

रोगी के ~~लक्षण~~ रोग - ~~Asthma~~ Mile Arthritis

रोग के लक्षण - Severe migraine headache once a week, Knee & leg with general body pain

रोगी की पूर्व परीक्षण रिपोर्ट्स - R & R पिछली रिपोर्ट्स / फोटो R N B

नई रिपोर्ट्स / फोटो R N R

रोग में सुधार प्रतिशत - 80%

चिकित्सक का अनुभव - Patient got 80% Result through Yoga and Medicine both.

रोगी का उपचार संबंधी कथन - जब मैं यहाँ पहुँची तो सीढ़ियाँ चढ़ना कठिन, ज़मीन पर पालथी मार कर बैठना असंभव था। षटकर्म क्रिया के पश्चात शरीर में हल्कापन पहले दिन से ही महसूस हुआ और तीसरे दिन से ज़मीन पर बैठ कर योग करना संभव हो गया। अब 80% बेहतर महसूस कर रही हूँ। यहाँ की सभी चिकित्साएं, व्यवहार आदि अत्यंत लाभकारी है।

दिनांक - 16/6/19

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

OBESITY

(मोटापा)

PATIENT NAME : GAURAV SHARMA

University of Patanjali
Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण नं0): 30798/19 HIN (एच0आई0एन0): 15582421338

Full Name. (पूरा नाम): Gaurav Sharma Age & Gender (आयु एवं लिंग): 15 Male

Full Address. (पूरा पता): Hanuman Vatika Colony Lalsot (Dausa)

E-mail. (ई–मेल): Sharmagaurav2654@gmail.com

Mobile No. (मोबाईल नं0): 9 4 1 4 8 4 4 6 8 8

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति): NO

Disease (रोग): 2 Year Constipation

Duration of Disease (रोग की अवधि): 2 Year

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): NO

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): NO

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

योग से शरीर शांत व हल्का रहता है घटकर्म से होने वाले रोग में फायदा है

Percentage (प्रतिशत): 100%

Dated (दिनांक): 25/5/19 Patient Signature (रोगी हस्ताक्षर): Gaurav

Dr.Signature

University of Patanjali ★ Haridwar ★

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम गौरव शर्मा , HIN 1558242/338 है। मुझे शुरू में मोटापे की परेशानी रहती थी, जिसके लिए मैंने 21/6/18 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया , जहाँ पर मुझे ज्ञात हुआ कि मुझे मोटापे की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया , लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे रिश्तेदार के द्वारा पतंजलि योगपीठ , हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : मोटापा, चलने मे परेशानी, भारीपन, आलस्य

मैं 20/5/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ , हरिद्वार में वैद्य Sachin को दिखाया।

मरीज़ को दवाइयाँ दी गई:

विभाग (में दिखाया) : योग व पतंजलि

योग (किया या नहीं): हाँ

संतुलित आहार (लिया या नहीं): हाँ

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 25/5/19 दिनांक / माह /वर्ष हो गए और आज अब मैं 100 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: अब मुझे भारीपन नहीं है ना ही आलस्य और ना ही चलने मे परेशानी है

जिसके लिए मे वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री , पतंजलि योगपीठ व अन्य योग व पतंजलि का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: Sharmagaurav2654@gmail.com **मोबाइल व व्हाट्सप्प नंबर:** 6377178158

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। **वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।**

दिनांक / माह /वर्ष: 25/5/19

मरीज़ के हस्ताक्षर Gaurav

वैद्य के हस्ताक्षर Sachin 28/7/19

University of Patanjali Haridwar



चिकित्सक हेतु

चिकित्सक का नाम - Dr Sachin Kumar

रोगी का नाम - Gaurav Sharma आयु - 15 लिंग - male

रोगी का पता - Hanuman Vatika Colony Lalsot (Dausa)

रोगी के लक्षण - मोटापा, चलने मे परेशानी, आलस्य, भारीपन
कब्ज

रोगी के लक्षण - जल्दी थक जाना, शरीर मे भारीपन, शुस्ताई आना।

रोगी की पूर्व परीक्षण रिपोर्ट्स - RNR

पिछली रिपोर्ट्स / फोटो RNR

नई रिपोर्ट्स / फोटो - RNR

रोग में सुधार प्रतिशत - 100 %

चिकित्सक का अनुभव -

Patient got 100% Result through yog and Sheetkam

रोगी का उपचार संबधी कथन - अब ना ही आलस्य है ना ही चलने मे परेशानी और ना ही भारीपन है। शरीर मे हल्कापन महसूस होना, वजन भी गया है। 1 kg weight loss, अच्छे से ध्यान लगने लगा, पेट अच्छे से साफ हो रहा है।

दिनांक - 25/5/19

चिकित्सक के हस्ताक्षर 25/5/19

Gaurav
रोगी के हस्ताक्षर

University of Patanjali Haridwar

निःशुल्क परामर्श

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Free Consultation

Reg. No. AH-2017-0025

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token 6 HIN NO : 15582421338

Prescription No: 1 Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 30798-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 19/05/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-717-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. GAURAV SHARMA आयु Age 15 Year लिंग Sex Male

पता Address DIDWANA LALSOT,DAUSA ,Dausa ,Rajasthan ,India

फोन Landline No. : ..... मो. Mobile No. : 9414844688 ईमेल E-mail : ?

6377178058

Patient Complaint:
C.O Over Weight, Wt- 47

Diagnosis:
Stholya / Obesity

BP Sugar Thyroid No

1	SARVAKALPA KWATH	200 GM	Take 1 tea spoons of all the above medicines mix it with 400 ml of water and boil till it reduces to 100 ml, filter and take on an empty stomach in the morning and evening.
	KAYAKALPA KWATH	100 GM	
	TRIPHALA CHURNA	100 GM	

Follow-up Date: 18/06/2019

Remarks: TREATMENT START - 20/05/2019 TO 26/05/2019

ACUP POINT - STO,LIV,INT,CALF,OBESITY

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE – 23/05 To 26/05	ACUPRESSURE
2	SHATKARMA	JAL NETI	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	STEAM	STEAM
6	SHATKARMA	TRATKA 23/05 To 26/5/19	TRATAKA
7	SHATKARMA	YOG-NIDRA	YOG-NIDRA

रक्तचाप B.P.
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

Vinay Ji

5240 / 4 Days
8390 / 7 Days

पतंजलि योगपीठ-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth-1, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 248008, 248888, 248999, 246737 फैक्स Fax : 01334 - 244605, 246684 E-mail : divyayoga@divyayoga.com, patient.care@divyayoga.com Web : www.divyayoga.com

19-May-19 10:28 AM

Note : Not for Medico Legal Purpose

University of Patanjali Haridwar

SKIN DISESAE

(त्वचा रोग)

PATIENT NAME : ABHISHEK KUMAR

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No: AH-2017-0025

Reg: 3143/15222092586 | Dated: 03/04/2018

Name of Patient : Mr. Mrs. Ms. : ABHISHEK KUMAR | Age/Sex: ~~49Yer/M~~ 21 yr / m

Address :

Referred by : Dr. SACHIN.TYAGI

KIDNEY FUNCTION TEST

TEST	VALUE	NORMAL RANGE
Serum Cholesterol	161.0	mg% (Desirable < 200) (Border Line 200 – 234) (High > 240)
Serum Urea	25.0	(15 - 45 mg/dl)
Serum Creatinine	1.1	(0.7 - 1.5 mg/dl)
Serum Uric acid	6.4	(2.0 - 7.0 mg/dl)
Serum Alkaline Phosphate	71.0	U/L (53 - 128)
Serum Total Protein	6.4	(5.5 - 8.0 gm/dl)
Serum Albumin	4.1	(3.5 - 5.5 gm/dl)
Serum Globulin	2.3	mg% (2.3 – 2.6)
A/GRatio	1.8:1	(1.2 - 2: 1)
Serum Na+ (Sodium)	136.8	Mmol/L (135 – 145)
Serum K+ (Potassium)	3.7	Mmol/L (3.5 –5.0)
Serum Ca++ (Calcium)	5.2	MEq/ L (4.5 – 5.5)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar 249405, Uttarakhand, India
Phone: 01334 - 240008, 246868, 246999, 246737, Fax: 01334 - 244905, 240664, E-mail: divyayoga@divyayoga.com, Web: www.divyayoga.com

Not for Medico Legal Purpose

University of Patanjali Haridwar

योग संदेश में प्रकाशन हेतु

चिकित्सक का नाम- डा० सचिन त्यागी

रोगी का नाम- अभिषेक कुमार आयु: 21 लिंग: पुरुष

रोगी का पता- उत्तरवारी पोखर, बेतिया, पश्चिम चम्पारन, बिहार

रोगी के लक्षण- दवाइयों की एलर्जी, चर्म रोग, छाती में दर्द।

रोग के लक्षण- पेट का भारीपन, मानसिक तनाव, शरीर में दर्द शरीर का काँपना, उलटी।

उपचार अवधि- ....7.. दिन ~~माह~~ दि0...27/3/18 से दि0.....4-4-18 तक

रोगी द्वारा सेवन औषधियां: दिव्य कायाकल्प वटी, कायाकल्प तेल, कैसोर मुगुल। विधि C 4/04/18 को ली चिकित्सा के समय मैंने कोई औषधि नहीं ली।

पदकर्म चिकित्सा - (1) शंखप्रक्षालन
(2) कुंजर क्रिया
(3) जलनेति
(4) ~~[illegible]~~ एक्यूप्रेशर
(5) योगनिद्रा
(6) लार्वन
(7) योग

University of Patanjali Haridwar

रोगी की पूर्व परीक्षण रिपोर्ट्स- पिछली रिपोर्ट्स अटैच्ड

नई रिपोर्ट्स अटैच्ड

रोग में सुधार प्रतिशत- 100 %

रोगी का उपचार सम्बन्धी कथन- षटकर्म बहुत ही अच्छी किया है। षटकर्म के कारण मैं बहुत अच्छा महसूस कर रहा हूँ। सारी मानसिक तनाव दूर हो गए। मेरी दवाओं की एलर्जी में खतम हो गई। चर्मरोग भी मेरा खतम हो गया। पेट का भारीपन खतम हो गया। जब मैं यहाँ पतंजली आयुर्वेद आया था तो मैं बहुत बिमार था पर यहाँ पर इलाज के बाद मैं पुरी तरह ठीक होकर जा रहा हूँ। मेरा इलाज डा० सचिन आर्य के निर्देशों में हुआ और मैं उनका शुक्रगुजार हूँ कि मैं पुरी तरह ठीक होकर जा रहा हूँ।

चिकित्सक का अनुभव-

Patient got 100% Result in his Skin Disease, through yog and Bahana chikitsa.

दि०

4/04/18

चिकित्सक के हस्ताक्षर

रोगी के हस्ताक्षर

University of Patanjali Haridwar

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 1942 – 2018 HIN (एच0आई0एन0): 182220920586

Full Name. (पूरा नाम): ABHISHEK KUMAR Age & Gender (आयु एवं लिंग): 21 m

Full Address. (पूरा पता) UTTARWARI POKHRA, BETTIAH
WEST CHAMPARAN, BIHAR

E-mail. (ई–मेल) kumarabhi1234@gmail.com

Mobile No. (मोबाईल नं0) 7 7 6 4 9 4 2 2 6 9

Occupation (व्यवसाय): Student Marital Status (वैवाहिक स्थिति) unmarried

Disease (रोग): Drug allergy, Skin disease, Chest pain, wounds

Duration of Disease (रोग की अवधि): Since 2 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): Yes, allopathy

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि): 1 week

Effect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

I'm feeling well, and relax, Drug allergy also cured
Skin disease, Chest pain and wounds are also cured By Shatkarma

Percentage (प्रतिशत): 100%

Dated (दिनाँक): 4 – 4 – 2018 Patient Signature (रोगी हस्ताक्षर) Abhishek kumar

Dr.Signature

University of Patanjali Haridwar

नि.शुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL

Token 2 HIN NO : 15222092586

बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रात: 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PAC-534244392560

Prescription No: 1

पंजीकरण संख्या Reg. No. 19481/2018 चिकित्सक Vd. Dr. Abhishek Bhushan Sharma दिनांक Date 04/04/2018

विभाग Deptt. KAYACHIKITSA वार्षिक संख्या Annual No. KA-8840-2018 कक्ष संख्या Room No. 12

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ABHISHEK KUMAR आयु Age 21 Year लिंग Sex Male

पता Address BETTIAH WEST West Champaran Bihar India

फोन Landline No. : मो. Mobile No. :7766942269 ईमेल E-mail : KUMARABHISHEK1234@GMAIL.COM

Patient Complaint:
C/O Chest Pain, Stomach Heavyness, Skin L.Esion All Over Body

Diagnosis:
Twak Vikar/Skin Disease

Follow-up Date: 04/05/2018

1	HARIDRA KHAND	1-1 चम्च	20	GM	Take 1 tsp with milk / water / honey Before meal For 3 Days
	MANJISHTHA CHURNA		20	GM	
2	KAYAKALP VATI	2-2	5	GM	Take 2 tab of medicine After meal with water / milk For 3 Days
	KAISHORE GUGGUL	2-2	5	GM	

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, ANULOM-VILOM, BAHYAPRANAYAAM, BHRAMRI, UDGITH, UJJAI

Remarks: TREATMENT START 29/03/18 TO 04/04/18

ACUP POINT ALL DIGESTIVE POINT, CALF ALL CHANNELS

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	ACUPRESSURE	ACUPRESSURE
2	SHATKARMA	JAL NETI	SALT + WATER
3	SHATKARMA	KUNJARKRIYA	FENNEL FRUIT + WATE
4	SHATKARMA	SHANKHA PRAKSHALAM	FENNEL FRUIT + SALT WATER
5	SHATKARMA	TRATKA	TRATAKA
6	SHATKARMA	YOG-NIDRA	YOG-NIDRA

रक्तचाप B.P
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar
अन्य Other

पतंजलि योगपीठ फेज 1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग 58, निकट बहादराबाद, हरिद्वार 249405, उत्तराखण्ड, भारत
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 240908, 240888, 240999, 246737 फैक्स Fax : 01334 - 244805, 240664 E-mail : divyayoga@divyayoga.com, patientcare@divyayoga.com Web : www.divyayoga.com

Note : Not for Medico Legal Purpose

University of Patanjali Haridwar

THYROID

(थाइरोइड)

PATIENT NAME : ANJALI BHARDWAJ

University of Patanjali
Haridwar

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No. (AH 2017-0023)

Reg. No.: 3562/15479540522

Name of Patient : Mr./Mrs./Ms. : ANJALI BHARDWAJ

Dated : 20/01/2019

Age/Sex : 45Yer/F

Address : Dr. ARUN K. PANDEY

Referred by :

TEST	VALUE	NORMAL RANGE
T3	0.4ng/ml	(0.4 -1.8 ng/mL)
T4	2.8µg/dL	(4.4 – 10.8 µg/dL)
TSH	10.0µIU/mL	(0.4 - 4.2µIU/mL)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi-Haridwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone: 01334 - 240008, 248888, 248999, 246737 Fax: 01334 - 244805, 240064 E-mail: divyayoga@divyayoga.com Web: www.divyayoga.com

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100

Yog & Shatkarma Clinic & Research Centre
(योग व षट्कर्म चिकित्सा एवं अनुसंधान केन्द्र)
Patanjali Ayurved Hospital Patanjali Yogpeeth Phase – 1 , Haridwar
(पतंजलि आयुर्वेद चिकित्सालय पतंजलि योगपीठ फेज– 1, हरिद्वार)

Brief Case History & Feedback(रोगी का संक्षिप्त विवरण एवं प्रतिपुष्टि)

Reg. No. (पंजीकरण सं0): 3392-2019 HIN (एच0आई0एन0): 154795405222

Full Name. (पूरा नाम): Anjali Bhardwaj Age & Gender (आयु एवं लिंग): 45 F

Full Address. (पूरा पता) Anjali Bhardwaj, H. No - 379, Sector - 2, Kurukshetra, Haryana, 136118

E-mail. (ई–मेल) Anjalib1336@yahoo.com

Mobile No. (मोबाईल नं0) 7329497626 67

Occupation (व्यवसाय): home maker Marital Status (वैवाहिक स्थिति) married

Disease (रोग): Thyroid, fatty liver, weight gain

Duration of Disease (रोग की अवधि): 1-2 Thyroid for 15 years

Treatment Adopted Earlier (पहले कोई चिकित्सा अगर ली है तो): I've got 2 days of Panchkarma treatment

Duration of Treatment Adopted (पहले ली गई चिकित्सा की अवधि):

...fect of Yog & Shatkarma Procedures (योग एवं षट्कर्म क्रियाओं के द्वारा लाभ)

1. weight loss
2. Relief in allergies
3. Light breakfast
Over all feel good

Percentage (प्रतिशत): 85%

Dated (दिनाँक): 6/2/19 Patient Signature (रोगी हस्ताक्षर) Anjali

Dr.Signature

University of Patanjali * Haridwar *

PATHOLOGY LAB & RESEARCH CENTRE

PATANJALI AYURVED HOSPITAL

(Multidimensional Service Unit of Divya Yog Mandir Trust)

Certified by NABH (Constituent Board of Quality Council of India)

Certificate No (AH-2017-0025)

Reg. No: 3850/15479540522

Name of Patient : Mr./Mrs./Ms.: ANJALI BHARDWAJ

Dated: 05/02/2019

Age/Sex: 45Yer/F

Address:

Referred by: Dr. SACHIN TYAGI

TEST	VALUE	NORMAL RANGE
T3	0.7ng/ml	(0.4 -1.8 ng/mL)
T4	5.6µg/dL	(4.4 – 10.8 µg/dL)
TSH	0.4µIU/mL	(0.4 - 4.2µIU/mL)

Technologist

Pathologist

Patanjali Yogpeeth, Delhi Hardwar National High way, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
Phone 01334 - 240008, 248888, 248999, 246737 Fax 01334 - 244805, 246663 E-mail: divyavoga@divyayoga.com Web: www.divyayoga.com

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University of Patanjali Haridwar

पतंजलि आयुर्वेद चिकित्सालय (पतंजलि योगपीठ) हरिद्वार, उत्तराखण्ड

रोगी विवरण

मेरा नाम अंजलि भारद्वाज, HIN 15479540522 है। मुझे शुरू में thyroid की परेशानी रहती थी, जिसके लिए मैंने 20/1/19 दिनांक / माह /वर्ष को अपने निकटम चिकित्सालय में दिखाया, जहाँ पर मुझे ज्ञात हुआ कि मुझे thyroid की बीमारी है।जिसके लिए मैंने कई जगह इलाज करवाया, लेकिन मुझे आराम नहीं हुआ। अंततः हमे हमारे friend के द्वारा पतंजलि योगपीठ, हरिद्वार की जानकारी प्राप्त हुई और हमने यहाँ आने का निर्णय लिया।

मरीज़ के पूर्व लक्षण व रिपोर्ट : weight gain
low energy
all the time feeling low

मैं 20/1/19 दिनांक / माह /वर्ष को पतंजलि योगपीठ, हरिद्वार में वैद्य Dr. Sachin Pandey Tapasvi को दिखाया।

मरीज़ को दवाइयाँ दी गई:

विभाग (में दिखाया) : - Shatkarma

योग (किया या नहीं): - Yes.

संतुलित आहार (लिया या नहीं): - NO - I did not get good food here.

का पालन मेरे मेरे द्वारा किया गया।

और अब मुझे यहाँ इलाज लेते हुए 16 days दिनांक / माह /वर्ष हो गए और आज अब मैं 85 % ठीक हो चुका हूँ।

अभी मरीज़ के लक्षण व रिपोर्ट: - weight loss
feel good here energetic than before.

जिसके लिए मैं वैद्य जी,परम श्रद्धेय स्वामी जी, परम पूज्य आचार्य श्री, पतंजलि योगपीठ व अन्य whole Team of Shatkarma का हार्दिक आभार व्यक्त करता हूँ।

ईमेल आई डी: - Anjali6133@yahoo.com मोबाइल व व्हाट्सप्प नंबर:- 732-447-6267

रिपोर्ट्स उपलब्ध कराई गयी हाँ () या नहीं ()। वीडियो उपलब्ध कराई गयी हाँ () या नहीं ()।

दिनांक / माह /वर्ष:
6/2/19

मरीज़ के हस्ताक्षर
Anjali Bharatbaj

वैद्य के हस्ताक्षर

University of Patanjali Haridwar

चिकित्सक हेतु

चिकित्सक का नाम – Dr. Sachin tayagi

रोगी का नाम - Anjali Bhandhwaj आयु - 45 लिंग - F

रोगी का पता – Anjali Bhandhwaj
H.No - 374. Sector - 2 Kurukshetra
Haryana.

रोगी के लक्षण – Low energy
lot of weight gain
Allergy

रोग के लक्षण –

रोगी की पूर्व परीक्षण रिपोर्ट्स - Yes पिछली रिपोर्ट्स / फोटो -

नई रिपोर्ट्स / फोटो -

रोग में सुधार प्रतिशत –

चिकित्सक का अनुभव – → 85%.

Patient was having obesity, cough Allergy, Sneezing and milk Product Allergy. after treatment she is feeling very good and got 85% Result.

रोगी का उपचार संबधी कथन -

All team number of Shatkarma department is very friendly. While doing treatment I never felt that I was sick. Very good atmosphere I love it.

दिनांक -

चिकित्सक के हस्ताक्षर [signature] Anjali Bhandhwaj रोगी के हस्ताक्षर

University of Patanjali Haridwar



PRO

C-110-*-*

SLK-585-2019

ANJALI BHARDWAJ

45 - FEMALE

20/01/2019

01/02/2019

AVATU GRANTHI VIKAR / THYROID

DR. DAYASHANKAR SINGH

SATISFACTORY

HIN: 15479540522

Patient Complaint:
Waight Gain,Whole Body Pain,Palpitation,Headache 6 Yrs

Diagnosis:
Avatu Granthi Vikar / Thyroid, Sthplya / Obesity

Follow-up Date: 03/03/2019

1	TRIKUTA CHURNA	50	GM	Mix all the medicines and prepare 60 doses from it take in the morning and evening half-an-hour before Breakfast and Dinner with Water / Honey /cream of Milk.
	PRAVAAL PISHTI	10	GM	
	GODANTI BHASMA	10	GM	
	BAHERA CHURNA	20	GM	
2	SARVAKALPA KWATH	200	GM	Take 1 tea spoons of all the above medicines mix it with 400 ml of water and boil till it reduces to 100 ml, filter and take on an empty stomach in the morning and evening.
	KAYAKALPA KWATH	100	GM	
	TRIPHALA CHURNA	100	GM	
3	MEDOHAR VATI	50	GM	Take 2 tablet in the after morning and evening with lukewarm water.
4	TRIPHALA GUGGULU	40	GM	Take 2-2 tablets of each in the morning in the evening before lunch and dinner with lukewarm water.
	AAROGYAVARDHINI VATI	40	GM	
	KANCHNAR GUGGUL	40	GM	
5	GODHAN ARK	20	ML	Take each in the morning and evening on an empty stomach.
	GHRITAKUMARI SWARAS	20	ML	

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, BHAHA PRANAYAM, ANULOM-VILOM, BHRAMRI, UDGITH, UJJAI, PRANAV, BHUJANGASAN, MARKATASAN, SINGHASAN

Remarks:

University of Patanjali Haridwar

नि:शुल्क परामर्श
Free Consultation

पतंजलि आयुर्वेद चिकित्सालय
PATANJALI AYURVEDA HOSPITAL
बहिरंग चिकित्सा विभाग O.P.D.

समय : प्रतिदिन प्रातः 9 बजे से सायं 5 बजे तक Timing : 9.00 am to 5.00 pm Daily

Token HIN NO : 15479540522

Prescription No. 1 क्लीनिक एवं सेंटर नं. Clinic & Centre No. ..... पहचान प्रमाण ID Proof : DL / AC / VIP / PC / PP .....

पंजीकरण संख्या Reg. No. 3392-2019 चिकित्सक Vd. Dr. Sachin Kumar Tyagi दिनांक Date 21/01/2019

विभाग Deptt. SHATKARM CLINIC AND RESEARCH CENTER वार्षिक संख्या Annual No. SHAT-52-2019 कक्ष संख्या Room No. 0

रोगी :श्री/श्रीमती Patient : Mr./Mrs. ANJALI BHARDWAJ आयु Age 45 Year लिंग Sex Female

पता Address SEC-2 HNO-374 ,Kurukshetra ,Haryana ,India

फोन Landline No. : +17324476267 मो. Mobile No. : 9416915374 ईमेल E-mail : ANJALIB133@YAHOO.COM

Patient Complaint:
C/O Fatty Liver Grade1, Gastric Acidity,Constipation, Indigestion,Snizzing, Obesity

Diagnosis:
Avatu Granthi Vikar / Thyroid, Stholya / Obesity, Vibandha / Constipation, Yakrita Shotha / Fatty Liver

Since 15 Yrs
Since 15 Yrs
Since 3 Yrs
Since 2 Yrs

Follow-up Date: 22/02/2019

1	MEDOHAR VATI	50	GM	Take 2 tablet in the after morning and evening with lukewarm water.

Pranayam / Asanas: BHASTRIKA, KAPALBHATI, BHAHA PRANAYAM, ANULOM-VILOM, BHRAMRI, UDGITH, UJJAI, PRANAV, BHUJANGASAN, MARKATASAN, SINGHASAN, MANDHUKASAN, VAKRASANA, PASHCHIMOUTTANASAN, HALASANA, PAVANMUKTASAN

Remarks: TREATMENT START 22/01/19 TO 26/01/19

ACUP POINT ALL DIGESTIVE POINT,CALF,THRIOD

रक्तचाप B.P. X
नाड़ी Pulse
तापमान Temperature
रक्त शर्करा Blood Sugar X
अन्य Other
Allow

Satkarma Treatment: Yes

Treatment Details

1	SHATKARMA	*ACUPRESSURE*	ACUPRESSURE
2	SHATKARMA	*JAL NETI*	SALT + WATER
3	SHATKARMA	*KUNJARKRIYA* — Trifala X m.k.	FENNEL FRUIT + WATE
4	SHATKARMA	*SHANKHA PRAKSHALAM*	FENNEL FRUIT + SALT WATER
5	SHATKARMA	*STEAM*	STEAM
6	SHATKARMA	*SUTRA NETI*	RUBBER NETI
7	SHATKARMA	*TRATKA*	TRATAKA
8	SHATKARMA	*YOG-NIDRA*	YOG-NIDRA

पतंजलि योगपीठ फेज-1, महर्षि दयानन्द ग्राम, दिल्ली-हरिद्वार राष्ट्रीय राजमार्ग-58, निकट बहादराबाद, हरिद्वार-249405, उत्तराखण्ड 9 PM
Patanjali Yogpeeth Phase-I, Maharishi Dayanand Gram, Delhi - Haridwar National Highway-58, Near Bahadrabad, Haridwar - 249405, Uttarakhand, India
फोन Phone : 01334 - 246000, 246000, 246000, 246737 फैक्स Fax : 01334 - 246000, 246000 E-mail : divyayoga@divyayoga.com, patient.care@divyayoga.com Web : www.divyayoga.com

Note : Not for Medico Legal Purpose

University of Patanjali Haridwar

PHOTOGRAPHS OF VARIOUS YOGIC INTERVENTIONS

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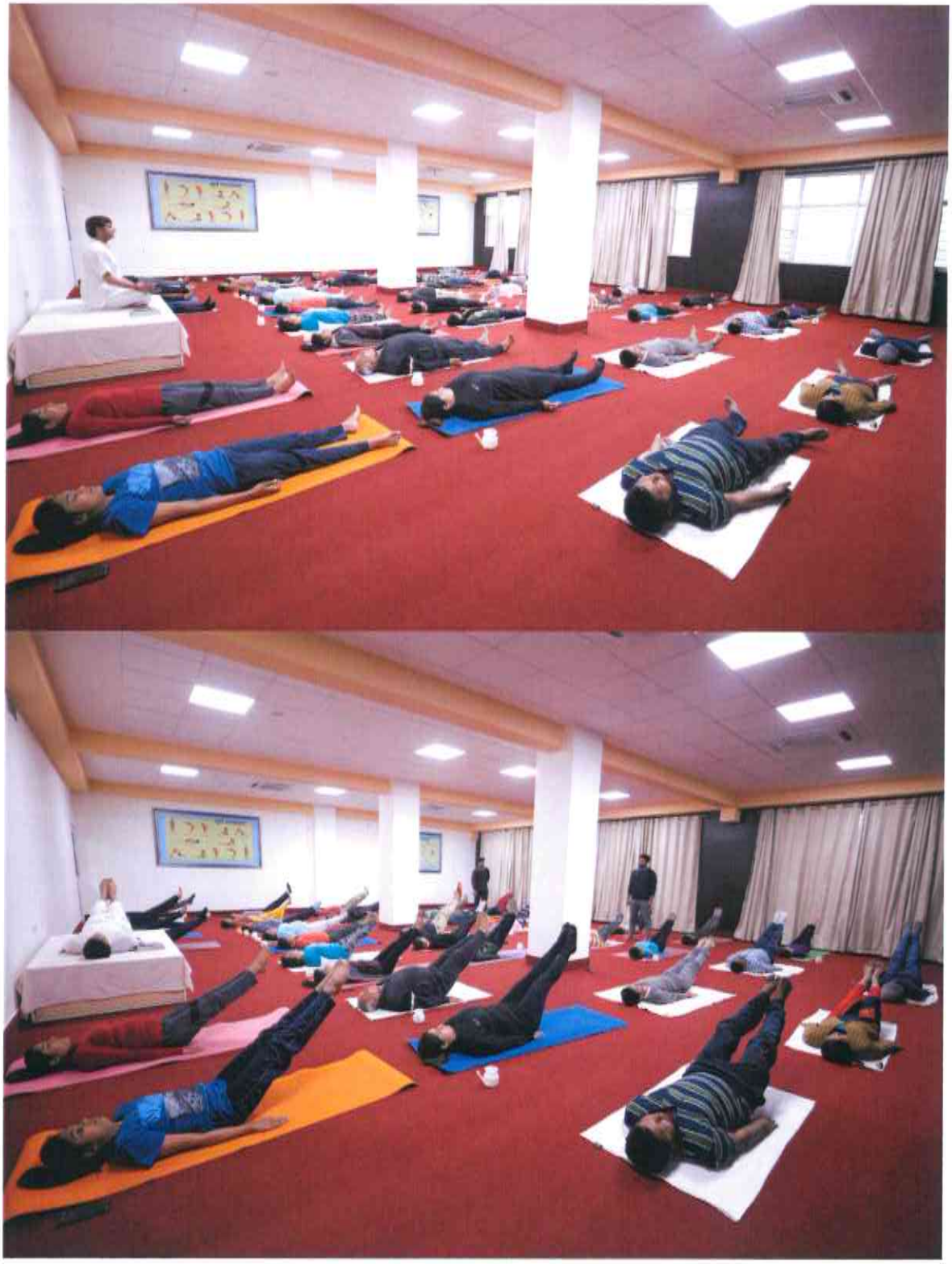

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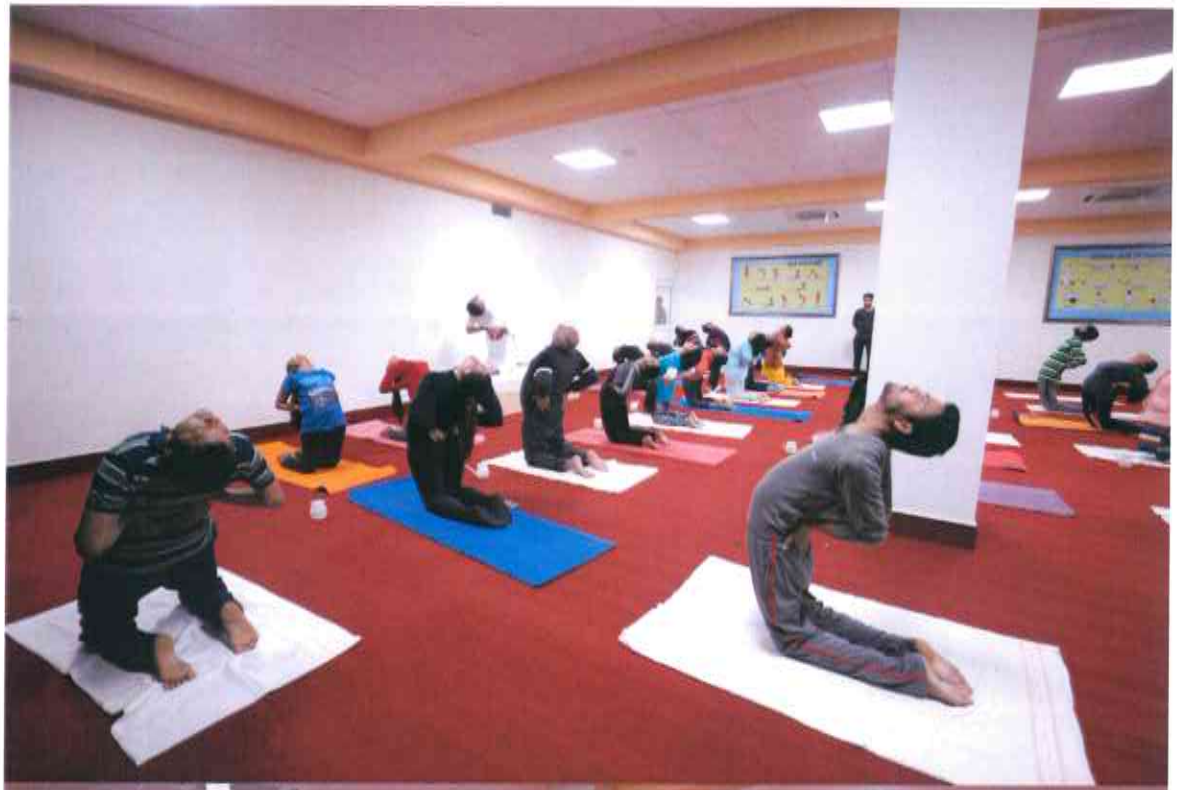

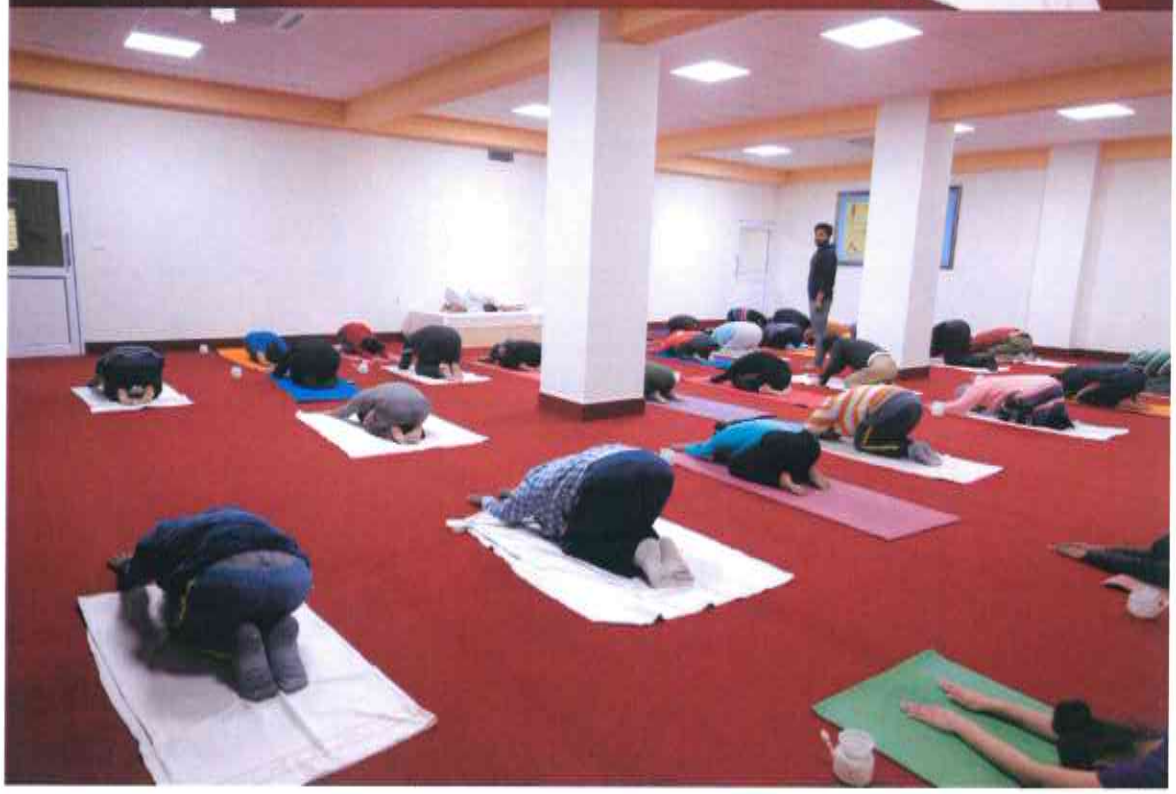

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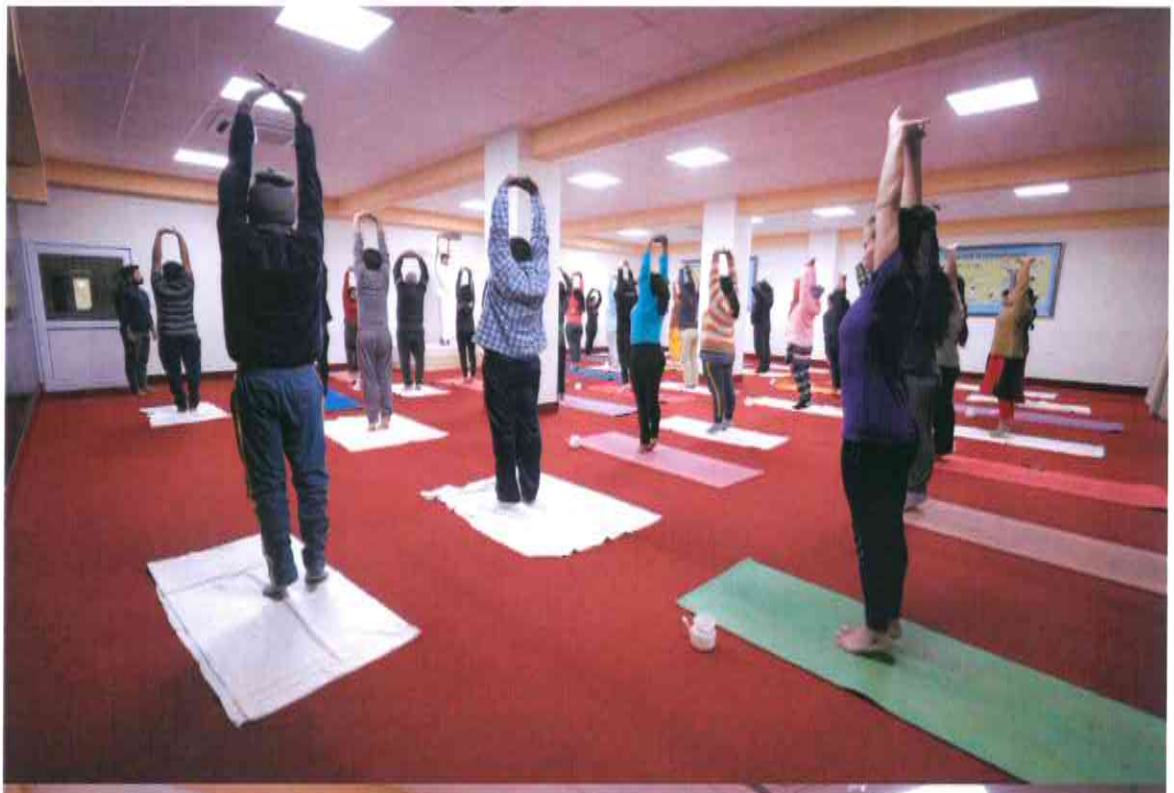

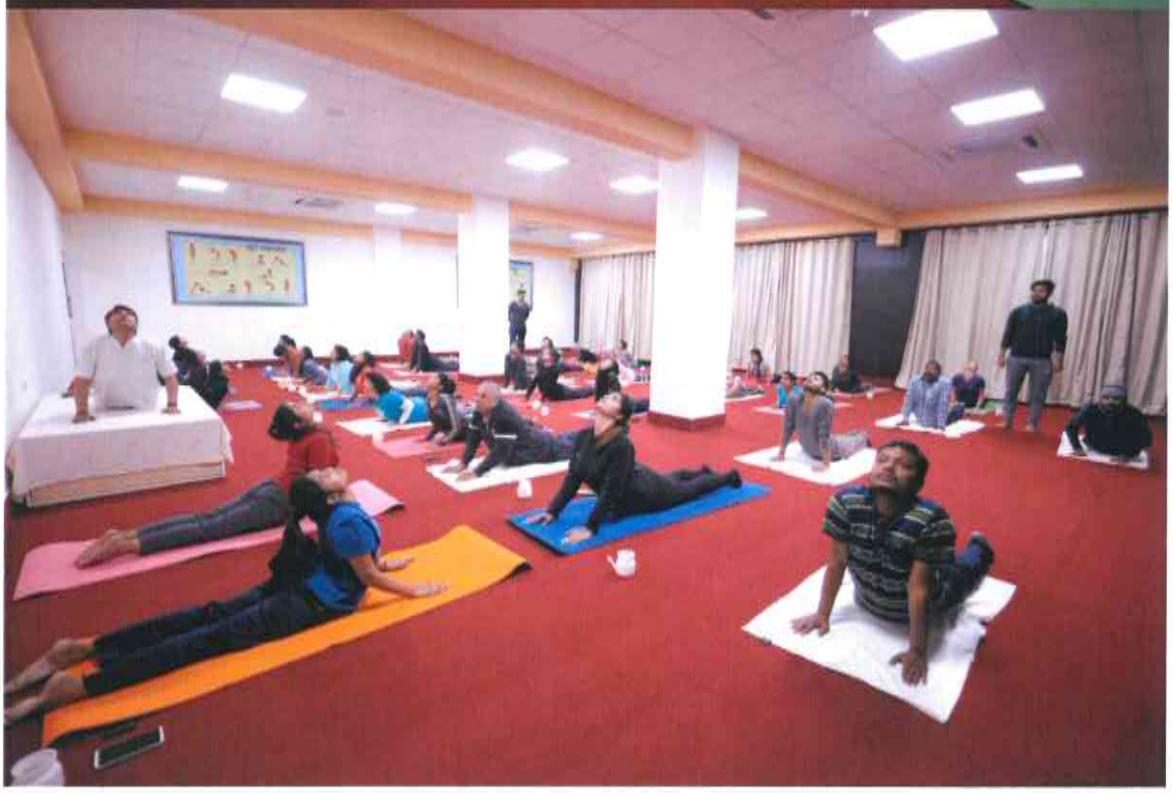

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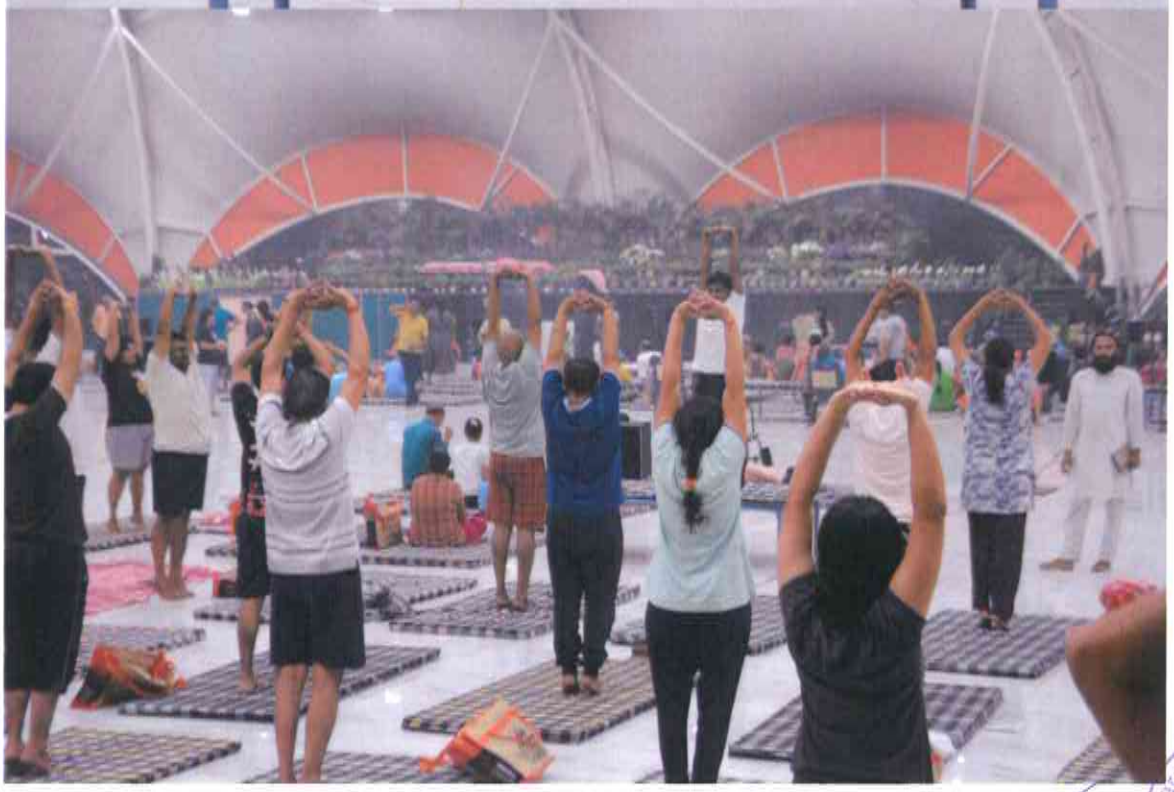

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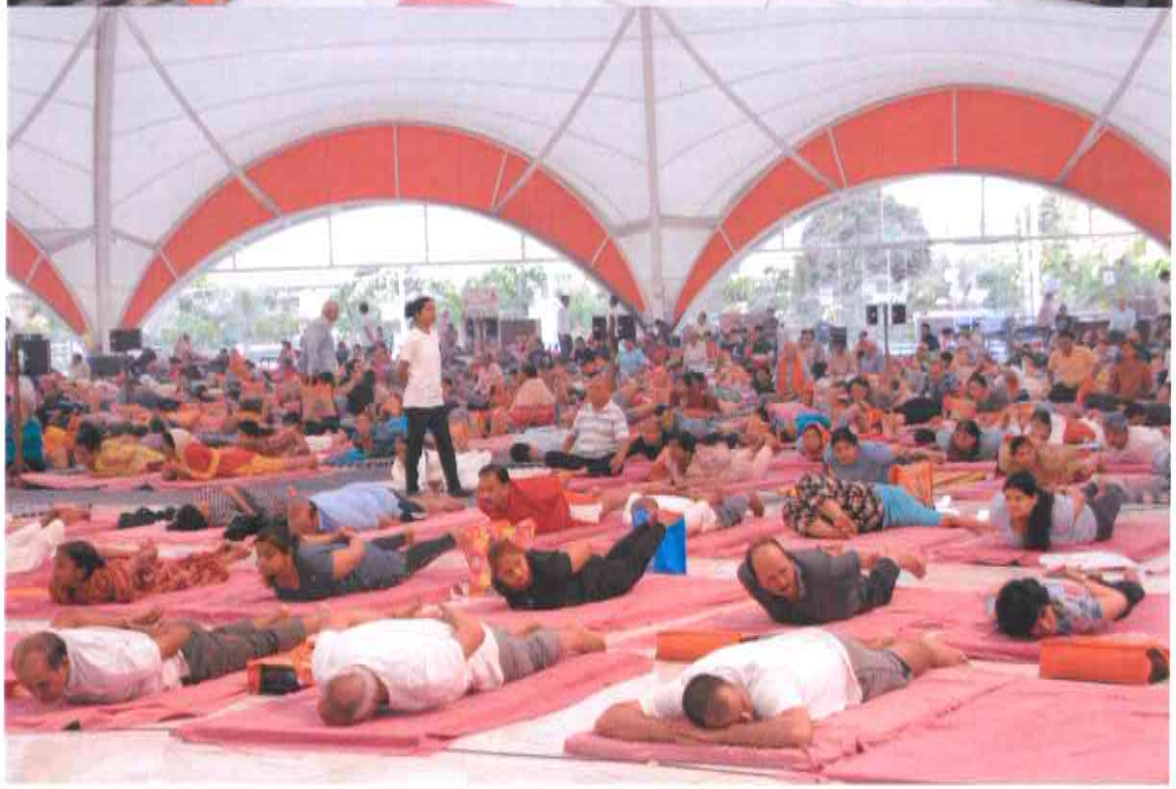

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A comparison of the quality of life in obese persons based on experience of *yoga* practice

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The present cross sectional comparative trial aimed to compare the quality of life (QoL) in Indian obese persons who had experience in *yoga* compared to those naïve to *yoga*. Forty obese participants (BMI $\geq$ 25Kg/m^2) of both sexes (M:F, 18:22), age range between 30 to 50 years (Mean ± SD, 43.1 ± 4.6 years) took part in the study. There were two groups of participants i.e., (i) a *yoga* experienced group with at least six months experience in *yoga*, and (ii) a naïve to *yoga* group. The QoL was assessed using the Moorehead-Ardelt Quality of Life (QoL) Questionnaire and the results were determined using a *t*-test for unpaired data; with individual Holm-Bonferroni adjustments. A significant difference was found between the two groups in the following domains of QoL: (i) self esteem ($p < 0.001$), (ii) enjoyment in doing physical activities ($p < 0.01$), (iii) ability to work ($p < 0.01$), and (iv) total quality of life ($p < 0.01$). These four aspects of QoL were found to be significantly higher in the *yoga* experienced group compared to the naïve to *yoga* group, indicating the possible usefulness of yoga to improve QoL in obese persons.

Keywords: Quality of life, Obesity, *Yoga*, Naïve to *yoga*, Cross-section study

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The prevalence of obesity is increasing globally and in India; this has become a health concern[1]. A recent study revealed the fact that India has the third maximum number of obese persons in the world, after the U.S. and China, with 30 million who are obese[1]. It has been reported that overweight and central fat distribution are not only associated with serious medical conditions such as type 2 diabetes, cardiovascular disease, and several types of cancers but also adversely affects many dimensions of quality of life even in those who are without diseases which may be linked to obesity[2]. Multiple studies have reported poor self-esteem[3], impaired psychosocial functioning[4], reduced physical functioning[5,6] disability[7] and sexual dysfunctions[8] in overweight/ obese and centrally obese subjects. Weight loss has been associated with improvement in quality of life of overweight, obese and centrally obese subjects[9]. Revised guidelines for the prevention and management of obesity emphasize lifestyle modifications for weight loss in overweight and obese persons[10]. *Yoga* is an ancient Indian life-style intervention which includes an increased level of physical activity, changes in thinking and perception and eventually, dietary suggestions[11]. Multiple studies have been conducted to assess the effects of *yoga* for weight loss. These studies have shown that the practice of *yoga* is safe and useful for weight loss in overweight and obese subjects[12-14]. Despite the fact that the practice of *yoga* has been found useful for reduction in body weight in overweight, obese and in those who are centrally obese[12-14], there are very few studies assessing the effects of *yoga* on the quality of life in obese participants. In a recent randomized controlled trial on 60 centrally obese otherwise healthy females, waist circumference as a measure of central obesity and other related anthropometric measures (waist/hip ratio, body weight, BMI, body fat percentage, body muscle mass percentage, blood pressure, health-related quality of life, self-esteem, subjective stress, body awareness, and body responsiveness) were assessed before and after 12 weeks of intensive yoga intervention (90 min per day twice a week)[15]. Following 12 weeks of intervention there were significant increases in self esteem, health related quality of life and a decrease in the waist circumference as well as other relevant anthropometric measurements. To our knowledge there is no study comparing the quality of life in Indian overweight and obese participants having experience in *yoga* with those who are naïve to *yoga*.

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With this background the present study was planned to see if there is any difference in the quality of life of obese participants who have at least six months of experience in *yoga* and those who are naïve to *yoga*.

Methods

Sample

Forty obese persons (BMI $\geq$ 25Kg/m^2) of both sexes (M:F, 18:22) with ages between 30 and 50 yrs (Mean ± SD 43.1 ± 4.6 yrs) participated in the study. The participants were those enrolled in a weight management program at a *yoga* center. Their baseline assessment included the Moorehead-Ardelt Quality of Life Questionnaire and BMI among other measurements. Participants were included in the study if their BMI was $\geq$ 25Kg/m^2. Participants were excluded if: (i) they drank alcohol or used tobacco in any form, (ii) they had any metabolic abnormalities (e.g. hypothyroidism and type 2 diabetes mellitus) or (iii) they were taking any medication. The baseline characteristics of the participants are given in Table 1. Recruitment was carried out by distributing leaflets in the locality and advertising in the local newspaper. A signed informed consent was obtained from each participant. The study had the approval of the institution's ethical committee.

Study design

The study was a cross sectional comparative control trial. Participants were recruited to form two groups, i.e., (i) a group of participants having at least six months of experience in *yoga* practice and (ii) a naïve to *yoga* group which included participants having no prior experience of *yoga* practice at the time of assessment. The participants of the *yoga* group had practiced the following *yoga* techniques (i) *pranayamas* and yoga breathing techniques (*kapalbhati, anulom-vilom, bhastrika,* and *bhramari*) and (ii) *asanas* (*tadasana, vakrasana, bhujangasana, mandukasana, makarasana* and *shavasana*). Their daily practice was approximately 45 minutes a day for at least 5 days in a week.

Assessments

Quality of life: In the present study the quality of life was assessed using Moorehead-Ardelt Quality of Life Questionnaire[16] which is often used to assess QoL in obese persons after bariatric surgery compared with before and assesses six different aspects of quality of life which are particularly compromised in overweight, obese persons, especially those who are centrally obese. The questionnaire is designed to assess different aspects of quality of life which are general self-esteem, physical activity, social contacts, satisfaction concerning work, sexual pleasure, and focus on eating behavior, in scores ranging from -0.5 to +0.5. The sum of these 6 scores provides an overall QoL score.

Data extraction

Data were extracted using standard methods[16]. Each score was classified into 5 categories (very poor: -3.0 to -2.1; poor: -2.0 to -1.1; fair: -1.0 to +1.0; good: 1.1 to 2.0: and very good: 2.1 to 3.0).

Statistical analysis

Statistical analyses were performed using the Predictive Analytic Software (Version 18.0, SPSS Inc). The t-test for unpaired data was used to detect differences between quality of life of both groups. The group average values and standard deviations are provided in the Table 2.

Table 1 — Baseline characteristics of the participants

	Yoga experienced group	Naive to *yoga* group
n (males/females)	20 (9/11)	20 (9/11)
Age (years) Mean±SD	43.0±4.8	43.3±4.5
Experience of yoga (months)	6-84	0

Table 2 — Different aspects of quality of life in obese persons with and without experience in yoga.

SI.No.	Aspect of Quality of life	*Yoga* experienced group (Mean±SD)	Naïve to *yoga* group (Mean±SD)	*p*-value
1	Feeling of respondent about himself (good/bad)	0.3± 0.2	0.0± 0.2***	$p<0.001$
2	Enjoying physical activities	0.3± 0.2	0.0± 0.2***	$p<0.001$
3	Satisfactory social contacts	0.2±0.2	0.1±0.3	Not significant
4	Ability to work	0.3± 0.2	0.1± 0.2**	$p<0.001$
5	Sexual pleasure	0.1±0.2	0.1±0.4	Not significant
6	Approach towards food	0.3± 0.2	0.2± 0.2	Not significant
7	Total quality of life	1.4± 0.7	0.5± 1.1**	$p<0.01$

*$p<0.05$, **$p<0.01$,***$p<0.001$ unpaired *t*-test

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Individual p values were adjusted using the Holm-Bonferroni adjustment.

Results

The *yoga* experienced group had 6 to 84 months (group mean ± SD; 31.9 ± 22.5 months) of experience of *yoga* practice.

There was a significant difference between groups in the following domains of quality of life: (i) self esteem ($p < 0.001$; where Holm-Bonferroni adjusted alpha = 0.0083(2)), (ii) enjoyment in doing physical activities ($p < 0.01$; where Holm-Bonferroni adjusted alpha = 0.0083(1)), (iii) ability to work ($p < 0.01$; where Holm-Bonferroni adjusted alpha = 0.0083(1)), and (iv) total quality of life ($p < 0.01$; where Holm-Bonferroni adjusted alpha = 0.0083(1)).

Discussion

Obese participants with at least six months of experience in *yoga* showed a significant improvement in quality of life, compared to those who were naïve to *yoga*. Self-esteem, enjoyment in doing physical activities, ability to work and total quality of life, were the four aspects of quality of life which were significantly better in the *yoga* experienced group compared to the group which was naïve to *yoga*. Self-esteem was significantly higher in the *yoga* experienced group of obese participants and is of importance as poor self-esteem has been linked with depression and even with ideas of suicide[17]. The results of the present study support the findings of an earlier study that reported that the practice of *yoga* improves self-esteem[18]. The difference between the earlier study[18] and present study is that the earlier study was carried out on normal-weight, healthy volunteers while the present study was carried out on obese persons. Among other factors body dissatisfaction has been attributed to poor self-esteem in overweight and obese persons[19]. It is known that *yoga* practice which includes specific *yoga* postures, breathing techniques and meditation gives specific emphasis to body awareness and responsiveness[20]. Increased body awareness and responsiveness have been linked with greater body satisfaction and lower levels of trait self objectification and may explain the significant group differences in self-esteem of obese participants having experience in *yoga* compared to those who were naïve to *yoga* in the present study. It is well known that overweight and obese participants are more likely to have poor physical functioning, which is also a measure of quality of life. In the present study obese participants with experience in *yoga* reported significantly better physical functioning compared to those naïve to *yoga*. The practice of *yoga* has been reported to reduce body fat, the waist circumference[13] and increase muscle strength[21] in overweight and obese persons with and without complications associated with obesity. Apart from this, the practice of *yoga* has been shown to be beneficial in improving the cardio respiratory fitness in normal healthy volunteers[22]. In the present study it may be speculated that obese persons with experience in *yoga* may have significantly better muscle strength, joint mobility and cardio respiratory fitness in comparison to group naïve to *yoga*. However in the absence of measurements, such as body composition and VO2 max this remains only a speculation. With an increase in age obese persons are more like to develop difficulty in performing daily activities such as carrying weights, kneeling and stooping[23]. In general reduction in lean body mass has been correlated with limitations in performing daily activities[24]. In the present study obese persons with experience in *yoga* showed significantly better ability to work compared to the naïve- to-*yoga* group. As mentioned above, the practice of *yoga* has been shown to improve lean mass in obese persons and this could be a possible factor why obese persons with experience in *yoga* have reported better ability to perform daily activities than the control group. Apart from this, the total quality of life was also significantly better in obese persons having experience in *yoga* compared to the naïve-to-*yoga* group. In the present study the total quality of life is obtained by adding the scores for the six different aspects of quality of life. Better quality of life in obese persons having experience in *yoga* in comparison to the naïve-to- *yoga* group could be related to the fact that out of six, three aspects of quality of life, i.e., (i) self esteem (ii) enjoyment in doing physical activities and (iii) ability to work were significantly higher in the *yoga* experienced group of obese persons. In the present study a significant difference in the total quality of life between obese persons having experience in *yoga* compared to those naïve to *yoga* could be attributed these three aspects of quality of life which were significantly better in the yoga experienced group.

In summary the present study indicates that the practice of *yoga* may be useful to improve different aspects of quality of life in obese persons. Further

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research is required to understand the mechanisms by which obese persons having experience in *yoga* have better quality of life compared to those naïve to *yoga*.

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Alternate-Nostril Yoga Breathing Reduced Blood Pressure While Increasing Performance in a Vigilance Test

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Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Background: Reports suggest that vigilance or sustained attention increases sympathetic activity. A persistent increase in sympathetic activity can lead to an increase in blood pressure. Alternate-nostril yoga breathing has been shown to be useful to (i) improve attention and (ii) decrease the systolic and diastolic blood pressure. Earlier studies did not report simultaneous recordings of the blood pressure and performance in vigilance tests after alternate-nostril yoga breathing. With this background, the present study was planned to determine if 15 minutes of alternate nostril yoga breathing could improve the performance in a vigilance test without an increase in blood pressure.

Material/Methods: Fifteen healthy male volunteers participated in the study (group mean age ±SD, 22.4±2.4 years). Participants were assessed on 3 separate days in 3 different sessions. These were (i) alternate nostril yoga breathing, (ii) breath awareness, and (iii) sitting quietly as a control. Blood pressure and the digit vigilance test were simultaneously assessed before and after each session.

Results: Systolic blood pressure ($p<0.01$), mean arterial blood pressure ($p<0.05$), and the time taken to complete the digit vigilance test ($p<0.05$) significantly decreased following alternate-nostril yoga breathing. The time taken to complete the digit vigilance test differed significantly between sessions ($p<0.05$). The time taken to complete the digit vigilance test was also significantly decreased after sitting quietly ($p<0.01$).

Conclusions: Alternate-nostril yoga breathing appears to improve performance in the digit vigilance test, along with a reduction in systolic blood pressure. This is suggestive of better vigilance without sympathetic activation.

MeSH Keywords: Attention • Blood Pressure • Breathing Exercises

Full-text PDF: https://www.basic.medscimonit.com/abstract/index/idArt/906502

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Background

Cerebral cortical activation influences the ability to process information [1]. States of cortical activation include arousal, alertness, vigilance, and attention. Vigilance has been described differently by specialists in different areas; however, vigilance is most commonly used to describe sustained attention [2]. Sub-cortical monoaminergic projections such as those from the nor-epinephrine locus coeruleus and the serotonergic raphe system play an important part in cognitive functions, especially attention [3]. Sustained attention is associated with increased sympathetic nervous system activity [4], which can result in changes such as increased heart rate or blood pressure [5]. Hence, it would be ideal to focus attention without an increase in sympathetic nervous system activity.

Yoga practice includes voluntary breath regulation, which allows a practitioner to modify physiological functions and mental state within physiological limits [6]. There are several voluntarily regulated breathing techniques which include changes in the rate and depth of respiration and the nostril breathed through [7]. Previous studies have shown that high-frequency yoga breathing (HFYB, at the rate of 2.0 Hz) can influence performance in cancellation tasks [8]. Cancellation tasks require the ability to focus attention and to shift or re-direct attention, as well abilities related to visual scanning and repetitive motor activity. It was speculated that HFYB improves attention, which was further supported by an increase in the P3 amplitude and decrease in P3 latency after HFYB [9].

Apart from HFYB, breathing through a particular nostril or through both nostrils alternately has been studied extensively [10]. Breathing through a particular nostril is supposed to selectively activate the parasympathetic (left nostril) or sympathetic (right nostril) divisions of the autonomic nervous system through a pathway involving connections between the nasal meatus and different hypothalamic nuclei [11]. The possibilities of altering the autonomic nervous system by alternate-nostril yoga breathing (ANYB) has given rise to several detailed studies which have also sought to determine the periodicity of the natural rhythm, which is the nasal cycle [12].

Practical observations have shown that 18 minutes of alternate nostril yoga breathing (ANYB) are optimal [13]. A recent EEG study on 13 normal participants showed a significant decrease in theta activity at the vertex and occipital region during ANYB [14]. The effects of ANYB have also been studied on the heart rate variability (HRV) in experienced yoga practitioners [15,16] and in those with no experience in yoga [17], showing that yoga practice makes a difference in the effects of ANYB on the HRV, with a shift towards parasympathetic dominance. Eighteen minutes of alternate-nostril yoga breathing (ANYB) in 26 healthy volunteers was found to lower the systolic blood pressure by an average of 4.5 mmHg as an immediate effect [15]. The reduction in systolic blood pressure in normotensives after 18 minutes of ANYB led to the question of whether hypertensives could perform a task requiring focused attention and coordination with no rise in blood pressure. This was tested in 90 hypertensives on medication, who were asked to perform the Purdue pegboard task while their blood pressure was monitored non-invasively [18]. Immediately after ANYB participants significantly improved their performance in the Purdue pegboard task (effect size=0.61). Simultaneously, both their systolic and diastolic blood pressure were decreased by an average of 4.24 mmHg (effect size=0.45) and 1.56 mmHg (effect size=0.16), respectively. As mentioned above, the Purdue pegboard task involves eye-hand coordination, repetitive motor activity, and focused attention. However, the Purdue pegboard task is not a direct test of sustained attention and vigilance. Hence, the present study was planned to assess the effect of ANYB on the performance of normotensives in a digit vigilance task while the blood pressure was simultaneously monitored non-invasively. The study was carried out on normotensives to check whether sustained attention, which is a part of vigilance, would increase the blood pressure. This has not been done before using a test which exclusively assesses vigilance. A first-time evaluation of effects is most easy to understand under normal physiological conditions [19]. Bernard (1957) differentiated between the study of disease and the study of normal physiology [19], stating that physiology is the foundation of scientific medicine, as it yields explanations of morbid phenomena by showing their relationship to normal states. Based on this general principle that the true mechanism of an intervention is best understood in the normal physiological state, the present study was designed to test normotensives and their response to a vigilance-specific task while measuring the blood pressure in relation to ANYB. The objective was to determine if ANYB could prevent an increase in blood pressure while participants completed the vigilance task. ANYB was compared with breath awareness (BAW), since BAW is a part of yoga breathing which has been found to increase attention [18]. Both ANYB and BAW sessions were compared with sitting quietly as a control.

The aim of the present study was to assess whether 18 minutes of alternate-nostril breathing or 18 minutes of breath awareness would prevent an increase in blood pressure while normotensives performed a vigilance task specific for sustained attention and alertness.

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Material and Methods

Participants

Fifteen healthy male participants with ages ranging between 18 and 27 years (group mean ±SD, 22.4±2.4 years) participated

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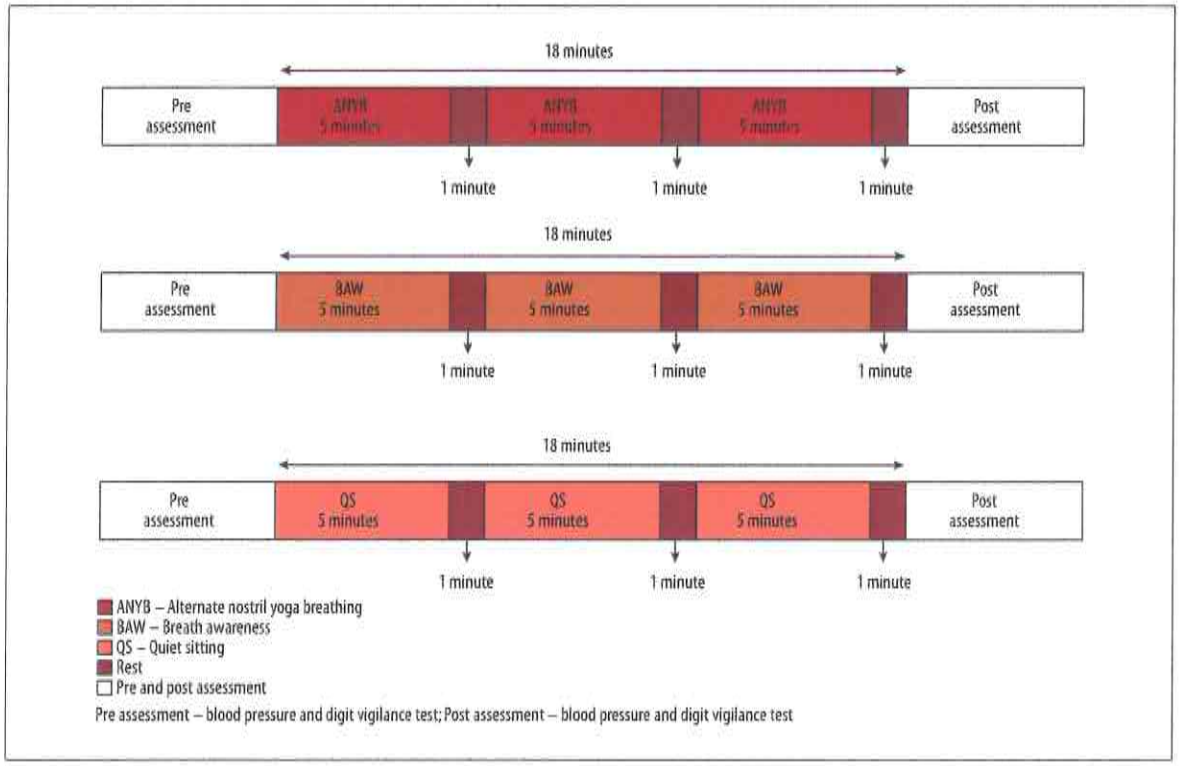

Figure 1. Schematic presentation of the study design.

in the study. The study was limited to male participants as autonomic variables vary with the phases of the menstrual cycle [20]. For the present study, the sample size was not calculated prior to the study. *Post hoc* analysis carried out to determine the power of the study, showing that for the present study, with a sample size of 15 and with the effect size of 0.40 calculated from the mean and SD of systolic blood pressure values which changed significantly after alternate nostril yoga breathing, the power was 0.82869 [21]. The participants were students of a university located in the north of India. The inclusion criteria were: (i) a minimum of 12 months of experience in yoga practice (average yoga experience ±SD, 28.9±15.1 months), (ii) normal physical and mental health based on a clinical examination, (iii) right hand dominance based on a standard inventory [22], and (iv) willingness to take part in the study. The exclusion criteria were: (i) any disease, (ii) taking any medication, and (iii) impaired cognitive or motor functions. None of the participants were excluded for these reasons. Participation in the study was voluntarily with no remuneration. The variables to be assessed and the study design were explained to the participants and signed informed consent was obtained from each participant. The study had ethics clearance from the Ethics Committee of the Patanjali Research Foundation [approval number: PRF/16/0024] which was formed based on the guidelines of the Indian Council of Medical Research.

Design of the study

Each participant was assessed in 3 separate sessions: (i) alternate nostril yoga breathing or *anuloma-viloma pranayama* (ANYB), (ii) breath awareness (BAW), and (iii) sitting quietly as a control (QS). The sessions were on 3 separate days. The 3 sessions were randomly allocated to the participants using a standard randomizer (*www.randomizer.org*). The total duration of each intervention was 18 minutes, which was divided into 3 epochs of 5 minutes with 1 minute for rest between 2 epochs. Blood pressure and performance on the digit vigilance test were assessed simultaneously. The design of the sessions is schematically presented in Figure 1.

Assessments

Noninvasive blood pressure

Participants were asked to rest for 10 minutes before assessments. The noninvasive blood pressure was measured using a Schiller Truscope™ II Multiparameter monitor (Guangdong BiolightMeditech, China) with the transducer placed over the left brachial artery, while the participant was seated with the left arm extended on a table. The systolic and diastolic blood pressure values were noted. The mean arterial pressure was calculated using the formula [MAP=DBP+1/3(SBP–DBP)] [23].

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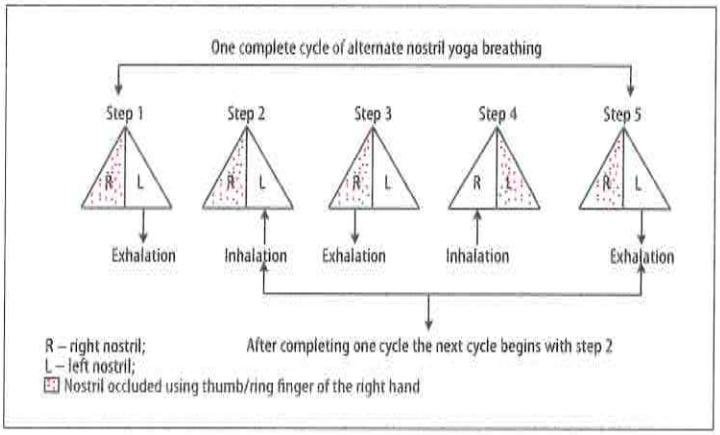

Figure 2. Schematic diagram for a typical cycle of alternate-nostril yoga breathing.

Vigilance or sustained attention

Sustained attention was measured using a digit vigilance test (DVT) of proven validity and reliability [24], which consisted of the numbers 1 to 9 arranged randomly in rows [25]. Each sheet had 50 rows with 30 digits per row. The participants were instructed to cancel only 2 digits (6 and 9) as quickly as they could. They were asked not to: (i) cancel other digits or (ii) miss any of the target digits (6 and 9). The total time taken to complete the test and the number of errors made were noted.

Interventions

Each participant was assigned to the following sessions: (i) alternate-nostril yoga breathing (ANYB), (ii) breath awareness (BAW), and (iii) quiet sitting (QS). The total time for each intervention was 18 minutes. The interventions were preceded and followed by assessments of the digit vigilance test and noninvasive blood pressure. The participants were instructed to sit erect with eyes closed during each session.

Alternate-nostril yoga breathing (ANYB)

ANYB involves breathing through both left and right nostrils alternately. The thumb and the ring finger of the right hand are used to manipulate the nostrils. The breathing practice begins by occluding the right nostril with the right thumb and exhaling through the left nostril, then inhaling through the left nostril with right nostril occluded, then exhaling through the right nostril with the left nostril occluded with the right ring and little fingers. After this, the practitioner inhales through the right nostril with the left nostril occluded, then exhales through the left nostril with right nostril occluded. This is 1 cycle of ANYB and is shown schematically in Figure 2.

Breath awareness (BAW)

The participants were seated erect with their eyes closed, and during this time participants maintained their awareness of the flow of the breath through the nasal passages, without manipulation of the breath.

Quiet sitting (control session; QS)

Participants were seated erect, as they were during the ANYB and BAW sessions. Participants were instructed to keep their eyes closed and allowed their thoughts to wander freely. There was no other activity.

Data extraction

Blood pressure

The systolic and diastolic blood pressure values of each participant were noted in mmHg, and the mean arterial pressure was calculated using the standard formula [MAP=DBP+1/3(SBP–DBP)] [23].

Vigilance or Sustained attention

The digit vigilance task was scored using the standard method [24]. The total time taken to complete the test (in minutes) and number of errors made were noted for analysis.

Data analysis

Statistical analysis was carried out using SPSS (Version 18.0). The data obtained before and after the 3 sessions were compared using a repeated-measures analysis of variance (RM-ANOVA) followed by *post hoc* analyses with Bonferroni adjustment. For the RM-ANOVA, there were 2 within-subject factors. These were sessions with 3 levels (alternate nostril yoga breathing, breath awareness, and quiet sitting) and states with 2 levels (before and after).

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Table 1. Changes in BP and DVT task performance before and after ANYB, BAW and QS.

Variables	ANYB			BAW			QS		
	Pre Mean ±SD	Post Mean ±SD	Cohen's d	Pre Mean ±SD	Post Mean ±SD	Cohen's d	Pre Mean ±SD	Post Mean ±SD	Cohen's d
Systolic BP (mmHg)	122.30 ±9.45	118.23* ±10.62	0.404	118.97 ±9.98	116.73 ±8.93	0.236	119.48 ±11.66	117.02 ±14.46	0.187
Diastolic BP (mmHg)	76.79 ±6.79	74.65 ±8.10	0.286	73.75 ±6.66	73.41 ±7.26	0.048	74.38 ±9.84	74.93 ±9.84	0.350
Arterial mean pressure (mmHg)	91.97 ±7.54	89.19* ±8.79	0.339	88.82 ±7.18	87.86 ±7.50	0.132	89.41 ±10.19	88.97 ±13.01	0.037
DVT task: Time Taken (in minutes)	6.54 ±1.09	5.98* ±1.15	0.499	5.95 ±1.22	5.69 ±1.58	0.184	5.96 ±1.60	5.27** ±1.03	0.512
DVT task: No. of errors	19.53 ±28.82	12.53 ±15.38	0.303	13.80 ±12.66	8.47 ±6.27	0.533	14.87 ±15.27	9.20 ±11.88	0.414

* p<0.05; ** p<0.01; RMANOVA with Bonferroni adjustment when pre values were compared with post values of the respective session. ANYB – alternate nostril yoga breathing; BAW – breath awareness; QS – quiet sitting; BP – blood pressure; DVT – digit vigilance test.

Table 2. Details of the repeated measures analyses of variance for BP and DVT task performance.

Variables	Sources	df	Mean square	F	Partial eta square
Systolic BP (mmHg)	Sessions	1.77, 22.41	56.51	1.240	0.082
	States	1, 14	192.41	8.580	0.380
	Sessions*States	2, 28	7.6	0.436	0.030
Diastolic BP (mmHg)	Sessions	1.51, 21.08	45.71	0.804	0.054
	States	1, 14	9.3	0.542	0.037
	Sessions*States	1.89, 28	14.9	1.009	0.067
Arterial mean pressure (mmHg)	Sessions	1.514, 21.19	50.32	0.952	0.064
	States	1, 14	44.33	2.564	0.155
	Sessions*States	2, 28	11.23	0.812	0.055
Time taken (in minutes)	Sessions	1.95, 27.34	3.3	6.260	0.309
	States	1, 14	5.8	25.810	0.648
	Sessions*States	2, 28	0.358	0.929	0.062
No. of errors	Sessions	1.63, 22.86	249.97	0.723	0.049
	States	1, 14	810	7.550	0.350
	Sessions*States	1.97, 27.64	5.9	0.049	0.003

Results

The group mean values ±SD for the different variables are given in Table 1. ANOVA values for blood pressure and digit vigilance test are given in Table 2.

Repeated-measures analyses of variance (RM-ANOVA)

The systolic blood pressure differed significantly between states (F=8.589, df=1, 14, Huynh-Feldt epsilon=1.000, p<0.05). A significant interaction between sessions x states (F=0.846, df=2, 13, p<0.05, Huynh-Feldt epsilon=1.000) was noted in mean

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arterial blood pressure, suggesting interdependence of the 2 factors. The time taken to complete the digit vigilance test differed significantly between states (F=25.814, df =1, 14, Huynh-Feldt epsilon=1.000, p<0.001) and sessions (F=4.201, df=2, 13, Huynh-Feldt epsilon=0.976, p<0.05).

Post hoc analyses

Systolic blood pressure decreased significantly (p<0.05) after ANYB with a 95% confidence interval (CI) of [6.779, 1.379]. The mean arterial blood pressure also reduced significantly (p<0.05) following ANYB with 95% CI of [5.145, 0.425]. The time taken to complete the digit vigilance test decreased significantly: (i) following ANYB (p<0.05) with 95% CI of [1.096, 0.036], and (ii) after quiet sitting (p<0.01) with 95% CI of [1.133, 0.250].

Discussion

Fifteen healthy volunteers performed a digit vigilance task with significantly less time, along with a decrease in systolic and mean blood pressure, after 18-minute practice of alternate-nostril yoga breathing (ANYB).

Previously, alternate-nostril yoga breathing was shown to reduce both systolic and diastolic blood pressure [26] and systolic blood pressure alone [15,27,28]. In hypertensives after 18 minutes of ANYB practice, the performance in a Purdue pegboard task which requires eye-hand coordination was better, while both systolic and diastolic blood pressure values reduced [18].

The mechanism by which ANYB alters the blood pressure is complex. ANYB acts on an inherent rhythm that influences autonomic functions, which is the nasal cycle. The nasal cycle is an ultradian rhythm which results in a variation in the patency and efficiency of the right and left nostrils [29,30]. Time-series analysis demonstrated that the time periods for 10 variables including the nasal cycle in healthy adults was 115–145 minutes, 70–100 minutes, and 40–65 minutes.

Hence, the concept of spontaneous variations occurring in nostril dominance in human appears a distinct possibility, most probably mediated by autonomic and central regulation of nasal blood vessels [11]. ANYB hence is voluntarily superimposed on this existing rhythm of fluctuation in nostril dominance. Earlier studies have found no correlation between nostril patency at baseline and the effects of voluntary regulation of the nostril in yoga breathing [26]. However, it is worth noting that the basic rhythm is based on complex regulation of the nasal vasculature.

Systolic blood pressure is understood to be determined by the cardiac output, whereas diastolic blood pressure is influenced more by peripheral vascular resistance [31].

In the present study, unlike in a previous study on hypertensives who practiced ANYB for the same duration [18], there was no change in systolic blood pressure following breath awareness. This is most probably related to differences in the regulatory mechanism in hypertensive and normotensive individuals.

The participants in the present study performed better after ANYB in a digit vigilance test taking significantly less time and with a trend of fewer errors. The vigilance test is specifically designed to evaluate sustained attention and focusing. In this task both the time taken as well as the number of errors made are of importance. After all 3 sessions (ANYB, BAW, and QS) there was a non-significant decrease in errors as follows: After ANYB (35.9% decrease, effect size=0.5), breath awareness (BAW) (38.6% decrease, effect size=0.5) and quiet sitting (QS) (38.1% decrease, effect size=0.4). There were no significant before/after differences in the number of errors, possibly due to the high levels of dispersion i.e., the high standard deviations. However, the degree of change was comparable in the 3 sessions, but after the ANYB session participants took significantly less time to complete the task. This suggests better efficiency.

An EEG study on 13 normal healthy participants after ANYB, BAW, and QS showed a decrease in theta activity at the vertex and occipital regions during ANYB [14]. These results suggest that the sustained attention required for DVT did not activate the mechanisms associated with mental effort. Memory tasks are known to result in increased frontal mid-line theta. It is possible that the effort involved in completing the DVT after ANYB was less than that after BAW and QS, as suggested by the decrease in systolic blood pressure (4.1 mmHg) and mean arterial pressure (2.8 mmHg). However, this is only a speculation.

The mechanism underlying the benefits of ANYB with improved efficiency in a vigilance task has not been studied. However, a study in army personnel who practiced a combination of yoga techniques including ANYB showed improved performance in a cancellation task requiring focusing and shifting attention, while their state anxiety decreased [30]. It is known that vigilance is influenced by psychological factors such as motivation [31] (a positive influence) and stress (a negative effect) [1]. In the present study, ANYB may have reduced stress and anxiety and hence improved performance. However, this remains to be studied. Not knowing the mechanism is a definite limitation of the study. It also provides direction for future research.

The mechanism by which breathing through one or both nostrils alternately influences the autonomic nervous system is complex. It appears to be mediated by mechanical receptors in the nasal mucosa, which are activated by air flow into the nostril from where the signal is unilaterally transmitted to specific regions within the hypothalamus regulating the autonomic nervous system [32].

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Conclusions

Hence, the results of the present study suggest that ANYB can help participants maintain a state of sustained attention without the usual increase in blood pressure. These findings are limited by the small sample size as well as by the fact that the participants were all male. A larger sample size with subjects of both sexes would allow the findings to be generalized.

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Characteristics of Yoga Practitioners, Motivators, and Yoga Techniques of Choice: A Cross-sectional Study

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Background: The characteristics of yoga practitioners and factors motivating people to practice yoga have been studied in the US and in Australia. This study aimed to determine the characteristics of yoga users in India, the factors that motivate them to practice yoga, and the yoga techniques of choice.

Materials and methods: The study was a one-time, cross-sectional survey based on convenience sampling. Inclusion criteria were (a) a minimum of 1 week experience of yoga and (b) at least 10 years of age. 14,250 people received the survey. After excluding those who did not meet the inclusion criteria or filled in the survey incompletely or incorrectly, 5,157 respondents were included in the study.

Results: Out of 5,157 respondents, there were more males (67.3%), aged between 21 and 44 years (33.7% of the sample surveyed), educated up to high school (62.5%), students (39.3%), and those who had between 1 and 12 months of experience in yoga (54.4%). The first most common reason to practice yoga for all respondents was physical fitness. Three of the remaining reasons to practice yoga differed significantly with age: (i) yoga for disease management ($\chi^2 = 17.62$, $p < 0.005$), (ii) yoga as a hobby ($\chi^2 = 10.87$, $p < 0.05$), and (iii) yoga based on the *guru's* (teacher's) instructions ($\chi^2 = 20.05$, $p < 0.001$). The yoga technique of choice [i.e., (i) *asanas* ($\chi^2 = 23.17$, $p < 0.001$), (ii) *pranayama* ($\chi^2 = 19.87$, $p < 0.001$), or (iii) meditation ($\chi^2 = 9.64$, $p < 0.05$)] differed significantly across age groups.

Conclusion: In India, a yoga practitioner was more likely to be male, between 21 and 44 years of age, high school educated, and a student. The reasons to practice yoga and the yoga technique of choice differed significantly with age.

Keywords: yoga, characteristics of users, motivating factors, yoga techniques, survey, India

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INTRODUCTION

Yoga has multiple and diverse benefits (1). June 21 was declared the International Day of Yoga by the United Nations General Assembly, following a resolution from the Government of India (2). This declaration was based on the holistic approach to health and well-being through yoga. Hence, the declaration aimed to disseminate information about the overall benefits of yoga, for health (2).

The Associated Chambers of Commerce and Industries Social Development Foundation (India) conducted a survey ($n = 1,100$) which suggests that the intention of this resolution was

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met in India (3). There was a 30% increase in yoga practitioners in metropolitan cities following the first International Day of Yoga in India, between June 2015 and June 2016 (3). In the survey, the majority of yoga practitioners were students, young professionals, those in decision-making positions, and retired persons.

A survey was conducted in the US as a personal household interview, with 34,525 respondents (4). The survey was part of the 2012 National Health Interview Survey (4) and aimed at determining the reasons why people chose to meditate, the predictors for use, self-reported outcomes of meditation practice, meditation use within the life time and in a 12-month period, utilization patterns, and the prevalence of specific meditation practices. Another survey, which was part of the 2002 US National Health Interview Survey aimed at determining the characteristics of yoga users (5). There were 31,044 respondents, and the survey was administered as a face-to-face interview. The questions were intended to determine the prevalence of yoga users (found to be 5.1%, $n = 1,593$), characteristics of yoga users, medical reasons for practicing yoga, perceptions about the helpfulness, and the disclosure of use to medical professionals. A nation-wide survey was conducted in Australia as an online 30-min interactive web-based questionnaire, which was also intended to determine the characteristics of yoga practitioners, investigate the styles of yoga commonly practiced, the motivation to practice, perceived effects of practice, yoga-related injuries, as well as dietary and lifestyle choices (6). In both the US (4, 5) and Australia (6), yoga practitioners were more likely to be female, educated, and to be practicing yoga chiefly for physical well-being.

At least two surveys have been conducted in India. In a survey conducted in a city in the west of India (Mumbai), the aim was to determine whether university students were aware of scientific research on yoga (7). The survey was returned by 972 respondents, whose average age was 26 years and the ratio of males to females was 54.8%:45.2%. The other survey aimed to determine the barriers which yoga practitioners face when they are committed to practice yoga (8). The 280 participants had self-elected to join a 1 month residential course in yoga and participated in an online survey. Their average age was 34.5 years and the male to female ratio was 48.0:52.0.

To the best of our knowledge, there has been no survey in India to determine the characteristics of yoga users, their reasons for practicing yoga, and the yoga techniques they preferred. In June 2016 in India, several events preceded International Yoga Day to increase awareness about the multiple benefits of yoga.

The present survey on Indian respondents aimed at determining: (i) the characteristics of yoga users, (ii) the primary reason why people chose to practice yoga, and (iii) the yoga technique of their choice.

MATERIALS AND METHODS

Sample

The respondents to the survey had come from all over India to participate in or observe a public event on yoga. To be included in the survey participants had to have (i) a minimum of 1 week experience of yoga practice and (ii) completed at least 10 years of age. 14,250 individuals received the survey. Excluding those who did not meet the inclusion criteria or did not complete the survey correctly, 5,157 respondents formed the sample (**Figure 1**). The baseline characteristics of these respondents are provided in **Table 1**. Their ages ranged between 10 and 91 years. The gender ratio (M:F in %) was 67.3:32.7. They had varying levels of education, and experience in yoga, as well as different occupations. The signed informed consent of each respondent was taken as part of the survey.

Design

The study was a one-time cross-sectional survey. The total number of participants exceeded 25,000. The selected sample size was 15,000. This was not based on statistical calculations but on pragmatic considerations. Administering the survey simultaneously to 15,000 participants posed practical difficulties. Hence, it was decided to administer the survey when participants were seated in smaller groups. Buses were arranged to transport participants from a specific point to the venue. There were 50 participants in each bus. Hence, 300 buses were selected so as to get the required number of 15,000 respondents. No standard methods of randomization were used to select buses, which is a definite limitation of the survey. The survey was administered by a volunteer (one volunteer/stationary bus). The volunteers had been briefed about the survey questions. There were no specific considerations for participants to enter a bus and entry was free. The study had prior clearance from the ethical committee

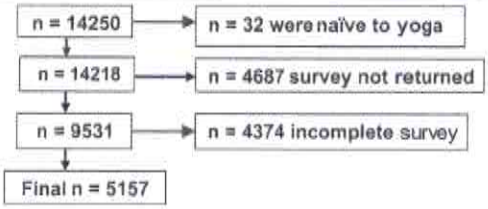

FIGURE 1 | Details about the number of respondents.

TABLE 1 | Baseline characteristics of the participants.

Characteristics	Details
Age (years)	
Group mean age (SD)	33.4 (17.3)
Age range	10–91
Gender: male:female (actual values), % values	3,469:1,688, 67.3:32.7
Years of education (%)	
10 years and less	39.2
11–12 years	23.2
13–15 years	24.2
16 years and above	13.2
Experience of yoga (%)	
Less than a month	7.1
1–12 months	54.4
13–60 months	23.8
60 months and above	14.7

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of Patanjali Research Foundation (approval no. PRF/16/0023), which was formed based on the guidelines of the Indian Council of Medical Research (9).

The Event and Yoga Protocol

The event was in New Delhi on June 19, 2016 in a public space with multiple entrances. The event was organized by a yoga institution in north India (*viz.*, Patanjali Yogpeeth). Entry was free and unrestricted. The grounds were easily accessible. Participants were given yoga mats to practice yoga or to observe others practice. Naïve-to-yoga participants were instructed to be observers. The event involved yoga practices from the common yoga protocol developed by the Ministry of AYUSH, Government of India (10), devised to be practiced across India on International Yoga Day. These techniques were considered relatively safe for all yoga practitioners. Contraindications for practice were mentioned. The 45-min protocol included a universal prayer, loosening exercises, yoga postures, yoga breathing techniques, and meditation. The details are given in **Table 2**.

The Survey

The survey was written in both English and Hindi. It had three parts: (i) Details about the respondents: age, gender, education, occupation, and experience in yoga, (ii) the primary reason why the participants wanted to practice yoga, and (iii) the yoga practice they liked the most. Participants were asked to sign an informed consent form. The second part of the survey, i.e., the primary reason to practice yoga had 10 possible responses with examples. These were (i) arranged in alphabetical order in English, (ii) given serial numbers, and (iii) the sequence of the 10 options was randomized using a standard randomizer (www.randomizer.org). Each person was asked to select one option which they rated as their primary reason to practice yoga. The authors' experience with yoga practice and research (from 1991 till the present time) (11–13) was taken into account to develop the survey.

For the third part of the survey, the yoga practices were selected based on (i) the eight limbs (*asthang* in *Sanskrit*) of yoga, described by the sage Patanjali (*Circa* 900 B.C.) (14) and (ii) the yoga practices commonly taught in India (15). There were six

TABLE 2 | The 45-min yoga protocol devised by the Ministry of AYUSH, Government of India (10).

Sl. no.	Type of practice	Duration (min)
1	Prayer in any meditative posture with *Namaskara Mudra* and ending with Yoga *Mudrasana*	2
2	*Sadilaja/Chaalan Kriyas*/loosening practices (neck, shoulders, trunk, and knees movements)	6
3	Light exercises and specific yoga postures (*asanas*) I. Standing postures • *Taadaasana* (palm tree pose) • *Vrikshaasana* (tree pose) • *Pada-hastaasana/Uttaanaasana* (hand to foot pose/standing forward bend pose) • *Ardha chakraasana* (standing backward bend pose) • *Trikonaasana* (triangle pose) II. Sitting postures • *Bhadraasana/Baddhakonaasan* (butterfly pose) • *Vajrasana/Veerasana* (thunderbolt pose/hero pose) • *Ushtraasana (Ardha* for beginners)(camel pose) • *Shashankaasan* (rabbit pose) • *Utthana Mandukasana* (stretched frog pose) • *Marichyaasana/Vakraasana* (ray of light pose/curved pose) III. Prone lying postures • *Makaraasana* (crocodile pose) • *Bhujangaasana* (cobra pose) • *Shalabhaasana* (locust pose) IV. Supine lying postures • *Setubandhasana* (bridge pose) • *Utthanapaadaasana* (leg raised pose) • *ArdhaHalasana* (half plough pose) • *PawanaMuktaasana* (wind relieving pose) • Shavaasan (corpse pose)	18
4	• *Kapalabhati* (3 cycles of 40 strokes each) (kapala = forehead; bhati = shining; rapid, forceful exhalations) Each cycle will be followed deep breathing	3
5	*Pranayama* • *NadiShodhana/AnulomaViloma Pranayama* (alternate nostril breathing) (5 rounds) • *Sheetali Pranayama* (cooling breath) (5 rounds) • *Bhramari Pranayama* (bee breathing) (5 rounds)	6
6	*Dhyana*/Meditation in any Meditative Posture (eyes closed) and hands in *Jnana/Gyana Mudra*	8
7	End of the yoga Practice Session with a *Sankalp*	2
	Total duration	45

University of Patanjali Haridwar

options written in English and given their *Sanskrit* name. These 6 options were then randomized as described above for the 10 options in the second part of the survey. The final sequence is presented in **Table 3**. Each respondent was asked to select their first choice out of the six options.

Data Extraction

Survey sheets were sorted for different characteristics such as age, gender, years of education, occupation, and experience of yoga. Under each category, the number of respondents who were practicing yoga for a specific reason was noted. Similarly, the yoga practice of choice was noted for respondents under each category, for example, male and female. Handling this volume of data is prone to error. Hence, each entry was checked by two researchers, independently.

Data Analyses

The values were converted as a percentage of the whole within each category. The percentages have been used in the discussion. They have been provided for the reasons to practice yoga (**Table 4**) and for the yoga practices of choice (**Table 5**). Also, the percentage values were used to carry out separate Chi square tests to detect differences between-groups in the responses to the two questions (i.e., the primary reason to practice yoga and the yoga practice of choice), under the categories: age, gender, years of education, occupation, and experience in yoga.

RESULTS

The first most common reason for all respondents to practice yoga was physical fitness. Three motivators, i.e., (i) disease management ($\chi^2 = 17.62$, $p < 0.005$), (ii) yoga as a hobby ($\chi^2 = 10.87$, $p < 0.05$), and (iii) practicing yoga because my *guru* says to practice it ($\chi^2 = 20.05$, $p < 0.001$) differed significantly between the five age ranges (i.e., 10–12, 13–20, 21–44, 45–59, and 60 years and above).

The yoga practice of choice also differed significantly between the different age groups: (i) *asanas* ($\chi^2 = 23.17$, $p < 0.001$), (ii) *pranayamas* ($\chi^2 = 19.87$, $p < 0.001$), and meditation ($\chi^2 = 9.64$, $p < 0.05$). *Pranayamas* as the practice of choice differed significantly with occupations ($\chi^2 = 9.62$, $p < 0.05$).

TABLE 3 | Questions asked in the survey.

Part of the survey	Section	Options
Part II	Motivators to practice yoga based on the question: why do you want to practice yoga?	Disease management (e.g., diabetes, hypertension) Belief with no specific reasons (that is as a part of faith) Mental development (e.g., increase memory) As a hobby Physical strength (e.g., muscle strength) Spiritual growth (e.g., *sadhana*) Because my friends practice it Emotional health (e.g., relief from depression) Because my *guru* says I should Belief based on scientific knowledge (e.g., books or research publications)
Part III	Choice of yoga practice based on the question: which practice of yoga do you like the most?	*Yamas* and *Niyamas* *Asanas* *Pranayamas* *Kriyas* *Mudras* and *Bandhas* Meditation

The sequence for options for both Part II and Part III has been randomized. Part I included socio-demographic data sheet.
Participants were instructed to select one option that was most appropriate for part II and similarly for Part III.

DISCUSSION

5,157 respondents completed a survey in June 2016 in New Delhi, India. There were more males (67.3%) compared to females (32.7%).

The maximum respondents were adults between 21 and 44 years (33.7%), followed by adolescents between 13 and 20 years (31.7%) (16). Children between 10 and 12 years were least (4.0%) and seniors 60 years and above were 9.4%.

Most yoga practitioners had between 8 and 10 years of education (39.2%). Ten years is equal to a basic school leaving certificate. The smallest percentage had at least 16 years of education (13.2%). This corresponds to post-graduation and further studies.

The respondents could be broadly categorized into five occupations. Students formed the highest percentage (39.3%) while retired persons were the fewest (3.5%). There is an increased interest in young people to be physically fit and the number of young people choosing to practice yoga has increased all over India (3). A contributing factor could partly be that younger persons would be expected to be more enthusiastic about such an outdoor event and also would find the venue more accessible.

Among the respondents, the maximum number had experience of yoga ranging from 1 to 12 months (54.4%). This could be related to the fact that the maximum respondents were students.

Hence, in the present survey in India, more yoga practitioners were male, aged between 21 and 44 years with education between 8 and 10 years, students, and with 1 and 12 months experience of yoga. These results contrasted with those obtained in the US, where yoga practitioners were more often female, between 40 and 64 years of age (4) or with an average age of 39.5 years (5), with a minimum of college education, and a greater likelihood of being White, non-Hispanic, and Caucasian (4, 5). In Australia too, participants were more often female, with an average age of 41 years and were tertiary educated (6). The gender ratio in this study resembles that of a survey carried out in west India in Mumbai, on 972 practitioners (7) where males exceeded females (54.8:45.2). The results differed from the results of another survey conducted in India on 280 persons who had self-selected to join for a 1-month yoga residential course (8). Among the 280 respondents, the number of males and females was comparable, i.e., 48:52. In this study, despite the large number of participants, there was adequate space and security measures; hence, it is unlikely that these factors influenced the participation of females. The other factors (e.g., 8–10 years of education, more students practicing yoga in India) which differed between surveys conducted in India versus the US or Australia may be attributed to

University of Patanjali Haridwar

TABLE 4 | The 10 motivators to practice yoga for the 5,157 respondents.

Characteristics		Total sample	Reasons to practice yoga									
				2	3	4	5	6	7	8	9	10
			Yoga for disease management*	Blind faith in yoga	Yoga for mental development	Yoga as a hobby*	Yoga for physical fitness	Yoga for spiritual growth	Because friends practice yoga	Yoga for emotional health	Because my *guru* (teacher) says*	Belief based on scientific knowledge
1. Gender	Male	3,469	438 (12.6%)	148 (4.3%)	347 (10.0%)	191 (5.5%)	1,667 (48.1%)	295 (8.5%)	59 (1.7%)	27 (0.8%)	116 (3.3%)	181 (5.2%)
	Female	1,688	227 (13.4%)	63 (3.7%)	179 (10.6%)	100 (5.9%)	895 (53.0%)	99 (5.9%)	14 (0.9%)	16 (0.9%)	40 (2.4%)	55 (3.3%)
2. Age (in years)	10–12	208	13 (6.3%)	9 (4.3%)	28 (13.5%)	30 (14.4%)	88 (42.3%)	4 (1.9%)	1 (0.5%)	2 (1.0%)	26 (12.5%)	7 (3.3%)
	13–20	1,642	129 (7.9%)	66 (4.0%)	205 (12.5%)	115 (7.0%)	833 (50.7%)	90 (5.5%)	38 (2.3%)	17 (1.0%)	69 (4.2%)	80 (4.9%)
	21–44	1,739	199 (11.4%)	66 (3.8%)	187 (10.8%)	75 (4.3%)	930 (53.5%)	141 (8.1%)	17 (1.0%)	17 (1.0%)	32 (1.8%)	75 (4.3%)
	45–59	1,081	203 (18.7%)	42 (3.9%)	76 (7.0%)	50 (4.6%)	502 (46.4%)	112 (10.4%)	13 (1.2%)	06 (0.7%)	23 (2.1%)	54 (5.0%)
	60 and above	487	121 (24.8%)	28 (5.7%)	30 (6.2%)	21 (4.3%)	209 (42.9%)	47 (9.7%)	04 (0.8%)	01 (0.3%)	06 (1.2%)	20 (4.1%)
3. Education (in years)	10 years and below	2,023	273 (13.5%)	85 (4.2%)	207 (10.2%)	133 (6.6%)	986 (48.7%)	132 (6.5%)	39 (1.9%)	14 (0.8%)	83 (4.1%)	71 (3.5%)
	11–12 years	1,202	147 (12.2%)	47 (3.9%)	145 (12.1%)	74 (6.2%)	588 (48.9%)	82 (6.8%)	16 (1.3%)	15 (1.3%)	41 (3.4%)	47 (3.9%)
	13–15 years	1,250	153 (12.2%)	53 (4.2%)	117 (9.4%)	55 (4.4%)	645 (51.6%)	114 (9.1%)	11 (0.9%)	9 (0.7%)	26 (2.1%)	67 (5.4%)
	16 years and above	682	92 (13.5%)	26 (3.8%)	57 (8.4%)	29 (4.3%)	343 (50.3%)	66 (9.7%)	7 (1.0%)	5 (0.6%)	6 (0.9%)	51 (7.5%)
4. Experience in yoga	Less than 1 month	365	47 (12.9%)	18 (4.9%)	35 (9.6%)	25 (6.8%)	181 (49.6%)	19 (5.2%)	10 (2.8%)	5 (1.4%)	15 (4.1%)	10 (2.7%)
	1–12 months	2,805	320 (11.4%)	110 (3.9%)	335 (11.9%)	158 (5.6%)	1,465 (52.2%)	162 (5.8%)	46 (1.7%)	21 (0.8%)	90 (3.2%)	98 (3.5%)
	13–60 months	1,228	171 (13.9%)	53 (4.3%)	114 (9.3%)	69 (5.6%)	593 (48.3%)	114 (9.3%)	12 (1.0%)	12 (1.0%)	33 (2.7%)	57 (4.6%)
	60 months and above	759	127 (16.7%)	30 (4.0%)	42 (5.5%)	39 (5.1%)	323 (42.6%)	99 (13.0%)	5 (0.7%)	5 (0.7%)	18 (2.3%)	71 (9.4%)
5. Occupations	Students	2,028	159 (7.8%)	77 (3.8%)	267 (13.2%)	159 (7.8%)	1,007 (49.7%)	106 (5.2%)	39 (1.9%)	20 (1.0%)	95 (4.7%)	99 (4.9%)
	Employed	1,070	143 (13.4%)	47 (4.4%)	97 (9.1%)	47 (4.4%)	534 (49.9%)	103 (9.6%)	15 (1.4%)	8 (0.8%)	22 (2.0%)	54 (5.0%)
	Self-employed	844	141 (16.7%)	33 (3.9%)	65 (7.7%)	38 (4.5%)	373 (44.2%)	107 (12.7%)	11 (1.3%)	6 (0.7%)	23 (2.7%)	47 (5.6%)
	Homemakers	781	132 (16.9%)	29 (3.7%)	59 (7.5%)	29 (3.7%)	452 (57.9%)	44 (5.6%)	5 (0.7%)	5 (0.7%)	8 (1.0%)	18 (2.3%)
	Retired	182	38 (20.9%)	15 (8.2%)	13 (7.1%)	9 (4.9%)	83 (45.6%)	10 (5.5%)	2 (1.1%)	1 (0.6%)	2 (1.1%)	9 (5.0%)
	Not mentioned	252	52 (20.6%)	10 (3.9%)	25 (9.9%)	9 (3.6%)	113 (44.8%)	24 (9.5%)	1 (0.5%)	3 (1.2%)	6 (2.4%)	9 (3.6%)

*χ^2 $p < 0.05$ across age groups.

University of Patanjali ★ Haridwar ★

TABLE 5 | The 6 yoga practices provided as options in a random sequence to the 5,157 respondents.

Characteristics		Sample size	Yoga practices					
			1	2	3	4	5	6
			Yama-niyams	*Asanas*[a]	*Pranayama*[a,b]	*Kriyas*	*Mudras-Bandhas*	Meditation[a]
1. Gender	Male	3,469	194 (5.6%)	842 (24.3%)	1493 (43.0%)	79 (2.3%)	44 (1.2%)	817 (23.6%)
	Female	1,688	69 (4.1%)	501 (29.7%)	733 (43.4%)	33 (2.0%)	13 (0.7%)	339 (20.1%)
2. Age (in years)	10–12	208	10 (4.8%)	102 (49.0%)	58 (27.9%)	3 (1.4%)	2 (1.0%)	33 (15.9%)
	13–20	1,642	66 (4.0%)	545 (33.2%)	463 (28.2%)	43 (2.6%)	18 (1.1%)	507 (30.9%)
	21–44	1,739	83 (4.7%)	407 (23.4%)	803 (46.2%)	46 (2.7%)	18 (1.0%)	382 (22.0%)
	45–59	1,081	72 (6.7%)	194 (17.9%)	628 (58.1%)	12 (1.1%)	14 (1.3%)	161 (14.9%)
	60 and above	487	32 (6.6%)	95 (19.5%)	274 (56.3%)	8 (1.6%)	05 (1.0%)	73 (15.0%)
3. Education (in years)	10 years	2,023	110 (5.4%)	592 (29.3%)	773 (38.2%)	51 (2.5%)	30 (1.5%)	467 (23.1%)
	11–12 years	1,202	72 (6.0%)	293 (24.4%)	476 (39.6%)	29 (2.4%)	11 (0.9%)	321 (26.7%)
	13–15 years	1,250	59 (4.7%)	286 (22.9%)	621 (49.7%)	22 (1.8%)	9 (0.7%)	253 (20.2%)
	16 years and above	682	22 (3.2%)	172 (25.2%)	356 (52.2)	10 (1.5%)	7 (1.0%)	115 (16.9%)
4. Experience in yoga	Less than 1 month	365	22 (6.0%)	96 (26.3%)	123 (33.7%)	8 (2.2%)	2 (0.6%)	114 (31.2%)
	1–12 months	2,805	127 (4.5%)	805 (28.7%)	1,101 (39.3%)	69 (2.5%)	34 (1.1%)	669 (23.9%)
	13–60 months	1,228	61 (5.0%)	305 (24.8%)	583 (47.5%)	28 (2.3%)	16 (1.3%)	235 (19.1%)
	60 months and above	759	53 (7.0%)	137 (18.0%)	419 (55.2%)	7 (0.9%)	5 (0.7%)	138 (18.2%)
5. Occupations	Students	2,028	79 (3.9%)	688 (33.9%)	584 (28.8%)	51 (2.5%)	23 (1.2%)	603 (29.7%)
	Employed	1,070	65 (6.1%)	224 (20.9%)	547 (51.1%)	25 (2.4%)	15 (1.4%)	194 (18.1%)
	Self-employed	844	59 (7.0%)	169 (20.0%)	439 (52.0%)	15 (1.8%)	10 (1.2%)	152 (18.0%)
	Homemakers	781	39 (4.9%)	175 (22.4%)	419 (53.6%)	17 (2.3%)	5 (0.7%)	126 (16.1%)
	Retired	182	9 (4.9%)	45 (24.7%)	98 (53.8%)	0 (0.0%)	1 (0.7%)	29 (15.9%)
	Not mentioned	252	12 (4.8%)	42 (16.7%)	139 (55.2%)	4 (1.6%)	3 (1.1%)	52 (20.6%)

[a] χ^2 $p < 0.05$ for asanas, pranayama, and meditation across age groups.
[b] χ^2 $p < 0.05$ pranayama across occupation.

aims and aspirations of young people in a developing economy such as India (17).

We mentioned 10 reasons in the survey that could motivate participants to practice yoga. The first most common reason for all respondents to practice yoga was physical fitness. Selecting physical fitness as a primary reason to practice yoga is comparable to the results of the survey in Australia (6) and surveys in the US (4, 5).

Three motivators (i.e., practicing yoga as a hobby, practicing based on a *guru's* instructions and for disease management) differed significantly between the five age ranges. The 10- to 12-year age group chose "practicing yoga as a hobby" which was significantly higher in comparison to the percentages of the four other age groups (i.e., 13–20, 21–44, 45–59, and 60 years and above). For children to practice yoga as a hobby is a healthy trend which should be encouraged (18). The reasons why children chose "yoga as a hobby" as a motivating factor could be many; there is an increased attempt to introduce yoga in schools in India to alleviate stress and reduce the growing incidence of childhood obesity (19). It is important to mention here that despite yoga having been introduced in certain schools in India, yoga is not treated as a subject for which students have a regular examination. This could allow children to learn yoga without a feeling of performance anxiety and stress. Apart from this in India, there are several sports persons and other celebrities who promote yoga, which may have influenced the way in which children perceive yoga practice (20). Practicing yoga "based on a *gurus's* instructions" was also significantly higher in children between 10 and 12 years age group compared to the percentages of the four other age groups (i.e., 13–20, 21–44, 45–59, and 60 years and above). This was an interesting trend in pre-teens and could be related to observations that Asian parents tended to be more authoritarian than their Caucasian counterparts (21). This also suggests that despite an increased awareness of freedom which pre-teens have in many cultures (22), in India traditional values appear to prevail in a large percentage of pre-teens. It is debatable whether it is ideal that children of this age should be so dependent on instructions from their *guru*. Some parents allow children of this age too much of the wrong kind of freedom or they offer freedom before the adolescent is ready to accept it. Other parents cling too tightly, denying pre-teens both the responsibilities they require to develop maturity and the opportunities they need to make choices and accept their consequences. The present results suggest that the attitude of these pre-teens requires to be reviewed. Respondents aged between 21 and 60 years and above selected disease management as their second most common reason to practice yoga. This could be related to the increased incidence of non-communicable diseases such as diabetes and hypertension in middle-aged persons in India (23, 24), as well as a growing awareness that yoga and healthy lifestyle choices can help in the management of these diseases (25).

The third part of the survey provided information about the yoga practice the participants were most likely to choose. The factors which significantly influenced the choice of yoga practice were age and occupation.

University of Patanjali Haridwar

Children between 10 and 12 years and adolescents (13–20 years) selected *asanas* as their first choice of practice. A possible reason is that most children prefer being active to sitting still as is required for *pranayama* and meditation practice (26). Also, *asanas* are known to improve physical fitness (27). This is supported by the findings of the survey, i.e., children and adolescents chose yoga to improve physical fitness as their primary reason to practice yoga.

Adults chose *pranayama* as their first choice and, *asanas* as their second choice of practice. The practice of *asanas* requires flexibility (28), while *pranayama* can also be practiced by those who are less mobile (29) or less flexible. It is well known that both mobility and flexibility reduce with age (30). This may explain why adults selected *pranayama* as their first choice of practice whereas for children and adolescents *asanas* were their first choice of practice.

The results of this survey show a significant difference between the percentages of respondents who selected *pranayama* as their primary choice of practice for different occupations. Out of five occupations, respondents from four categories of occupations selected *pranayama* as their first choice of practice. These were (i) employed, (ii) self-employed, (iii) retired, and (iv) homemakers. *Pranayama* practice is more popular in India than elsewhere, and specific sets of practices (15) and techniques such as *Sudarshan Kriya* Yoga (31) are practiced widely across the country. Apart from this, middle aged and older adults who have not been physically active often find *pranayama* easier to practice (32). Students' first two most common choices were *asanas* and meditation. Hence, the finding that *pranayama* as a primary choice of practice varies with the type of occupation, could be related to other factors, such as the age of the respondents and their level of physical activity and fitness. None of the respondents selected *yamas/niyamas*, *mudras/bandhas*, or *kriyas* as their first choice of yoga practice.

In summary, more yoga practitioners were male, aged between 21 and 44 years, with education between 8 and 10 years, students, and with 1 and 12 months experience of yoga. The first most common reason to practice yoga for all respondents was physical fitness. Three of the remaining reasons to practice yoga differed significantly with age: (i) yoga for disease management, (ii) yoga as a hobby, and (iii) yoga based on the *guru's* (teacher's) instructions. The yoga technique of choice [i.e., (i) *asanas*, (ii) *pranayama*, or (iii) meditation] differed significantly across age groups.

All respondents selected physical fitness as their primary reason to practice yoga. Three motivators (i.e., practicing yoga as a hobby, disease management, and practicing based on a *guru's* instructions) differed significantly between the five age ranges. The choice of yoga practice was influenced by age and occupation significantly.

The findings of this survey are limited by the method of sampling. Despite this limitation, the results represent people from across the Indian subcontinent. A further systematically conducted survey would help to substantiate the findings.

ETHICS STATEMENT

The study had prior clearance from the ethical committee of Patanjali Research Foundation (approval no. PRF/16/0023) which was formed based on the guidelines of the Indian Council of Medical Research.

AUTHOR CONTRIBUTIONS

SS collected and analyzed the data. ST drafted the manuscript. SS and NS assisted in compiling the revised manuscript, ST, AB, and SS contributed to the study design and interpretation of results. ST and SS will act as guarantors.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Hemisphere specific EEG related to alternate nostril yoga breathing

Shirley Telles*, Ram Kumar Gupta, Arti Yadav, Shivangi Pathak and Acharya Balkrishna

Abstract

Background: Previously, forced unilateral nostril breathing was associated with ipsilateral, or contralateral cerebral hemisphere changes, or no change. Hence it was inconclusive. The present study was conducted on 13 normal healthy participants to determine the effects of alternate nostril yoga breathing on (a) cerebral hemisphere asymmetry, and (b) changes in the standard EEG bands.

Methods: Participants were randomly allocated to three sessions (a) alternate nostril yoga breathing (ANYB), (b) breath awareness and (c) quiet sitting, on separate days. EEG was recorded from bilaterally symmetrical sites (FP_1, FP_2, C_3, C_4, O_1 and O_2). All sites were referenced to the ipsilateral ear lobe.

Results: There was no change in cerebral hemisphere symmetry. The relative power in the theta band was decreased during alternate nostril yoga breathing (ANYB) and the beta amplitude was lower after ANYB. During quiet sitting the relative power in the beta band increased, while the amplitude of the alpha band reduced.

Conclusion: The results suggest that ANYB was associated with greater calmness, whereas quiet sitting without specific directions was associated with arousal. The results imply a possible use of ANYB for stress and anxiety reduction.

Keywords: EEG, Alternate nostril yoga breathing, Cerebral hemisphere symmetry, Breath awareness, Quiet sitting, EEG relative power, EEG bands

Background

The nasal cycle is an ultradian rhythm characterized by alternating congestion and decongestion of opposite nostrils [1]. The nasal mucosal membrane has innervation from the autonomic nervous system so that sympathetic dominance on one side results in nasal mucosal vasoconstriction hence increasing nostril patency on that side. On the contralateral side there would be parasympathetic dominance and nasal mucosal vasodilation resulting in partial or complete occlusion of the nostril on that side. The nasal cycle varies widely in periodicity. When a continuous recording of nostril dominance was made, time series analysis detected periods of the nasal cycle at 280–275, 165–210, 145–160, 105–140, 70–100 and 40–65 min bins [2, 3].

Werntz et al. [4] showed that the nasal cycle was also related to the function of the central nervous system. The finding that forced uninostril breathing has selective effects on the EEG of the cerebral hemispheres was first shown in 1983 and later on with greater rigor in 1987 [5]. This is believed to be due to a neural connection arising from the superior nasal meatus [6]. Activation of the upper nasal cavity could be produced by air insufflation without inflation of the lung [6]. Also local anesthesia of the local mucosal membrane prevented the cortical changes which follow upper nasal cavity activation.

In a comparison between forced uninostril breathing and bilateral breathing, the peak power of beta2 in the frontal EEG was lower during uninostril compared to bilateral breathing [7].

The effects of forced alternate nostril breathing on the EEG were studied in 18 trained persons who practiced forced alternate nostril breathing for 10 min [8]. The study aimed at differentiating between forced alternate nostril breathing which began with inhalation through

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University of Patanjali * Haridwar

the left nostril compared to forced alternate nostril with right nostril inhalation to begin with [8]. No difference was reported. However the average power in the beta and alpha bands increased during both types of forced alternate nostril breathing. Also during the latter half of the ten minutes of forced alternate nostril breathing there was a decrease in hemisphere asymmetry in the beta 1 band, which the authors described as 'a balancing effect on the functional activity of the left and right hemisphere.'

Yoga voluntarily regulated breathing (*pranayama*) allows a practitioner to breathe through one nostril at a time, effortlessly and selectively [9]. Alternate nostril breathing is also a common yoga breathing practice [10]. In Indian medicine importance is given to uninostril and alternate nostril breathing [11]. The effects of uninostril breathing are described in detail, with left nostril breathing described as 'cooling and 'calming', while right nostril breathing is described as 'heat generating' and energizing', and alternate nostril breathing has been described as 'harmonizing' [11].

A previous study showed that 18 min of alternate nostril breathing lowered the systolic and diastolic blood pressure in persons with essential hypertension controlled by medication [12].

The present study was planned as a preliminary study to assess the effects of alternate nostril yoga breathing on the EEG.

The hypothesis of the present study was that alternate nostril yoga breathing would reduce hemisphere asymmetry in EEG as was observed for forced alternate nostril breathing.

Methods

Participants

Thirteen healthy males with ages between 18 and 45 years residing in a yoga center in north India participated in the study. They were recruited by flyers on the notice boards of the yoga center. To be included in the trial, participants had to meet the following criteria: (a) the participants had to have experience of yoga breathing (*pranayama*) of at least 45 min a day, practiced for at least 15 days per month, over a minimum period of 6 months, and (b) the participants all had to be right hand dominant based on a standard handedness questionnaire [13]. The exclusion criteria were (1) persons on any medication, and (2) the presence of any illness, particularly psychiatric or neurological disorders. None of the participants were excluded based on these criteria. The baseline characteristics of the participants are given in Table 1.

The experimental procedure was approved by the ethical committee of Patanjali Research Foundation and signed informed consent was obtained from each participant before beginning the study.

Table 1 Baseline characteristics of the participants (n = 13)

Age in years (group mean ± SD)	24.2 ± 4.7 years
Average years of education (group mean ± SD)	13.8 ± 1.6 years
Experience of yoga breathing including ANYB (group mean ± SD)	38.8 ± 32.6 months
Experience of ANYB exclusively	29.2 ± 22.8 months

ANYB alternate nostril yoga breathing

Design of the study

The participants were assessed before, during and after the intervention. Each participant was assessed in three sessions, conducted on 3 separate days, keeping the time of the day constant for a particular participant. The three sessions were (a) alternate nostril yoga breathing (ANYB), (b) breath awareness (BAW), and (c) quiet sitting (QS). Participants were randomly assigned to the three sessions using a standard randomizer [14], hence the order of the three sessions was different for different participants.

The total duration of each session was 28 min, i.e., 5 min before the practice, 18 min during the practice, and 5 min after the practice. During the practice the participants practiced ANYB, BAW or quiet sitting for 15 min with 1 min of rest after every 5 min of practice, so that the duration was 18 min. Hence the 15 min were divided into three epochs of 5 min each. Throughout the session participants were seated on a chair with their spine straight and eyes closed. Recordings were taken continuously in the pre, during 1, during 2, during 3 and post periods of 5 min each as shown in Fig. 1.

Recording procedure

EEG was recorded using Ag/AgCl disc electrodes. The scalp was prepared using Nuprep skin preparation gel (Weaver and Co., USA). Electrodes with Ten20 conductive EEG Paste (Weaver and Co., USA) were placed at FP_1, C_3, and O_1 referenced to the left ear lobe (A_1), and at FP_2, C_4, and O_2 referenced to the right ear lobe (A_2); based on the standard 10–20 system for electrode placement [15]. Participants were seated in a dimly lit, sound and electrical-noise attenuated cabin adjacent to the recording room. Participants were able to receive instructions or communicate with the examiner using a two way intercom. Throughout a session participants were observed on a closed circuit television, which they were informed about prior to the session.

EEG was recorded using Neurotravel LIGHT (ATES Medica Device, Italy). The sampling frequency was 250 samples per second. The low cut filter was set at .2 Hz and the high cut filter at 30.0 Hz. This had the obvious limitation of not including gamma frequencies, which could not be recorded with this equipment.

University of Patanjali Haridwar

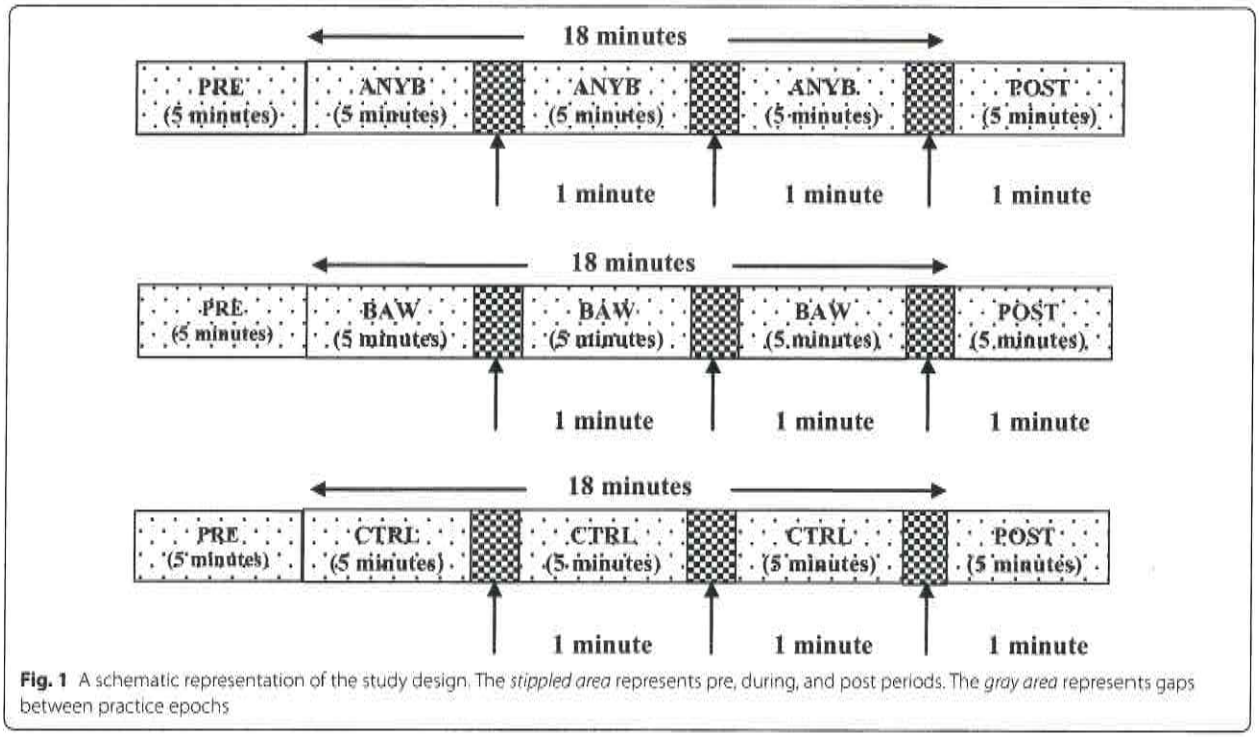

Fig. 1 A schematic representation of the study design. The *stippled area* represents pre, during, and post periods. The *gray area* represents gaps between practice epochs

Interventions

Alternate nostril yoga breathing

The participants sat comfortably with their spine erect and shoulders relaxed with eyes closed. ANYB involves breathing through left and right nostrils alternately without retention of the breath. In this practice the thumb and the ring figure of the right hand were used to manipulate or occlude the nostrils [16]. Participants were asked to sit erect in either the half-lotus posture (*ardha-padmasana*) or complete lotus posture *(padmasana*). They were asked to keep their eyes closed, gently, without effort. After this they were asked to keep their non-dominant hand (the left hand in all participants) on their left knee. They flexed the right arm at the elbow and raised their right hand to the level of their nose. The index and middle fingers of the right hand were flexed to rest their fingertips on their palms, using their thumb and ring figure of the right hand to manipulate or occlude the nostrils [16]. Occlusion of the nostrils was gentle. Participants were asked to begin the breathing practice by exhaling through the left nostril with the right nostril occluded with the right thumb; then inhaling slowly through the left nostril; followed by exhaling through the right nostril with the left nostril occluded with the right ring finger; then inhaling through the right nostril and exhaling through the left nostril. With this exhalation one cycle was complete. The approximate duration of 1 cycle was 6 s; with the ratio of inhale:exhale as 1:1.5 [9]. Participants were asked to continue breathing like this for 5 min. This was timed by the yoga instructor. They were then given 1 min gap during which participants were asked to remain with their eyes closed and to rest their right fingers on their right knee. This (5 min followed by 1 min) was repeated thrice in the session.

Breath awareness

During breath awareness, the participants maintained awareness of the breath without manipulation of the nostrils. Participants were asked to sit erect in either the half-lotus (*ardha padmasana*) or complete lotus (*padmasana*) posture and keep their eyes closed. During this time both arms were extended and the hands were placed on the respective knees. The instructor asked the participants to direct their attention to the movement of air into and out of their nostrils and also direct their awareness to the movement of air through the nasal passages. The period of breath was 5 min, timed by the instructor, followed by instructions to allow attention to wander for 1 min. This (5 min followed by 1 min) was repeated thrice in the session.

Quiet sitting

Participants were asked to sit with their spine erect and shoulders relaxed with eyes closed. Participants were asked to keep their eyes closed and to sit in either the half-lotus (*ardha padmasana*) or complete lotus posture

University of Patanjali Haridwar

(*padmasana*). They were asked to stretch their arms out to rest the fingers of each hand on the respective knees. Participants were told to allow their thoughts to wander without restrictions. After 5 min they were told there was a 1 min gap, though the instructions during the 1 min gap did not differ from the 5 min preceding it. This (5 and 1 min gap) was repeated thrice in the session.

Data extraction

EEG records were visually inspected for artifacts due to eye or body movements. The recordings were all free from artifact and no part of the records had to be excluded for analysis. The artifact-free data were spectrally analyzed using fast Fourier transform analysis (FFT). This analysis provided the relative power for each band as a percentage of the total power. This was provided for the delta (.5–3.5 Hz), theta (4–7.5 Hz), alpha (8–12) and beta (13–30 Hz) bands. Also, the actual values of the average amplitude within a band for a specific period (e.g., before alternate nostril yoga breathing) were obtained. These values were used for analysis.

Data analysis

Statistical analysis was carried out using SPSS (Version 18.0). Repeated measures analyses of variance (RM-ANOVA) were performed with two within subjects factors, i.e., Sessions (ANYB, BAW and QS), and States (pre, during, and post). An ANOVA was followed by post hoc tests for multiple comparisons with Bonferroni adjustment.

The Bonferroni adjustment was carried out for each of the multiple post hoc comparisons. The comparisons which were considered were the 'during' and 'post' values compared with the 'pre' values of a specific session. This was separate for each EEG band. With the SPSS software Bonferroni adjustment multiplies the uncorrected p value by the number of comparisons; hence α remains unchanged [17].

Results

Repeated-measures analysis of variance

(1) Energy of the EEG bands as a percentage of the whole

The theta energy (%) at $C_4 - A_2$ and $O_2 - A_2$ showed a significant difference between States ($p < .05$; $F = 2.730$, $df = 1, 48$; $p < .05$; $F = 1.868$, $df = 1, 48$ respectively). The beta energy (%) at $FP_2 - A_2$ showed a significant difference between States ($p < .05$; $F = 4.482$, $df = 1, 48$).

(2) Amplitudes of the EEG bands

The beta amplitude at $O_2 - A_2$ showed a significant difference between States ($p < .05$; $F = 8.400$, $df = 1, 48$). The alpha amplitude at $C_4 - A_2$ showed a significant difference between States ($p < .05$; $F = .676$, $df = 1, 48$).

For all comparisons the Huynh–Feldt epsilon was equal to 1.000, hence sphericity was assumed.

Post-hoc analyses with Bonferroni adjustment

The theta energy (%) was significantly reduced at $C_4 - A_2$, and $O_2 - A_2$ during the practice of ANYB compared to the values before the practice ($p < .05$), for both comparisons. In contrast there was a significant increase in the beta energy (%) at $FP_2 - A_2$ sites during QS compared to before QS ($p < .05$).

There was a significant reduction in the beta amplitude at $O_2 - A_2$ after the practice of ANYB compared to before ANYB ($p < .05$). During the QS session there was a significant reduction in the alpha amplitude at $C_4 - A_2$ compared to before QS ($p < .05$).

There were no significant changes following breath awareness. The mean values ± SD for energy (%) and amplitude at $FP_1 - A_1$, $FP_2 - A_2$, $C_3 - A_1$, $C_4 - A_2$, $O_1 - A_1$, and $O_2 - A_2$ electrode sites pre, during and post ANYB, BAW and QS are provided in Tables 2, 3 and 4. Significant changes in EEG energy (%) and EEG amplitude are shown in Figs. 2 and 3, respectively.

Discussion

Contrary to the hypothesis of the study alternate nostril yoga breathing was not associated with any change in cerebral hemisphere EEG symmetry. The relative power in the theta band reduced during alternate nostril yoga breathing (ANYB), while the amplitude of beta waves was lower after ANYB. During the control period of quiet sitting (QS) the relative power in the beta band increased, while the amplitude of the alpha band reduced.

Hemispheric symmetry was determined (1) based on coherence as calculated by the software (Neurotravel, Italy), and (2) based on changes in the EEG amplitude recorded at symmetrical pre-frontal, vertex, and occipital sites over the left and the right hemispheres. As mentioned contrary to the hypothesis, alternate nostril yoga breathing did not alter hemispheric symmetry.

Changes in the relative power in the EEG bands occurred during ANYB and during quiet sitting. There was a decrease in the relative power in the theta band during ANYB at the vertex on the right side. Frontal theta activity has been related to working memory [18] and increased frontal and midline theta were related to a positive emotional state [19]. In general, variations in the power of theta and alpha bands of the EEG are related to complex cognitive functions and memory performance [20]. Hence the decrease in relative theta power may be associated with a better ability to perform certain

University of Patanjali Haridwar

Table 2 Energy (%) of the four EEG bands (μV^2) pre, during and post, ANYB, BAW and QS sessions

Sl. no.	Bands	ANYB					BAW					QS				
		Pre M ± SD	During			Post M ± SD	Pre M ± SD	During			Post M ± SD	Pre M ± SD	During			POST M ± SD
			D1 M ± SD	D2 M ± SD	D3 M ± SD			D1 M ± SD	D2 M ± SD	D3 M ± SD			D1 M ± SD	D2 M ± SD	D3 M ± SD	
$FP_1 - A_1$	Delta	31.5 ± 9.6	29.4 ± 12.3	28.9 ± 13.9	28.5 ± 12.2	27.5 ± 11.2	25.2 ± 10.4	24.0 ± 10.4	21.5 ± 10.1	25.5 ± 10.2	26.0 ± 10.4	29.6 ± 10.5	28.0 ± 11.9	28.9 ± 13.9	33.5 ± 15.9	30.8 ± 12.8
	Theta	4.2 ± 2.7	2.8 ± 1.5	4.4 ± 4.0	3.5 ± 2.2	5.0 ± 4.1	3.6 ± 3.2	3.8 ± 2.8	4.0 ± 3.9	3.9 ± 2.6	3.7 ± 2.0	4.0 ± 3.5	4.2 ± 4.1	4.4 ± 4.0	4.3 ± 3.2	4.1 ± 3.3
	Alpha	2.6 ± 1.5	2.9 ± 2.6	2.1 ± 1.5	3.7 ± 4.0	3.0 ± 2.3	3.4 ± 5.5	3.3 ± 4.8	3.6 ± 6.7	4.4 ± 7.2	3.7 ± 5.1	2.4 ± 2.0	2.2 ± 1.7	2.1 ± 1.5	2.3 ± 1.5	2 ± 1.3
	Beta	.8 ± .4	.8 ± .4	.8 ± .6	1.0 ± .5	1.2 ± .8	.8 ± .8	.8 ± .6	.8 ± .6	1.0 ± .7	.9 ± .7	.7 ± .5	.7 ± .6	.8 ± .6	.7 ± .5	.8 ± .6
$FP_2 - A_2$	Delta	28.4 ± 11.4	26.0 ± 11.1	27.3 ± 14.2	26.7 ± 12.9	25.6 ± 10.3	25.7 ± 9.0	24.2 ± 10.7	21.8 ± 11.3	25.0 ± 11.0	25.7 ± 11.5	27.8 ± 9.4	26.3 ± 12.2	27.3 ± 14.2	29.3 ± 12.1	30.1 ± 12.6
	Theta	3.8 ± 2.4	2.8 ± 1.2	4.8 ± 4.4	4.0 ± 2.5	4.8 ± 3.6	4.1 ± 3.1	4.8 ± 3.6	4.6 ± 4.8	4.7 ± 3.4	4.3 ± 2.6	4.5 ± 3.6	4.8 ± 5.1	4.8 ± 4.4	5.0 ± 3.4	4.8 ± 3.5
	Alpha	2.8 ± 1.8	3.2 ± 2.7	2.4 ± 1.8	4.6 ± 5.0	3.2 ± 2.5	3.7 ± 4.4	3.8 ± 4.0	3.5 ± 4.9	4.7 ± 6.1	4.1 ± 4.6	3.0 ± 2.6	2.6 ± 2.1	2.4 ± 1.8	2.8 ± 1.7	2.8 ± 1.7
	Beta	.6 ± .2	.7 ± .2	.7 ± .5	.2 ± 1.0	.9 ± .5	.7 ± .4	.8 ± .5	.8 ± .6	.9 ± .5	.9 ± .6	.7 ± .4	.7 ± .5	.7 ± .5	.8 ± .5*	.8 ± .5
$C_3 - A_1$	Delta	22.7 ± 6.1	21.5 ± 6.2	24.3 ± 5.5	20.9 ± 7.5	23.7 ± 6.5	21.3 ± 5.7	20.8 ± 7.3	21.7 ± 7.4	22.5 ± 8.1	24.2 ± 8.9	21.9 ± 5.0	23.4 ± 4.0	24.3 ± 5.5	24.7 ± 5.8	23.9 ± 5.3
	Theta	9.6 ± 4.2	8.0 ± 3.0	10.4 ± 4.1	8.6 ± 3.3	10.4 ± 3.0	10.3 ± 6.6	9.4 ± 4.3	9.7 ± 4.4	9.8 ± 4.3	10.5 ± 4.9	9.1 ± 4.2	10.0 ± 4.2	10.4 ± 3.0	10.0 ± 4.1	8.6 ± 3.3
	Alpha	14.3 ± 12.2	13.6 ± 11.6	13.5 ± 11.3	16.5 ± 16.4	16.3 ± 15.1	16.1 ± 15.0	15.6 ± 16.2	16.2 ± 16.8	16.3 ± 16.8	17.2 ± 17.4	15.1 ± 14.1	14.8 ± 12.5	13.5 ± 11.3	13.3 ± 10.4	13.4 ± 11.6
	Beta	2.7 ± 1.5	2.6 ± 1.4	2.9 ± 1.5	3.1 ± 1.6	2.9 ± 1.4	2.6 ± 1.4	2.5 ± 1.5	2.6 ± 1.4	2.7 ± 1.5	2.7 ± 1.4	2.6 ± 1.8	2.8 ± 1.4	2.8 ± 1.5	2.8 ± 1.4	2.9 ± 1.5
$C_4 - A_2$	Delta	24.6 ± 8.1	22.2 ± 8.1	26.8 ± 6.1	21.1 ± 8.9	24.7 ± 7.4	23.7 ± 4.9	23.0 ± 7.0	24.9 ± 7.2	26.1 ± 7.8	26.1 ± 7.8	24.7 ± 5.7	24.8 ± 5.5	26.8 ± 6.1	26.3 ± 5.3	26.6 ± 6.1
	Theta	10.4 ± 4.2	8.2 ± 3.4*	11.5 ± 4.2	8.2 ± 3.4	10.6 ± 2.5	10.9 ± 4.1	11.0 ± 4.6	11.3 ± 3.9	11.8 ± 4.4	11.6 ± 4.6	4.2 ± 10.7	4.2 ± 11.0	3.0 ± 11.5	11.0 ± 3.8	11.1 ± 4.0
	Alpha	15.4 ± 13.0	14.9 ± 13.5	13.2 ± 10.2	15.9 ± 14.3	14.7 ± 11.8	17.6 ± 15.2	16.1 ± 14.5	17.0 ± 15.2	16.8 ± 15.5	17.0 ± 16.2	14.8 ± 12.5	13.3 ± 10.6	13.2 ± 10.2	12.6 ± 10.0	12.5 ± 8.9
	Beta	3.3 ± 1.8	3.7 ± 1.7	2.8 ± .9	4.2 ± 2.8	3.6 ± 1.9	3.2 ± 1.7	2.9 ± 1.3	2.9 ± 1.2	2.8 ± 1.3	2.9 ± 1.2	2.8 ± 1.1	3.0 ± 1.4	2.8 ± .9	2	2.8 ± 1.0
$O_1 - A_1$	Delta	17.8 ± 5.3	17.2 ± 6.5	19.1 ± 6.6	17.5 ± 6.5	20.0 ± 8.2	16.8 ± 6.4	19.6 ± 10.2	18.3 ± 8.9	18.7 ± 9.0	20.1 ± 9.0	17.7 ± 6.3	17.5 ± 5.4	19.1 ± 6.6	19.2 ± 7.2	20.1 ± 6.8
	Theta	6.7 ± 2.9	5.8 ± 3.4	7.2 ± 3.9	6.0 ± 2.9	7.7 ± 2.9	6.5 ± 3.2	7.2 ± 4.0	7.1 ± 4.1	7.5 ± 4.2	7.8 ± 4.2	7.0 ± 3.8	6.7 ± 3.4	7.2 ± 3.9	6.9 ± 3.7	7.2 ± 3.7
	Alpha	21.1 ± 18.2	18.3 ± 17.4	15.4 ± 14.4	21.2 ± 21.0	19.1 ± 18.1	19.1 ± 18.2	18.1 ± 20.2	18.0 ± 20.1	18.5 ± 21.4	18.7 ± 20.8	19.2 ± 17.1	17.3 ± 15.6	15.4 ± 14.4	16.5 ± 15.8	17.2 ± 15.0
	Beta	2.9 ± 1.6	2.9 ± 2.1	2.4 ± 1.0	2.9 ± 2.0	3.2 ± 1.8	2.6 ± 1.3	2.7 ± 1.6	2.7 ± 1.5	2.6 ± 1.4	2.6 ± 1.3	2.5 ± 1.2	2.5 ± 1.2	2.4 ± 1.0	2.4 ± 1.0	2.4 ± .9
$O_2 - A_2$	Delta	19.7 ± 8.8	18.1 ± 7.9	20.9 ± 7.3	18.1 ± 7.4	21.5 ± 8.4	17.7 ± 5.1	19.5 ± 7.6	19.5 ± 5.6	20.1 ± 8.4	19.8 ± 7.5	20.3 ± 7.1	20.1 ± 5.6	20.9 ± 7.3	20.9 ± 7.6	20.7 ± 7.3
	Theta	7.2 ± 2.7	5.8 ± 2.8*	8.6 ± 4.7	6.1 ± 2.2	9.3 ± 4.2	7.0 ± 3.3	7.8 ± 3.6	7.9 ± 2.6	8.1 ± 3.6	7.7 ± 3.2	8.0 ± 3.7	9.0 ± 5.0	8.6 ± 4.6	7.9 ± 4.4	8.2 ± 4.3
	Alpha	20.8 ± 17.9	18.7 ± 17.2	16.3 ± 15.8	20.8 ± 17.4	19.0 ± 14.7	19.8 ± 21.1	17.5 ± 19.8	19.7 ± 20.1	18.3 ± 20.4	17.8 ± 20.0	18.6 ± 17.1	19.0 ± 17.8	16.3 ± 15.8	16.9 ± 16.6	17.7 ± 16.9
	Beta	2.8 ± 1.3	2.8 ± 1.2	2.6 ± 1.4	2.9 ± 1.1	2.8 ± 1.1	2.5 ± 1.2	2.7 ± 1.5	2.8 ± 1.5	2.6 ± 1.4	2.5 ± 1.4	2.6 ± 1.2	2.7 ± 1.3	2.6 ± 1.4	2.4 ± 1.1	2.4 ± 1.1

Comparisons were of post and during values compared with the pre values of the respective session, i.e., ANYB, BAW and QS. $p < .05$, RM ANOVA, followed by post hoc tests with Bonferroni adjustment

ANYB alternate nostril yoga breathing, *BAW* breath awareness, *QS* quiet sitting

University of Patanjali Haridwar

Table 3 Amplitudes of the four EEG bands (in μV) pre, during and post, ANYB, BAW and QS sessions

Sl. no.	Band	ANYB					BAW					QS				
		Pre M ± SD	During			Post M ± SD	Pre M ± SD	During			Post M ± SD	Pre M ± SD	During			Post M ± SD
			D1 M ± SD	D2 M ± SD	D3 M ± SD			D1 M ± SD	D2 M ± SD	D3 M ± SD			D1 M ± SD	D2 M ± SD	D3 M ± SD	
$FP_1 - A_1$	Delta	35.3 ± 16.8	35.0 ± 12.1	35.6 ± 19.5	31.2 ± 12.5	30.0 ± 15.1	34.3 ± 17.9	30.3 ± 15.4	32.2 ± 21.6	28.9 ± 14.8	28.7 ± 13.4	39.0 ± 20.0	35.4 ± 17.1	35.6 ± 19.5	37.4 ± 27.2	35.7 ± 19.1
	Theta	12.1 ± 7.3	10.3 ± 3.2	12.3 ± 9.2	10.5 ± 3.5	11.1 ± 5.4	11.7 ± 8.7	11.8 ± 7.2	11.2 ± 6.1	9.9 ± 3.9	9.8 ± 4.6	12.8 ± 8.3	12.0 ± 8.0	12.3 ± 9.2	12.5 ± 8.8	11.7 ± 7.0
	Alpha	9.1 ± 4.0	9.3 ± 4.3	8.3 ± 4.8	9.9 ± 5.3	8.5 ± 5.2	8.8 ± 4.4	8.4 ± 4.7	9.0 ± 6.0	8.6 ± 5.1	8.0 ± 4.5	9.1 ± 4.4	8.4 ± 4.5	8.3 ± 4.8	8.3 ± 4.7	8.3 ± 4.4
	Beta	5.0 ± 1.9	5.3 ± 1.9	5.0 ± 3.0	5.7 ± 2.8	5.5 ± 3.3	4.9 ± 2.3	4.8 ± 1.9	5.3 ± 3.1	4.9 ± 2.3	4.8 ± 2.2	5.1 ± 2.7	5.1 ± 3.1	5.0 ± 3.0	4.9 ± 2.9	5.0 ± 2.7
$FP_2 - A_2$	Delta	31.0 ± 13.7	30.8 ± 11.6	32.6 ± 19.2	27.0 ± 10.9	26.8 ± 13.3	28.6 ± 12.3	24.8 ± 9.8	29.4 ± 21.1	24.9 ± 12.7	24.5 ± 10.3	34.4 ± 15.8	32.9 ± 17.6	32.6 ± 19.2	33.1 ± 24.6	31.7 ± 16.6
	Theta	11.3 ± 5.9	10.0 ± 2.9	12.2 ± 8.5	10.0 ± 3.2	10.5 ± 4.8	10.6 ± 6.1	10.2 ± 4.1	11.2 ± 6.0	9.8 ± 3.7	9.4 ± 3.6	12.4 ± 7.2	11.9 ± 7.4	12.2 ± 8.5	12.1 ± 7.8	11.5 ± 6.4
	Alpha	9.0 ± 3.9	9.4 ± 4.3	8.6 ± 5.2	10.0 ± 5.4	8.5 ± 5.1	8.8 ± 4.4	8.5 ± 4.7	9.2 ± 6.3	8.9 ± 5.6	8.1 ± 4.4	9.6 ± 4.9	8.9 ± 4.9	8.6 ± 5.2	8.7 ± 5.1	8.7 ± 5.1
	Beta	4.4 ± 1.1	5.0 ± 1.4	4.8 ± 2.2	5.8 ± 2.4	4.8 ± 2.9	4.6 ± 2.0	4.3 ± 1.2	4.8 ± 2.5	4.4 ± 1.7	4.3 ± 1.3	4.9 ± 2.0	5.0 ± 2.5	4.8 ± 2.2	4.8 ± 2.3	4.8 ± 2.1
$C_3 - A_1$	Delta	14.3 ± 2.0	15.4 ± 3.1	14.8 ± 2.8	14.6 ± 2.1	14.0 ± 1.8	14.1 ± 2.2	14.1 ± 2.4	14.7 ± 4.4	14.1 ± 2.9	13.9 ± 3.0	15.7 ± 2.9	14.8 ± 2.4	14.8 ± 2.8	15.0 ± 3.4	14.8 ± 2.8
	Theta	9.4 ± 1.6	9.2 ± 1.9	9.7 ± 2.5	9.6 ± 2.1	9.4 ± 1.9	9.2 ± 1.9	9.5 ± 2.1	9.8 ± 3.3	9.4 ± 2.3	9.0 ± 1.8	9.9 ± 2.5	9.6 ± 2.7	9.7 ± 2.5	9.6 ± 2.6	9.7 ± 2.8
	Alpha	10.1 ± 5.6	10.8 ± 6.2	10.6 ± 6.8	11.9 ± 7.4	11.0 ± 7.1	10.5 ± 5.8	10.6 ± 6.5	11.2 ± 7.4	10.9 ± 6.9	10.1 ± 6.2	11.6 ± 6.9	10.9 ± 6.6	10.6 ± 6.8	10.6 ± 6.2	10.7 ± 6.7
	Beta	4.8 ± 1.3	5.2 ± 1.5	5.1 ± 2.1	5.7 ± 1.7	4.9 ± 1.6	4.9 ± 1.5	4.9 ± 1.6	5.1 ± 2.1	4.8 ± 1.6	4.6 ± 1.5	5.2 ± 2.0	5.1 ± 1.8	5.1 ± 2.1	5.1 ± 1.9	5.2 ± 1.9
$C_4 - A_2$	Delta	14.7 ± 2.0	15.3 ± 2.8	14.9 ± 3.3	15.1 ± 2.9	14.1 ± 2.5	14.7 ± 2.2	14.9 ± 3.3	14.8 ± 3.5	15.0 ± 3.1	14.4 ± 2.4	15.1 ± 3.1	14.9 ± 3.4	14.9 ± 3.3	15.1 ± 4.8	15.0 ± 3.6
	Theta	9.5 ± 1.8	9.3 ± 2.1	9.7 ± 2.5	9.7 ± 2.0	9.4 ± 1.8	9.9 ± 2.3	10.1 ± 2.6	10.2 ± 3.1	10.2 ± 2.8	9.6 ± 2.1	9.8 ± 2.3	9.7 ± 2.5	9.7 ± 2.5	9.5 ± 2.4	9.5 ± 2.4
	Alpha	10.8 ± 5.2	11.9 ± 5.8	10.3 ± 6.0	13.0 ± 6.7	10.7 ± 6.1	11.5 ± 6.4	11.5 ± 7.2	12.0 ± 7.9	11.6 ± 7.6	10.9 ± 6.8	11.2 ± 6.0	10.5 ± 5.7	10.3 ± 6.0	10.2 ± 5.6*	10.2 ± 5.6
	Beta	5.6 ± 2.6	6.8 ± 3.4	5.2 ± 1.6	7.6 ± 5.1	5.5 ± 2.2	5.2 ± 1.4	5.1 ± 1.8	5.2 ± 1.9	5.0 ± 1.9	4.9 ± 1.6	5.2 ± 1.8	5.2 ± 1.9	5.2 ± 1.6	4.9 ± 1.5	5.0 ± 2.0
$O_1 - A_1$	Delta	12.9 ± 3.7	16.0 ± 7.8	14.0 ± 4.8	17.1 ± 7.6	12.8 ± 3.4	13.0 ± 2.9	13.2 ± 3.8	13.1 ± 3.8	13.1 ± 4.4	12.1 ± 2.5	13.3 ± 14.7	14.7 ± 6.4	14.0 ± 4.8	14.5 ± 6.2	14.4 ± 5.7
	Theta	8.0 ± 2.7	8.8 ± 4.3	8.4 ± 2.8	9.3 ± 4.0	7.9 ± 2.8	8.1 ± 2.6	8.3 ± 2.6	8.1 ± 2.5	8.2 ± 2.8	7.8 ± 3.1	8.5 ± 2.5	8.4 ± 2.7	8.4 ± 2.8	8.2 ± 2.6	8.3 ± 3.0
	Alpha	13.5 ± 10.1	14.7 ± 11.2	12.3 ± 9.6	15.6 ± 12.3	12.6 ± 11.0	12.9 ± 8.6	12.5 ± 9.9	13.0 ± 9.8	12.5 ± 10.2	11.7 ± 9.7	13.5 ± 9.2	13.6 ± 9.8	12.3 ± 9.6	12.2 ± 8.9	12.5 ± 9.1
	Beta	5.2 ± 2.2	6.3 ± 3.9	5.0 ± 2.0	6.2 ± 3.0	5.1 ± 2.7	5.2 ± 1.8	5.1 ± 1.9	5.1 ± 2.2	4.9 ± 2.0	4.6 ± 2.0	5.2 ± 2.1	5.1 ± 2.0	5.0 ± 2.0	4.9 ± 1.9	4.9 ± 2.0
$O_2 - A_2$	Delta	13.2 ± 3.7	15.0 ± 6.0	13.9 ± 4.2	14.1 ± 4.1	12.3 ± 2.7	12.3 ± 1.7	12.1 ± 2.1	12.0 ± 2.8	12.5 ± 3.1	11.8 ± 1.8	14.1 ± 3.7	13.7 ± 4.0	13.9 ± 4.2	14.0 ± 4.9	14.2 ± 5.0
	Theta	8.3 ± 2.5	8.6 ± 2.9	8.7 ± 3.3	8.5 ± 2.6	8.2 ± 2.4	7.7 ± 1.7	7.8 ± 2.1	7.9 ± 2.4	7.9 ± 2.1	7.6 ± 2.0	8.7 ± 3.1	8.6 ± 3.4	8.7 ± 3.3	8.3 ± 3.0	8.5 ± 3.4
	Alpha	13.7 ± 9.2	15.0 ± 10.4	11.9 ± 10.5	15.3 ± 10.7	12.2 ± 9.1	11.6 ± 7.1	10.9 ± 7.1	11.4 ± 7.4	11.1 ± 7.3	10.6 ± 6.9	13.3 ± 9.9	12.5 ± 9.9	11.9 ± 10.5	11.7 ± 9.1	12.2 ± 9.8
	Beta	5.2 ± 2.4	6.2 ± 3.3	4.8 ± 2.0	5.9 ± 2.5	4.7 ± 2.1*	4.6 ± 1.4	4.5 ± 1.5	4.5 ± 1.7	4.5 ± 1.6	4.3 ± 1.4	5.2 ± 2.2	4.9 ± 1.9	4.8 ± 2.0	4.7 ± 1.9	4.7 ± 2.1

Comparisons were of post and during values compared with the pre values of the respective session, i.e., ANYB, BAW and QS. $p < .05$, RM ANOVA, followed by post hoc tests with Bonferroni adjustment

ANYB alternate nostril yoga breathing, *BAW* breath awareness, *QS* quiet sitting

University of Patanjali Haridwar

Table 4 Left right coherence as a measure of hemisphere asymmetry, recorded at prefrontal, vertex and occipital sites in ANYB, BAW and QS sessions

Sl. no.	$FP_1 - A_1$ and $FP_2 - A2$ (max)		$C_3 - A_1$ and $C_4 - A_2$ (max)		$O_1 - A1$ and $O_2 - A_2$ (max)		$FP_1 - A1$ and $FP_2 - A_2$ (2-peck)		$C_3 - A1$ and $C_4 - A_2$ (2-peck)		$O_1 - A_1$ and $O_2 - A_2$ (2-peck)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ANYB												
Pre	.92	.04	.89	.03	.79	.07	.87	.05	.86	.04	.72	.07
D1	.90	.05	.87	.05	.76	.10	.85	.08	.84	.05	.69	.10
D2	.90	.05	.88	.03	.78	.07	.85	.07	.85	.04	.71	.07
D3	.90	.05	.88	.04	.77	.09	.85	.08	.84	.05	.70	.09
Post	.91	.04	.90	.03	.79	.07	.91	.18	.87	.03	.73	.06
BAW												
Pre	.90	.06	.89	.03	.78	.06	.87	.07	.86	.04	.72	.07
D1	.89	.06	.88	.03	.78	.05	.90	.23	.85	.03	.73	.06
D2	.90	.05	.89	.03	.79	.06	.86	.06	.86	.03	.73	.05
D3	.89	.05	.89	.03	.78	.05	.85	.05	.85	.03	.72	.05
Post	.89	.06	.95	.22	.79	.05	.85	.06	.96	.41	.73	.05
QS												
Pre	.93	.05	.89	.03	.80	.06	.89	.06	.85	.03	.74	.05
D1	.91	.05	.89	.03	.80	.06	.87	.06	.85	.04	.75	.05
D2	.91	.05	.88	.04	.80	.05	.87	.06	.85	.04	.74	.06
D3	.91	.05	.88	.03	.79	.06	.87	.06	.85	.03	.74	.06
Post	.92	.06	.89	.03	.80	.06	.88	.07	.85	.05	.75	.06

ANYB alternate nostril yoga breathing, *BAW* breath awareness, *QS* quiet sitting

cognitive tasks, though the connection is not strong. The theta activity increases in several conditions including drowsiness associated with a decreased ability to perform specific tasks [20].

The increase in relative power of the beta band of the EEG during quiet sitting over the right prefrontal region could suggest increased alertness, arousal and excitement, which are associated with increased beta wave activity [21]. Conversely, the amplitude of the beta wave band was lower after ANYB recorded over the right occipital region. Beta wave activity is not well understood, and its functional role remains only partially explained [22]. For instance research has shown that increased beta wave activity generated in the motor cortex is related to slow motor behavior [23]. A decrease of beta wave power (i.e., desynchronization) is believed to be an indicator of movement preparation, execution, and motor imagery [24, 25]. An arousal based theory [26] may help explain the changes in beta activity found in the present study. The arousal theory suggests that increased beta activity is associated with increased mental activity or arousal [26]. This suggests that after ANYB there is a decrease in arousal consistent with descriptions of yoga breathing as calming [8]. During the quiet sitting session, in contrast, the decrease in alpha amplitude over the right vertex could suggest greater arousal associated with random thinking in the absence of specific instructions [27]. This finding of increased activation during quiet sitting has been found in other studies [28]. It was suggested that the mental state during quiet sitting may be comparable to the state of mind wandering and self-referential processing [29].

Most of the changes described above (during and after ANYB, and during QS) occurred on the right side. These results may be considered comparable to those of an earlier study which assessed cerebral hemisphere specific task performance in 135 participants, aged between 10 and 17 years [30]. Participants were randomly assigned to (1) left nostril breathing, (2) right nostril breathing, (3) alternate nostril breathing, (4) breath awareness or (5) a control state. Hence there were 5 groups (n = 27 each) who practiced the intervention they were assigned to for 10 days. At the beginning and end of the 10 day period participants were assessed using verbal and spatial memory tasks, considered specific for left and right hemispheric functions, respectively. All four active intervention groups (left, right and alternate nostril yoga breathing as well as breath awareness) showed a significant increase by 84% in spatial memory scores at the end of 10 days. These results suggested that yoga breathing

University of Patanjali Haridwar

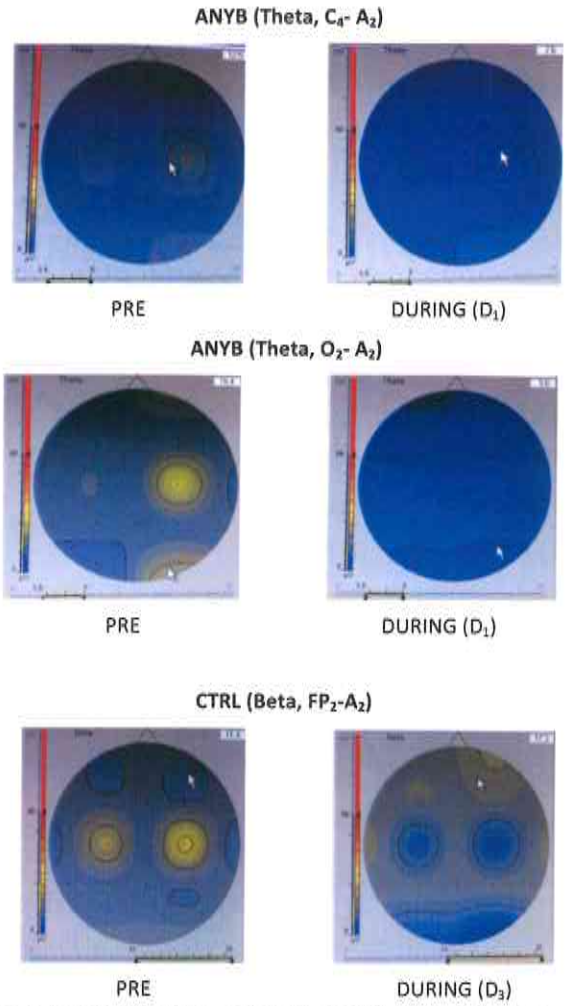

Fig. 2 Energy of the theta and beta bands (μV^2). Energy of the theta band (μV^2) showing a significant reduction at $C_4 - A_2$ and $O_2 - A_2$ during alternate nostril yoga breathing compared to before. Energy of the beta band increased during quiet sitting compared to before at $FP_2 - A_2$

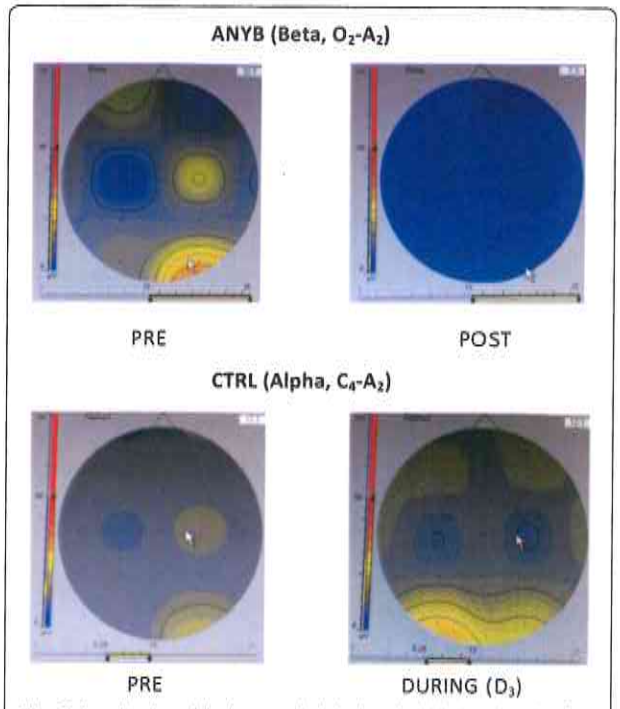

Fig. 3 Amplitudes of the beta and alpha bands (μV). Amplitude of the beta band (μV) showing a significant reduction at $O_2 - A_2$ during alternate nostril yoga breathing compared to before. Amplitude of the alpha band decreased during quiet sitting compared to before at $C_4 - A_2$

increases right hemisphere task performance. In the present study it is possible that during quiet sitting the participants who were trained in *pranayama* practiced yoga breathing inadvertently. It remains unclear why the breath awareness sessions showed no change unlike the study cited above. A possible reason is the small sample size which is a limitation of the study. Also, the present study assessed EEG, while the study cited above [30] assessed verbal and spatial memory task performance. It would have been ideal to record both measurements simultaneously. Hence simultaneous recording of the EEG and cognitive tasks could be a definite direction for future research.

The findings of the present study are limited by (a) the small sample size (n = 13; effect size = .11 (low), and (b) the inability to record and report the gamma band of the EEG with the equipment used.

Despite these limitations, this may be considered a pilot study which has results suggesting that ANYB may be calming and may possibly influence cognitive functions.

Conclusions

Contrary to the hypothesis of the study there was no change in cerebral hemisphere asymmetry during alternate nostril yoga breathing. Alternate nostril yoga breathing resulted in a decrease in theta band energy at the vertex and occipital sites on the right side. There was a decrease in the amplitude of the beta band after alternate nostril yoga breathing at the right occipital site, while the amplitude of the alpha band reduced during sitting quietly without specific instructions at the right vertex site. Also during sitting quietly without specific instructions there was an increase in energy in the beta band at the right prefrontal site.

University of Patanjali ★ Haridwar

Importance and relevance

Airflow through the nostril can impact the EEG. In this case alternate nostril yoga breathing had effects on the EEG suggesting that the practice can be calming and reduce arousal.

Abbreviations

A_1: reference (left ear lobe); A_2: reference (right ear lobe); ANYB: alternate nostril yoga breathing; BAW: breath awareness; C_3: vertex, left side; C_4: vertex, right side; QS: quiet sitting; EEG: electroencephalography; FFT: fast Fourier transform; FP_1: left pre-frontal; FP_2: right pre-frontal; M: mean; O_1: left occipital; O_2: right occipital; RM-ANOVA: repeated measures analysis of variance; SD: standard deviation.

Authors' contributions

ST conceptualized and designed the study, interpreted the data, reviewed the literature and prepared the manuscript. RKG assisted in compiling the manuscript and completing the revision. AY collected the data, analyzed it statistically, carried out the literature review and assisted in manuscript compilation. SP collected the data and assisted in the review of literature. AB conceptualized and designed the study. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

The original data of individual participants are available in spread sheets and can be accessed on request. At present we have no repository for these data generated on individual participants.

Consent to publish

Written informed consent was obtained from participants to participate in the study and to share images or data if required.

Ethics approval and consent to participate

The experimental procedure was approved by the ethical committee of Patanjali Research Foundation and signed informed consent was obtained from each participant before beginning the study.

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Phase change heat transfer during cryosurgery of lung cancer using hyperbolic heat conduction model

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ABSTRACT

The paper reports a numerical study of phase change heat transfer process in lung cancer undergoing cryosurgery. A two dimensional hyperbolic bio-heat model with non-ideal property of tissue, blood perfusion and metabolism is used to analyze the problem. The governing equations are solved by finite difference method based on enthalpy formulation. Effects of relaxation time of heat flux in hyperbolic model on freezing process have been examined. A comparative investigation of two different models (hyperbolic and parabolic bio-heat models) is also presented.

1. Introduction

Cancer has become one of the most dangerous diseases in the world. It occurs mainly in lungs, liver, stomach, prostate and colorectal among others. Lung cancer is the leading cause of death among other cancer related deaths. It is uncontrolled growth of abnormal or diseased tissues in the lungs. As per the report of the World Health Organization (WHO), about 1.59 million people (19.4% of the total) die from lung cancer each year [1]. Main causes of the lung cancer are cigarette smoking, second-hand smoke and air pollution etc. Many medical techniques namely, cryosurgery, chemotherapy, radiation therapy and hyperthermia are available for the treatment of the lung cancer [2]. One of the important medical techniques to treat the lung cancer is cryosurgery.

Cryosurgery is the use of intense cold temperature in surgery to destroy diseased tissue. In cryosurgery, liquid nitrogen is introduced through an instrument called as cryoprobe within diseased tissues [3]. The main advantages of the cryosurgery are: (i) less pain, (ii) less cost (iii) shorter recovery time and (iv) shorter hospital stay [4,10,18]. Immediate and delayed effects are the two main mechanisms towards the destructive effect of freezing in cryosurgery. The immediate effect occurs due to the cooling rate, whereas the delayed effect appears due to the progressive failure of microcirculation [5]. The freezing process involves extracellular and intracellular ice crystallization. Extracellular ice crystallization form when the cooling rate is slow. As the freezing continues, the ice crystals increase, i.e., the water gets removed from the cells. As a result, the cells shrink and membrane gets damaged. During the high cooling rate, the extracellular ice crystallization does not have enough time to form. In this situation, the intracellular ice forms which causes destruction of cells [6].

For a successful cryosurgical treatment, a good knowledge of temperature distribution and the position of phase change interface within tumor tissues and neighboring normal tissues is required. The objective of cryosurgery in lung cancer is to maximize the damage of tumor tissues while preserving surrounding healthy lung tissues [7]. The cryosurgery is an important treatment of the lung cancer as it also provides the potential for long-term survival. A brief literature review related to the cryosurgery in lung cancer is given below.

Hoffmann et al. [8] have proposed a cryosurgical model to predict the thermal reaction of tumor and normal tissue to cryosurgery within a dorsal skin flap chamber. The detailed analysis of temperature distribution and rate of cell destruction in the tumor during cryosurgery has been presented by Chua et al. [9]. In their study, they observed that a single cryoprobe of bigger diameter is more effective in destroying the tumor while preserving healthy tissue as compared to multiple cryoprobes. Nakayama et al. [10] have simulated both analytically and numerically the growth of ice-ball and location of freezing front with time. It was reported that there exists a tumor tissue of limiting size, which can freeze at the maximum by a single cryoprobe. Niu et al. [11] have experimentally analyzed lung necrosis using different freeze-thaw cycles during cryosurgery in lung cancer. In their study, they found that three freeze-thaw cycles are required for complete destruction of lung cancer cells. Cryosurgical simulation of lung cancer based on efficient freezing time has been investigated by Tarwidi [12]. He showed that

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phase change interface position and temperature distribution in tissue can be used to maximize the damage to tumor tissue and minimize the injury to normal tissue.

Most of the above studies were based on Penne's bio-heat model [13]. The Penne's bio-heat model is given as

$$\rho c\frac{\partial T}{\partial t} = -\nabla q + \rho_b c_b w_b (T_b - T) + Q_m \tag{1}$$

where c and ρ are the specific heat and density of the tissue, respectively.ρ_b is the density of blood, c_b is the specific heat of blood, w_b is the blood perfusion rate, T is the temperature, t is the time, T_b is the arterial temperature and Q_m is the metabolic heat generation in the tissue.

Eq. (1) is based on the Fourier's heat conduction law, which is given as

$$q(S, t) = -k\nabla T(S, t), \tag{2}$$

where k is the thermal conductivity of the tissue, $q(S, t)$ is the heat flux and $T(S, t)$ is the temperature at position $S(x, y, z)$ for time t.

In classical Fourier's law of heat conduction, it is assumed that the propagating speed of a thermal signal is infinite [14]. But in reality, thermal signal propagate with finite speed because in any thermodynamic process an equilibrium state takes some relaxation time to establish. Also, biological tissues have non-homogeneous structure and they require a relaxation time to acquire sufficient amount of energy for transfer to the nearest element [15]. To account the thermal behavior, which is not captured by Fourier's law, Cattaneo [16] and Vernotte [17] have simultaneously proposed a modified form of the Fourier's law as

$$q(S, t + \tau_q) = -k\nabla T(S, t), \tag{3}$$

where τ_q is the thermal relaxation time for heat flux. The first order Taylor expansion of Eq. (3) gives

$$q(S, t) + \tau_q\frac{\partial q(S, t)}{\partial t} = -k\nabla T(S, t), \tag{4}$$

Eq. (4) is called as Cattaneo-Vernotte's constitutive equation. After using Eqs. (1) and (4), we get a hyperbolic bio-heat equation of heat transfer as:

$$\tau_q\rho c\frac{\partial^2 T}{\partial t^2} + (\rho c + \tau_q\rho_b c_b w_b)\frac{\partial T}{\partial t} = k\left(\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2}\right) + \rho_b c_b w_b (T_b - T) + Q_m. \tag{5}$$

If the relaxation time for heat flux, i.e, τ_q=0, then the above hyperbolic bio-heat model becomes parabolic bio-heat model.

Heat transfer in biological tissues is a complex process. It involves several mechanisms such as thermal conduction, convection, radiation, metabolic heat generation, blood perfusion and phase change. Phase change process is the characteristic of cryosurgical treatment of lung cancer. The Penne's bio-heat model has been used by various authors in the literature [18–22] to solve the phase change problem in cryosurgery. The nature of phase change problems is non-linear due to the unknown position of the freezing front and the direction of ice growth. The major difficulty in the solution of phase change heat transfer problem of biological tissue appears because of non-linearity in the model due to discontinuity between phase change regions and the unknown position of the solidius-liquidus interfaces [23], though some researchers have ignored the temperature discontinuity at the solid-liquid interface [24–26].

Many studies are available in the literature [15,26–30], where hyperbolic bio-heat model with freezing has been used. Among others, Deng and Liu [26] have studied phase change heat transfer and thermal stress inside the skin tissue during freezing by using hyperbolic heat conduction model. They neglected the temperature discontinuity at phase change interface. To investigate temperature distribution and thermal damage in laser-irradiated biological tissues a two-dimensional non-Fourier bio-heat conduction model was presented by Zhou et al. [27]. An analytical and numerical solution of the hyperbolic bio-heat conduction equations was given by Torabi et al. [28]. Ahmadikia and Moradi [29] used the hyperbolic heat conduction model to describe the non-Fourier effect of biological tissue during freezing. In their study, the authors included the temperature discontinuity at solid-liquid interface without the heat source term due to metabolic heat and blood perfusion. Singh and Kumar [30] studied the freezing in biological tissue during cryosurgery by using one dimensional hyperbolic bio-heat conduction model with the non-ideal property of tissue and source of heat due to blood perfusion and metabolism. They obtained the temperature distributions and phase change interface positions in biological tissue for different values of relaxation time.

The above literature review reveals that the hyperbolic bio-heat model is still not used for the cryosurgical treatment of the lung cancer. In the present study, we propose a two dimensional hyperbolic bio-heat model for cryosurgery in lung cancer. A finite difference scheme is used to solve the model. To study the effect of relaxation time for heat flux on cryosurgery, temperature distributions and position of phase change interfaces in the tissue are obtained for different values of relaxation time (τ_q).

The rest of the paper is organized as follows. Mathematical formulation and governing equations are described in Section 2. Numerical solution is given in Section 3. Results and discussion are presented in Section 4. Finally, some concluding remarks are reported in Section 5.

2. Mathematical formulation

We consider a lung tissue of dimension 4.0 cm×4.0 cm in which a tumor tissue of dimension 1.5 cm×1.5 cm is embedded. A cryoprobe is located at the position $x = 0$, 1.8 cm $\leq y \leq$ 2.2 cm. The physical configuration of the present problem is given in Fig. 1 [19]. The governing equations of two dimensional hyperbolic bio-heat model in frozen and unfrozen regions are given as:

$$\tau_q\rho_f c_f\frac{\partial^2 T_f}{\partial t^2} + \rho_f c_f\frac{\partial T_f}{\partial t} = k_f\left(\frac{\partial^2 T_f}{\partial x^2} + \frac{\partial^2 T_f}{\partial y^2}\right), \tag{6}$$

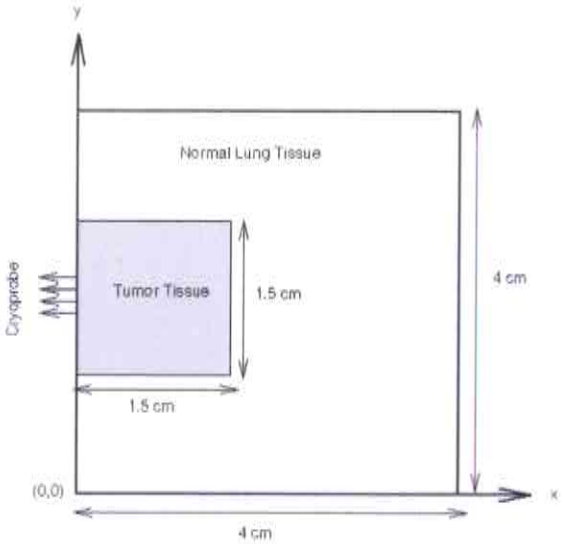

Fig. 1. Sketch of the physical problem.

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$$\tau_q \rho_u c_u \frac{\partial^2 T_u}{\partial t^2} + (\rho_u c_u + \tau_q \rho_b c_b w_b) \frac{\partial T_u}{\partial t} = k_u \left(\frac{\partial^2 T_u}{\partial x^2} + \frac{\partial^2 T_u}{\partial y^2} \right) + \rho_b c_b w_b (T_b - T_u) + Q_m, \quad (7)$$

respectively. The symbols are already defined in the introduction section, whereas, subscripts f, u and b stand for frozen, unfrozen and blood of tissue, respectively.

The conditions at phase change interface are given as

$$k_f \frac{\partial T_f(S, t)}{\partial n} - k_u \frac{\partial T_u(S, t)}{\partial n} = \rho L v_n + \tau_q \rho L \dot{v}_n, \quad (8)$$

$$T_u(S, t) = T_f(S, t) = T_{ph}. \quad (9)$$

where $v_n = \frac{\partial S}{\partial t}$, $\dot{v}_n = \frac{\partial^2 S}{\partial t^2}$, n is the unit outward normal, L is the latent heat of fusion. The subscript ph stands for the phase change.

Using void fractioning volumetric averaging technique [31], macroscopic properties of lung are computed as [7]

$$\begin{aligned} \rho_l &= \rho_w f_w + \rho_a f_a \\ c_l &= c_w f_w + c_a f_a \\ k_l &= k_w f_w + k_a f_a \end{aligned} \quad (10)$$

where subscripts l, w and a represent lung, tissue and air.

To avoid the discontinuity of temperature between phase change regions and unknown position of the solidius-liquidus interfaces, we consider enthalpy formulation to solve the present governing equations. Using enthalpy $H(T) = \int_{T_r}^{T} c\, dT$, where T_r is the reference temperature, temperatures are transformed into enthalpies as follows:

(i) Frozen region ($T < T_{ms}$):

$$H = \int_{T_{ms}}^{T} c_f dT = c_f (T - T_{ms}).$$

(ii) Mushy region ($T_{ms} \le T \le T_{ml}$):

$$\begin{aligned} H &= \frac{1}{2} \int_{T_{ms}}^{T} (c_f + c_u)\, dT + \frac{L}{(T_{ml} - T_{ms})} \int_{T_{ms}}^{T} dT \\ &= (T - T_{ms}) \left\{ \frac{1}{2} (c_f + c_u) + \frac{L}{(T_{ml} - T_{ms})} \right\}. \end{aligned}$$

(iii) Unfrozen region ($T > T_{ml}$):

$$\begin{aligned} H &= L + \frac{1}{2} \int_{T_{ms}}^{T_{ml}} (c_f + c_u)\, dT + \int_{T_{ml}}^{T} c_u\, dT \\ &= L + \frac{1}{2} (c_f + c_u)(T_{ml} - T_{ms}) + c_u (T - T_{ml}). \end{aligned}$$

Thus, enthalpy and temperature of tissue are related as [8,32]

$$H = \begin{cases} c_f (T - T_{ms}) & T < T_{ms} \\ (T - T_{ms}) \left\{ \frac{1}{2} (c_f + c_u) + \frac{L}{(T_{ml} - T_{ms})} \right\} & T_{ms} \le T \le T_{ml}, \\ L + \frac{1}{2} (c_f + c_u)(T_{ml} - T_{ms}) + c_u (T - T_{ml}) & T > T_{ml} \end{cases} \quad (11)$$

where T_{ml} and T_{ms} are liquidus (−1 °C) and solidus (−8 °C) temperatures. Using Eq. (11), Eqs. (6)–(9) reduce to a single equation as

$$\tau_q \rho \frac{\partial^2 H}{\partial t^2} + \left(\rho + \frac{\tau_q \rho_b w_b c_b}{c} \right) \frac{\partial H}{\partial t} = k \left(\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} \right) + \rho_b w_b c_b (T_b - T) + Q_m. \quad (12)$$

The following assumptions are considered to solve the two dimensional hyperbolic bio-heat transfer model.

Table 1
Comparison between published [19] and present results at τ_q = 0s.

Published results [19]			Present results	
Time (s)	Lower Interface (cm)	Upper Interface (cm)	Lower Interface (cm)	Upper Interface (cm)
25	0.30	0.34	0.30	0.34
50	0.40	0.43	0.39	0.42
75	0.46	0.52	0.47	0.51
100	0.51	0.56	0.52	0.57
125	0.56	0.60	0.57	0.62
150	0.59	0.65	0.60	0.66
175	0.65	0.70	0.66	0.71
200	0.67	0.71	0.69	0.73

Table 2
Thermal-physical properties of tissues [7,19,34,35].

Parameter	Units	Value
Density of blood	kg/m^3	1005
Density of unfrozen tumor tissue	kg/m^3	998
Density of frozen tumor tissue	kg/m^3	921
Density of unfrozen lung tissue	kg/m^3	161
Density of frozen lung tissue	kg/m^3	149
Thermal conductivity of unfrozen tumor tissue	W/m °C	0.552
Thermal conductivity of frozen tumor tissue	W/m °C	2.25
Thermal conductivity of unfrozen lung tissue	W/m °C	0.11
Thermal conductivity of frozen lung tissue	W/m °C	0.38
Specific heat of unfrozen tumor tissue	J/kg °C	4200
Specific heat of frozen tumor tissue	J/kg °C	1230
Specific heat of unfrozen lung tissue	J/kg °C	4174
Specific heat of frozen lung tissue	J/kg °C	1221
Blood perfusion in tumor tissue	ml/s/ml	0.002
Blood perfusion in lung tissue	ml/s/ml	0.0005
Metabolic heat generation in tumor	W/m^3	672
Metabolic heat generation in lung	W/m^3	42,000
Latent heat	kJ/kg	333.00
Arterial blood temperature	°C	37

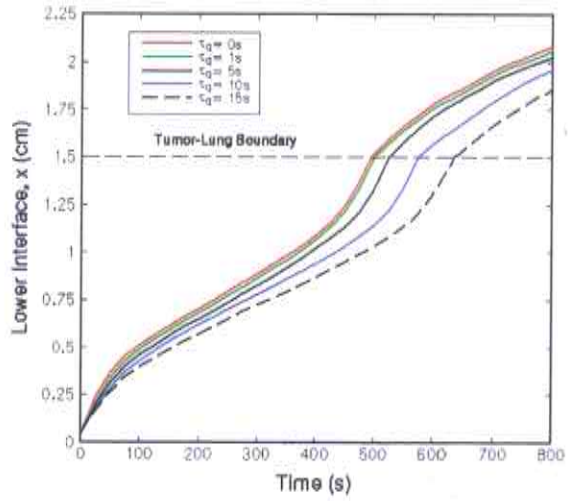

Fig. 2. Lower Phase change interface during freezing versus time at y=2.0 cm for the value of τ_q = 0s, τ_q = 1s, τ_q = 5s, τ_q = 10s, τ_q = 15s..

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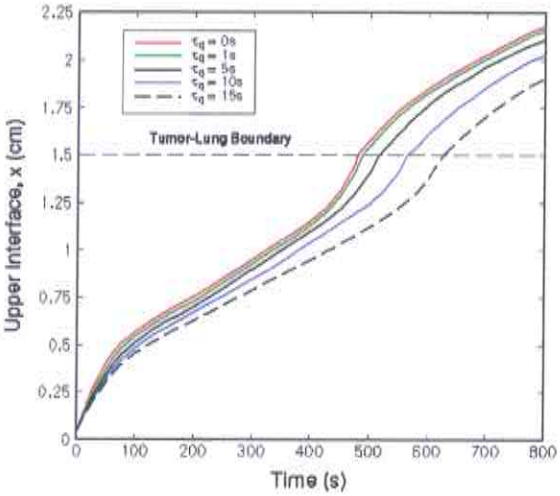

Fig. 3. Upper Phase change interface during freezing versus time at y=2.0 cm for the value of τ_q = 0s, τ_q = 1s, τ_q = 5s, τ_q = 10s, τ_q = 15s.

- Heat conduction follows the non-Fourier heat conduction law [29].
- Heat source appears due to blood perfusion and metabolism when tissue is unfrozen [23,33].
- Thermo-physical properties of normal lung and tumor tissue are taken as

$$(k)_e = \begin{cases} (k_f)_e & T < T_{ms} \\ \frac{1}{2}\{(k_f)_e + (k_u)_e\} & T_{ms} \le T \le T_{ml}, \\ (k_u)_e & T > T_{ml} \end{cases}$$

$$(\rho)_e = \begin{cases} (\rho_f)_e & T < T_{ms} \\ \frac{1}{2}\{(\rho_f)_e + (\rho_u)_e\} & T_{ms} \le T \le T_{ml}, \\ (\rho_u)_e & T > T_{ml} \end{cases}$$

$$(c)_e = \begin{cases} (c_f)_e & T < T_{ms} \\ \frac{1}{2}\{(c_f)_e + (c_u)_e\} & T_{ms} \le T \le T_{ml}, \\ (c_u)_e & T > T_{ml} \end{cases}$$

where subscripts e=l and t are for lung and tumor respectively.

- The initial temperature of tissue is considered as an arterial temperature (37 °C).
- Non-ideal property of tissue is used with upper and lower phase change interface at temperature −1 °C and −8 °C respectively [34].

Initial and boundary conditions are defined as:

(a) Initial conditions:

$$T_f(x, y, 0) = T_0 = 37^0C \text{ and } \left.\frac{\partial T_f}{\partial t}\right|_{t=0} = 0,$$

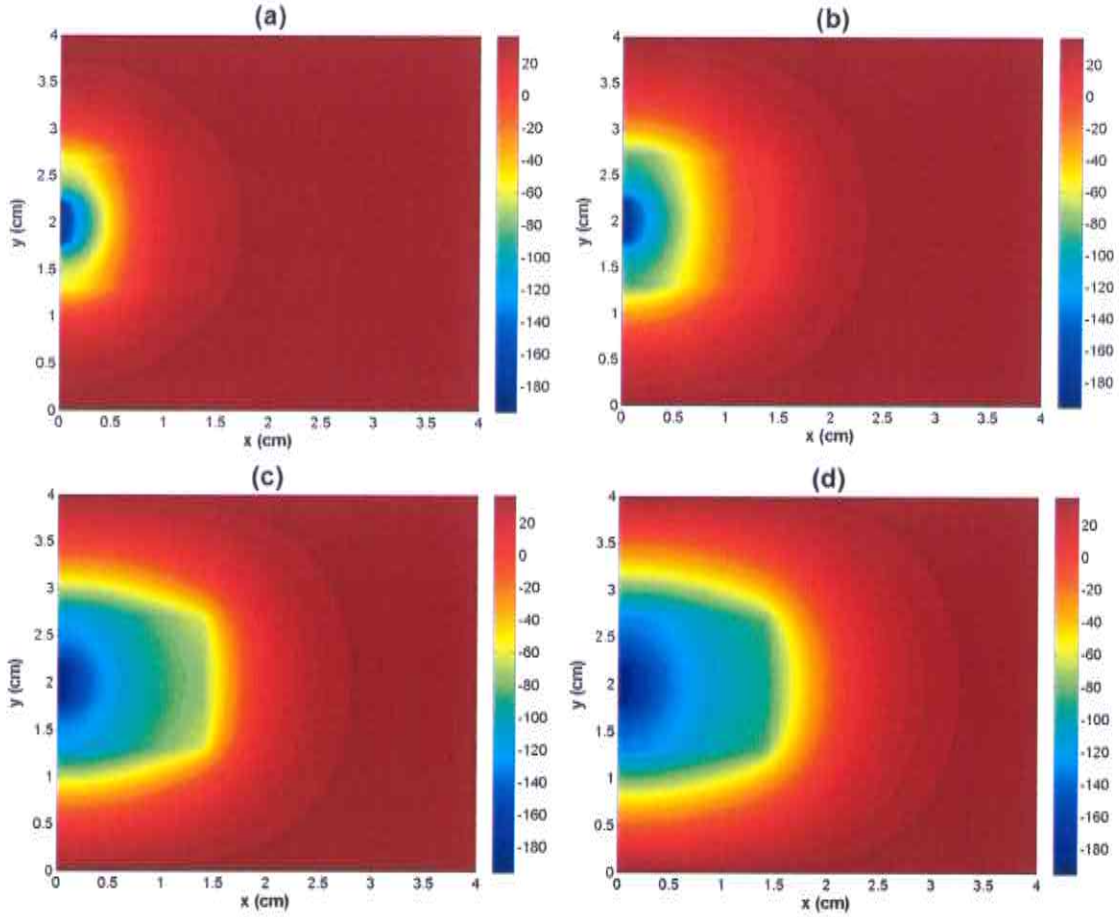

Fig. 4. Temperature distribution along the tissue during freezing for τ_q = 0s: (a) t=200 s, (b) t=400 s, (c) t=600 s and (d) t=800 s.

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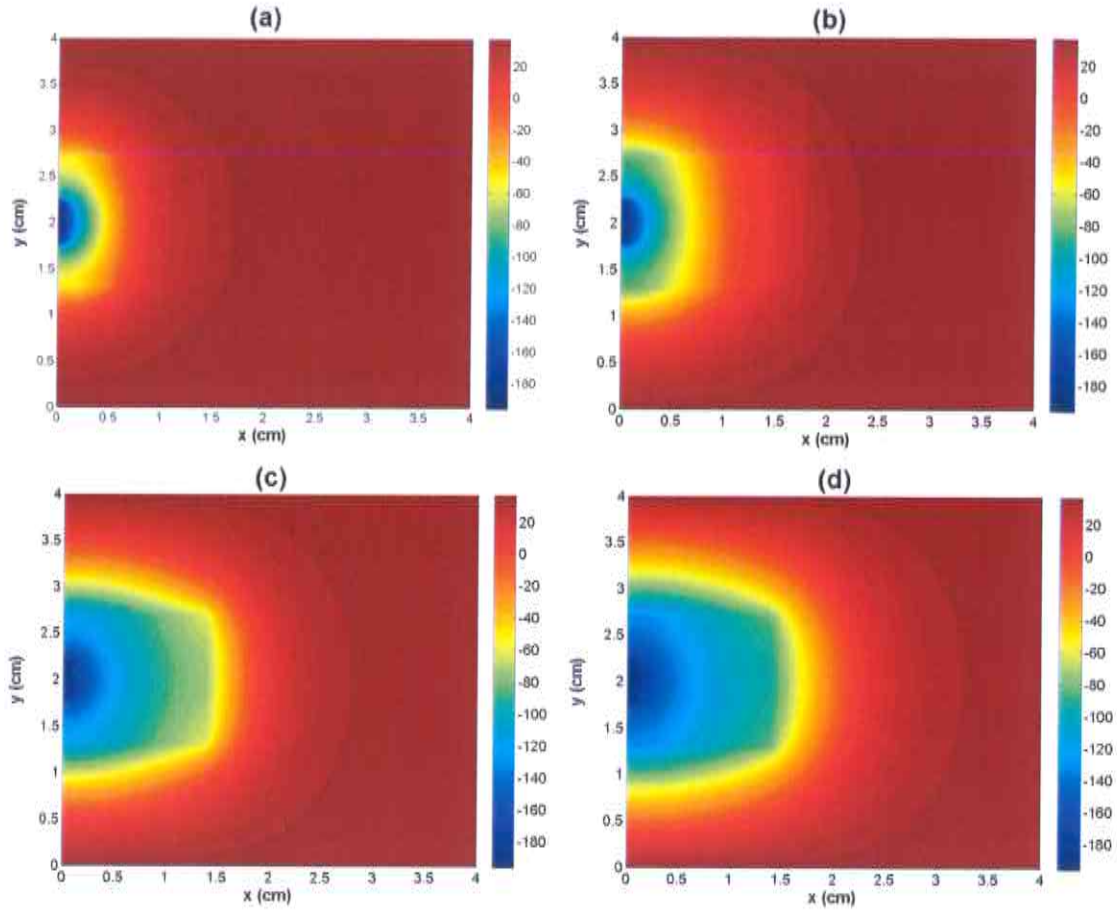

Fig. 5. Temperature distribution along the tissue during freezing for τ_q = 1s: (a) t=200 s, (b) t=400 s, (c) t=600 s and (d) t=800 s.

$$T_u(x, y, 0) = T_0 \text{ and } \left.\frac{\partial T_u}{\partial t}\right|_{t=0} = 0,$$

(b) boundary conditions:

(i) At x=0 and 1.8 $\leq y \leq$ 2.2 cm $T(0, y, t) = T_c$ =−196 °C.
(ii) At x=0, 0 $\leq y <$ 1.8 cm and 2.2 $< y \leq$ 4.0 cm

$$\frac{\partial T(x, y, t)}{\partial x} = 0.$$

(iii) At y=0, y=4.0 cm and 0 $\leq x \leq$ 4.0 cm; x=4.0 cm, 0 $\leq y \leq$ 4.0 cm T (x, y, t) =37 °C.
(iv) At y=1.25 cm, y=2.75 cm and 0 $\leq x \leq$ 1.5 cm; x=1.5 cm, 1.25 cm $\leq y \leq$ 2.75 cm,

Continuity of heat flux and temperature at lung-tumor boundary is given as

$$k_t \frac{\partial T_t(x, y, t)}{\partial x} = k_l \frac{\partial T_l(x, y, t)}{\partial x} \text{ and } T_t = T_l$$

where, subscripts t and l stand for tumor and normal lung tissue, respectively.

3. Numerical solution

Since the governing equations of the present problem are nonlinear, it is difficult to find the solution by an analytical approach. Therefore, we have used a numerical technique to solve the problem. Many numerical methods such as finite difference method (FDM) [19,20,29,33,36], finite element method (FEM) and boundary element method (BEM) have been used to solve the phase change problems. As compared to FDM, FEM and BEM are complex and time consuming methods. However, FDM is simple and less time consuming method for the regular geometry. Here, we have also employed a finite difference scheme to solve the present problem. A complete finite difference formulation for the present problem is given below.

Considering $x_i = i\delta x$, $y_j = j\delta y$ ($\delta x = \delta y$) *and* $t_n = n\delta t$, where i, j and n are the space and time index respectively; δx, δy and δt are the increment in x-axis, y-axis and time respectively. Applying forward difference approximation to first order time derivative and second order central difference approximation to time and space derivatives at point (x_i, y_j, t_n) in Eq. (12), we get

$$\begin{aligned} H_{i,j}^{n+1} = {} & (1 + A_{i,j}^n F_{i,j}^n) H_{i,j}^n - A_{i,j}^n F_{i,j}^n H_{i,j}^{n-1} + D_{i,j}^n F_{i,j}^n (T_{i+1,j}^n + T_{i-1,j}^n - 4T_{i,j}^n \\ & + T_{i,j+1}^n + T_{i,j-1}^n) \\ & + E_{i,j}^n F_{i,j}^n (T_b - T_{i,j}^n) + F_{i,j}^n Q_{mi,j}^n, \end{aligned} \tag{13}$$

where,

$$A_{i,j}^n = \frac{\tau_q \rho_{i,j}^n}{(\delta t)^2}; \quad B_{i,j}^n = \left\{ \frac{\rho_{i,j}^n}{(\delta t)} + \frac{\tau_q \rho_b c_b w_{bi,j}^n}{c_{i,j}^n (\delta t)} \right\}; \quad D_{i,j}^n = \frac{k_{i,j}^n}{(\delta x)^2};$$

$$E_{i,j}^n = \rho_b c_b w_{bi,j}^n; \quad F_{i,j}^n = \frac{1}{A_{i,j}^n + B_{i,j}^n}.$$

Eq. (13) gives the enthalpy at the (n+1)th time level in terms of

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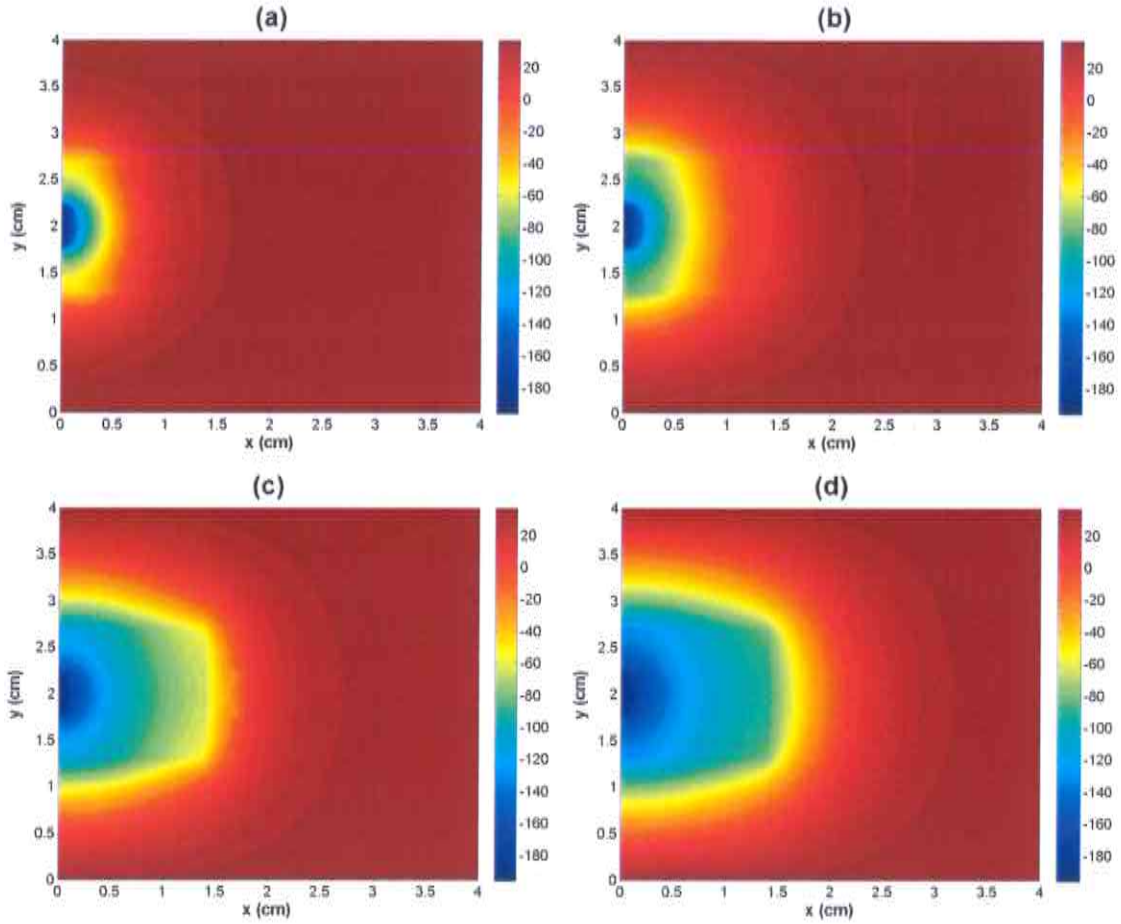

Fig. 6. Temperature distribution along the tissue during freezing for $\tau_q = 5s$: (a) t=200 s, (b) t=400 s, (c) t=600 s and (d) t=800 s.

enthalpy and temperature at nth time level. A stability criteria for numerical solution is used to manage the space and time increments, which is given as

$$\max\left\{\frac{(\delta t)^2\{4k+\rho_b w_b c_b(\delta x)^2\}}{(\delta x)^2\{2c\tau_q\rho+c\rho(\delta t)+\tau_q\rho_b w_b c_b(\delta t)\}}, \frac{(\delta t)^2\{4k+\rho_b w_b c_b(\delta y)^2\}}{(\delta y)^2\{2c\tau_q\rho+c\rho(\delta t)+\tau_q\rho_b w_b c_b(\delta t)\}}\right\} \le 1.$$

After finding the enthalpy at $(n+1)$th level, one can obtain the temperature at $(n+1)$th time level by inverting Eq. (11) as follows:

$$T = \begin{cases} \frac{H}{c_f} + T_{ms}, & H < 0 \\ \frac{2H(T_{ml}-T_{ms})}{(c_f+c_u)(T_{ml}-T_{ms})+2L} + T_{ms}, & 0 \le H \le L + \frac{1}{2}(c_f+c_u)(T_{ml}-T_{ms}). \\ \frac{H}{c_u} - \frac{L}{c_u} - \frac{(c_f+c_u)}{2c_u}(T_{ml}-T_{ms}) + T_{ml}, & H > L + \frac{1}{2}(c_f+c_u)(T_{ml}-T_{ms}) \end{cases} \quad (14)$$

Once the new temperature field is known from the enthalpies, the procedure is repeated. The position of upper and lower phase change interfaces is given by isotherms at −1 °C and −8 °C.

Before discussing the analysis of the present problem, a numerical code validation and accuracy are checked by comparing our general results with the published results [19]. Results are compared with parabolic bio-heat model as a special case ($\tau_q = 0s$). Solution generated by present code is in good agreement with the published results (see Table 1). Apart from this, grid independence of the solution is also checked for various grid sizes in the x and y directions. We found that the results remain consistent when the grid size is 40×40 or more. Therefore, all the computations are reported by taking the grid size as 40×40.

4. Results and discussion

In this section, we illustrate the numerical results for hyperbolic bio-heat conduction model with phase change during cryosurgical treatment of lung cancer. Present problem is solved with dimensional parameters. The values of dimensional parameters for both tumor and lung tissue based on Eq. (10) are given in Table 2 [7,19,34,35]. The values of relaxation time for heat flux are considered as $\tau_q = 0s$, $1s$, $5s$, $10s$ and $15s$[14,26,29,37].

To implement a cryosurgery precisely, analysis of tissue freezing and temperature behavior in the frozen region is also required. For this we have examined position of the phase change interfaces for different values of relaxation time. Since the biological tissues show the non-ideal property, therefore phase change occurs over a wide range with upper phase change temperature −1 °C and lower phase change temperature −8 °C. Position of the phase change interfaces (lower and upper interfaces) versus time in x-direction at y=2.0 cm for different values of relaxation time are presented in Figs. 2 and 3, respectively. Figs. 2 and 3 examine how freezing positions are affected due to changes in the relaxation time. Phase change movement, i.e., slope of freezing position decreases on increasing the relaxation time and temperature gradient also decreases due to an increase in distance from the cryoprobe. In this situation, the relaxation time for heat flux

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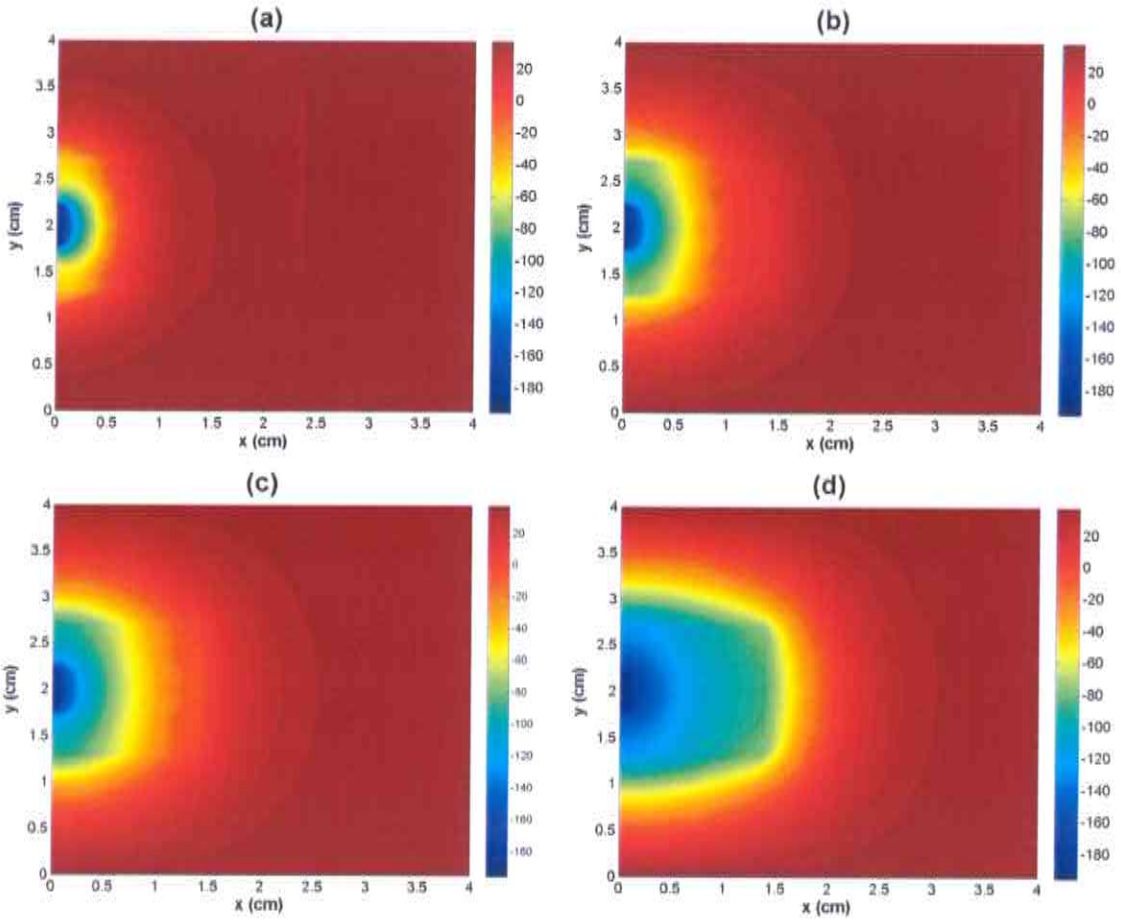

Fig. 7. Temperature distribution along the tissue during freezing for τ_q = 10s: (a) t=200 s, (b) t=400 s, (c) t=600 s and (d) t=800 s.

controls the behavior of thermal wave propagation. This shows that freezing position for hyperbolic solution moves slower than the parabolic one, which implies that phase change interface position for hyperbolic case at the same time is lower than that of parabolic case. For example, phase change interface position for $\tau_q = 5s$ and $\tau_q = 10s$ are lower than $\tau_q = 0s$ (see Figs. 2 and 3). Furthermore a decrease in freezing position is observed with an increase in the value of τ_q.

As can be observed from Figs. 2 and 3 that both freezing interfaces suddenly accelerate as they move towards healthy lung tissue from tumor tissue, i.e., cross the lung-tumor boundary. This phenomenon can be explained by considering the densities and conductivities of healthy lung tissue and tumor tissue. Parameter values from Table 2 shows that the healthy lung tissue has low density and smaller thermal conductivity as compared to the density and thermal conductivity of tumor tissue. This difference in the thermal-physical properties of healthy lung tissue and tumor tissue causes the freezing interfaces to suddenly accelerate as they cross the lung-tumor boundary. Bischof et al. [7] have also observed the similar kind of phenomena in their earlier work where they have studied the freezing in the special case of a solid tumor embedded in porous lung. Also, the hyperbolic model reduces to parabolic bio-heat model when $\tau_q = 0$ which is studied in great detail by Kumar and Katiyar [19] in their previous work.

Figs. 4–8 are plotted for the temperature distributions within the tissue at time t=200, 400, 600 and 800 s during cryosurgery for different values of relaxation time i.e., τ_q = 0s, 1s, 5s, 10s and 15 s We know that when the value of τ_q tends to zero, hyperbolic solution approaches to the parabolic solution. As can be seen from Figs. 4 and 5, the temperature distribution is almost similar for τ_q = 0s and τ_q = 1s, i.e., the solutions of hyperbolic model and parabolic model predict almost same results for small value of the relaxation time. However, as we increase the relaxation time, both solutions differ significantly. Tissue temperature for hyperbolic model is higher than parabolic one at the same time. Temperature increases in the tissue with an increase in the relaxation time. A possible qualitative justification towards an increase in the temperature as follows. In the case of low relaxation time, heat diffuses into tissue much faster, hence tissue freezes quicker and its temperature decreases rapidly as compared to high relaxation time case. In addition to above, it can also be observed that in both hyperbolic and parabolic models, tissue temperature of tumor is much below the lethal temperature (−30 °C) after time t=800 s.

Figs. 9–12 show the positions of lower and upper freezing interfaces at time t=200, 400, 600 and 800 s for hyperbolic bio-heat conduction model with respect to the distance x and y for different values of relaxation time (τ_q = 0s, 1s, 5s, 10s and 15 s). Results in Figs. 9–12 clearly show the direction of ice growth and ice-ball history. It can be observed from the above figures that the phase change interfaces for hyperbolic model move faster as the value of relaxation time (τ_q) is decreased. Freezing velocity of the thermal signals is retarded by relaxation time as it dominates the behavior of thermal signal propagation. Hence, the freezing is faster for smaller values of τ_q.

For performing effective cryosurgical treatment, these information are very useful to control temperature level accurately at the target tumor tissue because over freezing may cause an irreversible injury to the surrounding normal lung tissue.

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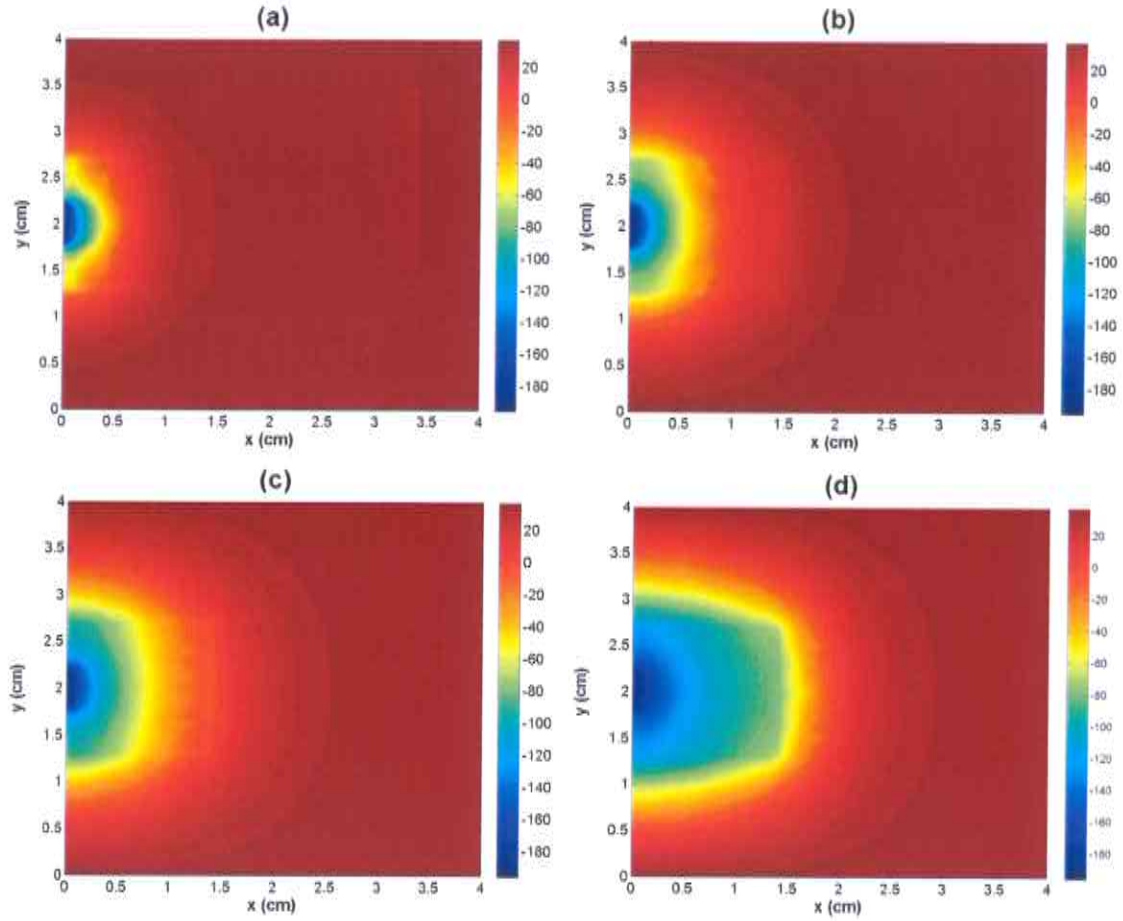

Fig. 8. Temperature distribution along the tissue during freezing for τ_q = 15s: (a) t=200 s, (b) t=400 s, (c) t=600 s and (d) t=800 s.

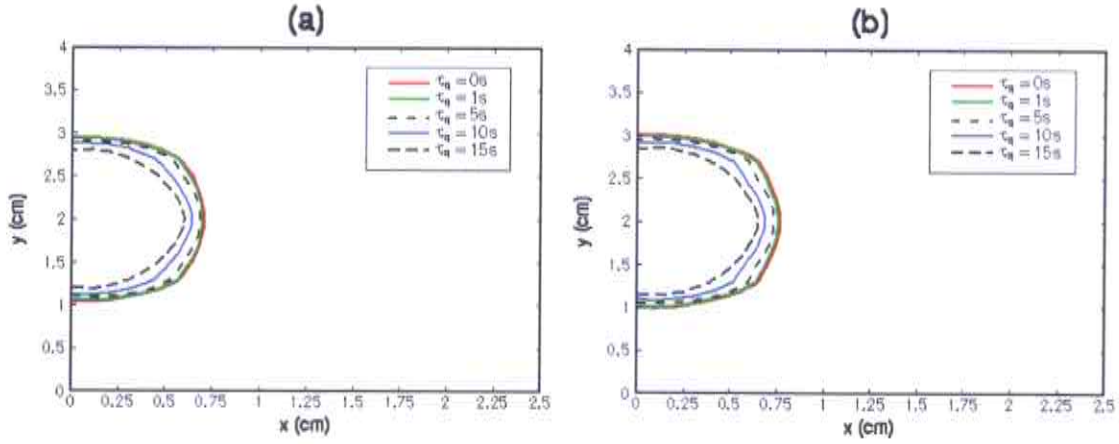

Fig. 9. (a) Lower phase change interface and (b) Upper phase change interface during freezing at t=200 s, for τ_q = 0s, τ_q = 1s, τ_q = 5s, τ_q = 10s, τ_q = 15s.

5. Conclusion

In this paper, we have analyzed numerically the phase change interface and temperature distribution in a lung tumor tissue during cryosurgery. Due to infinite speed of heat propagation in the Fourier's law, a two dimensional hyperbolic bio-heat conduction model is considered. The governing equations are solved by finite difference method and temperature dependent enthalpy formulation. Non-ideal property of tissue, blood perfusion and metabolic heat generation are also taken into consideration. By means of rigorous numerical experiments, we observe that relaxation time of heat flux has important effect on temperature distribution and interface position of phase change interfaces. The main concluding remarks of the present investigation are given below:

- Phase change interface position decreases on increasing relaxation time and temperature gradient also decreases due to being away from the cryoprobe. This shows that the freezing position for hyperbolic solution moves slower than the parabolic one, which implies that phase change interface position for hyperbolic case at

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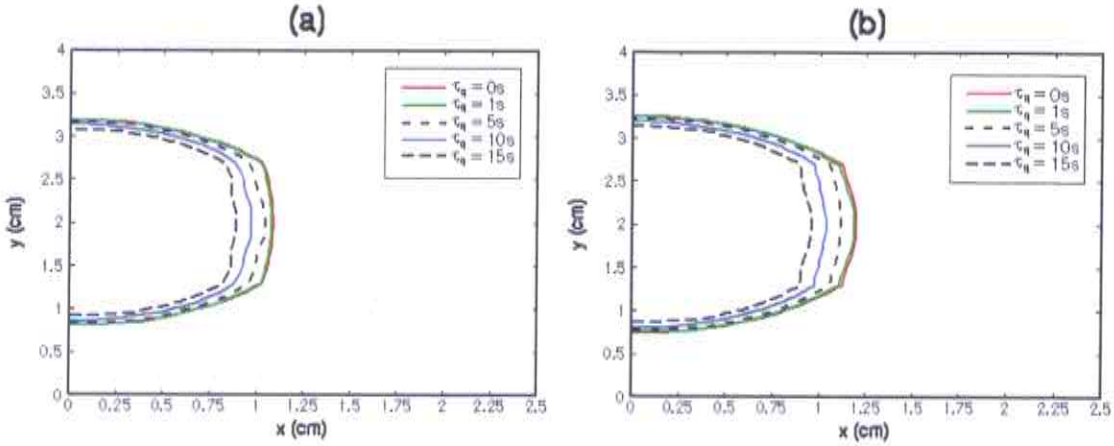

Fig. 10. (a) Lower phase change interface and (b) Upper phase change interface during freezing at t=400 s, for τ_q = 0s,τ_q = 1s, τ_q = 5s, τ_q = 10s, τ_q = 15s.

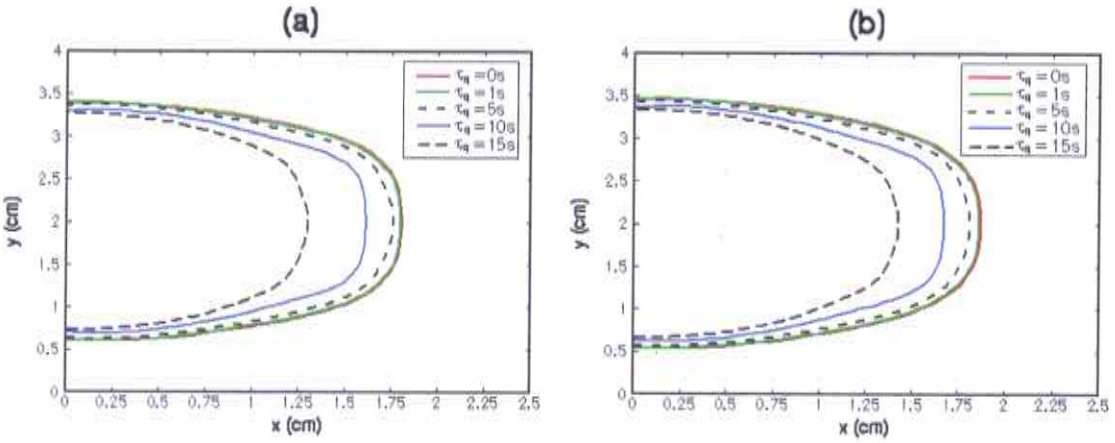

Fig. 11. (a) Lower phase change interface and (b) Upper phase change interface during freezing at t=600 s, for τ_q = 0s,τ_q = 1s, τ_q = 5s, τ_q = 10s, τ_q = 15s.

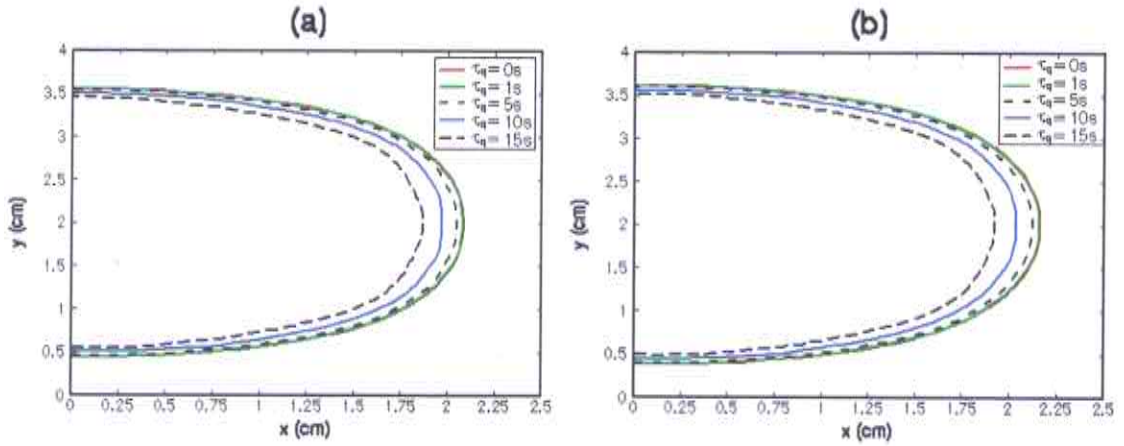

Fig. 12. (a) Lower phase change interface and (b) Upper phase change interface during freezing at t=800 s, for τ_q = 0s,τ_q = 1s, τ_q = 5s, τ_q = 10s, τ_q = 15s.

the same time is lower than that of parabolic case.

- Hyperbolic solution reduces to parabolic solution for small value of relaxation time. Tissue temperature for the hyperbolic case is higher than the parabolic one at the same time. Tissue temperature increases with an increase in the value of relaxation time. Hence non-Fourier effect becomes more effective as compared to Fourier effect.
- In the case of hyperbolic model freezing is fast for small values of relaxation time.

Results obtained in this article regarding the phase change interface positions and temperature distribution in a lung tumor tissue may help in carrying out the cryosurgical treatment in lung cancer more effectively. Treatment can be optimized in a desired manner so that freezing process destroys only tumor tissues while the damage to neighboring healthy lung tissues due to over freezing can be minimized. Although, we have considered a two dimensional hyperbolic bio-heat model in the present investigation, but it can be extended for three dimensional bio-heat models. This problem is left for a future study.

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Conflict of interest

None declared.

Acknowledgments

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The anatomy of the skin: concepts from ayurveda and computational modelling

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Abstract

Ayurveda used unique methods to understand human anatomy, which included examination of cadavers. Conventional anatomy is based on cadaver dissection with complex tools to understand histology. Computational modelling of the anatomy of the skin based on light attenuation at different wavelengths converted into corresponding chromophores gave a model which resembles that described in Ayurveda. The descriptions of the Ayurveda sages Charaka (*Circa* 500 B.C.) and Sushruta (*Circa* 600 B.C.) in classical Ayurveda are compared with contemporary, conventional anatomy and with the computational model. Such comparisons can facilitate an integrated approach to dermatology.

Keywords: Anatomy of skin, Ayurveda, Conventional histology.

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Introduction

Sushruta (*Circa* 600 B.C.) is known for detailed descriptions of over a thousand illnesses, as well as plant and mineral remedies which are considered fundamental to present day Ayurveda.[1] The contributions of Sushruta to understanding human anatomy are relevant nowadays, as they show an unusual depth of understanding and accuracy.[2]

In the text *Sushruta Samhita, Sharirasthana*, there is a systematic description of the methods used to understand and study the human cadaver.[3] It is mentioned that the cadaver should be of a person who did not die due to poisoning, chronic illness, or extreme old age.[4] The rest of the description is as clear; after removing waste matter from the digestive system, the cadaver should be wrapped in grass and placed in a cage, which should then be kept in dimly lit, slowly flowing water for seven nights. After this the decomposed cadaver should be removed (from the cage) and using fragrant roots of plants the cadaver should be gently rubbed and any part of the body which is removed would be visually inspected in great detail. This method, devoid of present day dissecting tools, was obviously very effective as the descriptions of anatomy given by Sushruta are remarkably accurate and close to present day descriptions. This will be discussed here with particular relevance to the skin.

According to the teachings of the great father of Ayurveda medicine, Charaka, the skin was described as six layers based on the clinical conditions of each.[5,6] This categorization is mentioned in Table 1.

Table 1: Description of skin layers according to Charaka

S. No.	Skin layer	Functions	Diseases[5,6]
1	*Udakdhara*	Holding the water	Dehydration, wrinkles
2	*Asrukdhara*	Holding the blood	Nonelevated mole (*Tilakalaka*), Naevi (*Nyacha*) and capillary angiona (*Vyanga*)
3	Seat of *Sidhma* (dermatitis) and *Kilas kushta* (leucoderma or vitiligo)	Possible function is pigmentation and immunity/ protection*	Pityriasis versicolor or Tinea versicolor (*Sidhma*) and Vitiligo (*Kilas kushta*)
4	Seat of *Dadru* (Ringworm or Tinea corpora) and *Kushtha* (Hansens disease or leprosy)	Possible immune function against chronic infections *	Tinea corporis or ring worm (*Dadru*) and Hansen's disease or leprosy (*Kushtha*)

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5	Seat of *Alaji* (boil) and *Vidradhi* (abscess)	Possible immune functions against acute infections*	A type of boil (*Alaji*) and abscess (*Vidradhi*)
6	Seat of boils, appearing blackish-red and deep rooted on joints	Related to life or consciousness	Pain in case of injury

*Speculations were made based on diseases observed

Compared to the categorization of Charaka, the Ayurveda surgeon Sushruta mentioned seven layers of the skin. These are (in Sanskrit) *avabhasini*, *lohita*, *shweta*, *tamra*, *vedini*, *rohini*, and *mansdhara*.[4,6,7] *Avabhasini* is the outermost layer, which is believed to reflect the health of the individual, the health of deeper layers and of the interstitial, nutrient fluid called *rasa dhatu*. *Lohita* indicates the quality of blood (*rakta dhatu*) and it also supports the outer layer. *Shweta* balances the color of the skin. *Tamra* nurtures and protects the upper layers. It is considered a protective barrier. *Vedini* is the layer responsible for sensation. *Rohini* is the layer which supports healing and regeneration. The last layer, *mansdhara* is considered necessary for the skin to appear firm and supple. These details along with the clinical conditions associated with each are given in Table 2.

Table 2: Description of skin layers according to Sushruta

S. No.	Skin layer	Functions	Diseases[4,6,7]
1	Avabhasini	Reflecting the health of the individual and maintaining health of deeper layers and of the interstitial, nutrient fluid called rasa dhatu Illuminates all shades of the skin	Pityriasis vesicular (Sidhma) and padmakantak considered as papilloma
2	Lohita	Supporting the outer layer and indicates the quality of blood	Nonelevated mole (Tilakalaka), Naevi (Nyacha) and capillary angioma (vyanga)
3	Shweta	Balancing the color of the skin	Charmadala, Ajagallika and mashaka
4	Tamra	Nurturing and protecting the upper layers	Leprosy (Kushtha) and erysipelas (visarpa)
5	Vedini	Sensation	Leprosy (Kushtha) and Vitiligo (Kilasa)
6	Rohini	Healing and regeneration	Sebaceous cyst (Granthi), lymphadenitis (apachi), tumor (arbuda), filariasis (shlipada) and goiter (galaganda)
7	Mansadhara	Skin to appear firm and supple	Fistula (Bhagandar), abscess (vidradhi) and Piles (arsha roga)

Many of the functions described in Ayurveda texts are comparable to the functions described in contemporary medicine. Contemporary anatomy describes the skin as (i) the epidermis, with six layers; (ii) the dermis with two layers, and (iii) the hypodermis or subcutaneous tissue.[8] In conventional anatomy three layers of the epidermis, two layers of the dermis and hypodermis (making six layers in all) correspond to six layers described by Sushruta (Table 3). Taking their structure and function into account the following parallels may be considered: (a) *Avabhasini* with *stratum corneum* of the epidermis; (b) *Shweta* with *stratum lucidum* of the epidermis; (c) *Tamra* with *stratum granulosum* of the epidermis; (d) *Vedini* with the papillary layer of the dermis; (e) *Rohini* with the reticular layer of the dermis; and (f) *Mansdhara* with the hypodermis.[9]

Table 3: The correlation between layers described by Sushruta and layers mentioned in conventional anatomy

Name & functions	Ayurveda	Conventional anatomy
Name of the layer	1. Avabhasini	1. Stratum corneum (Epidermis)
Functions of the layer	Reflecting the health of the individual and maintaining	Forms a barrier to protect underlying tissue from infection, dehydration,

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	health of deeper layers and of the interstitial, nutrient fluid called *rasa dhatu* Illuminates all shades of the skin	chemicals and mechanical stress[10]
Name of the layer	2. Shweta	2. Stratum lucidum (Epidermis)
Functions of the layer	Balancing the color of the skin	Responsible for elasticity of the skin Makes the skin water proof[11]
Name of the layer	3. Tamra	3. Stratum granulosum (Epidermis)
Functions of the layer	Nurturing and protecting the upper layers	This layer is at the transition of boundary between this layer and stratum corneum, the cells secretes lamellar bodies which contain lipids and proteins. This forms a hydrophobic barrier. This layer has a protective function[10]
Name of the layer	4. Vedini	4. Papillary layer (Dermis)
Functions of the layer	Sensation	This layer contains connective tissue, blood capillaries and Meissner's corpuscles. Hence the papillary dermis provide support, nourishment and deep sensation[12]
Name of the layer	5. Rohini	5. Reticular layer (Dermis)
Functions of the layer	Healing and regeneration	This layer contains collagenous, elastic, reticular and protein fibers giving it strength and elasticity. The reticular layer also has roots of hair follicles, sebaceous glands, sweat glands, apocrine glands, lymph and blood vessels. The orientation of certain collagen fibers within this layer are important for support and nourishment[13]
Name of the layer	Mansadhara	Hypodermis
Functions of the layer	Skin to appear firm and supple	The hypodermis acts as an energy reserve[14]

Note: The conventional description does not include all 7 layers of the epidermis

Despite the differences in the number of layers, other parallels can be drawn. For example, within the epidermis are keratinocytes with keratin which acts as an effective barrier; there are melanocytes which influence the pigment or color of the skin; Merkel cells play a role in sensation; and Langerhans cells help fight antigens. The skin is vascular and has other secretions (sebum and sweat, for example).[10] While these structures require present day microscopic methods to study them, Ayurveda descriptions do mention the presence of sensation, as well as protective and nourishing factors. The common features in functions, based on the descriptions of Sushruta and of contemporary medicine are given in Table 3.

Interestingly, computational modelling of the skin also describes seven layers, as were described in Ayurveda.[15] Simulated diffuse reflectance spectra were assumed by a wavelength independent scattering coefficient for the different skin tissues, using the known wavelength dependence of the absorption coefficient of oxy and deoxy Hb and water. This computational modelling resulted in a three-dimensional media which has seven layers.[15] The physical and structural parameters of internal tissues were comparable with results of *in vivo* measurements of skin reflectance spectra.

According to the computational model, the first layer has desquamating cells containing keratin, and was called the *stratum corneum* (20μm thick). The second layer, called the 'living epidermis' (80 μm thick) contains columnar cells, cells with keratohyalin granules, and a fraction of dehydrated cells.[16] The remaining layers which were speculated to provide support and protection, as well as sensation and pigmentation, have been called the papillary dermis (150 μm thick), upper blood net

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dermis (80 μm thick), reticular dermis (1500 μm thick), and deep blood net dermis (100 μm thick). The deepest layer in this model is subcutaneous fat (6000 μm thick).

These layers are approximate but illustrate that the spatial distribution of blood in heterogenous tissues is an important factor, which influences the transport of light in the tissue.[17] It is interesting that computational modeling, conventional and ancient Ayurveda texts (of Sushruta Samhita, Chapter 4 Verse 3) describe the skin ascribing similar functions to the layers, even though the methods used are very different. These common features can be considered important as medical conditions, especially dermatological diseases often do not respond adequately to conventional medicine.[18] It is increasingly apparent that an integrated approach, which combines conventional dermatology and complementary and alternative treatments would be a better alternative. This was proposed by Terence Ryan (1998), who as the Chairman of the International Foundation of Dermatology advocated *Skin Care for All*.[19] The Institute of Applied Dermatology (IAD) in Kerala, India under S.R. Narhari MD has developed an unique integrated approach, combining allopathic treatment with ayurveda to successfully manage lymphatic filariasis, lichen planus and vitiligo.[20] The integrated approach has been successful, with a good response rate and no side effects. In order to promote an integrated approach to dermatology, common features between the two knowledge systems, i.e., allopathy and ayurveda is essential. A good starting point would be to demonstrate common features in the anatomy and physiology of the skin layers in both systems. This is the aim of the present study.

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The inter-dependence between beliefs and feelings about a *yagna*: a correlational study

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Yagnas are an integral part of ancient Indian traditions. There are textual descriptions that attending a *yagna* results in psycho-physiological benefits. This correlational study intended to correlate beliefs that a *yagna* does have beneficial effects with self-rated feelings in terms of calmness, compassion and warmth towards other people, physical relaxation and physical tiredness following the *yagna*. There were 172 participants including 116 patients and 56 caregivers who attended a *yagna* performed in a residential *yoga* therapy camp. In general, beliefs about positive effects were positively correlated with positive feelings. The single negative feeling assessed (i.e., feeling physically tired) did not correlate with beliefs about the benefits of the *yagna*. Hence, when considering subjective responses to any intervention which has philosophical and spiritual components, it is desirable to assess participants' beliefs about the intervention.

Keywords: *Yagna*, Mind-body interventions, Positive feelings
IPC Int. Cl.[8]: A 61K 31/185, A61K 31/19, A61K 38/00, A61K, B64C 13/46

In western medicine, a physician treats the body of patients; a psychological counsellor attends psychological health and interpersonal behaviour while a pastoral counsellor provides spiritual guidance. Hence body, mind, cognition, emotion and spirituality are viewed as discrete entities[1]. In contrast, oriental philosophies adopt a holistic concept of an individual in relation to their environment. This distinction is important as it is now recognized that spirituality, religion and personal beliefs impact an individual's quality of life[2]. Spirituality, religion and personal beliefs (SRPB) were found to be highly correlated with all the domains of the World Health Organization's (WHO's) quality of life instrument. Hence, it is suggested that spirituality, religion and personal beliefs, as well as inner peace, faith, hope and optimism make a difference in the quality of life, particularly for people with compromised health. With respect to spiritual connection or connectedness, in the ancient Indian Vedic tradition, *yagnas* are the most ancient rituals connecting a human being with the divine presence[3]. A *yagna* is not merely a fire sacrifice, but combines esoteric and exoteric practices. In performing a *yagna*, the heat from the *yagna's* fire and the sound of the *mantras* are combined to achieve the desired physical, psychological and spiritual benefits. Adding of specific substances to the *yagna* also has significance[4].

In ancient Vedic society, a *yagna* was an integral part of daily life, and played a vital role in providing communal prosperity, social peace, and harmony with nature. Persons performing a *yagna* are believed to experience physical, mental and emotional beneficial changes[5]. *Yagna* may be effective in enhancing the psychosomatic health of an individual[6]. A study assessed the impact of (i) *mantra* chanting compared to (ii) a *yagna* or (iii) selected *yoga* practices on physiological, haematological and psychological parameters in healthy individuals. Following 30 days of the *yagna*, a significant increase occurred in alpha waves and a trend of increase in haemoglobin content was found[7]. Apart from this a trend of reduction in the level of anxiety, depression and fatigue was observed. There have also been studies on *yoga* as another complementary therapy, an example is referred to here[8]. A review on '*yoga* for asthma' suggests that *yoga* practice can improve the quality of life of the patients with improvement in pulmonary functions[8].

However, it is now well recognized that the way we think influences the way we feel. This can be supported by a study mentioned below. Neuroimaging studies of conscious and voluntary regulation of various emotional states highlighted the fact that metacognition and cognitive recontextualization can selectively alter

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the way the brain processes and reacts to emotional stimuli[9]. Collectively, the findings of a series of neuroimaging studies strongly support the view that the subjective nature and the intentional content (i.e., what mental processes are about from a first person perspective) such as thoughts and beliefs, significantly influence various levels of brain functioning, and hence the behaviour.

To the best of our knowledge, there is no study published on the correlation between the belief about a *yagna* and feelings after witnessing the *yagna*. Hence, the present study was designed to evaluate whether the personal beliefs about a *yagna*, influenced subjective feelings (in terms of calmness, compassion, physical relaxation and physical tiredness) of the participants after the *yagna*.

Materials and methods

Participants

The participants were 172 persons from a total of 526 persons who had different illnesses for which they had enrolled for a one week intensive yoga-based lifestyle change program. The program was conducted at Patanjali Yogpeeth, a residential *yoga* and *Ayurveda* center located near Haridwar in northern India. Selection of the sample was based on convenience sampling and the survey was administered to persons observing the *yagna*. It was based on the participants' choice whether to attend the *yagna* ceremony or not. The age range of the participants varied between 20 and 70 yrs, (group mean ± S.D, 46.0 ± 12.3 years). There were 83 females in the sub-group of 172 who attended the *yagna*. Those who willing to follow the study condition were included in this study and those having impaired cognition were excluded. None of them were excluded for the above reason. Their participation was voluntary and no incentive was given to them. All the participants were familiar with the concept of a *yagna*. Among the participants there were patients with different diseases or pre-morbid conditions such as type 2 diabetes (n=25), hypertension (n=29), obesity (n=6), hypo or hyperthyroidism (n=6), bronchial asthma (n=8), rheumatoid arthritis (n=18), infertility (n=5), chronic renal disease (n=7), acid peptic disease (n=8), cancer (n=4), and there were 56 participants who were healthy and attending the camp as 'care givers' of a patient or for the promotion of positive health. None of the patients had psychiatric or neurological conditions which could have affected their mental orientation. All of them had normal mental orientation. Signed consent from all the participants was obtained prior to the study.

Design

The participants were seated around the site at which the *yagna* was performed for the last 45 min before the *yagna* ended. The total duration of the *yagna* ceremony was two hours however the actual sacrificial fire into which oblations were offered was for 45 min. The participants were given two questionnaires (i.e., about beliefs and about feelings) to fill in. They were asked to fill in the first questionnaire (about beliefs) before the *yagna* started and then asked to fill in the second one (about feelings) after the *yagna* ended. The first questionnaire assessed their existing beliefs about the *yagna* while the second questionnaire assessed their feelings immediately after the *yagna*.

Assessments

The two questionnaires were intended to quantify the participants' beliefs about the *yagna* as well as their subjective feelings immediately after the *yagna*. The beliefs were chosen after carrying out an informal interview of approximately 50 participants who had attended the *somayagna*. The first questionnaire had linear analogue scales and participants were asked to respond by making a mark on each of the five 10.0 cm long linear analogue scales. This response form presents the respondent with a continuous line (10.0 cm in length as mentioned above) between a pair of descriptors representing opposite ends of a continuum[10]. Participants were asked to make a mark at a point on the line that most closely represented his or her beliefs. Visual analogue scales are considered useful to measure phenomena before and after some intervening events. The two descriptors for the questionnaire which dealt with beliefs about the *yagna* were (i) 'no belief at all' at one end of the line or at 0 cm and (ii) a very strong beliefs at the other end of the line or at 10.0 cm. The five questions about beliefs were: (i) Do you believe that the *yagna* purifies the environment? (ii) Do you believe that the *yagna* has a beneficial effect on the physical health of people around? (iii) Do you believe that the *yagna* has a beneficial effect on the mental state of the people around? (iv) Do you believe that the *yagna* can change a person and bring out divine qualities in them? (v) Do you believe that the *yagna* can influence world peace? For all five questions [(i) to (v)], participants were asked to indicate their level of belief on a linear visual analogue scale.

The second questionnaire was concerned with the way participants felt immediately after the *yagna*. For this questionnaire as for the first one, there were four

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linear analogue scales. They were all 10.0 cm in length. Since, they dealt with the feelings of the participants the two descriptors were 'not at all' at one end of the line and 'very strong' at the other end of the line. The questions were: at the end of the *yagna,* (i) Do you experience feelings of calmness? (ii) Do you experience feelings of compassion and warmth towards other people? (iii) Do you feel physically relaxed? And (iv) Do you feel physically tired? For the five linear visual analogue scales of the first part which dealt with beliefs, and as well as the part which dealt with feelings, the analogue scales were scored from '0' to '10', from the left or the right side. Whether the left end of the scale corresponded to '0', and the right end to '10', or whether the right end of the scale corresponded to '0' and the left end of the scale corresponded to '10', was determined using a random number table. Both the questionnaires used (Form A for beliefs about the *yagna* and Form B for feeling after attending *yagna*) have been mentioned as Figs. 1&2, respectively.

***Somayagna* as intervention**

The word *yagna* is derived from the *Sanskrit* verb '*yag*' which means 'to sacrifice'[5]. *Somayagna* is named after the *soma* plant with the botanical name *Sarcostemma brevistigma* L.. The juice of the plant (*soma-rasa*) is believed to be the 'ambrosia of the gods' and forms the main offering. The *somayagna* performed here was the *agnistoma*, the first of the seven *somayagnas* described in the *Yajurveda.* The participants sat around the area in which the *yagna* was being performed, not more than three feet away. The *somayagna* was continuous for two hours that is between 09:00 a.m. and 11:00 a.m. The *yagna* was started at the scheduled time, i.e., at 09:00 a.m. There were no concurrent events at the time of the *yagna*.

Data extraction

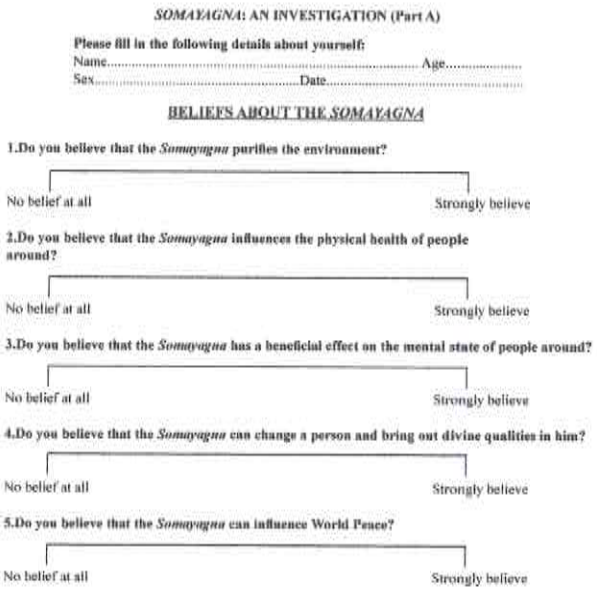
The beliefs about the *yagna* of each participant were obtained using the 10 centimetre (cm) linear visual analogue scales. The calculation was made from the left of the line (considered as zero) till the mark made by the participants; this distance was measured in cm. Measurements were precise up to 0.1 mm. For this part there were hence 5 values (between '0' and '10') corresponding to the 5 questions on beliefs. Similarly for the 4 questions asked about feelings there were 4 values (between '0' and '10') corresponding to the 4 questions which participants were asked about their feelings after attending the *somayagna*.

Data analysis

Each of the 5 values related to beliefs were tested for correlation with each of the 4 values related to the feelings after the *somayagna* using SPSS (Version 18.0). For the statistical analysis, Pearson correlation was done. This has been schematically depicted in Fig. 3.

Results

The belief that the *somayagna* purifies the environment was positively correlated with: (i) a


SOMAYAGNA: AN INVESTIGATION (Part A)

Please fill in the following details about yourself:

Name..... Age.....

Sex..... Date.....

BELIEFS ABOUT THE *SOMAYAGNA*

1.Do you believe that the *Somayagna* purifies the environment?

No belief at all — Strongly believe

2.Do you believe that the *Somayagna* influences the physical health of people around?

No belief at all — Strongly believe

3.Do you believe that the *Somayagna* has a beneficial effect on the mental state of people around?

No belief at all — Strongly believe

4.Do you believe that the *Somayagna* can change a person and bring out divine qualities in him?

No belief at all — Strongly believe

5.Do you believe that the *Somayagna* can influence World Peace?

No belief at all — Strongly believe

Fig. 1—Linear visual analogue scales for the assessment of beliefs about the *yagna*


SOMAYAGNA: AN INVESTIGATION (Part B)

Please fill in the following as accurately as possible. This information is purely for research purpose and will be kept confidential:

Name..... Age.....

Sex..... Date.....

FEELINGS AFTER ATTENDING THE *SOMAYAGNA*

Some questions are given below about how you are feeling now, immediately after the *Somayagna.*

1. A feeling of calmness

Very strong — Not at all

2. A feeling of compassion and warmth towards other people

Not at all — Very strong

3. Physically relaxed

Not at all — Very strong

4. Physically tired

Very strong — Not at all

Fig. 2—Linear visual analogue scales for the assessment of feelings after attending the *yagna*

University of Patanjali ★ Haridwar

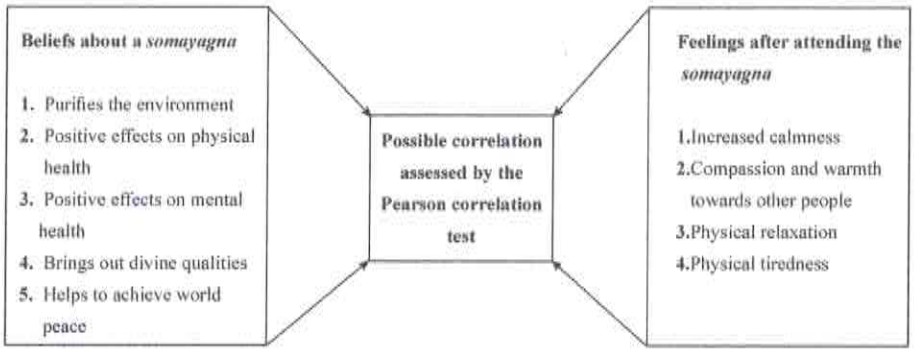


Fig. 3—Descriptive diagram showing the correlation between beliefs about the *yagna* and feelings after attending the *yagna*

feeling of calmness after the *yagna* (r = .424, p < 0.001), and (ii) a feeling of warmth and compassion towards others (r = .309, p < 0.001). The belief that the *somayagna* has a positive effect on the physical health of people correlated positively with: (i) a feeling of calmness after the *yagna*, (r = .394, p < 0.001) (ii) a feeling of warmth and compassion towards others (r = .339, p < 0.001), and (iii) a feeling of being physically relaxed (r = 0.158, p < 0.05). Another belief, that the *somayagna* positively influences the mental health of people was positively correlated with: (i) a feeling of calmness after the *somayagna* (r = .417, p < 0.001), and (ii) a feeling of warmth and compassion towards others (r = .338, p < 0.001). Finally, the belief that the *somayagna* can bring out 'divine qualities' in people was correlated positively with: (i) feelings of calmness after the *somayagna* (r = .462, p < 0.01), (ii) feelings of warmth and compassion towards other people (r = 0.236, p < 0.01), and (iii) feelings of being physically relaxed (r = 0.190, p < 0.05). These correlations are provided in Table 1.

Table 1—Correlations between beliefs about the *somayagna* and subjective feelings experienced after it

Belief about the *somayagna*	Feelings after attending the *somayagna*			
	Calmness	Compassion	Physical relaxation	Physical tiredness
Purifies the environment	√	√	-	-
Positive effect on physical health	√	√	√	-
Positive effect on mental health	√	√	-	-
Brings out divine qualities	√	√	√	-
Helps to achieve world peace	√	√	√	-

√ indicates a positive correlation and – indicates no correlation, based on the Pearson correlation test.

Discussion

The present study showed definite positive correlations between the beliefs about the *somagyana* and the feelings people had, after witnessing it. For example, feelings of calmness and compassion correlated with all 5 beliefs that the *somayagna*: (i) purifies the environment, (ii) positively impacts physical and mental health and (iii) helps bring out divine qualities in people, as well as (iv) facilitates world peace. There was no correlation between any of the beliefs and feelings of tiredness. This was possibly related to the fact that a large number of persons (i.e., 63 %, or 109 out of 172) rated their tiredness after the *somayagna* as less than 2.5 out of 10.0 (i.e., less than 25 %). However, even in those who rated their 'feeling of physical tiredness' more than 50 %, there was no correlation with beliefs about possible benefits. Feelings of being physically relaxed correlated positively with beliefs related to 'bringing out' divine qualities, facilitating world peace and positively impact on physical health. On the other hand feelings of relaxation did not have any correlation with a belief that the *somayagna* purifies the environment, and also did not correlate with a belief that the *somayagna* has a positive impact on mental health.

The present results in general do corroborate the general impression that our beliefs and feelings are closely associated. However, there was one exception. A belief that the *somayagna* can positively influence the mental health of individuals did not correlate positively with feelings of physical relaxation. In spite of this we may say in a non-specific sense, people who had beliefs that the *somayagna* had positive effects were more likely to experience positive feelings after it.

These findings can be indirectly considered along with the results of an international study, conducted across 18 countries which observed in 5087 persons on

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how spirituality, religion and personal beliefs (SRPB) related to quality of life[2]. Spirituality, religion and personal beliefs (SRPB) were highly correlated with all domains of the WHO quality of life questionnaire. Among the sample (n = 5087), in a sub sample (n = 588) who reported poor health, it was found that SRPB, in addition to the level of independence, environmental factors and physical factors, influenced the quality of life (QOL) and the extent of influence was greater in those with poor compared to those with normal health. This report concludes with the suggestion that SRPB should be more routinely addressed in the assessment of QOL, which it can substantially influence.

As described in the introduction, neuroimaging studies have shown that beliefs and expectations can markedly modulate neurophysiological and neurochemical activity in brain regions involved in perception and various aspects of processing emotions[9]. These findings suggest that for most studies on mind-body interventions it would be both important and useful to correlate the beliefs that the intervention would benefit the participants with any effect found. This also makes it interesting and important to determine whether a person who has no belief or interest that a particular mind-body intervention would positively impact them, would get any benefit at all. A previous study did show that when the effect of a one month *yoga* program was studied in persons who had self elected to join for the program compared to persons who did not choose to join, but were deputed for the program by their employers, both groups benefited, with the former benefiting more than the latter[11].

The findings of the present study are limited by the following factors: (i) the participants were not randomly selected, it was based on convenience sampling, (ii) the participants were a mixed population, i.e., they were patients as well as caregivers (116 out of 172 persons had an illness), (iii) beliefs about the *yagna* and feelings after the *yagna*, were subjective which could cause bias, (iv) not attending the *yagna* either because of no belief in it or some other reason could further have biased the sample, and (v) participants self-elected to join the *yoga*-based lifestyle change program, which indicated an inherent belief in traditional Indian practices.

Despite these limitations, the *somayagna* did appear to induce feelings of physical and mental relaxation in participants attending it. These feelings showed a positive correlation with their beliefs that the *somayagna* has beneficial effects.

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Yoga and Physiotherapy: Therapies Which Complement Each Other

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Commentary

Yoga is an Indian science and a way of life which includes physical postures, voluntarily regulated breathing, meditation, certain philosophical principles and recommendations for living in tune with the laws of nature [1]. While yoga was originally intended for spiritual advancement there is a growing interest in applying yoga for therapy and rehabilitation [2]. Rehabilitation includes helping seniors increase their ability to balance and prevent falls [3] as well to improve their gait. Yoga practice can also help persons regain mobility after cerebrovascular accidents culminating in stroke and hemiplegia [4]. In certain cases where the outcome of a disease is early mortality, as in Duchenne's muscular dystrophy, the practice of yoga can improve the quality of life of the patient significantly [5].

Physiotherapy is a science-based profession and takes a 'whole person' approach to health and wellbeing, which includes the patient's general lifestyle (http://www.csp.org.uk/your-health/what-physiotherapy). At the base is the patient's involvement in their own care, through education, awareness, empowerment and participation in their treatment. Physiotherapists help people affected by injury, illness or disability through movement and exercise, manual therapy, education and advice. Physiotherapists maintain health for people of all ages, helping patients to manage pain and prevent disease.The disciplinehelps to encourage development and facilitate recovery, enabling people to stay in work while helping them to remain independent for as long as possible. Hence it is apparent that yoga and physiotherapy both empower an individual to regain health and wellbeing through an all-systems approach to hence improve all aspects of health.

In the ancient yoga texts the importance of the breath is emphasized; this includes diaphragmatic breathing, inhalation and exhalation in a ratio of 1:2 as well as well awareness of the breath. Several of the benefits of yoga in healing, including correction of autonomic imbalance [6] and of motor functions [7] are attributed to the benefits related to breathing in the correct way, specifoied by yoga texts. In physiotherapy there is also adequate emphasis on breathing; placing adequate importance on breath awareness can help augment the benefits of physiotherapy. Awareness is an integral part of yoga. It is mentioned in the yoga texts and Mindfulness is further emphasized in Buddhist teachings. Awareness helps a patient to actively participate in their healing. Hence as a physiotherapist and patient interact together for healing the patient should remain in a state of 'body awareness' to be more sensitive to interoceptive signals. This would facilitate healing [8].

This brief write-up is intended to suggest how concepts from yoga can be used to augment the multiple benefits of physiotherapy in healing.

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Short Communication

Yoga Practice in a School Setting Positively Impacts Self-esteem : A 13 Month Follow-up Study

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Abstract

The present study is a sequel of a randomized controlled trial where the effect of 3 months of yoga or physical exercise on physical, cognitive and self-esteem measures have been assessed in 98 school children in December, 2010. A 13 month follow-up study was conducted in February, 2012. The present study had two aims: (i) to determine whether any of the participants of the yoga group continued to practice yoga though it was not supervised, 13 months later, and (ii) to determine whether there was any difference within the yoga group between practitioners and those who had stopped practicing. 26 school children were available at the day of follow-up who belonged to the yoga group in the original study. Out of 26 children, 13 were practicing yoga (mean age±S.D. = 11.9±0.6 years) and another 13 were not practicing yoga (mean age±S.D. = 11.6±1.1 years). They were followed up 13 months later. Signed informed consent was taken and the study was approved by the Ethics Committee of Patanjali Research Foundation. The study was a longitudinal retrospective study. At follow-up, self-esteem of the participants was measured using Battle's Self-Esteem Inventory. Apart from this, a follow-up survey form about yoga practice was given to all the participants. Data were analyzed by Student's t-tests using PASW Version 18.0. Within the yoga group, total and parental self-esteem had significantly improved after 13 months of unsupervised home practice of yoga when the data of the group who were practicing yoga were compared with those who were not practicing yoga. Apart from these findings, this follow-up study also indicates that 50 percent of the students were motivated to practice yoga in their own time when unsupervised.

Introduction

Self-esteem can be defined as an individual's attitude about themselves, involving self-evaluation along a positive-negative dimension (1). There are different types of self-esteem such as general, social, academic, parental and total self-esteem (2). Self-esteem is essential for optimal health; low self-esteem especially in pre-teens might cause difficulty in interpersonal relationships, teenage pregnancies, loneliness, eating disorders and suicidal tendencies (3). An epidemiological survey in India showed a prevalence of 7 to 12 percent of emotional and behavioral problems in children (4). These problems can be managed in part by the enhancement of self-esteem in pre-teen, school children.

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Self-esteem and school adjustment of children in primary school has a close relationship with the development of personality and mental health (5). A study provides significant evidence that the intervention of *Maum* meditation (a meditation program) had positive effects on self-esteem and school adjustment of children in the early stage of primary school (5). Yoga plays a significant role in enhancing one's mental health. Previously, a randomized controlled trial was conducted to compare the effects of yoga with physical exercise on physical, cognitive and self-esteem measures in 98 school children (6). In this study, comparable effects were found of yoga and physical exercise on physical fitness and the Stroop task performance in school children after three months of the two interventions in after-before comparisons while social self-esteem was higher in the physical exercise group in a between groups comparison of after values of the two groups. A significant increase was found after yoga in total, general and parental self-esteem in a within group comparison when compared to before yoga. Hence the present study was conducted to see the effect of unsupervised yoga on self-esteem alone in the school children.

The present study is a sequel of the above mentioned trial (6). A 13 month follow-up study was conducted in February, 2012. The present study had two aims: (i) to determine whether any of the participants of the yoga group continued to practice yoga though it was not supervised, 13 months later, and (ii) to determine whether there was any difference within the yoga group between practitioners and those who had stopped practicing. The physical exercise group was not included in this study, as physical exercise is a part of the ongoing curriculum of the school.

Material and Methods

26 school children were available at the day of follow-up who belonged to the yoga group in the original study (6). Out of these 26 children, 13 were practicing yoga (mean age±S.D. = 11.9±0.6 years; gender ratio (boys : girls) = 7 : 6) and another 13 were not practicing yoga (mean age±S.D. = 11.6±1.1 years; gender ratio (boys : girls) = 8 : 5). They were followed up 13 months later. The participants (i) belonged to an urban location, (ii) their socio-economic status was categorized as lower middle class (7), and (iii) the primary language spoken at their homes was not English. Signed informed consent was taken from the Principal of the school who informed the parents about the study. The parents gave their informed consent after receiving the information from the Principal of the school. The present study was approved by the Ethics Committee of Patanjali Research Foundation (approval number: PRF/12/0010) and the original study (6) was registered in the Clinical Trials Registry of India (CTRI/2012/11/003112). The study was a longitudinal retrospective study. At follow-up self-esteem of the participants was measured using the same questionnaire (6) whose reliability and validity has been established in an Indian population (2). The questionnaire has 50 close-ended questions with 4 subscales for general (20 items), social (10 items), academic (10 items) and parental self-esteem (10 items).

Apart from this, a follow-up survey form about yoga practice was given to all the participants. It had a question which was close-ended and binomial that is 'Are you continuing to practice yoga after December, 2010' (Yes/No)? Scoring of the self-esteem inventory was carried out by an individual who was blinded to which group the participants belonged.

Data were analyzed by Student's t-tests using PASW Version 18.0. Within the group originally allocated to yoga (n=26, in 2010), 13 were practicing yoga in 2012. For analysis, t-tests for unpaired data were used to compare the level of self-esteem between those who were practicing yoga compared to those who were not practicing yoga.

Results

The group mean values±SD for different sub scales of self-esteem within the yoga group (between those who were practicing yoga with those who were not practicing yoga) after 13 months of follow-up are given in Table I. Within the yoga group, total self-esteem (Cohen's d=0.838) and parental self-esteem (Cohen's d=0.223) had significantly improved after 13 months of unsupervised home practice of yoga when the data

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TABLE I: The Indian adaptation of Battle's self-esteem inventory. Values are group mean±S.D.

Groups	*Group practicing Yoga (n = 13)*	*Group not practicing Yoga (n = 13)*	*Cohen's d*
Total score of Self-Esteem	38.23±3.85	35.31±3.12*	0.838
General Self-Esteem	14.62±2.22	13.85±1.95	0.369
Social Self-Esteem	6.38±1.61	6.00±1.58	0.238
Academic Self-Esteem	8.54±0.88	7.85±1.28	0.639
Parental Self-Esteem	8.69±0.63	7.62±1.12**	0.223

*p<.05; **p<.01, t tests for unpaired data comparing the Group practicing yoga with the Group not practicing yoga.

Note: Cohen's d is an appropriate effect size for the comparison between two means (Reference: https://en.wikiversity.org/wiki/Cohen%27s_d). It can be calculated using the formula mentioned below.

Cohen's d = Mean difference / SD_{pooled} where $SD_{pooled} = \sqrt{(SD_1^2 + SD_2^2) / 2}$

of the group who were practicing yoga were compared with those who were not practicing yoga. Apart from these findings, this follow-up study also indicates that 50 percent of the students were motivated to practice yoga in their own time when unsupervised. None of them reported any adverse outcomes or adverse events related to yoga practice.

Discussion

Parent-related self-esteem refers to children's perceptions of their status at home, involving subjective perceptions of how their parents view them (8). Preadolescent self-esteem is closely related to family interactions and family support (9). The yoga group showed an improvement in parental and total self-esteem after 13 months of unsupervised home practice of yoga when the data of the group who were practicing yoga were compared with those who were not practicing yoga. This could be related to the fact that yoga practice increases emotional resilience (10).

In the prequel of this study a significant increase was found after yoga in total, general and parental self-esteem in a within group comparison when compared to before yoga (6). Yoga practice was supervised in a school setting (6). In the present report out of these three variables, in two subscales, that is total, and parental self-esteem there was a significant increase even when yoga was practiced at home and unsupervised. This suggests that the regular practice of yoga was also found beneficial to improve self-esteem when the practice was unsupervised. This is not to say that unsupervised practice is recommended; following the present observation the children were told they could contact the yoga center for guidance. Yoga can be practiced on ones own after practicing for sometime under expert supervision. However, in this case of pre adolescent children there was considered to be a risk if they practiced unsupervised. This study demonstrated that yoga is beneficial to measure pre-teen self-esteem and the present study could help in designing yoga programs for school children.

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EC PAEDIATRICS
Mini Review

A Brief Overview of Yoga for Children with Physical and Mental Needs

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Abstract

Yoga is increasingly being used for its benefits in promoting positive health as well as in preventing and treating certain disorders. Yoga has improved health in children with physical and mental needs. This mini review covers three physical disorders viz. Duchenne muscular dystrophy (DMD), cystic fibrosis, cerebral palsy and three primarily mental/ psychological disorders viz. attention deficit hyperactivity disorder (ADHD), mental retardation and autism. Yoga improved mobility, breathing and lung functions in DMD. Yoga improved the psychological state in cystic fibrosis. In ADHD yoga practice improved sensory-motor performance, processing ability, academic performance and reduced symptoms of ADHD when children were rated by their teachers and parents. Yoga also improved intelligence quotient (IQ) and social adaptation in mentally challenged children. In autism, yoga improved classroom behavior of the children. Hence yoga can benefit in children with physical and mental needs.

Keywords: Yoga; Children with Physical and Mental Needs; ADHD; DMD; Autism

Abbreviations

DMD: Duchenne Muscular Dystrophy; ADHD: Attention Deficit Hyperactivity Disorder; IQ: Intelligence Quotient

Introduction

Yoga is a mind-body practice [1] which helps to establish harmony between the body and the mind [2]. Yoga is a safe practice for children over 3 years of age [3]. Previous studies have reported various physical, mental, psychological and behavioral improvements in children after practicing yoga [1]. Yoga practice improves in children with normal health and also in children with physical and mental needs [4].

This mini review covers three physical disorders viz. Duchenne muscular dystrophy (DMD), cystic fibrosis, cerebral palsy and three primarily mental disorders viz. attention deficit hyperactivity disorder (ADHD), mental retardation and autism.

Children with DMD showed an improvement in mobility, self-care and ease of breathing after 18 months of yoga and ayurveda [5]. In another study, after yoga breathing exercise for a period of 10 months there was an improvement in FVC and FEV which are markers of pulmonary functions in children with DMD [6]. In cystic fibrosis while yoga practice does not influence respiratory functions adequately, there are psychological benefits such as reduced anxiety and a more positive mental state, with a decrease in overall discomfort [7]. In cerebral palsy, yoga acts as a stretching activity and improves muscle extensibility, maintains joint functional movement and delays orthopedic surgical interventions [8].

In earlier studies, meditation showed an improvement in sensory-motor performance and processing ability in children with attention deficit hyperactivity disorder (ADHD) [9]. In another study, yoga practice in co-operation with behavioral therapy improved academic performance [10] and reduced symptoms of ADHD when the children were rated by their teachers and parents [11]. The children had practiced yoga for 6 weeks, with a one hour session twice in a week.

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Yoga practice for one academic year (5 hours in every week) showed an improvement in the intelligence quotient (IQ) and social adaptation in children who were diagnosed as mentally challenged in an early randomized controlled trial with a one year follow up period [12].

Yoga was also found beneficial in children with autism with disruptive behavior. Children with autism improved their classroom behavior when they practiced yoga for 16 weeks [13] and some other core features related to autism also changed [14].

Apart from these examples which have covered the benefits of yoga practice in children with diagnosed physical and mental disorders, yoga practice appears to improve visual perception [15], motor skills, strength [16], planning, execution time [17], spatial memory [18], self-esteem [19] and emotional balance in children with normal health [20].

The results suggest that yoga is a promising mind-body intervention which should be investigated more extensively for children with physical and mental disorders as well as children with normal health.

Conclusion

Yoga practice which includes yoga postures, cleansing practices, voluntarily regulated breathing and meditation has been reported to be useful for children with physical disorders such as Duchenne muscular dystrophy, cystic fibrosis, cerebral palsy and mental disorders such as attention deficit hyperactivity disorder, mental retardation and autism. Yoga practice showed an improvement in mobility, breathing, pulmonary functions, sensory-motor performance, behavior, intelligence and social adaptation also showed a reduction in anxiety and discomfort.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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Original Article

Changes in Reaction Time after Yoga Bellows-type Breathing in Healthy Female Volunteers

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Abstract

Background: Previously, yoga bellows-type breathing (*bhastrika pranayama*) reduced reaction time (RT) or reduced anticipatory responses in male participants or a mixed group of male and female participants. **Aims:** The present study as a control trial aimed to assess the effects of yoga bellows-type breathing on RT in females exclusively. **Methods:** The sample consisted of 25 healthy females, aged between 19 and 32 years (group mean ± standard deviation, 22.8 ± 3.5 years). All of them had prior minimum experience of yoga including yoga bellows-type breathing of 12 months. The RT was assessed in each participant before and after three randomized sessions differed in the intervention given held on three separate days. The sessions were (i) YOGA bellows-type breathing or *bhastrika pranayama* (BHK), (ii) Breath awareness (BAW), and (iii) Sitting quietly (CTL) as a control session. The duration of the intervention was 18 min, and the participants were assessed for RT before and after the intervention. **Results:** Repeated measures ANOVA, *post hoc* tests with Bonferroni adjusted showed that the time taken to obtain a correct response reduced significantly after 18 min of BAW ($P < 0.05$) and CTL ($P < 0.05$). However, no changes were seen in the RT after BHK. **Conclusions:** The results suggest that different interventions may optimize performance in tasks requiring attention in females compared to males.

Keywords: *Bhastrika pranayama, breath awareness, Multi-Operational Apparatus for Reaction Time, quiet sitting, reaction time*

Introduction

Yoga practice includes physical postures *(asanas)*, voluntarily regulated breathing (*pranayamas*), meditation, and specific philosophical guiding principles. There are several types of voluntarily regulated yoga breathing techniques, all of which are considered to influence the mental state.[1] *Bhastrika* or bellows-type of breathing involves a deep inhalation followed by a complete exhalation.[2] This practice has consistently been found to influence the reaction time (RT). A total of 22 schoolboys aged between 13 and 16 years, who had been trained in yoga for 3 months were assessed for the immediate effect of nine rounds of *bhastrika pranayama*.[3] Following nine rounds of *bhastrika pranayama*, there was a significant decrease in visual RT (VRT) (Cohen's $d = 2.81$) and auditory RT (ART) (Cohen's $d = 3.15$). In this study, there was no control group; hence, a practice effect could not be ruled out.

There have been studies on the effects of *bhastrika pranayama* on volunteers with physical and intellectual disabilities. A total of 34 adolescents whose ages were between 14 and 16 years, and who were diagnosed with intellectual disability were trained in yoga for 2 years, with a practice session at least once a week.[4] After nine rounds of *mukha bhastrika* (yoga bellows breathing through the mouth), the participants showed a decrease in both VRT (Cohen's $d = 2.50$) and ART (Cohen's $d = 2.38$). This study also did not have a control group for comparison. The results suggest that despite the intellectual disability participants show a comparable reduction in RT, comparable to healthy volunteers.

Multiple sclerosis is known to reduce nerve conduction velocity.[5] A combination of yoga practices including physical postures *(asanas)*, voluntarily regulated breathing *(pranayamas)*, meditation, and lectures on yoga philosophy were given to 11 persons (six females) diagnosed with multiple sclerosis.[6] Yoga practice sessions

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were for 5 h a day, for 5 days a week, for 3 weeks. The auditory and VRT and levels of anxiety were assessed at baseline and after 3 weeks. There was a significant decrease in VRT (Cohen's $d = 0.569$) and levels of anxiety. This group also lacked a control group for comparison.

A comparison between participants who had experience in yoga and those who were naïve-to-yoga was carried out on two groups of healthy males average age 29 years.[7] The yoga group had been practicing yoga which included postures, breathing techniques, and meditation for an average of 6 months. There were 35 participants in each group. The RT was assessed in both groups. The yoga group had two experimental sessions as follows: (i) a session of *bhastrika pranayama* practiced for 18 min and (ii) a session of breath awareness, as breath awareness is part of every *pranayama* practice and has been shown to influence attention.[8] The control group was assessed after a comparable duration of time, seated comfortably, with their eyes closed. Following 18 min of *bhastrika pranayama,* there was a significant reduction in the number of anticipatory responses (The Cohen's d was <0.05 though the change was statistically significant).

Hence, this study had a control group for comparison. In the study, an important point which was noteworthy is that all the participants were males. Hence, keeping the points mentioned above, the present study was planned to study the following in an all-female samples: (i) assess the effects of *bhastrika pranayam*a, breath awareness, and quiet sitting in the same individuals on separate days, a design which has been used in multiple studies[9] and (ii) to study the effects on RT. Our hypothesis was that *bhastrika pranayama* would improve the RT in females as it had in an all-male sample and in studies involving both sexes.

Methods

Participants

A total of 25 female volunteers with ages between 19 and 32 years (group mean ± standard deviation, 22.8 ± 3.5 years) participated in the trial. The sample size was determined using G*power software Version 3.1.9.2 was developed by Franz Faul, University Kiel, Germany, 2014,[10] to determine Cohen's formula for an effect size of 0.6 and alpha of 0.05, powered at 0.99. The required sample size was obtained 18; however, 25 was decided upon to account for attritions. Female participants alone were selected as a previous study reported the effects of yoga bellows-type breathing (*bhastrika pranayama*) on RT in male participants exclusively.[7] The participants were completing a residential course in yoga in India, and all of them had between 12 and 18 months of experience in yoga practice, including *bhastrika pranayama*. The participants were included in the trial if as follows: (i) they were the right hand dominant based on a standard handedness inventory[11] and (ii) they were able to stick to the experimental schedule. The participants were excluded from the trial if they had any physical or psychological illness, were on medication, or on any supplements which could alter the mental state. None of the participants had to be excluded for these reasons. Recruitment was by flyers placed on the notice board of the yoga center. The participation in the trial was voluntary, and there was no incentive to take part. Each participant's signed consent was obtained. The study was approved by the Institutional Ethics committee (approval number: YRandD/16/0022).

Study design

The participants were assessed in three different sessions conducted on separate days at the same time of the day. The sessions were as follow: (i) yoga bellows-type breathing (*bhastrika pranayama*; BHK), (ii) breath awareness (BAW), and (iii) a control session of sitting quietly (CTL). The order of the sessions was randomized for the 25 participants using a standard randomizer (www.randomizer.org). One sample of randomization is shown in Table 1. Each session consisted of three epochs: (i) Pre (5 min), (ii) During (18 min), and (iii) Post (5 min). The 18 min spent "during" a session included three 5 min epochs separated by a gap of 1 min. On 1 day "during" involved the practice of yoga bellows-type breathing (BHK), on another day the practice was of BAW, and on the 3rd day it was CTL. This order was randomized as was mentioned above. A schematic representation of the structure of the sessions is given in Figure 1.

Assessments

The Multi-Operational Apparatus for Reaction Time (MOART: Lafayette Instrument Company, Model no. 35600, USA) with temporal resolution of 0.001 s (±0.005%) was used to conduct the Simple Reaction Time Test. The apparatus consisted of two panels, namely, (i) the main panel (the stimulus was displayed, and participant's response was made here) and an attached (ii) display panel; PsymCon interface unit, model-35500 (displays the correct/incorrect/anticipatory responses and the time taken to respond to a "GO" stimulus). The participants were seated cross legged with their back straight and at ease. The MOART was put in

Table 1: A sample random sequence of *bhastrika pranayama*, breath awareness, and control (quiet sitting) sessions for five participants (A to E)

Participants (example)	Sequence of the sessions		
	Day 1	Day 2	Day 3
A	BHK	BAW	CTL
B	BHK	CTL	BAW
C	CTL	BHK	BAW
D	BAW	BHK	CTL
E	BAW	CTL	BHK

BHK=*Bhastrika pranayama*, BAW=Breath awareness, CTL=Control (quiet sitting)

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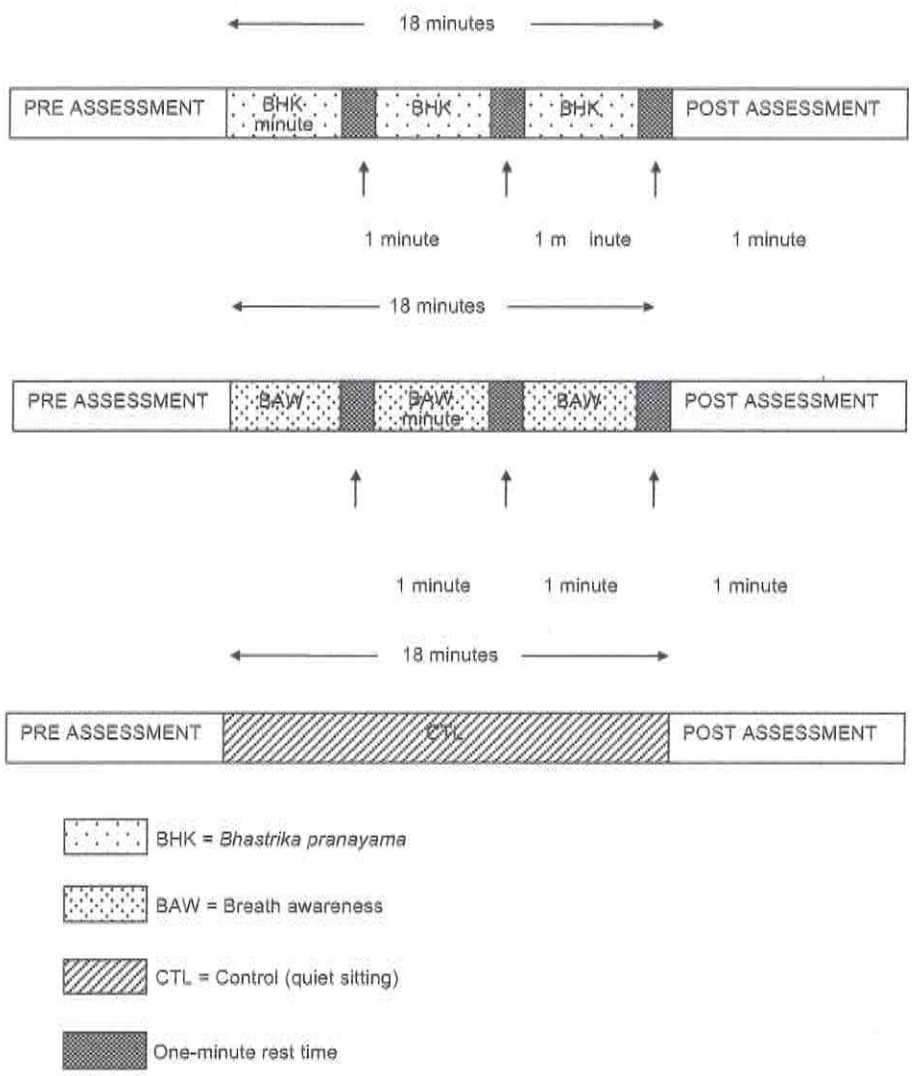

Figure 1: Schematic representation of the three sessions (BHK, BAW, and CTL)

front of them. They were told to use their right (dominant) hand and extend their right index finger about 2 cm above the response key (the button to be pressed when "GO" stimulus was displayed). The participants had to wait for a light signal located 8 inches above the response key. When the signal was amber, this was a warning sign or cue that a stimulus would be displayed. The cue delay was set at 2.5 s, i.e. after 2.5 s of the warning stimulus, the actual stimulus would be seen. If this was a red light ("GO" stimulus), participants had to press the response key with their right index finger as quickly as possible whereas if the stimulus was green, ("NO-GO" stimulus) participants had to remain in position without moving their index finger. A correct response could be as follows: (i) responding to the red light "GO" stimulus or (ii) not responding to the green light "NO-GO" stimulus. The response time (RT) would be displayed up to three decimal places after responding to "GO" stimulus in the display panel. Incorrect responses could be as follows: (i) not responding to "GO" stimulus or (ii) responding to "NO-GO" stimulus or (iii) early or anticipatory response (a response made during the cue delay). The RT was recorded in 10 trials before the "Pre" epoch and at the end of the "Post" epoch of each intervention.

Interventions

Yoga bellows-type breathing (bhastrika pranayama)

During this *pranayama*, the participant was seated with eyes closed and spine erect in *ardha padmasana* (the half lotus pose). The participants inhaled deeply and fully so that breathing was diaphragmatic while also expanding the chest during inhalation. Exhalation was also complete with a full out-breath. Inhalation and exhalation were through the nose.[12] The breath rate was kept at 12 ± 2 breaths per min throughout the practice.

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Breath awareness

The participants would be seated with their eyes closed and spine erect in *ardha padmasana* (the half lotus pose). They would be asked to be aware of the movement of air through the nasal passages. The participants were instructed to bring their attention back to their breath if it wandered.

Control (Seated quietly)

During the control epoch, the participants were asked to adopt the same posture (spine erect, eyes closed) and sit in *ardha padmasana* (the half lotus pose). Participants were not given specific instructions about how to direct their thoughts.

Data extraction

The RT, the number of correct and incorrect responses, and the number of anticipatory responses were directly obtained from the display panel of the PsymCon interface unit.

Data analysis

Separate repeated measures ANOVA were performed for (i) the RT (RT in sec.), (ii) number of correct responses to "GO" stimulus, (iii) number of correct responses to "NO-GO" stimulus, and (iv) number of anticipatory responses. For each ANOVA, there were two within-subjects factors. These were (i) sessions (BHK, BAW, or CTL) and (ii) states (Pre and Post). The interaction between sessions and states was also assessed. *Post hoc* analysis was carried using tests for multiple comparisons which were Bonferroni adjusted. The comparisons were between the "post" and "pre" data of a session as well as between "pre" data across sessions and "post" data across sessions.

Results

The time taken to respond to a red light ("GO" or correct response) was significant reduction after BAW ($P < 0.05$) and CTL ($P < 0.05$). The group mean values, P values, and Cohen's d for the following: (i) time taken to respond to "GO" stimulus (ii) number of correct response to "GO" stimulus (iii) number of correct response to "NO-GO" stimulus, and (iv) number of anticipatory responses are given in Table 2.

The details of the repeated measures analyses of variance are presented in Table 3.

Discussion

A total of 25 healthy female volunteers showed a significant reduction in RT after a breath awareness session and after a session of quiet sitting. Contrary to the hypothesis, there was no change in RT after yoga bellows-type breathing, called *bhastrika pranayama*.

In previous studies, male volunteers[7] and a group of male and female volunteers[3] volunteers showed a decrease in RT as an acute response to *bhastrika pranayama*. The reason why the present volunteers did not show a similar response appears to be related to gender differences in the effects of yoga breathing, as well as gender differences in the response to a stimulus. The reason for considering gender differences as the most likely factor to explain the differences in results is that in the present study most of the other experimental details were comparable to an earlier reported study conducted on male volunteers.[7]

A possible explanation may be found based on understanding how *bhastrika pranayama* may have reduced RT in earlier studies.[4] Deflation which occurs during the exhalation phase of *bhastrika pranayama*[2] may play a role in this. The link between lung deflation and attention follows. Attention is closely related to activation of the neurons within the brainstem reticular activating system (RAS).[12] Experimental lung deflation in dogs activated 47% of neurons studied using long-lasting extracellular recordings from the medial parts of the reticular formation.[13] Hence, active deflation of the lungs during *bhastrika pranayama* could be expected to excite neurons within the brainstem RAS. Stimulation of the RAS activates the respiratory system, which would possibly facilitate the practice; stimulation of the RAS also activates structures at higher levels of the neuraxis, including the thalamus and cortex; this could increase response to a stimulus. The cortical regions mentioned were especially the anterior cingulate and the orbital frontal cortex.[14] This activation of the RAS by efferents from the deflated lung could explain why active exhalation in yoga breathing is associated with better performance in attention tasks such the event-related P300[15] and in cancellation tasks.[16] The same principle may apply to *bhastrika pranayama*, with activation of the RAS during exhalation, hence, resulting in a better response to a stimulus in the RT task.

This speculation is supported by an early study which reported slower RT during inspiration.[17] The reduction in RT was attributed to inhibition brought by the vagus and the nucleus of the *tractus solitarius*. An opposite finding was reported by Beh and Nix-James (1974).[18] Here, RT was shorter during inhalation, attributed to increased tension in the diaphragmatic, and thoracic muscles. Hence, the level of respiratory muscle tension could influence the response to the RT task. RT is known to be optimal with an intermediate level of respiratory and skeletal muscle tension and deteriorates when the levels are too low or too high.[19]

In almost every age group, males have faster RTs than females.[20] Botwinick and Thomson (1966) found that the difference between males and females was accounted for by the time lag between the presentation of a stimulus and beginning of a muscle contraction, which was slower in females.[21]

The female participants in the present study showed a reduction in RT after breath awareness and after quiet sitting sessions, but not after *bhastrika pranayama*. If

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Table 2: Variables of reaction time test pre- and post-*Bhastrika pranayama*, breath awareness, and control (quiet sitting) sessions

Assessments	BHK							
	Time taken to respond to "GO" stimulus		Number of correct responses to "GO" stimulus		Number of correct responses to "NO-GO" stimulus		Number of anticipatory responses	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mean±SD	0.46±0.16	0.43±0.14	4.92±1.91	4.76±1.27	5.12±1.56	4.68±1.87	0.00±0.00	0.08±0.40
P	0.26		0.69		0.38		0.33	
Cohen's d	0.20		0.10		0.26		-	
Assessments	**BAW**							
	Time taken to respond to "GO" stimulus		Number of correct responses to "GO" stimulus		Number of correct responses to "NO-GO" stimulus		Number of anticipatory responses	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mean±SD	0.45±0.13	0.41±0.12	5.40±1.96	5.32±1.60	4.32±2.12	4.44±1.42	0.04±0.20	0.08±0.28
P	0.03*		0.88		0.81		0.33	
Cohen's d	0.02		0.45		0.07		0.16	
Assessments	**CTL**							
	Time taken to respond to "GO" stimulus		Number of correct responses to "GO" stimulus		Number of correct responses to "NO-GO" stimulus		Number of anticipatory responses	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mean±SD	0.47±0.20	0.41±0.14	5.08±1.35	5.36±2.0	4.72±1.90	4.72±1.70	0.04±0.20	0.16±0.47
P	0.02*		0.58		1.00		0.27	
Cohen's d	0.31		0.16		0.00		0.33	

*Represents the level of significance as $P < 0.05$. RM ANOVA, *post hoc* tests with Bonferroni adjustment; postvalues were compared with the prevalues for three sessions, i.e., BHK, BAW, and CTL. BHK=*Bhastrika pranayama*, BAW=Breath awareness, CTL=Control (quiet sitting), SD=Standard deviation, RM ANOVA=Repeated-measures analyses of variance

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Table 3: Details of the four repeated measures analyzes of variance

Variables	Sources	df	MS	*F*	Partial η^2
Time taken to respond to "GO" stimulus	Sessions	1.42, 34.18	0.01	0.23	0.01
	States	1, 24	0.07	11.47	0.32
	Sessions × states	1.97, 47.18	0.00	0.29	0.01
Number of correct responses to "GO" stimulus	Sessions	1.97, 47.20	3.68	1.29	0.05
	States	1, 24	0.01	0.00	0.00
	Sessions × states	2, 48	0.69	0.27	0.01
Number of correct responses to "NO-GO" stimulus	Sessions	1.81, 43.49	3.85	1.01	0.40
	States	1, 24	0.43	0.14	0.01
	Sessions × states	2, 48	1.09	0.45	0.02
Number of anticipatory responses	Sessions	2, 48	0.05	0.43	0.02
	States	1, 24	0.24	3.27	0.12
	Sessions × states	1.79, 42.97	0.02	0.24	0.01

the reduced RT found in earlier studies after *bhastrika pranayama* may be related to active deflation of the lung, it is important to note that there *are* gender differences in airway behavior throughout the human lifespan.[22] Hence, the female participants appeared to have more attentional resources active and available after breath awareness and quiet sitting sessions.

It is possible that the level of respiratory muscle tension required for forced exhalation was higher in females, during *bhastrika pranayama*. In contrast, it is possible that without any respiratory exercise, the participants were more relaxed and hence better able to respond to the RT task. There is no direct evidence to support this. Gender differences in the auditory startle reaction support a gender difference with the greater arousal and muscle tension in females compared to males in response to a sound stimulus.[23] Females also show a heightened response to stress.[24] Hence, conversely, in the absence of a respiratory task (*bhastrika pranayama*), considered to be stimulating, the female participants may have achieved an optimal level of arousal following breath awareness or quiet sitting. This speculation could be tested by having a population of both male and female participants performs the RT task after *bhastrika pranayama*, breath awareness, and quiet sitting, while simultaneously assessing the tension in the intercostal muscles through an electromyography recording.

The present study is limited by the fact that the level of stress or relaxation was not assessed after the sessions. Hence, it is a mere speculation that the female participants found *bhastrika pranayama* more exertional than breath awareness or quiet sitting. Despite these limitations, the present study unlike several previous studies[3,4,7] showed that no decrease in RT after *bhastrika pranayama*. The results suggest that different interventions may optimize performance in tasks requiring attention in females compared to males.

Conclusion

The results suggest that different interventions may optimize performance in tasks requiring attention in females compared to males.

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Conflicts of interest

There are no conflicts of interest.

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RESEARCH NOTE Open Access

Changes in vigilance, self rated sleep and state anxiety in military personnel in India following yoga

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Abstract

Objectives: To study the effects of 9 days of yoga on self-rated sleep, state anxiety and performance in a vigilance test among border security force (BSF) personnel. Seven hundred and twenty-two BSF personnel took part in the trial. They were all males, with an average age of 30.9 ± 7.4 years. All of them were involved in guarding the country's border. They were deputed for 9 days residential training in yoga. Before and after training they were assessed for self-rated sleep, state anxiety and vigilance.

Results: The results suggest the benefits of yoga in BSF personnel. The BSF personnel showed a significant increase in scores in the vigilance test, a decrease in state anxiety, and improved self-rated sleep.

Keywords: Vigilance, Insomnia, Yoga, Military personnel

Introduction

Military personnel face different levels of stress based on the nature of the role assigned to them [1]. The factors which could influence stress levels are the work load, the exposure to direct combat and the place to which the personnel are deployed [2]. In India the border security force (BSF) are a central armed force whose responsibility includes guarding India's territorial borders and preventing conflict with other nations [3]. The BSF are most often stationed at high altitudes (i.e., 9000 ft above sea level), where they face social isolation while needing to be hyper vigilant [4]. Being hyper vigilant for long periods can negatively impact physical and mental health with impaired cognition (i.e., attention, concentration and memory) and sleep disorders [5]. The most common sleep disorder is insomnia. Apart from this, vigilance or heightened awareness [6] is associated with increased sympathetic nervous system activity [7], which over a period of time could lead to hypertension and other disorders [8].

Yoga has been used to help military personnel adapt to high altitude [9]. The benefits included quicker adaptation to high altitude, lower sympathetic activity, improved performance at a submaximal level of exercise, better joint flexibility, as well as reduced anxiety and depression with better mental functioning.

Yoga practice helped to perform well in a vigilance task [10] while decreasing sympathetic activity [11]. Apart from increasing vigilance without the associated negative effects, yoga practice positively impacted the quality of sleep in people with normal sleep [12] and in those with chronic insomnia [13]. Yoga practice was shown to improve sleep efficiency and reduce sleep onset latency among other benefits.

BSF personnel have been shown to have a high incidence of anxiety [4]. Yoga practice was associated with reduced state and trait anxiety when practiced for an hour daily for 10 days [14]. This was also seen when military personnel stationed in an army base in north India, who were naïve to yoga, showed reduced state anxiety and better performance in an attention task after a 2 h yoga session [15].

Hence in separate studies yoga practice has been shown to (i) improve vigilance while reducing sympathetic

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activity, (ii) reduce anxiety and (iii) improve the quality of sleep.

Considering that the BSF personnel are in a state of hypervigilance, with insomnia and anxiety, the present study was designed to assess whether they would benefit from a 9 day residential yoga program with respect to (i) performance in a vigilance task, (ii) state anxiety and (iii) sleep.

Main text

Methods

Study design and recruitment of research participants

Seven hundred and twenty-two BSF personnel with ages 20–56 years (group mean age ± SD; 30.9 ± 7.4 years) completed the assessments. They were receiving training in yoga at a residential centre in north India. To be included in the trial participants had to (i) be male, (ii) have at least 8 h of duty in a day and (iii) complete the questionnaires correctly. The participants had an experience of 9.2 ± 7.2 years being in the BSF. The majority of participants were non gazetted officers (626 were constables and the rest were head constables) with a minimum of 10–12 years of education. They were all fluent in Hindi, but able to understand and read elementary English. Participation in the study was entirely voluntary. The entire group agreed to participate. The participants' signed informed consent was explained in Hindi and English and the study was approved by the institutions ethics committee (PRF/16/0014).

The study was a single group longitudinal study. All participants had been deputed to learn yoga hence there was no comparison group to receive an alternate intervention.

Assessments

On the day preceding the first day of training and on the day after the ninth day of training participants were assessed for (i) vigilance (ii) state anxiety and (iii) self rated sleep.

(i) Vigilance was assessed using a standard digit vigilance test (DVT) which consists of an A4 size sheet with 1500 digits randomly arranged from 1 to 9 on it in 30 columns and 50 rows [16]. This test measures sustained attention and psychomotor speed [17]. The participants were instructed in Hindi to cancel the target digits '6' and '9' wherever they appeared in the test. Missing any target digits and cancellation of other digits were counted as errors. The score obtained was the total number of digits cancelled minus the errors. The time given to complete the task was 8 min. Participants were familiar with the numbers written as Arabic numerals.

(ii) State anxiety was assessed using the standardized Spielberger's state trait anxiety inventory (STAI-S) [18] which is a 4-point Likert scale and comprises 20 items to describe the feelings at the moment of testing. The test was administered in Hindi using a standardized version [15]. The items of the inventory are: (1) I feel calm, (2) I feel secure, (3) I am tense, (4) I am regretful, (5) I feel at ease, (6) I feel upset, (7) I am presently worrying over possible misfortunes, (8) I feel rested, (9) I feel anxious, (10) I feel comfortable, (11) I feel self confident, (12) I feel nervous, (13) I am jittery, (14) I feel high strung, (15) I am relaxed, (16) I am content, (17) I am worried, (18) I feel over-exited and rattled, (19) I feel joyful and (20) I feel pleasant. The participants had to choose one out of the four options provided for each item i.e., not at all, somewhat, moderately so, and very much so. The scores range from 20 to 80.

(iii) Self-rated sleep quality was assessed using the Sleep Rating Questionnaire (SRQ) which is standardized for use in an Indian population and is in Hindi [19]. The SRQ consists of one open-ended (item 4) and six close-ended items which are: (1) Approximately how long in minutes does it take you to fall asleep? (2) How many minutes do you sleep each night? (3) How many times (if any) do you wake up during the night? (4) What are the usual reasons for waking up if you do so? (5) Do you feel rested in the morning (yes/no)? (6) Do you sleep in the day time (yes/no)? (7) If your answer to question 6 was 'yes', for how long does your daytime sleep last in minutes?

Intervention

The yoga intervention was for 240 min in each day. The yoga sessions were conducted in a large hall that can accommodate 4000 people. The 722 BSF personnel were seated in 20 rows and 37 columns (i.e., each row having 37 persons) separated by 3.0 ft distance between them. The dimension of the hall was 500 × 350 ft. Each yoga session was led by an expert in yoga who has over 45 years of experience in practicing yoga, having learned yoga in childhood. In addition there were 20 yoga teachers who had experience of 5 years or more of teaching yoga who were assigned to a single row. Audiovisual aids were used to ensure that the yoga expert who was at the front of the hall on an elevated platform, was visible and audible to all participants. Instructions were given in Hindi using a microphone and 24 speakers (placed on either side of the hall), each with an output of 136 dB. Two LED screens (10 × 16 feet each) were placed at the front of the hall, approximately 320 ft away from the last row. The yoga sessions included a universal prayer for 3 min, warming up for 10 min, and loosening exercises

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for 10 min, yoga postures (*asanas*) for 50 min, voluntarily regulated breathing techniques (*pranayamas*) for 35 min, and guided relaxation for 10 min followed by a concluding prayer, which was also universal. The timings for yoga sessions were between 05:00–07:00 h and 16:00–18:00 h daily for 9 days. The details of the yoga session are given in Table 1.

The participants were provided a shared room for two persons with an attached bathroom within the same campus as the yoga hall. Apart from the yoga practice sessions participants were given lectures (3 h/day) on principles of stress reduction and coping with stress based on principles of yoga (*Patanjali's Yoga Sutras*; by the sage Patanjali, *Circa* 900 B.C.) [20]. The rest of the day was for them to complete personal chores (e.g., laundry), reading or studying, walking or playing outdoor games. The campus includes a dining hall, cafeteria, grounds to walk in, and a shop where all basic requirements can be bought. Participants were required to stay in the residential campus during the yoga training period.

Data analysis

Paired t-tests were performed to compare vigilance scores, state anxiety and self-rated sleep before and after the yoga practice in BSF personnel. Two items of the SRQ (i.e., number 5 and number 6) were measured on a nominal scale (i.e., yes = 1, no = 0) and analyzed with Pearson's Chi square test.

Results

The BSF personnel showed a significant increase in the scores of the digit vigilance test ($t = 15.42$, $P < 0.001$) and a significant decrease in state anxiety ($t = 21.33$, $P < 0.001$) after 9 days of yoga. The total duration of nocturnal

Table 1 Details of a yoga practice session

S. no.		Yoga practice	Duration (min)
1	Starting	Universal prayer	3
2	Warming up	Sun salutation *(Surya namaskara)*	10
3	Loosening exercises	Neck rotation	3
		Knee and ankle rotation	3
		Shoulder rotation	3
		Butterfly pose	1
4	Standing postures	Swaying palm tree pose *(Tirryaktadasana)*	3
		Tree pose *(Vrikshasana)*	3
		Feet and hands posture *(Padahastasana)*	2
5	Sitting postures	Frog posture *(Mandukasana)*	3
		Rabbit posture *(Sasakasana)*	3
		Sitting lateral twisting posture *(Vakrasana)*	5
		Cow face posture *(Gomukhasana)*	5
6	Prone postures	Crocodile posture *(Makarasana)*	5
		Cobra posture *(Bhujangasana)*	3
		Half-locust posture *(Salabhasana)*	3
7	Supine postures	Half-plough posture *(Ardhhalasana)*	3
		Rotating leg pose *(Padavritasana)*	6
		Leg circling pose *(Dwichakrasana)*	6
8	Relaxation	Supine relaxed posture *(Shavasana)* with breath awareness	5
9	Yoga breathing series *(pranayamas)*	Yoga bellows type breathing *(Bhastrika)*	3
		High frequency yoga breathing *(Kapalabhati)*	10
		Bahyavriti pranayama	3
		Victorious breath *(Ujjayi)*	3
		Alternative nostril yoga breathing *(Anlom-vilom)*	10
		Bee breathing practice *(Bhramari)*	3
		Om chanting *(Udgeeth)*	3
10	Relaxation	Supine relaxed posture *(Shavasana)* with breath awareness	5
11		Concluding prayer	2

Total duration of the session was 120 min and the same practices have been repeated during the evening session too

University of Patanjali Haridwar

sleep increased significantly ($t=11.44$, $P<0.001$). There was also a significant decrease in the time taken to fall asleep ($t=7.43$, $P<0.001$), number of arousals during the night ($t=11.18$, $P<0.001$) and duration of day time sleep ($t=15.66$, $P<0.001$). The two nominal scores i.e., (i) 'the feeling of being rested in the morning' increased ($\chi^2=115.47$, $P<0.001$, Cramer's $V=0.28$) and (ii) 'sleeping in the day' decreased ($\chi^2=39.78$, $P<0.001$, Cramer's $V=0.17$) after yoga compared to before. The details are given in Table 2. One item of the SRQ that is 'reason for night time awakenings' was open ended. These reasons were most often (i) using the rest room, (ii) bad dreams, or (iii) thirst. This did not change after yoga.

The effect sizes obtained in the present study for state anxiety and self-rated sleep are higher than those reported in volunteers after 7 days of yoga in identical conditions [12].

Discussion and conclusion

Seven hundred and twenty-two border security force personnel (BSF) received 9 days of residential training in yoga. At the end of the training the BSF personnel showed an increase (by an average of 31 min) in total amount of nocturnal time spent asleep, decrease in sleep onset latency (by an average of 9 min), reduced day time sleep and nocturnal arousals. Their state anxiety levels were decreased by 20% while their scores in a vigilance test were significantly better.

The BSF require to be alert and vigilant while they guard the country's borders. Prolonged alertness and attention can influence the parts of the brain which help to stay awake, as well as those involved in actively inducing sleep [17]; in addition, neural pathways which actively promote sleep are inhibited by sustained attention [21]. Alertness and attention are also associated with increased sympathetic activity which would further promote wakefulness and prevent sleep [22]. As yoga practice is known to increase parasympathetic activity [23] this could reduce physiological arousal associated with sympathetic activation (e.g., increased heart rate, cardiac output and blood pressure, among other changes). With a predominance of parasympathetic tone as well as the decrease in state anxiety seen in the BSF personnel, it is possible that in the CNS too there would be changes, with activation of sleep inducing areas. This is a speculation, but it is supported by numerous EEG studies which have shown an increase in slow EEG frequencies [24] as well as increased cortical gamma amino butyric acid measured by NMRS as an immediate effect of yoga practice [25, 26]. These mechanisms could explain the improvement in sleep and decrease in anxiety after 9 days of yoga. In turn, decreased anxiety could improve performance in the vigilance test suggesting better concentration [27].

Hence the results suggest that intensive yoga training can help BSF personnel to perform with better sustained attention and psychomotor speed in a vigilance test, have better sleep and reduced state anxiety. This could help them perform their duties better. The BSF have a job which is of great importance, is very demanding and requires optimal physical and mental fitness [4]. There are comparable jobs in other countries which require physical fitness, courage, emotional stability and the ability to be attentive and act quickly. This could include people in the military, in the police force as well as other jobs such as pilots (both military and commercial). Hence the findings of the present study have a broader relevance.

Table 2 Changes in vigilance, state anxiety and self rated sleep quality before and after 9 days of yoga intervention

Variables	Yoga intervention					
	Before	After	t value	χ^2 value	Cohen's d/ Cramer's V	P value
Vigilance scores	284.46 ± 45.98	307.15 ± 22.13	15.42	–	0.63[b]	< 0.001
State anxiety scores	38.61 ± 9.68	30.98 ± 9.03	21.33	–	0.82[b]	< 0.001
Time taken to fall asleep (min)	29.69 ± 21.22	20.27 ± 25.25	7.43	–	0.40[b]	< 0.001
Total duration of nocturnal sleep (min)	276.68 ± 63.25	308.20 ± 51.02	11.54	–	0.55[b]	< 0.001
Number of arousals during the night	1.34 ± 1.04	0.88 ± 0.85	11.18	–	0.48[b]	< 0.001
Duration of daytime sleep (min)	72.86 ± 42.25	44.57 ± 35.89	15.66	–	0.72[b]	< 0.001
Feeling of being rested in the morning (number of participants who reported 'yes')[a]	476	645	–	115.47	0.28[c]	< 0.001
Sleeping in the day (number of participants who reported 'yes')[a]	599	504	–	39.78	0.17[c]	< 0.001

Values are group mean ± SD

[a] The remainder of the participants reported 'No'

[b] Cohen's d

[c] Cramer's V

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Limitations

The limitations include (i) the absence of a control group, (ii) the improved digit vigilance test performance could have been a learning effect and (iii) since the data was not blind scored there could be bias.

Hence though the participants followed a regular yoga schedule and showed significant changes the results cannot be considered conclusive.

Abbreviations

BSF: border security force; SRQ: Sleep Rating Questionnaire; DVT: digit vigilance test; STAI-S: Spielberger's state trait anxiety inventory; CNS: central nervous system; EEG: electroencephalogram; NMRS: nuclear magnetic resonance spectroscopy.

Authors' contributions

ST designed the study, interpreted the data and prepared the manuscript. RKG helped in designing the study, supervising data scoring and manuscript preparation. SV and NK collected the data, scored and analyzed the data, the literature review and assisted in manuscript preparation. AB helped in designing the study and providing the funds and infrastructure. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

The individual data are available in the archives of the laboratory and can be obtained from the corresponding author on request.

Consent for publication

Not applicable.

Ethics approval and consent to participate

The study was approved by the ethical committee of Patanjali Research Foundation (PRF/16/0014) and written signed informed consent was taken from each participant before beginning the study.

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Increased Mental Well-Being and Reduced State Anxiety in Teachers After Participation in a Residential Yoga Program

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Background: Reducing stress in the workplace improves mental health. Teaching is of social importance, but it may receive inadequate recognition and rewards. The present study compared mental well-being and state anxiety in primary school teachers who practiced 15 days of yoga in a residential setting with those who continued their usual routine.

Material/Methods: We enrolled 236 primary school teachers to participate in the study. We assigned 118 primary school teachers (group mean ±S.D., age 41.5±6.0 years, 74 females) to the experimental group; they underwent 15 days of yoga training for 6 hours/day) in a residential yoga center. The non-yoga control group (group mean ±S.D., age 42.3±6.0 years, 79 females) consisted of 118 teachers who continued with their normal teaching routine.

Results: After 15 days in the residential yoga program, there was an increase in overall mental well-being ($p<.001$) and lower state anxiety ($p<.01$) (repeated-measures ANOVA, followed by *post hoc* multiple comparison tests). At baseline, the non-yoga control group had higher levels of state anxiety, presumably related to their remaining in the workplace.

Conclusions: The study was a 15-day, comparative, controlled trial. The results show that after 15 days of participation in the residential yoga program, primary school teachers increased all aspects of mental well-being and had reduced state anxiety.

MeSH Keywords: Faculty • Occupational Health Services • Yoga

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Background

Prolonged exposure to stress can reduce the sense of well-being [1]. Teachers are known to face high levels of stress across cultures [2]. In India, these stressors often consist of long working hours, inadequate pay, ambiguous roles, poor infrastructure, lack of social recognition, and job dissatisfaction, often associated with workplace conflict [3].

When a person is employed in a particular job, there is a critical link between self-esteem, self-efficacy, and the societal status associated with making the person feel rewarded, esteemed, and belonging to a specific group – their colleagues [4]. However, if there is an imbalance between the effort at work and reward in terms of the monetary benefit, self-esteem, status, and level of work freedom allowed, a person is likely to experience emotional distress, with a specific risk of autonomic arousal, associated stress reactions, and increased insecurity and anxiety [4].

A stressful workplace and anxiety can negatively impact mental health and well-being [5]. There is a close relationship between stress and anxiety. Stress is a response to a stimulus (e.g., a threat) in a particular situation, while anxiety is a reaction to stress [6]. Physiologically, both stress and anxiety stimulate the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis [7]. Earlier studies have shown that anxiety can be detrimental to mental health. Anxiety has been shown to negatively impact well-being [5]. It has been associated with depression [8] and decreased self-esteem [9], psychological well-being [10], and quality of life [11].

It is well recognized that to function optimally, subjective well-being is essential [12]. Subjective well-being has both emotional and cognitive components. The emotional component includes positive and negative affect, while the cognitive component is related to an individual's level of satisfaction with life, including their job, health, and other factors [13].

In the present study this is especially relevant, as teachers' well-being can influence the way in which they deal with factors within the school and with the demands of the teaching profession [12]. Teachers' well-being improves positive patterns of feeling and thinking. Their effectiveness in the classroom positively influences students' well-being, improves productivity, school effectiveness, cognitive self-regulation, job satisfaction, relationships with the parents or guardians of students, and increases chances of approaching teaching with innovation [14].

Physical activity has been reported to reduce stress and increase well-being in school teachers [15]. The effect of moderate exercise in elementary school teachers was assessed after 12 weeks of training [16]. The effect on the autonomic nervous system was based on recordings of the heart rate variability (HRV), and the Beck Anxiety Inventory was used to assess anxiety. Time domain variables of the HRV increased significantly in the exercise group compared to the non-exercise group in a between-groups comparison. The time domain variables of the HRV are associated with parasympathetic activity [17,18]. The anxiety scores were not discussed in detail. The authors describe these results as comparable to those of other studies evaluating exercise for sedentary adults [19].

Mindfulness-based stress reduction (MBSR) has also been shown to reduce depression and stress in school teachers. Eight-week practice of mindfulness-based stress reduction (MBSR) showed a reduction in depression (Cohen's d=1.67) and stress (Cohen's d=1.12) in 9 primary school teachers and 2 teaching assistants with ages ranging from the late 20s to the late 50s [20]. Depression and stress were measured using the Depression Anxiety Stress Scales (DASS21). The intervention included one 2.5-h weekly session for 8 weeks and one day with 5 h of silence between week 5 and 6.

Yoga is a mind-body practice which includes both physical and mental components. The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) assesses subjective well-being and psychological functioning [21]. This scale was used to assess well-being in 30 physiotherapy trainees who were enrolled in a yoga program for 1 h daily for 5 days a week over a period of 6 weeks [22]. At the end of 6 weeks, the total sense of well-being showed a significant improvement after yoga training, correlating with factors assessed in the scale, such as an enhanced mood, feeling cheerful, and improved confidence.

Given the background that teaching is a socially responsible yet stressful occupation in which mental well-being can be compromised, the present study was designed to assess mental well-being and state anxiety in 118 primary school teachers after 15 days in a residential yoga program compared to before and compared to 118 of their colleagues who formed a non-yoga control group.

Material and Methods

Participants

Our study included 236 primary school teachers, of which 118 adults of both sexes – the experimental (yoga) group – were teachers in primary schools in a state in north-east India. The state government had an agreement with the yoga center carrying out the research to train teachers in yoga. The state government selected all government-funded primary schools within the state. Each school was asked to choose 1 teacher for training. Their selection was not based on specific criteria (e.g., they were not physical education teachers), but on the

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Table 1. Baseline characteristics of participants of yoga group and non-yoga control group.

Groups	Yoga group (15-day residential program)	Non-yoga control group (routine activities)
Total number of participants	118	118
Age (mean ±S.D.)	42.17±6.61 years	42.35±6.01 years
Age range	26 to 55 years	29 to 53 years
Gender (M: F)	44: 74	39: 79

convenience of the teaching schedule. The selected teachers received all benefits during the study and they did not have to pay for their training or their accommodation. The schools had assigned them (1 teacher/school with no specific rationale) to receive training in yoga as a part of an initiative to introduce yoga in schools. The teachers were naïve to yoga. Hence, instructions were given to learn the basics of yoga and then how to impart this to students of primary schools. Their ages were between 26 and 55 years (group mean ±S.D., 41.5±6.0 years). The control group consisted of 118 participants of comparable age (group mean ±S.D., 42.3±6.0 years) who were primary school teachers in government-funded primary schools in the same state, but who were not selected to learn yoga. The sample size was based on a study which reported changes in state anxiety following a single yoga session in army personnel with effect size=0.59 (medium) [23]. The inclusion criteria were: (i) participants of both sexes, teaching in primary schools, (ii) no prior experience of yoga, (iii) willing to follow the study conditions, and (iv) not participating in any other wellness programs (e.g., meditation, physical exercise, or special diet). Exclusion criteria were: (i) any physical or mental illness, or being on medication, based on answers to survey questions, and (ii) using alcohol or any intoxicant. None of the teachers had to be excluded for these reasons. The inclusion criteria for the non-yoga control group were the same. The study was conducted in a residential yoga center located in northern India. Overall, the residential facility can accommodate approximately 5000 persons. The teachers were provided a shared room for 2 persons with an attached bathroom.

Teachers were assigned by their schools to learn yoga but their participation in the study was voluntary. Baseline characteristics of the participants are shown in Table 1. After the initial assessments, the participants in the yoga group started yoga practice. The non-yoga control group continued with their usual teaching routine (approximately 6 h per day). All participants provided signed informed consent. The study was approved by the Institutional Ethics Committee (approval number: PRF/16/0012) of our institution.

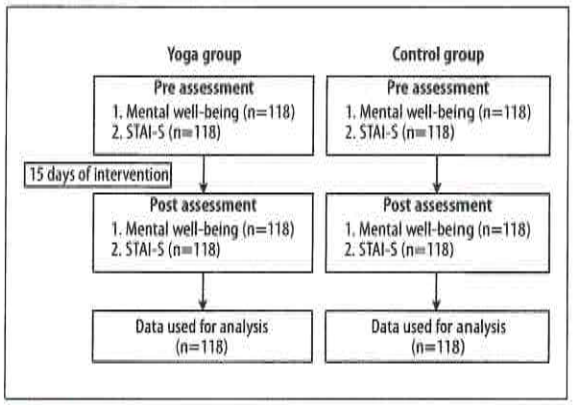

Figure 1. Trial profile (details about the number of participants in both groups).

Design of the study

This study was a matched control study with assessments at the beginning and end of 15 days of a residential yoga program. The non-yoga control group continued with their usual routine of teaching for approximately 6 h per day in their schools for the same duration. In the yoga group, participants were occupied from 04: 00 hours in the morning to 21: 00 hours in the night. The participants were required to stay in the campus during the training except for a 1-day visit to different units of the institution (that is, the residential hospital which is 22 kilometers away or the nutraceutical manufacturing unit also 25 kilometers away from the training center). The campus includes a dining hall, grounds to walk in, and a shop where all basic necessities can be bought.

Figure 1 shows the trial profile, including the number of participants in yoga and non-yoga control groups at different stages.

Assessments

Mental well-being

Mental well-being was estimated using the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) [21]. This is a 14-item scale which asks people to describe their experience of feelings and thoughts over the last 2 weeks, with 5 possible options as their response: "1" for "never", "2" for "rarely", "3" for "sometimes", "4" for "often", and "5" for "very often".

State anxiety

State anxiety was measured using a sub-scale of the Spielberger's State-Trait Anxiety Inventory which has 20 items to assess state anxiety or anxiety at the moment of testing [24]. Participants selected the number that best described the intensity of their feelings at the moment of testing, where "1"

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Table 2. Two-hour yoga practice session as part of the residential yoga program.

Sl. no.	Practice	Duration
1	Meditation on the *Sanskrit* syllable, OM and *Bhajans* (*Bhakti yoga*)	10 min
2	Sun Salutation (*Surya namaskara*)	10 min
3	Loosening exercises (*Sukshma vyayama*)	20 min
4	Guided relaxation (in Shavasana)	10 min
5	Voluntarily regulated breathing (*Pranayamas*)	20 min
6	Yoga postures (*Asanas*)	30 min
7	Relaxation (in Shavasana)	10 min
8	Meditation	10 min
	Total duration	**120 min**

The same practices have been repeated during the evening session. The time for theory sessions was 120 min each day and the topics for this session were yoga and health, diet, stress management, and spirituality.

was "not at all", "2" was "somewhat", "3" was "moderately", and "4" was "very much so".

Intervention

The total duration of the program was 15 days. The participants practiced yoga for 4 h every day (2 sessions in a day, and each session lasted 2 h). In addition to the yoga practice session, they attended theory classes related to yoga for 2 h per day. During the remaining time they were engaged in individual chores, group meetings with their supervisors, and in unsupervised studying or reading. In each session all the participants were taught the following techniques for 15 days: (i) loosening exercises and specific physical postures (*asanas*), (ii) breathing techniques (*pranayamas*), (iii) chanting, and (iv) guided relaxation techniques. The details are given in Table 2.

The teachers were naïve to yoga. Hence, instructions were given to learn the basics of yoga theory and to practice basic yoga postures (*asanas*), yoga breathing (*pranayama*), and meditation. During the theory classes, the participants were also taught what yoga includes, how the concepts of yoga in Sanskrit texts (e.g., Hatha Yoga texts, *circa* 1500 C.E.) applies to present-day life, which practices are included, the directions to be followed when teaching yoga to children, and precautions to be taken while teaching yoga to children to avoid any harm to them.

The teachings were also based on the theory given in *Patanjali's Yoga Sutras* (by the sage Patanjali, *circa* 900 B.C.) [25]. While most of the information about yoga theory and practices was derived from this source, a few details, particularly related to diet and health, were taken from the *Bhagwad Gita* (*circa* 3200 B.C.) [26]. They were instructed to contact yoga instructors of the institute in their state after they returned to their homes so as to get help to introduce yoga in schools. This training would be further supported by observers who would later take yoga classes along with the trained instructors of the institution who have over 10 years of experience in teaching yoga. The institute had already prepared a curriculum, yoga teacher's manual and text books on yoga for primary school children (Classes I–VI). The yoga instructors of the institute are aware of these teaching methods [27]. Yoga instructors were asked to specifically watch for any adverse event during yoga practice, but no such event was reported.

The participants in the non-yoga control group did not receive any such intervention and they followed their usual routine at their workplace. None of them practiced yoga or started any physical activity or stress management routine during the 15-day period.

Data extraction

All questionnaires were blindly scored by 2 evaluators. Data were scored and the group mean values ±SD were calculated before and after the yoga sessions.

Mental well-being

Each item of the scale was given a weighted score of 1 to 5. A standard method was used to score the data [21]. Higher scores are positively correlated with a higher level of well-being.

State anxiety inventory

Each STAI-S item was given a weighted score of 1 to 4. A standard method was used to score the data [24]. Higher scores are positively correlated with a higher anxiety level.

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Table 3. Mental well-being and state anxiety of the 2 groups (n=118 each). Values are group mean (S.D.).

Variables	Yoga group (n=118) (15-day residential program)			Non-yoga control group (n=118) (routine activities)		
	Before	After	Cohen's d	Before	After	Cohen's d
Mental well-being	53.30 (7.55)	55.94 (7.07)***	−0.361	54.33 (6.75)	53.46 (8.10)	0.117
STAI-S	33.44 (7.90)	31.47 (8.10)**	0.246	39.60 (8.78)	40.39 (9.14)	−0.089

STAI-S – state anxiety; ** p<.01, *** p<.001, *post hoc* analysis with Bonferroni adjustment compared with pre.

Table 4. ANOVA for different variables: Mental well-being and state anxiety (STAI-S).

Sl. no.	Factors	Variables	F	df	Huynh-Feldt ε	p
1	Within-subjects (States)	Mental well-being	4.252	1, 234	1	0.040
		STAI-S	1.650	1, 234	1	0.200
2	Between-subjects (Groups)	Mental well-being	0.709	1, 234	–	0.401
		STAI-S	56.293	1, 234	–	<0.001
3	States × Groups	Mental well-being	16.764	1, 234 (States) × 234 (Groups)	–	<0.001
		STAI-S	8.946	1, 234 (States) × 234 (Groups)	–	0.003

<0.001, values are less than .00001.

Statistical analysis

A repeated-measures analysis of variance (RMANOVA) followed by *post hoc* analyses with Bonferroni adjustment were done to compare data after the intervention with data recorded before the intervention, using PASW Version 18.0. Data of 118 subjects of the yoga group were compared with 118 subjects of the control group. There was 1 within-subjects factor (States: pre and post) and 1 between-subjects factor (Groups: yoga and control). Statistical significance (α) was set at 0.05.

Results

Repeated-measures analysis of variance (RMANOVA)

For this assessment, 118 teachers in each group were assessed, and their group mean values ±S.D. are given in Table 3. Values for the factors such as Within-Subjects (States), Between-Subjects (Groups), and interaction between the 2 for (i) mental well-being, which covers hedonic and eudemonic elements of the mental well-being, and (ii) STAI-S (anxiety at the specific moment), are given in Table 4. The significant Groups X States interaction indicated interdependence, suggesting mental well-being and state anxiety are interdependent.

Post hoc analyses

The repeated-measures analysis of variance showed a significant difference in mental well-being scores (p<0.001) and state anxiety scores (p<0.01) within the group who received residential yoga training in a post-pre comparison (the sub-group, n=118). For between-group analysis, in the post comparison between yoga and control groups, there was a significant difference in mental well-being and state anxiety, while in the pre comparison there was a significant difference in state anxiety alone, which was higher in the control group. Comparisons were made with respective 'pre' States within a group. In the between-groups comparisons of the 2 groups, the post data and the pre data were compared separately.

Discussion

One hundred and eighteen primary school teachers showed improvement in their total sense of mental well-being and a decrease in state anxiety after 15 days of a residential yoga program. One hundred and eighteen of their colleagues who continued with their routine as the non-yoga control group showed no significant change.

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The mental well-being scale (WEMWBS) used in this study has been used in an Indian population who practiced yoga and showed improved well-being, but the suitability of the scale was not discussed in that report [22]. A more detailed analysis of Asian adults (22 Chinese and 47 Pakistani adults) using the WEMWB scale examined the suitability of the scale for this population [28], suggesting that WEMWBS was appropriate for English-speaking Pakistani and Chinese adults. While these populations are not the same as an Indian population, there are certain similarities in their attitude towards happiness and family. Based on this and the earlier use of the WEMWBS in an Indian population [22], the scale was considered appropriate to be used in the present study.

Positive mental well-being is an important protective factor against mental health problems [29], including anxiety. It also influences health, social outcomes, and psychological functioning [30]. Positive mental well-being includes both hedonic and eudemonic aspects of well-being [31]. Hedonic aspects include happiness and subjective well-being, while positive functioning is a part of the eudemonic aspect. The 14-item scale used in the present study assesses both aspects of mental well-being. The hedonic elements include happiness, joy, and contentment, while examples of the eudemonic elements are psychological functioning, autonomy, a sense of purpose in life, and a positive relationship with others. The present study did not separate hedonic and eudemonic items, but showed an increase in overall mental well-being following 15 days of residential yoga program.

Regular practice of yoga has been associated with higher levels of psychological well-being [32], psychological functioning [33], happiness [34], and subjective well-being [35]. A cross-sectional study aimed at correlations between dimensions of psychological well-being with yoga practice was conducted on 203 healthy individuals. In particular, body awareness, body image dissatisfaction, and mindfulness were assessed. These 3 aspects of psychological well-being showed a significant correlation with the frequency of yoga practice. Apart from these 3 factors, yoga practice was associated with increased calmness, a state of pleasant enthusiasm, with a decreased rate of anxiety and depression [36].

Apart from better mental well-being, state anxiety was significantly reduced after the 15-day residential yoga program. This reduction in state anxiety following yoga needs to be interpreted with caution since the 2 groups differed in their baseline levels of state anxiety. The control group who continued with their routine teaching had higher levels of baseline state anxiety compared to the yoga group. The yoga group consisted of teachers who were selected to attend the 15-day residential yoga program. This group could have been expected to have lower state anxiety as they were away from their workplace, because people with work anxiety may perceive their workplace more negatively than those without such anxiety [37].

On the other hand, anxiety increases when a person is faced with adapting to new places and novel situations [38]. Since these teachers were naïve to yoga, the change in their schedule, for example waking up at 04: 00 a.m., and learning yoga for the first time, could have increased their state anxiety at baseline. However, in the between-groups comparison, this was not the case, as state anxiety was higher in the non-yoga control group.

Various factors could account for the decrease in state anxiety following yoga, but none of them have been proven. The theory sessions, which are considered an important part of the yoga practice, are based on the ancient yoga texts (*Patanjali's Yoga Sutras, circa* 900 B.C.) [25]. In these texts, the perception of situations as stressful or not stressful is considered to be reinforced by reasoning and thinking patterns [39]. A study showed that state anxiety decreased with yoga theory based on *Patanjali's Yoga Sutras* (*circa* 900 B.C.) [40].

Anxiety has been found to be associated with low parasympathetic nervous system activity [41], increased high-frequency EEG [42], and reduced gamma amino butyric acid (GABA) levels [43]. The residential yoga program in the present study may have influenced physiological factors associated with anxiety. For example, slow, deep breathing increases the parasympathetic tone [44]. The program also included alternate nostril yoga breathing, which has been shown to reduce high frequencies in the electroencephalogram [45]. NMRs imaging demonstrated an increase in levels of GABA in the brain after 60 min of practicing yoga postures [46]. This is of relevance, as the yoga sessions included 120 min of theory and 2 yoga practice sessions. Each practice session was for 2 hours which included slow breathing, high frequency yoga breathing and 30 minutes of yoga postures.

Hence, following yoga, complex mechanisms could be involved in reducing the psychophysiological effects of anxiety. The control group had high levels of baseline state anxiety, which did not change at re-test 15 days later. Hence, the between-group comparison could also be related to the difference in the circumstances of the groups. The control group continued their usual work activities. It is known that teaching is associated with specific stressors, such as tension, frustration, anger, and depression, usually demonstrated by high anxiety and low psychological well-being [1]. This could account for the high state anxiety in the control group.

An informal discussion with the teachers in the yoga group showed that the physical health problems most commonly faced were vocal strain, allergy to chalk, and problems associated

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with standing for long periods. The 15-day residential yoga program did not attempt to address these health problems. However, it is worth noting that yoga can help in public speaking [47] and can reduce allergies [48]. Hence, these areas require further research, especially in countries where teachers manage large classes and use simple teaching aids such as blackboard and chalk.

Our results suggest that yoga is beneficial to teachers, reducing their anxiety and promoting feelings of well-being. The findings are limited by the study design. The participants were not randomly assigned to the 2 groups and the non-yoga control group was in their usual work environment. Baseline data was not collected prior to arrival at the residential yoga center. Also, the duration of the 15-day intervention was relatively short. The findings of the present study are important as they are related to the fact that a teacher's performance in terms of psychological functioning, performance in school, and their interaction with students, varied directly with their feelings of mental well-being.

Conclusions

Our findings suggest that 15 days of a residential yoga program which includes physical postures, regulated breathing, and guided relaxation can improve mental well-being while reducing state anxiety in primary school teachers. Teachers in the control group who continued with their usual routine showed no change in either mental well-being or state anxiety.

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Conflicts of interest

None.

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EC NEUROLOGY
Mini Review

Neurophysiological Changes Determined by the EEG with Yoga Breathing Practices: A Mini Review

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Abstract

Yoga is a mind body intervention which helps to attain a calm and stable mental state. In yoga, voluntary breath regulation is given importance as it acts as a bridge between the brain and the rest of the body. There are several studies which reported changes in EEG caused by yoga breathing practices. Thirty one studies from the year 2000 to the present, from PubMed were reviewed here. Two studies fulfilled the criteria for inclusion. The summary of these studies is that yoga breathing practices can alter the EEG by decreasing theta and beta band frequencies, suggestive of better attention and relaxation. However, there are several limitations which are discussed.

Keywords: EEG; Yoga Breathing Practices; Relaxation

Abbreviations

EEG: Electroencephalography; ERP: Event Related Potentials; EP: Event potentials; ANYB: Alternate Nostril Yoga Breathing

Introduction

Yoga is a mind body practice which is increasing in popularity world-wide. An important component of yoga is breathing which is described as a bridge between the mind and body. There are a number of breathing techniques practiced in yoga called pranayama (in Sanskrit). Yoga breathing is described as a method to achieve mental tranquility in yoga texts [1]. The text describes the association of breath with the mind in a verse as "when the prana (breath) is irregular the chitta (mind) is unstable, when the prana is without movement the chitta is stable (Hatha Yoga pradipika, Chapter II, Verse 2).

Electroencephalography (EEG) is commonly used to assess changes in the mental state [2]. Recording the electrical activity generated by voltage fluctuations from the ionic flow provides a quantitative and non-invasive approach to study brain functions. Studies suggest the neurophysiological effects of yoga breathing practices. This mini review is aimed to discuss the neural changes associated with yoga breathing practices determined by the EEG recordings.

Materials and Methods

Studies exclusively assessing yoga breathing practices and the EEG were included in the review. PubMed was searched using the search terms "EEG and Yoga breathing". A total of thirty-one studies were found. The exclusion criteria were (i) studies published before the year 2000 (16 excluded), (ii) practicing other yoga techniques as well (e.g., postures, meditation) (8 studies excluded), (iii) review articles (4 studies excluded) and (iv) studies on ERP or EP other than EEG (1 study excluded). Two studies met the inclusion and exclusion criteria and were reviewed in the present study.

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Results

One study reported changes in the EEG after alternate nostril yoga breathing (ANYB) [3]. As the name implies this practice involves breathing through the nostrils alternately. The study included 13 healthy males with 6 months experience of ANYB, who were allotted to three sessions randomly on three consecutive days at the same time of the day. The three sessions were (i) alternative nostril yoga breathing, (ii) breath awareness and (iii) quiet sitting; each for 18 minutes. The recordings were at FP1, FP2, C3, C4, O1 and O_2 sites of scalp according to the 10 - 20 system of electrode positioning. There was a 19.4 % and 21.2 % decrease in theta band energy at occipital (O_2, $p < 0.05$) and central sites (C4, $p < 0.05$), respectively during ANYB. Amplitude of the beta band was decreased by 9.6% after ANYB at occipital sites (O_2, $P < 0.05$). In addition, there was a 14.3% increase in the beta band energy at the right frontal area (Fp2, $p < 0.05$) during quiet sitting, along with a 8.9% decrease in alpha band amplitude on the right side centrally (C4, $p < 0.05$).

The other study with a pre and post design reported that bumble bee breathing can generate high-frequency gamma waves [4]. This practice involves slow, long and deep respiration along with producing a vibrating sound while exhaling through the nostrils. The sound produced resembles the buzzing of bumble bees, hence the name. There were eight subjects, among whom one had four months of experience of practicing bumble bee breathing and one had no experience of this practice. The remaining subjects had one month of experience of bumble bee breathing. There were 20 rounds of bumble bee breathing with EEG recorded from 128 active electrodes. All subjects exhibited high-frequency biphasic paroxysmal gamma waves during humming. The large amplitude peaks (+/- 10 - 30 μV) were seen at a sustained fast rhythm of approximately 10 - 30 Hz. Besides this, there was a trait of increased theta activity ($P < .05$).

Discussion and Conclusion

There are different methods of breath regulation described in yogic texts. The two studies reviewed here suggest that yoga breathing leads to definite changes in the brain as measured by EEG recordings. During the practice of alternate nostril yoga breathing there was a reduction in theta band energy at occipital and central sites, along with a decrease in the amplitude of the beta band at occipital sites [3]. A study suggested that a tonic increase in alpha and a decrease in theta power was related to better memory and is related to complex cognitive functions [5]. Another study reported that anterior and frontal midline theta reflected an emotionally positive state and internalized attention [6]. However, the theta activity increases in drowsiness which can decrease the performance in cognitive tasks [5]. Hence alternate nostril yoga breathing could be associated with better performance in cognitive tasks but this cannot be concluded firmly. Alternate nostril yoga breathing also lowered the beta amplitude at occipital sites. This could suggest decreased alertness, arousal and excitement which are associated with increased beta wave activity [7], though beta wave activity and its functional correlates are not well understood [8]. Interestingly, sitting quiet for a duration of 18 minutes increased beta band energy at frontal sites along with a decrease in alpha band amplitude at centrally. The arousal based theory of beta activity relates increased beta activity with increased mental activity or arousal [9]. This along with the reduction seen in alpha amplitude could be due to raised arousal and a state of mind wandering, because subjects were given no tasks to do except to sit quietly as a control.

Bumble bee breathing produced high-frequency biphasic ripples of paroxysmal gamma waves during the practice [4]. These were large amplitude voltage transients of about +/- 10-30 μV occurring at a fast rate of approximately 10 - 30 spikes/sec. Similar to this paroxysmal gamma wave phenomenon, high-frequency gamma waves of unusually large amplitude were seen in trained practitioners of Buddhist meditation [10]. There was a basic trait of increased theta range activity for bumble bee breathing. This is similar to results of meditation techniques which were associated with a thoughtless blissful state [11]. The bumble bee breathing practice may hence be associated a more quiet mental state.

Both the studies reviewed here have some limitations such as lack appropriate controls and small sample sizes. Hence, the two breathing practices can be said to have beneficial effects on the brain and mental state while in the absence of larger sample sizes and proper study designs, this cannot be said conclusively.

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Twelve Weeks of Yoga or Nutritional Advice for Centrally Obese Adult Females

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Background: Central obesity is associated with a higher risk of disease. Previously yoga reduced the BMI and waist circumference (WC) in persons with obesity. Additional anthropometric measures and indices predict the risk of developing diseases associated with central obesity. Hence the present study aimed to assess the effects of 12 weeks of yoga or nutritional advice on these measures. The secondary aim was to determine the changes in quality of life (QoL) given the importance of psychological factors in obesity.

Material and Methods: Twenty-six adult females with central obesity in a yoga group (YOG) were compared with 26 adult females in a nutritional advice group (NAG). Yoga was practiced for 75 min/day, 3 days/week and included postures, breathing practices and guided relaxation. The NAG had one 45 min presentation/week on nutrition. Assessments were at baseline and 12 weeks. Data were analyzed with repeated measures ANOVA and *post-hoc* comparisons. Age-wise comparisons were with *t*-tests.

Results: At baseline and 12 weeks NAG had higher triglycerides and VLDL than YOG. Other comparisons are within the two groups. After 12 weeks NAG showed a significant decrease in WC, hip circumference (HC), abdominal volume index (AVI), body roundness index (BRI), a significant increase in total cholesterol and LDL cholesterol. YOG had a significant decrease in WC, sagittal abdominal diameter, HC, BMI, WC/HC, a body shape index, conicity index, AVI, BRI, HDL cholesterol, and improved QoL. With age-wise analyses, in the 30–45 years age range the YOG showed most of the changes mentioned above whereas NAG showed no changes. In contrast for the 46–59 years age range most of the changes in the two groups were comparable.

Conclusions: Yoga and nutritional advice with a diet plan can reduce anthropometric measures associated with diseases related to central obesity, with more changes in the YOG. This was greater for the 30–45 year age range, where the NAG showed no change; while changes were comparable for the two groups in the 46–59 year age range. Hence yoga may be especially useful for adult females with central obesity between 30 and 45 years of age.

Trial registration: (CTRI/2018/05/014077).

Keywords: central obesity, anthropometry, anthropometric indices, risk of disease, yoga, nutritional advice

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BACKGROUND

The Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) study is an ongoing cross sectional national study of the prevalence of obesity, diabetes, and hypertension across the Indian sub-continent (1). In Phase 1 of the study 16,000 individuals aged 20 years and above were sampled from the whole of India. Generalized, abdominal, and combined obesity (i.e., generalized as well as abdominal) were determined based on the BMI and waist circumference using the World Health Organization Asia Pacific Guidelines (2, 3). The ICMR-INDIAB study reported a higher prevalence of isolated abdominal obesity compared to generalized obesity across India. This finding was given importance considering the association independent of ethnicity, between central obesity and several chronic non-communicable diseases such as cardiovascular disease, type 2 diabetes mellitus and certain cancers (1).

Lifestyle changes which include increased physical activity, a healthy diet and a positive attitude have been recommended for the management of obesity (4). For people who are obese and physically less active, physical activity may seem challenging (5). This would prevent persons who are obese from initiating and adhering to increased physical activity. The practice of yoga has been adopted for weight control because of its increasing popularity and relative safety while supervised (6, 7). A systematic meta-analysis assessed the effects of yoga for weight related outcomes in overweight and obese persons assessed in randomized controlled trials (RCTs) (7). Thirty trials with a total of 2,173 participants from bibliographic databases such as MEDLINE, Scopus, and Cochrane Library were screened from their inception to March 2016. The risk of bias was assessed using the Cochrane risk of bias tool which demonstrated methodological drawbacks in the 30 trials. Nonetheless the authors of the meta-analysis concluded that yoga can be considered a safe and effective intervention to reduce the BMI in overweight and obese individuals.

A single study demonstrated a decrease in central obesity in 60 female participants after 12 weeks of yoga (8). This inference was based on the waist circumference. There are several other anthropometric measures and derived anthropometric indices which have been shown to predict the risk of developing diseases associated with central obesity (9).

The aim of this study was to determine if in adult females with central obesity a 12 week program of yoga or of nutritional advice could (i) alter anthropometric measurements associated with a risk of developing diseases associated with central obesity and (ii) positively influence the lipid profile and quality of life.

MATERIALS AND METHODS

Participants

Fifty two healthy Asian Indian adult females with central obesity with ages between 30 and 59 years (group average age ± SD; 43.98 ± 6.89 years) were recruited for the trial. The trial profile is provided in **Figure 1**. The sample size was determined from a previous study on centrally obese females (8). A required sample size ($n = 20$) was obtained using Cohen's formula for the effect size of 0.40 calculated from the mean and SD values of waist circumference which were changed significantly after 12 weeks of yoga, alpha at 0.05, powered at 0.90 using G power software (10). Participants were recruited through advertisements in local newspapers and flyers distributed in nearby residential areas and hospitals. Participation in the study was voluntary with no remuneration. The inclusion criteria were (i) waist circumference ≥ 80 cm (11), (ii) BMI ≥ 25 kg/m^2 (12), (iii) ages between 30 and 59 years, and (iv) willingness to take part in the study. The exclusion criteria were (i) obesity secondary to hormonal imbalance, medication such as steroids or secondary to any other medical condition, (ii) any physical or psychological disability which would have prevented the participants from taking part in the yoga program or attending the nutritional advice session, (iii) involvement in any other dietary or exercise program during the 12 months prior to, at the time of or during the study, and (iv) any co-morbidities associated with obesity such as cardiovascular disease, type-2 diabetes mellitus, or hypertension. No participant was excluded from the trial for the above mentioned reasons. The participants' written signed informed consent was taken. The baseline characteristics of the participants are given in **Table 1**.

Study Design

The present single blind comparative controlled trial was carried out between April and August 2016 where assessors were blinded to the group to which the participants belonged. The yoga group practiced yoga for 75 min/day, for 3 consecutive days in a week, over a 12 week period. Along with this they were given a diet plan for 1,900–2,000 Kcal/day developed based on the guidelines from the National Institute of Nutrition, India (13). The nutritional advice group was given lectures on nutrition (one 45 min lecture/week) and the same diet plan for 1,900–2,000 Kcal/day developed based on the guidelines from the National Institute of Nutrition, India (13). Adherence to yoga was based on the attendance in the yoga class noted by the yoga teacher. The compliance to the diet plan was based on the 24 h diet recall questionnaire which was administered at the start and end of the 12 week period. This did not cover the dietary intake during the rest of the time which is a limitation. Both groups were assessed for levels of physical activity using the International Physical Activity Questionnaire—Short Form administered at the beginning and end of 12 weeks. The study had the approval of the ethics committee of the institute, which was formed and based on the guidelines of the Indian Council of Medical Research and is in accordance with the Helsinki Declaration (Approval number: YRD/016/022). The trial is registered with the Clinical Trials Registry of India (CTRI/2018/05/014077). The present study is part of a larger nationwide trial of which the data are still being analyzed, comparing yoga with nutritional advice in different regions of India.

At the start of the trial an attempt was made to convince participants to be randomly allocated to yoga or nutritional advice groups. However participants had time and practical constraints. Hence based on their convenience they were assigned to either intervention. However several participants of the nutritional advice group mentioned that they were interested to learn yoga later on.

University of Patanjali Haridwar

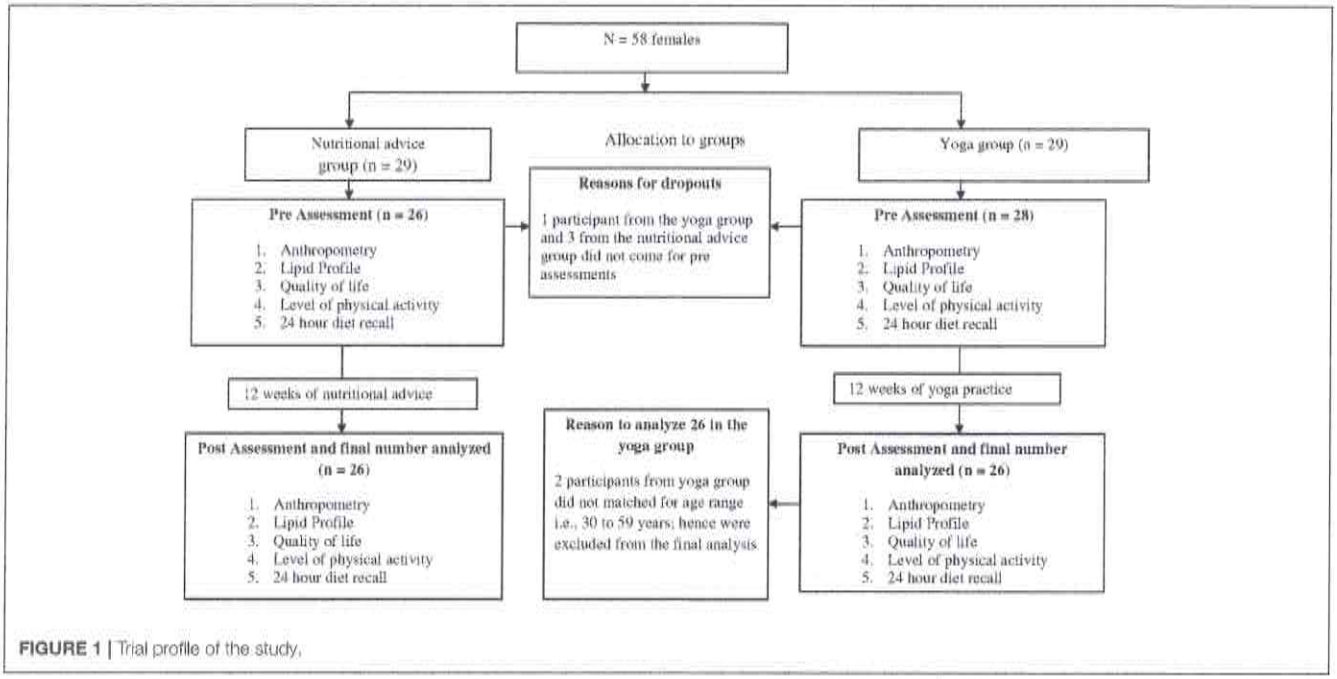

FIGURE 1 | Trial profile of the study.

TABLE 1 | The baseline characteristics of the participants.

Characteristics	Nutritional advice group	Yoga group
Number of participants (n)	26	26
Number of participants in 30–45 (years) age group	12	16
Number of participants in 46–59 (years) age group	14	10
Age in years (mean ± SD)	45.9 ± 7.4	42.5 ± 8.3
Weight in kg (mean ± SD)	74.62 ± 12.03	78.92 ± 12.03
BMI in kg/m^2 (mean ± SD)	31.75 ± 4.17	33.31 ± 4.71
Waist circumference in cm (mean ± SD)	100.77 ± 10.79	101.06 ± 8.56
Type of diet	Vegetarian	Vegetarian
Health	Normal	Normal
Taking any medication	No	No
Consumption of alcohol or nicotine in any form	No	No

Assessments

The following assessments were carried out by individuals who were blinded to the group to which the participants belonged.

Anthropometry

Waist Circumference (WC)

Participants were lightly clothed and asked to stand upright with their feet 25–30 cm apart and weight evenly distributed on both feet. The tape measure which was used for assessments (Gülick Anthropometric tape Model J00305, Lafayette Instrument, U.S.A.) was fitted around the abdomen without compressing soft tissue. The waist circumference was measured to the nearest 0.1 cm in a horizontal plane midway between the inferior costal margin and the iliac crest.

Sagittal Abdominal Diameter (SAD)

The participant was asked to lie supine on their back. The caliper used to measure the supine sagittal abdominal diameter has two arms attached to a vertical scale [Holtain-Kahn Abdominal Caliper 50 cm (98.609XL), U.K.]. The standard method was followed by which the lower arm of the caliper was placed under the participant (14). After a normal exhalation, the upper arm of the caliper was lowered to reach the mid-point between the inferior costal margin and the iliac crest. The lower arm was re-positioned if required. The reading on the vertical scale between the upper and lower arms of the caliper gave the supine sagittal abdominal diameter in cm.

Hip Circumference (HC)

The hip circumference was measured around the pelvis at the point of maximal protrusion of the buttocks. The ratio of the waist circumference to the hip circumference was derived and is a ratio of the fat stored centrally inside the abdomen (waist circumference) and fat stored peripherally (hip circumference).

Derived Anthropometric Indices

Seven anthropometric indices were derived from direct measurements using standardized formulae (9, 15–18). These indices are as follows.

Body Mass Index (BMI)

The body mass index (BMI) was calculated as the body weight (in kg), in light clothing and without footwear, divided by the height (in meters squared). The accuracy of the weighing machine

University of Patanjali Haridwar

(Model DS 215 N, Essae-Teraoka Pvt. Ltd, Bengaluru, India) was up to 0.05 kg. The height was measured to the nearest 0.1 cm.

BMI = Weight (kg)/ Height ^{2}(m).

Waist-Hip Ratio (WHR)

WHR = WC (cm)/HC (cm).

A Body Shape Index (ABSI) (9)

ABSI = WC (m)/[BMI $^{2/3}$ (kg/m^2) Height ^{½} (m)]

where WC and height are expressed in m and BMI in kg/m^2.

Conicity Index (CI) (9)

CI = 0.109 $^{-1}$ WC (m) [Weight (kg) / Height (m)] $^{-1/2}$

where WC is measured in cm, weight in kg and height in m.

Abdominal Volume Index (AVI) (9)

AVI = [2WC^2 (cm) + 0.7 (WC - HC) ^{2} (cm)]/1000

where WC and HC (hip circumference) are expressed in cm.

Visceral Adiposity Index (VAI) (15)

VAI $_{female}$ = {WC (cm)/[36.58 +1.89BMI (kg/m^2)]} [TG (mmol/L)/0.81] [1.52/HDL (mmol/L)]

where WC is expressed in cm, BMI in kg/m^2, Triglycerides in mmol/L, and HDL in mmol/L.

Body Roundness Index (BRI) (9)

BRI = 364.2 − 365.5 [1 −π $^{-2}$ WC ^{2} (m) Height $^{-2}$ (m)] $^{1/2}$

where WC and height are expressed in m.

Biochemical Measures

Antecubital venous blood samples were collected under sterile conditions. Total cholesterol, triglycerides, high density, and low density lipoprotein cholesterol were estimated using appropriate enzymes followed by spectrophotometry.

24 h Diet Recall (Energy Intake/Day)

A structured interview was carried out to recall the food and fluids which the participants had consumed in the 24 h prior to the study. The method was as follows: participants were asked (i) to recall and list the foods they had consumed during the 24 h preceding the assessment, (ii) the method of preparation (e.g., raw, cooked, boiled, or baked), (iii) the size of utensils used, the interviewer had four types of utensils (i.e., a bowl, cup, glass, and spoon), each of which had four sizes. Participants were asked to indicate the size used by them. The volume of each of the utensils of different sizes had already been determined (19). The total energy intake/day as well as the amount of macronutrients was calculated based on norms for Indian foods (13, 19, 20).

Level of Physical Activity and Energy Expenditure/Day

Physical activity was assessed using the International Physical Activity Questionnaire Short Form (IPAQ) (21). Data obtained at the beginning and end of the 12 week period for both groups were extracted using the guidelines published by the IPAQ for data processing (22). From these data the basal metabolic rate of each participant was determined and energy expenditure/day was calculated using the Harris-Benedict equation (23).

Quality of Life

The Moorehead-Ardelt Quality of Life Questionnaire was used to assess six aspects of the quality of life (QoL) (24). These were general self-esteem, physical activity, social contacts, satisfaction concerning work, pleasure related to sexuality, and focus on eating behavior, with scores ranging from −0.5 to +0.5. The sum of these 6 scores provided a total QoL score. Each score was classified into 5 categories (very poor: −3.0 to −2.1; poor: −2.0 to −1.1; fair: −1.0 to +1.0; good: 1.1 to 2.0: and very good: 2.1 to 3.0).

Interventions

Nutritional Advice

Participants received a 45 min presentation on nutrition (1 presentation/week) for 12 weeks. The person who gave the presentation had a minimum of 12 years of education including 2 years of training in science. The presenter used slides made by the research institute conducting the trial. The 12 topics of the presentations were: (i) five basic food groups, (ii) vegetarian diet, (iii) proteins, (iv) fats, (v) carbohydrates, (vi) dietary fiber, (vii) vitamins, (viii) minerals, (ix) probiotics, (x) iron deficiency, (xi) calcium, and (xii) antioxidants.

Yoga

The yoga intervention consisted of (i) a universal prayer (3 min)[1], (ii) yoga postures (*asanas*, 42 min), (iii) voluntarily regulated breathing techniques (*pranayamas*, 24 min), and (iv) guided relaxation with meditation (6 min). Yoga classes were conducted on three successive days in a week between (i) 05:30 h and 06:45 h, during the 12 weeks. Attendance was noted in each yoga class by the yoga instructor. The instructor was also asked to note any adverse event during the classes. The yoga instructor had been teaching yoga for 5 years. All the participants in the yoga group attended at least 18 out of a total of 36 yoga classes. Details of the yoga intervention are given in **Table 2**.

Diet Plan

Participants of both groups were given a diet plan for a balanced diet of 1900–2000 Kcal/day. The diet plan included fruits, vegetables, lentils, complex carbohydrates, and dairy products. Hence it was a lacto-vegetarian diet. The ratio of carbohydrates, protein and fats in the diet was based on the guidelines for a balanced diet for an Indian population published by the National Institute of Nutrition, India (13), which states that a balanced Indian diet should have 10–15% of total calories from proteins, 20–30% of calories from fats and 50–60% of calories from carbohydrates. The total energy and nutritive values of the foods were determined from a database of Indian foods (20).

[1] May all be prosperous and happy
May all be free from illness
May all see what is uplifting
May no one suffer
Peace, peace, peace

University of Patanjali Haridwar

TABLE 2 | Details of the yoga intervention.

Sl. no.		Name of the yoga practice	Duration of the practice
1	Universal prayer	*Sukhasana* (easy posture) + *Prathana mantra* (universal prayer)	3 min
2	*Pranayama* (voluntarily regulated yoga breathing)	1. *Bhastrika* (bellows yoga breathing)	3 min
		2. *Kapalabhati* (high frequency yoga breathing)	6 min
		3. *Ujjayi* (victorious breathing)	3 min
		4. *Anulom-vilom* (alternate nostril yoga breathing)	6 min
		5. *Bhramari* (bumble bee breathing)	3 min
		6. *Udgeeth* (OM chanting)	3 min
3	*Asanas* Standing postures	1. *Tirryaktadasana* (swaying palm tree pose) (right side, left side with 10 repetitions; normal breathing and eyes closed)	3 min
		2. *Trikonasana* (triangle pose) (right side followed by left side; the posture is sustained for at least 15 s on either side with eyes closed and normal breathing)	3 min
		3. *Konasana* (angle pose) (right side followed by left side; the posture is sustained for at least 15 s on either side with eyes closed and normal breathing)	3 min
		4. *Padahastasana* (hand to foot pose) (remaining in the posture for at least 15 s with normal breathing and eyes closed)	1 min
4	*Asanas* Sitting postures	1.*Chakkiasana* (mill churning pose) seated with legs extended, hands stretched out and fingers interlaced. Each movement would involve forward bending and making circles with the extended arms keeping the spine erect (15 rounds, clockwise; 15 rounds anti-clockwise with normal breathing and eyes closed)	3 min
		2. *Sthitta konaasana* (static angle pose) Extending both legs and keeping them one forearm span apart while seated, then holding the left big toe with the right hand while the left arm is extended upward. The person should face the extended left arm keeping the spine erect. During the practice there should be normal breathing and eyes closed. The posture should be maintained for at least 15 s. The practice is repeated on the opposite side.	3 min
		3. *Paschimottanasana* (seated forward bend pose) (remaining in the posture for at least 15 s with normal breathing and eyes closed)	1 min
5	*Asanas* Supine postures	1. *Ardhahalasana* (half plow pose) raising both legs to form a right angle, keeping the legs straight at the knee, repetitive (10 times with eyes closed and normal breathing)	3 min
		2. *Padavrttasana* (cyclical leg pose) raising the right leg extended at the knee and making circles in the air, rotating the leg (10 rounds clockwise and 10 rounds anticlockwise with normal breathing and eyes closed). The practice is repeated with the left leg with 10 rounds clockwise and 10 rounds anticlockwise.	6 min
		3. *Dwicakriasana* (cycling pose) repetitive (10 times with eyes closed and normal breathing)	3 min
		4. *Markatasana* (monkey pose) this is a spinal twist (right side, left side with 10 repetitions; normal breathing and eyes closed)	6 min
6	*Asanas* Prone postures	1. *Bhujangaasana* (cobra pose) two methods are followed. Method1—Lie prone with extended elbows and the palms near the chest, flat on the ground. Then the upper part of the body till the waist is raised while looking upwards and forwards. The weight of the upper parts of the body should be evenly distributed on both hands. The procedure is repeated 10 times with eyes closed and normal breathing. The second method is almost the same except that the hands are not kept apart but with the right palm over the left palm. The rest of the procedure is the same. This method is also repeated 10 times with normal breathing and eyes closed.	6 min
		2. *Salabhasana* (locust pose) (remaining in the posture for at least 15 s with normal breathing and eyes closed)	1 min
7	Guided relaxation	*Shavasana* (corpse pose) with breath awareness	6 min
		Total duration	75 min

Those practices which are commonly used are not detailed.

Data Analysis

Group as a Whole

The data obtained at the beginning and end of the 12 week period for the two groups were compared with a repeated measures analysis of variance (ANOVA) followed by multiple *post-hoc* comparisons which were Bonferroni adjusted. The ANOVA had one Within subjects factor i.e., States, with two levels (pre and post) and one Between subjects factor i.e., Groups which were (i)

University of Patanjali * Haridwar

TABLE 3 | Anthropometric variables.

Variables	Nutritional advice (n = 26)					Yoga (n = 26)				
	Pre	Post	Cohen's d	95% CI		Pre	Post	Cohen's d	95% CI	
				Lower	Upper				Lower	Upper
Waist circumference (cm)	100.8 ± 10.8	97.9 ± 8.6*	0.30	0.72	5.00	101.1 ± 8.6	94.8 ± 7.1***	0.81	4.14	8.41
SAD (cm)	23.5 ± 2.8	23.3 ± 2.3	0.08	−0.35	0.73	24.1 ± 2.6	23.1 ± 2.6**	0.39	0.45	1.52
Hip circumference (cm)	111.7 ± 7.4	109.2 ± 6.8**	0.36	0.79	4.16	112.3 ± 10.4	107.8 ± 9.3***	0.46	2.79	6.16
BMI (kg/m^2)	31.8 ± 4.2	31.3 ± 4.1	0.12	−0.10	1.06	33.3 ± 4.7	32.2 ± 5.4***	0.22	0.52	1.68
Waist/hip ratio	0.9 ± 0.1	0.9 ± 0.1	0.17	−0.01	0.03	0.9 ± 0.1	0.9 ± 0.1*	0.31	0.00	0.04
A body shape index	0.081 ± 0.01	0.079 ± 0.01@	0.22	−0.02	0.29	0.079 ± 0.01	0.06 ± 0.01*	0.21	0.04	0.35
Conicity index	1.3 ± 0.1	1.3 ± 0.1	0.21	−0.00	0.05	1.3 ± 0.2	1.3 ± 0.1**	0.28	0.01	0.06
Abdominal volume index	20.7 ± 4.3	19.4 ± 3.4**	0.33	0.44	2.02	21.2 ± 6.1	19.3 ± 5.6***	0.33	1.08	2.65
Visceral adiposity index	2.9 ± 1.4#	3.0 ± 2.1	0.02	−0.51	0.44	2.2 ± 1.1	2.3 ± 0.9	0.07	−0.51	0.37
Body roundness index	6.9 ± 2.0	6.4 ± 1.5**	0.30	0.18	0.84	7.0 ± 2.4	6.3 ± 2.2***	0.33	0.40	1.06

Values are group mean± SD.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$, post-hoc analyses with Bonferroni adjustment, post values compared with pre.*
#$p < 0.05$, post-hoc analyses with Bonferroni adjustment, pre values compared with pre.
@$p < 0.05$, post-hoc analyses with Bonferroni adjustment, post values compared with post.
BMI, Body mass index; SAD, Sagittal abdominal diameter.

TABLE 4 | Lipid profile.

Variables	Nutritional advice (n = 26)					Yoga (n = 26)				
	Pre	Post	Cohen's d	95% CI		Pre	Post	Cohen's d	95% CI	
				Lower	Upper				Lower	Upper
Total cholesterol (mmol/L)	4.6 ± 0.8	5.0 ± 0.8**	0.54	−0.7	−0.15	4.6 ± 0.8	4.6 ± 1.0	0.02	−0.3	0.23
Triglycerides (mmol/L)	1.72 ± 0.7#	1.7 ± 0.7@@	0.01	−0.21	0.19	1.35 ± 0.5	1.30 ± 0.42	0.18	−0.11	0.27
LDL cholesterol (mmol/L)	2.8 ± 0.6	3.0 ± 0.6*	0.41	−0.44	−0.02	3.1 ± 0.6	3.0 ± 0.7	0.15	−0.08	0.27
HDL cholesterol(mmol/L)	1.2 ± 0.3	1.3 ± 0.3	0.13	−0.14	0.06	1.23 ± 0.24	1.1 ± 0.3*	0.50	0.03	0.22
VLDL (mmol/L)	0.77 ± 0.3#	0.78 ± 0.29@@	0.04	−0.10	0.08	0.58 ± 0.24	0.56 ± 0.15	0.12	−0.06	0.11

Values are group mean ± SD.
*$p < 0.05$; **$p < 0.01$, post-hoc analyses with Bonferroni adjustment, post values compared with pre.*
@@$p < 0.01$, post-hoc analyses with Bonferroni adjustment, post values compared with post.
#$p < 0.05$, post-hoc analyses with Bonferroni adjustment, pre values compared with pre.

TABLE 5 | Estimated energy intake/day based on 24 h diet recall questionnaire.

Variables	Nutritional advice (n = 26)					Yoga (n = 26)				
	Pre	Post	Cohen's d	95% CI		Pre	Post	Cohen's d	95% CI	
				Lower	Upper				Lower	Upper
Protein (gm)/day	53.8 ± 17.4	55.7 ± 10.3	0.13	−9.15	5.44	59.0 ± 14.0	50.7 ± 10.4	0.68	1.24	15.23
Fat (gm)/day	47.5 ± 19.6	46.9 ± 18.5	0.03	−8.87	10.03	39.2 ± 14.1	41.4 ± 16.7	0.15	−11.88	7.39
Carbohydrates (gm)/day	193.6 ± 76.9	222.0 ± 77.5	0.38	−79.07	22.12	216.5 ± 55.4	248.7 ± 114.2	0.37	−82.78	18.42
Energy intake (Kcal)/day	1625.9 ± 395.4	1716.3 ± 384.6	0.24	−320.57	139.89	1753.5 ± 423.5	1590.6 ± 366.0	0.42	−67.33	393.13

Values are group mean ± SD.

nutritional advice group with a diet plan of 1900–2000 Kcal/day and (ii) yoga group who had a similar diet plan of 1900–2000 Kcal/day, as the nutritional advice group.

Analysis Based on Age

Both nutritional advice and yoga groups were subdivided based on age as (i) participants between 30 and 45 years and (ii) those who were 46 years and above.

For (i) and (ii) there were separate between group comparisons of values at baseline and after 12 weeks using t-tests for unpaired data. Within the groups baseline data and date at 12 weeks were compared with t-tests for paired data.

RESULTS

None of the participants reported any adverse events during the trial. At baseline the visceral adiposity index (VAI), levels of triglycerides and of VLDL differed significantly between the nutritional advice and yoga groups. The group mean values ±

University of Patanjali Haridwar

TABLE 6 | Estimated energy expenditure/day based on (i) International Physical Activity Questionnaire—Short Form and (ii) Harris-Benedict equation to determine the basal metabolic rate.

Variable	Nutritional advice (n = 26)					Yoga (n = 26)				
	Pre	Post	Cohen's d	95% CI		Pre	Post	Cohen's d	95% CI	
				Lower	Upper				Lower	Upper
Total energy (Kcal) spent/day	2022.6 ± 238.7	1995.6 ± 205.7	0.12	−87.79	141.78	2158.8 ± 322.6	2019.5 ± 219.8	0.52	24.10	253.67

Values are group mean ± SD.

TABLE 7 | Quality of life.

Variables	Nutritional advice (n = 26)					Yoga (n = 26)				
	Pre	Post	Cohen's d	95% CI		Pre	Post	Cohen's d	95% CI	
				Lower	Upper				Lower	Upper
General self-esteem	0.22 ± 0.27	0.3 ± 0.16	0.37	−0.185	0.015	0.22 ± 0.25	0.30 ± 0.16	0.39	−0.188	0.012
Physical activity	0.25 ± 0.23	0.32 ± 0.15	0.37	−0.165	0.026	0.24 ± 0.23	0.25 ± 0.22	0.05	−0.130	0.61
Social contacts	0.22 ± 0.29	0.30 ± 0.15	0.35	−0.104	0.081	0.24 ± 0.23	0.30 ± 0.17	0.30	−0.130	0.168
Satisfaction concerning work	0.32 ± 0.14	0.35 ± 0.12	0.24	−0.108	0.046	0.29 ± 0.25	0.29 ± 0.22	0.00	−0.085	0.069
Pleasure related to sexuality	0.04 ± 0.31	0.14 ± 0.31	0.33	−0.196	0.034	0.07 ± 0.31	0.14 ± 0.25	0.25	−0.184	0.046
Focus on eating behavior	0.29 ± 0.22	0.27 ± 0.21	0.09	−0.072	0.110	0.2 ± 0.3	0.29 ± 1.9*	0.07	−0.183	−0.001
Total quality of life	1.34 ± 0.93	1.67 ± 0.78	0.39	−0.675	0.014	1.23 ± 1.06	1.58 ± 0.87*	0.37	−0.690	−0.002

Values are group mean ± SD.
$p < 0.05$, post-hoc analyses with Bonferroni adjustment, post values compared with pre.

SD for the (i) anthropometric measures and anthropometric indices, (ii) lipid profile, (iii) energy intake/day and energy expenditure/day, and (iv) quality of life are given in **Tables 3–7**.

Repeated Measures Analysis of Variance (RM-ANOVA)

The ANOVA values for the Within-Subjects factor (States), Between-Subjects factor (Groups) and interaction between the two are given below. The details of the ANOVA are available in the **Supplementary Material**.

Within-Subjects Factor (States)

There were significant differences between post and pre states for waist circumference ($F = 36.92$, $p < 0.001$), sagittal abdominal diameter ($F = 9.66$, $p < 0.01$), hip circumference ($F = 34.41$, $p < 0.001$), BMI ($F = 14.88$, $p < 0.001$), a body shape index ($F = 20.77$, $p < 0.01$), conicity index ($F = 13.09$, $p < 0.001$), abdominal volume index ($F = 31.05$, $p < 0.001$), body roundness index ($F = 28.78$, $p < 0.001$), total cholesterol ($F = 5.71$, $p < 0.05$), general self-esteem ($F = 6.05$, $p < 0.05$), and total quality of life ($F = 7.80$, $p < 0.01$). For all comparisons mentioned above the condition of sphericity was met and value of epsilon (Huynh-Feldt, Greenhouse-Geisser) was 1. The degrees of freedom for all variables were 1,50.

Between-Subjects Factors (Groups)

There were significant differences between the groups in a body shape index ($F = 4.10$, $p < 0.05$), triglycerides ($F = 8.23$, $p < 0.01$), and VLDL ($F = 9.94$, $p < 0.01$). The condition of sphericity was met for the comparisons and value of epsilon (Huynh-Feldt, Greenhouse- Geisser) was 1. The degrees of freedom for all variables were 1,50.

Interaction Between States and Groups

Interaction between States and Groups was significant for waist circumference ($F = 5.11$, $p < 0.05$), total cholesterol ($F = 4.69$, $p < 0.05$), LDL cholesterol ($F = 5.77$, $p < 0.05$), and HDL cholesterol ($F = 5.44$, $p < 0.05$). A significant interaction between States and Groups suggests that the effects of the two factors are interdependent. For all comparisons the condition of sphericity was met and value of epsilon (Huynh-Feldt, Greenhouse-Geisser) was 1. The degrees of freedom for all variables were 1, 50 (States) x 50 (Groups).

Post-hoc Analyses

There were two *post-hoc* comparisons: (i) Between groups [at baseline (pre) and at 12 weeks (post)] and (ii) Within groups, comparing values obtained at 12 weeks (post) with those at baseline (pre).

Post-hoc Between Groups Comparisons

At baseline (pre) the visceral adiposity index (VAI, $p < 0.05$), VLDL ($p < 0.05$) and triglyceride levels ($p < 0.05$) were significantly higher in the nutritional advice group compared to the yoga group. After 12 weeks (post) a body shape index ($p < 0.01$), the triglyceride levels ($p < 0.01$), and VLDL ($p < 0.01$) levels were higher in the nutritional advice group compared to the yoga group.

University of Patanjali Haridwar

TABLE 8 | Anthropometric variables and derived indices for two age range i.e., 30-45 and 46-59 year.

Variables	Nutritional advice				Yoga			
	Pre	Post	*t* value	Cohen's d	Pre	Post	*t* value	Cohen's d
Age range	**30–45 Years age range**							
Number of participants (n)	12				16			
Waist circumference (cm)	97.3 ± 12.3	98.0 ± 10.6	0.52	0.07	101.6 ± 9.3	95.3 ± 8.4***	5.77	0.71
SAD (cm)	22.0 ± 2.7	22.6 ± 2.5	1.25	0.25	24.0 ± 2.6	23.1 ± 2.8**	3.34	0.34
Hip circumference (cm)	110.8 ± 9.5	109.7 ± 9.0	0.70	0.12	113.2 ± 11.8	108.9 ± 9.8**	4.25	0.40
BMI (kg/m^2)	30.5 ± 4.8	30.6 ± 4.5	0.20	0.02	33.1 ± 4.9	32.0 ± 4.7**	4.08	0.24
Waist/hip ratio	0.9 ± 0.1	0.9 ± 0.1	0.88	0.17	0.9 ± 0.1	0.9 ± 0.1	1.98	0.25
A body shape index	0.1 ± 0.0	0.1 ± 0.0	0.368	0.00	0.08 ± 0.0	0.08 ± 0.0**	4.0	0.31
Conicity index	1.3 ± 0.1	1.3 ± 0.1	0.75	0.10	1.3 ± 0.2	1.3 ± 0.2*	2.68	0.18
Abdominal volume index	19.4 ± 4.9	19.5 ± 4.2	0.31	0.04	22.3 ± 7.3	20.5 ± 6.7***	4.48	0.27
Visceral adiposity index	2.9 ± 1.4	2.6 ± 1.3	0.92	0.26	2.1 ± 1.0	2.3 ± 0.8	1.65	0.28
Body roundness index	6.2 ± 2.1	6.3 ± 1.8	0.35	0.04	7.4 ± 2.9	6.7 ± 2.6**	4.01	0.26
Age range	**46–59 Years**							
Number of participants (n)	14				10			
Waist circumference (cm)	103.8 ± 8.7#	97.9 ± 6.8***	3.26	0.79	100.2 ± 7.7	93.9 ± 4.8**	3.33	1.03
SAD (cm)	24.8 ± 2.3	23.9 ± 2.0**	4.64	0.42	24.2 ± 2.7	23.1 ± 2.3*	2.99	0.46
Hip circumference (cm)	112.5 ± 5.2	108.8 ± 4.4**@	3.30	0.80	110.8 ± 8.1	106.2 ± 8.7**	4.59	0.59
BMI (kg/m^2)	32.9 ± 3.4	31.9 ± 3.7	2.15	0.28	33.6 ± 4.6	32.6 ± 4.1*	2.36	0.24
Waist/hip ratio	0.9 ± 0.1	0.9 ± 0.1*	2.19	0.32	0.9 ± 0.0	0.9 ± 0.0	1.07	0.30
A body shape index	0.08 ± 0.0	0.08 ± 0.0**	3.43	0.10	0.08 ± 0.0	0.1 ± 0.0*	2.94	0.42
Conicity index	1.4 ± 0.1	1.3 ± 0.1**	4.18	0.77	1.3 ± 0.1	1.2 ± 0.1	2.01	0.55
Abdominal volume index	21.8 ± 3.5	19.4 ± 2.6***	4.61	0.82	19.4 ± 2.7	17.4 ± 2.2**	3.30	0.82
Visceral adiposity index	2.9 ± 1.4	3.3 ± 2.6	0.79	0.20	2.4 ± 1.2	2.2 ± 1.0	1.11	0.19

Values are group mean ± SD.
$^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$, paired t-test, post values compared with pre.
@$p < 0.05$, Unpaired t-test, post values compared with post.
#$p < 0.05$, Unpaired t-test, pre values compared with pre.
BMI, Body mass index; SAD, Sagittal abdominal diameter.

Post-hoc Comparisons Within a Group (Post-Pre)

The nutritional advice group showed a significant decrease in the waist circumference ($p < 0.05$), hip circumference ($p < 0.01$), abdominal volume index ($p < 0.01$), body roundness index ($p < 0.01$), a significant increase in total cholesterol ($p < 0.01$), and LDL cholesterol ($p < 0.05$).

The yoga group had a significant decrease in waist circumference ($p < 0.001$), sagittal abdominal diameter ($p < 0.01$), hip circumference ($p < 0.001$), BMI ($p < 0.001$), waist/hip ratio ($p < 0.05$), a body shape index ($p < 0.05$), conicity index ($p < 0.01$), abdominal volume index ($p < 0.001$), body roundness index ($p < 0.001$), HDL cholesterol ($p < 0.05$), improved quality of life, i.e., focus on eating behavior ($p < 0.05$) and total quality of life ($p < 0.05$).

Age Wise Analysis (*t*-Tests)

The participants of both groups were divided as two groups based on age, viz., 30–45 years and 46–59 years. For each age group, comparisons were made between nutritional advice and yoga groups using *t*-tests for unpaired data and within each group using *t*-tests for paired data. The age wise group mean values ± SD for the (i) anthropometric measures and anthropometric indices, (ii) lipid profile, (iii) energy intake/day and energy expenditure/day, and (iv) quality of life are given in **Tables 8–12**.

Age Group 30–45 Years

Between Groups

At baseline the triglyceride levels and the focus on eating behavior (an aspect of the quality of life) were lower in the yoga group ($p < 0.05$, both cases) compared to the nutritional advice group. There were no differences at 12 weeks between groups.

Within Groups

There were no significant changes in the nutritional advice group. In the yoga group there was a decrease in waist circumference, sagittal abdominal diameter, hip circumference, BMI, a body shape index, conicity index, abdominal volume index, and body roundness index ($p < 0.05$ in all cases).

University of Patanjali Haridwar

TABLE 9 | Lipid profile for two age range i.e., 30–45 and 46–59 year.

Variables	Nutritional advice				Yoga			
	Pre	Post	*t* value	Cohen's d	Pre	Post	*t* value	Cohen's d
Age range	**(30–45 Years)**							
Number of participants (n)	12				16			
Total cholesterol (mmol/L)	4.58 ± 0.78	5.43 ± 0.62	3.71	1.26	4.34 ± 0.77	4.20 ± 0.74	1.59	0.19
Triglycerides (mmol/L)	1.75 ± 0.80#	1.64 ± 0.52	0.55	0.17	1.22 ± 0.36	1.24 ± 0.34	0.39	0.07
LDL cholesterol (mmol/L)	2.95 ± 0.49	3.41 ± 0.48	3.37	0.98	2.89 ± 0.59	2.76 ± 0.62	1.72	0.22
HDL cholesterol (mmol/L)	1.17 ± 0.19	1.33 ± 0.24	1.60	0.74	1.22 ± 0.22	1.08 ± 0.20	3.33	0.68
VLDL (mmol/L)	0.75 ± 0.32	0.72 ± 0.20	0.39	0.13	0.54 ± 0.17	0.54 ± 0.13	0.20	0.05
Age range	**(46–59 Years)**							
Number of participants (n)	14				10			
Total cholesterol (mmol/L)	4.55 ± 0.84	4.54 ± 0.78	0.04	0.01	5.08 ± 0.55	5.35 ± 0.86	1.14	0.39
Triglycerides (mmol/L)	1.70 ± 0.56	1.82 ± 0.79	0.78	0.19	1.56 ± 0.62	1.32 ± 0.42	1.59	0.48
LDL cholesterol (mmol/L)	2.65 ± 0.60	2.62 ± 0.43	0.19	0.05	3.36 ± 0.42	3.31 ± 0.83	0.25	0.07
HDL cholesterol (mmol/L)	1.28 ± 0.40	1.20 ± 0.32	1.09	0.23	1.28 ± 0.28	1.18 ± 0.35	1.78	0.33
VLDL (mmol/L)	0.78 ± 0.26	0.84 ± 0.38	0.78	0.19	0.66 ± 0.31	0.60 ± 0.19	0.88	0.25

Values are group mean ± SD.
#p < 0.05, Unpaired t-test, pre values compared with pre.

TABLE 10 | Estimated energy intake/day based on 24 h diet recall questionnaire for two different age range i.e., 30–45 and 46–59 year.

Variables	Nutritional advice				Yoga			
	Pre	Post	*t* value	Cohen's d	Pre	Post	*t* value	Cohen's d
Age range	**(30–45 Years)**							
Number of participants (n)	12				16			
Protein (gm)/day	51.9 ± 19.3	55.9 ± 12.0	0.54	0.26	64.5 ± 13.5	53.6 ± 8.9	2.79	0.98
Fat (gm)/day	52.3 ± 22.1	54.9 ± 17.5	0.34	0.17	37.8 ± 13.2	42.7 ± 17.8	0.77	0.32
Carbohydrates (gm)/day	198.0 ± 76.9	216.8 ± 60.8	0.68	0.28	238.2 ± 45.5	251.1 ± 97.6	0.43	0.18
Energy intake (Kcal)/day	1601.4 ± 447.1	1738.8 ± 292.3	0.83	0.38	1744.6 ± 299.8	1679.9 ± 425.1	0.49	0.18
Age range	**(46–59 Years)**							
Number of participants (n)	14				10			
Protein (gm)/day	55.9 ± 15.7	55.5 ± 8.6	0.09	0.03	50.7 ± 9.9	46.4 ± 11.5	1.03	0.42
Fat (gm)/day	43.4 ± 16.9	40.1 ± 16.9	0.53	0.20	41.7 ± 16.0	39.2 ± 15.3	0.37	0.17
Carbohydrates (gm)/day	189.8 ± 79.5	226.5 ± 91.5	1.09	0.45	181.8 ± 53.8	244.7 ± 142.6	1.12	0.62
Energy intake (Kcal)/day	1646.9 ± 361.3	1696.9 ± 459.6	0.29	0.13	1767.8 ± 589.9	1447.7 ± 184.8	1.58	0.77

Values are group mean ± SD.

Age Group 46–59 Years

Between Groups

At baseline the waist circumference and satisfaction concerning work (of the quality of life scale) were higher in the nutritional advice group compared to the yoga group ($p < 0.05$). At 12 weeks the hip circumference and satisfaction concerning work remained higher in the nutritional advice group compared to the yoga group ($p < 0.05$ both cases).

Within Groups

The nutritional advice group showed a decrease in waist circumference, sagittal abdominal diameter, hip circumference, waist-hip ratio, a body shape index, conicity index, abdominal volume index, and body roundness index ($p < 0.05$ in all cases). The yoga group had a significant decrease in waist circumference, sagittal abdominal diameter, hip circumference, BMI, a body shape index, abdominal volume index, body roundness index, and total quality of life ($p < 0.05$ in all cases). The significant results have been summarized in the **Supplementary Material**.

DISCUSSION

Following 12 weeks of nutritional advice there was a significant decrease in waist circumference, hip circumference, abdominal

University of Patanjali ★ Haridwar

TABLE 11 | Estimated energy expenditure/day based on (i) International Physical Activity Questionnaire—Short Form and (ii) Harris-Benedict equation to determine the basal metabolic rate for two different age range i.e., 30-45 and 46-59 years.

Variables	Nutritional advice (n = 12)				Yoga (n = 16)			
	Pre	Post	t value	Cohen's d	Pre	Post	t value	Cohen's d
Age range				(30–45 Years)				
Number of participants (n)		12				16		
Total energy (Kcal) spent/day	2027.8 ± 275.2	2035.0 ± 233.8	0.07	0.03	2173.0 ± 299.5	2007.1 ± 226.9	2.40	0.65
Age range				(46–59 Years)				
Number of participants (n)		14				10		
Total energy (Kcal) spent/day	2018.2 ± 213.2	1961.9 ± 180.0	0.75	0.30	2136.2 ± 372.5	2040.6 ± 218.3	1.00	0.33

Values are group mean ± SD.

TABLE 12 | Quality of life for two different age range i.e., 30–45 and 46–59 years.

Variables	Nutritional advice				Yoga			
	Pre	Post	t value	Cohen's d	Pre	Post	t value	Cohen's d
Age range				(30–45 Years)				
Number of participants (n)		12				16		
General self-esteem	0.3 ± 0.2	0.29 ± 0.19	0.15	0.06	0.2 ± 0.3	0.3 ± 0.2	0.99	0.28
Physical activity	0.3 ± 0.2	0.3 ± 0.2	0.24	0.06	0.3 ± 0.2	0.3 ± 0.2	0.11	0.00
Social contacts	0.2 ± 0.3	0.3 ± 0.2	1.27	0.60	0.2 ± 0.3	0.3 ± 0.2	0.63	0.23
Satisfaction concerning work	0.3 ± 0.2	0.3 ± 0.1	0.0	0.00	0.4 ± 0.2	0.3 ± 0.2	0.48	0.17
Pleasure related to sexuality	0.1 ± 0.3	0.1 ± 0.3	0.14	0.04	0.2 ± 0.2	0.2 ± 0.2	0.89	0.30
Focus on eating behavior	0.3 ± 0.2[#]	0.2 ± 0.2	0.89	0.33	0.2 ± 0.3	0.3 ± 0.2	1.23	0.44
Total quality of life	1.4 ± 0.7	1.5 ± 0.9	0.36	0.09	1.5 ± 0.9	1.8 ± 0.8	1.15	0.32
Age range				(46–59 Years)				
Number of participants (n)		14				10		
General self-esteem	0.2 ± 0.4	0.3 ± 0.1	1.93	0.58	0.2 ± 0.3	0.3 ± 0.1	1.59	0.65
Physical activity	0.2 ± 0.3	0.4 ± 0.1	1.97	0.74	0.1 ± 0.3	0.2 ± 0.2	1.27	0.34
Social contacts	0.3 ± 0.3	0.3 ± 0.2	0.60	0.17	0.3 ± 0.2	0.2 ± 0.2	0.16	0.05
Satisfaction concerning work	0.3 ± 0.1[#]	0.4 ± 0.1[@]	1.37	0.72	0.2 ± 0.3	0.2 ± 0.3	1.21	0.25
Pleasure related to sexuality	−0.0 ± 0.3	0.1 ± 0.3	1.58	0.44	−0.1 ± 0.4	0.0 ± 0.3	0.85	0.29
Focus on eating behavior	0.3 ± 0.3	0.3 ± 0.2	0.38	0.10	0.2 ± 0.3	0.3 ± 0.1	1.72	0.63
Total quality of life	1.3 ± 1.1	1.8 ± 0.7	1.87	0.82	0.8 ± 1.2	1.3 ± 1.0[*]	2.57	0.47

Values are group mean±SD.

[*] $p < 0.05$, *Paired t-test, post values compared with pre.*

[@] $p < 0.05$, *Unpaired t-test, post values compared with post.*

[#] $p < 0.05$, *Unpaired t-test, pre values compared with pre.*

volume index, and increase in total cholesterol and LDL cholesterol. The yoga group at the end of 12 weeks showed a decrease in waist circumference, sagittal abdominal diameter, hip circumference, BMI, waist-hip ratio, a body shape index, conicity index, abdominal volume index, body roundness index, HDL cholesterol, and better total quality of life. When both groups were considered as two age ranges (i.e., 30–45 and 46–59 years), the results were different. For the 30–45 years age group the nutritional advice group showed no change after 12 weeks whereas the yoga group showed most of the changes mentioned above for the group as a whole. In contrast to this for the 46–59 year age group, the nutritional advice and yoga groups showed comparable benefits with reduction in most-anthropometric measures and indices at 12 weeks. Hence yoga may be especially useful for adult females between 30 and 45 years of age.

The waist circumference, hip circumference, abdominal volume index, and body roundness decreased in both groups irrespective of age. The waist circumference correlates with increased risk of cardiovascular disease (25), the abdominal volume index has been correlated with impaired glucose tolerance and higher incidence of type 2 DM and metabolic syndrome (26). Body roundness index was associated with higher occurrence of non-alcoholic fatty liver disease (27). Hence the risk of these conditions could be considered to be lower in both groups at 12 weeks. The other changes in the yoga group also suggest a reduction in the risk of

University of Patanjali * Haridwar

developing obesity associated diseases such as carotid artery stiffness (28) and insulin resistance (29), based on a decrease in SAD, cardiovascular disease (based on reduction in waist-hip ratio and conicity index (30), and cardiometabolic disease (based on reduced a body shape index and BMI) (31). Hence these risk factors reduced in the yoga group irrespective of age.

The serum lipid profile was assessed using quantitative methods. The yoga group showed a significant decrease in HDL cholesterol. This reduction in HDL cholesterol has been seen in two other studies, in which obese participants received yoga for 6 days and 15 days (32, 33). In both studies participants consumed a plant based lacto vegetarian diet comparable to that of the present study. In another study, 12 weeks of yoga practice resulted in a significant decrease in total cholesterol, triglycerides and LDL levels with a non-significant increase in HDL levels (34). The participants' diet was not described. It has been observed that those diets which are most effective in reducing the risk of atherosclerosis are usually associated with the greatest decrease in protective HDL cholesterol levels (35–37). These diets are typically plant based high fiber low fat diets. However this reduction in protective HDL cholesterol levels following such diets need not necessarily be harmful as separate studies have shown that even if HDL levels decrease, the anti-inflammatory efficacy of HDL cholesterol may be enhanced despite reduction in absolute levels of HDL (38, 39).

In the nutritional advice group there was a significant increase in total cholesterol, and LDL levels. The explanation for this increase is not clear as the nutritional advice group was given the same dietary instructions as the yoga group. Mental stress levels have a positive correlation with total cholesterol, triglycerides and LDL cholesterol levels (40–42). Practicing yoga is one of the methods for stress reduction. Even though the stress levels were not measured in the present study it may be speculated that in the absence of yoga intervention the nutritional advice group continued to experience higher stress levels which contributed to the increase in total cholesterol, and LDL cholesterol levels. Though this is a speculation it is supported by the results of the participants' response to the six items of the Moorehead-Ardelt Quality of Life Questionnaire.

The yoga group showed significantly higher scores in focus on eating behavior (an aspect of quality of life) and total quality of life after 12 weeks. Previously the Moorehead-Ardelt Quality of Life Questionnaire has been used to compare the quality of life in obese persons who were experienced in yoga compared to those without any yoga experience and demonstrated a better quality of life in the group with prior yoga experience (43). These findings are of importance as psychological wellbeing is important for the long term successful management of obesity (44).

The centrally obese participants of the present trial showed no differences in their energy intake or energy expenditure after 12 weeks irrespective of the group to which they belonged. Energy intake was derived from the 24 h diet recall questionnaire which does not give an accurate idea of the diet during the 12 week period. Hence though the present results suggest that the energy intake in a day did not differ significantly with the energy expenditure in a day, between groups after 12 weeks it must be emphasized that both energy intake/day and energy expenditure/day were assessed by qualitative methods which lack the accuracy and objectivity of quantitative assessments.

The main limitations of the present findings are the study design and small sample size. Both the yoga and nutritional advice groups were given their intervention based on convenience, though the nutritional advice group did express an interest to learn yoga at some stage after the trial. The ideal design would have been a randomized controlled trial but after recruitment it was clear that though the participants were motivated to learn yoga, for personal reasons such as time constraints they were unable to state that they could complete 12 weeks of yoga practice successfully. This point demonstrates the practical difficulties a person may have in learning and practicing any intervention. Apart from this, though the supine sagittal abdominal diameter through anthropometry is an acceptable method to measure visceral adipose tissue, magnetic resonance imaging (MRI), dual-energy x-ray absorptiometry (DEXA), and computed tomography (CT) scans would be more accurate (30). To distinguish between types of adipose tissue in central obesity these methods are essential. The other limitations include the lack of quantitative measures to assess energy expenditure/day and energy intake/day. Also the present sample included females alone, all of whom were generational vegetarians. Hence generalizing the findings cannot be done.

CONCLUSIONS

Yoga and nutritional advice with a diet plan can reduce anthropometric measures associated with diseases related to central obesity, with more changes in the yoga group. This difference was greater for the 30–45 years age range, where the nutritional advice group showed no change; while changes were comparable for the two groups in the 46–59 year age range. Hence yoga may be especially useful for adult females with central obesity between 30 and 45 years of age.

AUTHOR CONTRIBUTION

ST, SS, and AB designed the study. NK and SP performed data collection and analyses. ST and SS wrote the manuscript. NK, SP, and RG prepared the manuscript. ST, SS, NK, SP, RG, and AB proofread the manuscript.

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University of Patanjali Haridwar

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fendo.2018.00466/full#supplementary-material

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Changes in Shape and Size Discrimination and State Anxiety After Alternate-Nostril Yoga Breathing and Breath Awareness in One Session Each

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Background: Yoga breathing techniques like high-frequency yoga breathing (HFYB) and breath awareness (BAW) have been associated with improved performance in the shape and size discrimination task. A PubMed search of the literature revealed that alternate-nostril breathing has been shown to improve performance in attention tasks, but the effect on tactile perception has not been studied. Hence, the present study was designed to assess the immediate effects of alternate-nostril yoga breathing (ANYB) compared to breath awareness on shape and size discrimination and state anxiety.

Material/Methods: Fifty healthy male volunteers ages 20–50 years (group mean ±S.D., 28.4±8.2 years) were recruited. Each participant was assessed in 3 sessions conducted on 3 separate days at the same time of day. The 3 sessions were (i) alternate-nostril yoga breathing (ANYB), (ii) breath awareness (BAW), and (iii) quiet sitting (QS), and the sequence of the sessions was randomly allocated. The shape and size discrimination task and state anxiety were assessed before and after all 3 sessions. Repeated measures analysis of variance (RM-ANOVA) followed by *post hoc* tests for multiple comparisons, which were Bonferroni-adjusted, were performed to compare data before and after all 3 sessions using SPSS version 18.0.

Results: The errors scores in the shape and size discrimination task showed a significant reduction after the ANYB session ($p<0.001$). A significant reduction was found in the level of state anxiety after breath awareness ($p<0.05$) and quiet sitting sessions ($p<0.001$).

Conclusions: The present results suggest that ANYB: (i) improves performance in a task which requires perceptual sensitivity and focused attention, but (ii) does not reduce state anxiety following this task.

MeSH Keywords: Anxiety • Breathing Exercises • Discrimination (Psychology)

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Background

Perception is a complex process which involves sensory input, memory, recognition and synthesizing information from these sources [1]. Acuity in perception involves sensory discrimination and the ability to detect minor increments or decrements in specific attributes of the stimulus being perceived [2]. Shape and size discrimination require tactile information about the objects being perceived. This information is typically obtained by stereotypical movements, especially scanning movements of the fingers [3,4].

Practicing yoga techniques has been shown to influence perception, since an early study on Burmese Buddhist meditators found practitioners were particularly sensitive to the size, shape, color, and texture of visual stimuli [5]. Subsequent studies have also shown improved visual perception for a flickering light stimulus [6] and for geometric optical illusions [7].

The Chinese practice of tai chi, which has some similarities with yoga, was found to improve tactile perception in those who had experience of tai chi practice [8]. A blinded experimenter assessed tactile sensitivity in tai chi practitioners compared with controls. Tai chi practitioners' tactile spatial acuity was better than that of the matched controls [8].

A single study showed that 2 yoga breathing practices – high-frequency yoga breathing HFYB (*kapalabhati* in Sanskrit; rate 1.0 Hz) and breath awareness – decreased the errors and the time taken to complete a shape and size discrimination task [9].

Perceptual discrimination requires focusing on the stimuli and focusing is usually associated with increased sympathetic nervous system activity [3]. Sympathetic nervous activity (SNSa) is usually increased when a person is anxious and, in turn, anxiety further increases SNSa.

A specific yoga breathing practice involving breathing through the left and right nostril alternately (alternate-nostril yoga breathing) was found to improve the performance in a Purdue pegboard task, and, in a separate study, performance in a digit vigilance task, while in both studies, alternate-nostril breathing practice was associated with reduced systolic and diastolic blood pressure values [10,11]. This was observed as an immediate effect of 18 minutes of alternate-nostril yoga breathing.

Given the paucity of information on the effect of yoga on tactile discrimination, the present study was designed to assess study whether 18 minutes of alternate-nostril yoga breathing or 18 minutes of breath awareness would influence: (i) shape and size discrimination and (ii) state anxiety, when compared to 18 minutes of sitting quietly as a control.

Material and Methods

Participants

Fifty healthy male volunteers ages 20–50 years (group mean ±S.D., 28.4±8.2 years) were recruited. Male participants alone were selected because visuotactile perception has been shown to change with the phases of the menstrual cycle in females [12]. Participants were staying at a residential yoga center located in north India. The inclusion criteria were: (i) the participants had to have at least 3 months of experience in the yoga breathing practices (i.e., ANYB and BAW), (ii) normal vision which did not require correction (based on their self-report), and (iii) normal tactile sensation of the volar surfaces of the fingers based on the participants' ability to sense the test material through touch during the explanation prior to testing. Participants were excluded if they: (i) were on any medication which could impair cognition or cause drowsiness, (ii) had any illness, particularly psychiatric disorders, which could influence cognition and state anxiety, and (iii) if they had calluses or impaired sensation in the fingers based on observation. Since none of the participants had any of the conditions for exclusion, they did not need to be removed from the study. Participants were recruited by notices on the institution's notice boards. They did not receive any incentive to take part in the study. Calculations using G Power Software Version 3.1 based on changes in state anxiety after breath awareness, where effect size=0.175 (medium), showed that the power was adequate (0.678) [13]. Signed informed consent was obtained from each participant and the study was approved by the Institutional Ethics Committee (approval number: PRF/16/0026).

Study design

Each participant was assessed on 3 separate days for 3 different yoga breathing practice sessions held at the same time of the day. Instead of selecting 3 separate groups, this design, where the same individual is assessed on 3 separate days, was selected to reduce inter-individual variation [14]. The sequence of the practice sessions was randomized with the help of a randomizer (www.randomizer.org). The total time for intervention was 18 minutes, with 1 minute of rest after each 5 minutes of practice. This has been shown schematically in Figure 1. This was true for all 3 interventions: alternate-nostril yoga breathing (ANYB), breath awareness (BAW), and quiet sitting (QS) sessions.

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Assessments

Shape and size discrimination task

Depending on a person's visual and tactile sensations, as well as their speed of sorting, the shape and size discrimination

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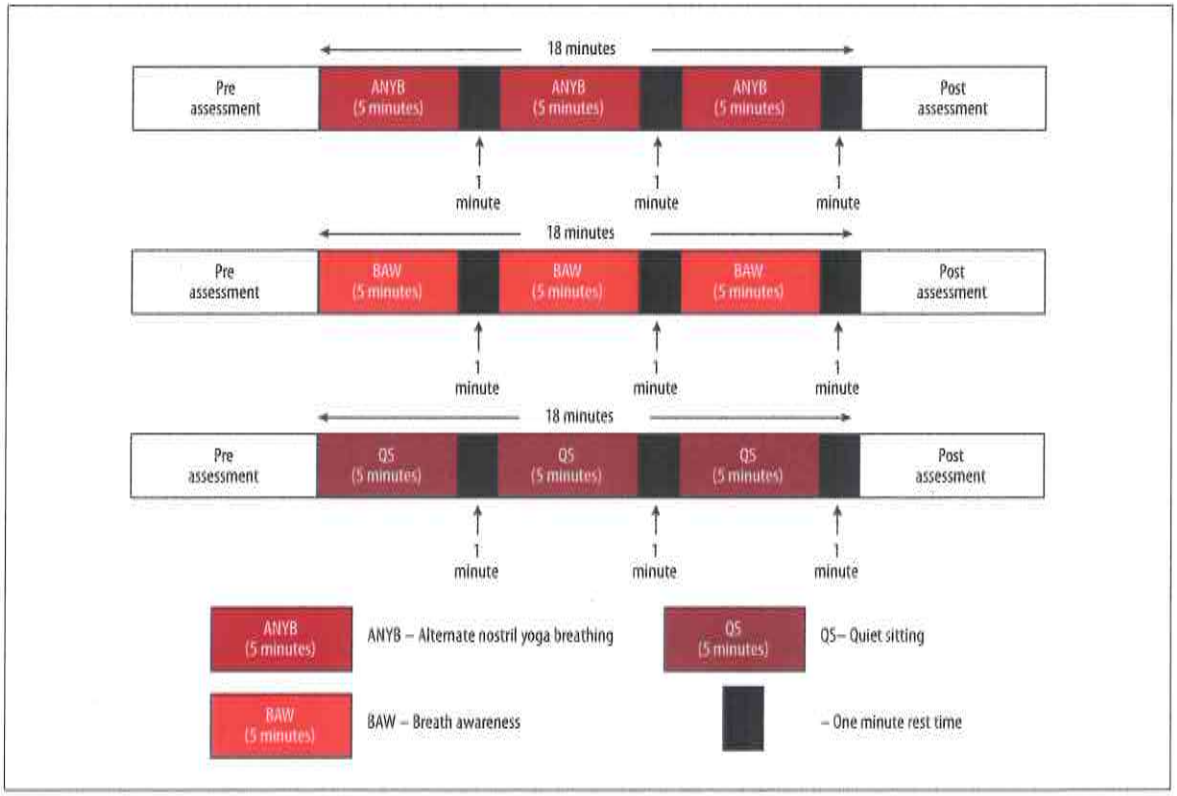

Figure 1. This is a schematic representation of the study design. Each participant was assessed in 3 sessions on 3 separate days. Each session was of 18 minutes duration, with three 5-minute epochs of the intervention and three 1-minute rest periods. The interventions are depicted as follows: the dark red rectangle indicates alternate-nostril yoga breathing (ANYB), the bright red rectangle indicates breath awareness (BAW), the maroon rectangle indicates quiet sitting (QS), and the darkened parts indicate rest periods of 1-minute duration.

task (Takei Scientific Instruments Co., Japan) is used to assess a person's ability to discriminate between coins and squares of different sizes [9]. The participant has to insert 50 such coins and squares of different sizes and thickness into 5 slits of a wooden box, where each slit has been especially designed to allow a square or coin of a specific size and thickness to pass through it. The time taken to complete the task (in seconds) and number of errors (attempts to insert a coin in a wrong slit) were recorded. The experimenter did not know, and hence was blinded to, the intervention the person had practiced.

State trait anxiety inventory (STAI)

Spielberger's state trait anxiety inventory (STAI) has 20 items to assess state anxiety or anxiety at the moment of testing. At the moment of testing, the number that best describes the intensity of feelings of anxiety of a participant has to be selected, on a scale of 1 to 4, where the following numbers have been associated for each item with the associated value – 1: Not at all, 2: Somewhat, 3: Moderately, or 4: Very much so. Assessment was done at the beginning and end of all 3 sessions.

Interventions

Each participant performed 3 practices: (i) alternate-nostril yoga breathing (ANYB), (ii) breath awareness (BAW), and (iii) quiet sitting (QS). The total time of the invention was 18 minutes, with 3 practice periods of 5 minutes each followed by 1 minute of rest.

Alternate-nostril yoga breathing (ANYB)

Alternate breathing from both nostrils without retention of breath is known as alternate-nostril yoga breathing (=*anulom-vilom pranayama* in Sanskrit). The participants were asked to sit cross-legged (*sukhasana*=comfortable pose), with their spine erect and spine and neck aligned and eyes closed throughout each session. The thumb and ring finger of the right hand (the dominant hand in all participants) were used to manipulate or occlude the right and the left nostril respectively. The participant first starts with exhaling through the left nostril with the right nostril closed, then inhaling through the left nostril, exhaling through the right nostril, then inhaling through the

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Table 1. Time taken (in seconds) and number of errors in the shape and size discrimination task pre and post ANYB, BAW, and QS sessions. Values are group mean ±SD.

	ANYB			BAW			QS		
	Shape and size discrimination task			Shape and size discrimination task			Shape and size discrimination task		
Sessions	Time (seconds)	Number of errors	STAI scores	Time (seconds)	Number of errors	STAI scores	Time (seconds)	Number of errors	STAI scores
Pre	96.40± 37.96	6.64± 3.58	38.66± 10.94	104.76± 53.70	6.24± 3.22	37.70± 10.93	108.37± 49.80	5.92± 3.41	38.06± 8.83
Post	104.70± 43.29	4.44± 2.96	38.00± 11.44	96.29± 40.07	5.14± 3.91	35.12± 10.55	99.87± 39.35	5.30± 3.55	34.24± 9.29
p -value	0.20	0.001	0.57	0.33	0.07	0.03	0.25	0.22	0.001
Percentage change	8.60	33.13	1.70	8.08	17.62	6.84	7.84	10.47	10.03
Cohen's d	0.20	0.67	0.06	0.18	0.31	0.24	0.19	0.18	0.42

Post values were compared with respective pre values for 3 sessions, i.e., ANYB, BAW, and QS. * p<0.05; ** p<0.01, *** p<0.001, RM-ANOVA – post hoc tests with Bonferroni adjustment. ANYB – alternative nostril yoga breathing; BAW – breath awareness; QS – quiet sitting.

right nostril and exhaling through the left nostril. Throughout the practice, nostril manipulation was carried out with the right hand. This sequence has been detailed in previous studies as well [11].

Breath awareness (BAW)

The participants were instructed to close their eyes and then feel the flow of air passing through the nasal passage during the breath awareness session. The participants were asked to sit cross-legged with spine erect and neck aligned.

Quiet sitting (QS)

The participants were seated erect and cross-legged with spine erect and neck aligned, as for the ANYB and BAW sessions. Participants were instructed to keep their eyes closed and to allow their thoughts to wander freely. There was no other activity.

Data analysis

Repeated-measures analyses of variance (RM-ANOVA) followed by *post hoc* Bonferroni adjustment was performed using SPSS version 18.0. There were 2 within-subject factors: sessions (i.e., ANYB, BAW, and QS) and states (i.e., before and after).

Post hoc Bonferroni-adjusted tests for multiple comparisons were carried out to compare values after *vs.* before within a group, and to compare values between groups before and after the interventions.

Results

Shape and size discrimination task

The errors in the shape and size discrimination task were significantly reduced after the ANYB session ($p<0.001$). The time taken to complete the task showed no significant difference between the 3 sessions ($p>0.05$).

State trait anxiety inventory (STAI)

A significant reduction was found in the level of state anxiety after breath awareness ($p<0.05$) and quiet sitting sessions ($p<0.001$). Changes in mean, SD, and Cohen's d in the shape and size discrimination task total scores are given in Table 1. The ANOVA-related *df*, MS, F, and partial *eta* squared values are given in Table 2.

Discussion

After 15 minutes of alternate-nostril yoga breathing, there was improved performance in a shape and size discrimination task, while after 15 minutes of breath awareness or sitting quietly, there was a decrease in state anxiety. Contrary to the hypothesis of the study, a reduction in state anxiety did not occur along with improved performance in the shape and size discrimination task.

The shape and size discrimination task requires tactile sensitivity to distinguish between shapes which differ in size (by 1 mm

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Table 2. Details of the 3 repeated measures analyses of variance.

Variables	Sources	df	MS	F	Partial eta square
Time taken to complete the task	Sessions	1.88, 92.14	455.47	0.35	0.01
	States	1, 49	625.25	0.52	0.01
	Sessions×States	2, 98	2345.60	1.60	0.32
Number of errors	Sessions	2, 98	.563	0.06	0.00
	States	1, 49	128.05	16.13	0.25
	Sessions×States	1.95, 95.46	16.84	2.21	0.04
STAI scores	Sessions	2, 98	141.77	1.44	0.03
	States	1, 49	415.36	10.27	0.17
	Sessions×States	2, 98	63.37	2.39	0.05

to <4 mm) in thickness and have different shapes (e.g., a circle, square). The task also requires motor speed and co-ordination to place the objects in the correct slot as quickly as possible. Haptic information processing also involves higher-order neural resources [15].

In tai chi, the goal of the practice is to increase body awareness. Practitioners are encouraged to focus their attention on their fingertips as a way of sensing the entire body up to the periphery [8]. Tactile activity was compared in 14 tai chi practitioners and in 14 control participants. In both groups, tactile activity was assessed using dome-shaped pieces of plastic presented to the participant's fingertip for 2.5 seconds, during which participants were required to identify the grating orientation as either parallel or perpendicular. The tai chi practitioners had greater tactile activity than the control group (1.4 versus 1.8 mm, respectively, or 32.6%).

Previously, tactile discrimination was assessed using the same coin-sorting task as the present study [9]. Ninety-four participants were randomized to 2 groups: (i) a high-frequency yoga breathing group (breath rate 1.0 Hz, n=47) and (ii) a breath awareness group (n=47). There was a significant decrease in errors and time taken to complete the coin discrimination task after both high-frequency yoga breathing and after breath awareness. Errors were reduced by 41.0% after high-frequency yoga breathing, and were reduced after breath awareness by 22.0%. The time taken to complete the task was reduced by 15.0% after both high-frequency yoga breathing and breath awareness. In the present study, the reduction in errors after alternate-nostril yoga breathing was 33.1% and 17.6% after breath awareness. Hence, the effect of alternate-nostril breathing on error reduction was less than the effect of high-frequency yoga breathing reported earlier [9]. The changes following breath awareness were comparable in the earlier study [9] and the present study.

Yoga breathing has been found to improve attention based on a digit vigilance task (Cohen's=0.61) [11] and reduce reaction time (Cohen's d=0.404) [16]. The yoga breathing practices differed, since in some practices the emphasis was on increasing the rate [17], while in others the emphasis was on the depth of breathing [18].

In the present study, participants practiced alternate-nostril yoga breathing. Breathing through a particular nostril has been studied extensively as a part of a series of studies on the rhythmic alternating patency of the nostrils as part of the ultradian nasal cycle [19]. The nasal cycle is a naturally occurring ultradian rhythm in which the nostrils show alternating congestion and decongestion [20]. The nasal mucosa is innervated by the autonomic nervous system. There are believed to be nerves arising from the superior nasal meatus and ending in different hypothalamic nuclei which activate either the sympathetic or the parasympathetic nervous system [21]. These nerve endings can be activated by air insufflations even if the lung is not inflated [21]. These findings were reinforced by a report that local anesthesia injected locally in the nasal mucosal membrane prevented cortical changes which were shown to follow activation of the upper nasal cavity. When there is increased sympathetic nervous system activity on any side, there would be vasoconstriction in the nasal mucosa on that side, leading to greater nostril patency on that side. In contrast, on the opposite side, parasympathetic dominance would lead to vasodilation in the nasal mucosa leading to the nostril on that side being either partially or totally occluded. The periodicity of the nasal cycle varies widely; time series analysis detected periods of this rhythm at 280–275, 165–210, 145–160, 105–140, 70–100, and 40–65 min bins [22,23]. In contrast to the naturally occurring rhythmic variation in nostril dominance, there have been several studies on forced unilateral nostril breathing. This may require a person to breathe through a nostril which is not patent at the time and hence could be potentially stressful.

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In the present study, since the practice involved alternate-nostril breathing, it is unlikely to have had the effect of unilateral breathing related to forcefully inducing breathing through a non-patent nostril.

Alternating nostril patency was found to be coupled to alternating activation and de-activation of the cerebral hemispheres [24]. This rhythm is based on a complex connection between the nasal meatus and cortical centers through anatomically indistinct pathways [21]. Hence, alternate-nostril breathing can modify cortical functions based on changes in the EEG [25], as well as by improved performance in the P300 event-related potential task [26].

The P300 requires auditory discrimination and focused attention to detect and process the difference in the pitch of 2 tones – standard and target – which differ in frequency [27]. This is a form of auditory perceptual sensitivity. It is possible that a similar improvement in attentional processes may contribute to the improved performance in the shape and size discrimination task in the present study.

State anxiety was reduced after breath awareness and after sitting quietly with no breath manipulation. In people who practice mind-body interventions such as yoga and tai chi, breath awareness has a wide range of benefits, including a reduction in anxiety [28]. This is possibly because the attention is focused on the breath, which would not be expected to give rise to disturbing thoughts. Another mechanism could be by activation of the parasympathetic nervous system, particularly the vagus nerve. During normal breathing, the activity of the vagus nerve causes sinus arrhythmia. Activation of the vagus nerve also prevents excessive expansion of the lungs by the Hering-Breuer reflex. The role of the vagus nerve in calming, self-soothing, and relaxation is well known [29]. More recently, more complex roles of the vagus nerve have been given attention due to the effects in enhancing social bonding, as in the polyvagal theory [30], and in increasing flexibility in adapting to different environmental conditions [31]. These effects of increased vagal nerve activity may explain the reduction in state anxiety following breath awareness, as mindfulness is known to increase parasympathetic activity [32].

State anxiety also was decreased after sitting quietly. The reduction in state anxiety during the control session of quiet sitting could be related to the fact that the participants already had a minimum of 3 months of prior experience of yoga practice. It is recognized that experience in yoga practice increases behavioral forms of self-regulation, even when the person is not practicing yoga [33]. Yoga practice is believed to increase proactive coping during stressful situations and increase the possibility of moving towards a healthier lifestyle [34]. Hence, even at rest, a person who has experience in yoga practice may reach a quiet and restful state with low levels of state anxiety. Physiologically, the basal metabolic rate of yoga practitioners was found to be 12.0% lower than in non-yoga practitioners [35]. The authors attributed this difference to differences in the sympathetic nervous system responses to stressors and baseline differences in sympathetic and endocrine functioning in yoga practitioners compared to non-yoga practitioners, with yoga practitioners being more likely to show lower levels of arousal. Hence, these psychological [34] and physiological [35] differences which occur with experience in yoga may explain why quiet sitting reduced state anxiety in this sample of persons who had 3 months of prior experience of yoga practice.

However, there was no attempt to determine what the participants thought about during the session, and this is a limitation of the study, which also shows the importance of getting adequate subjective information from the participants to understand their experience in its entirety.

Hence, the present results suggest that ANYB: (i) improves performance in a task which requires perceptual sensitivity and focused attention, but (ii) does not reduce state anxiety in the practitioners while performing the task.

In the present study, while participants showed an improvement in shape and size discrimination after ANYB, further studies involving methods to localize the changes in space and time in the brain are required. A review of physiological findings when combined gives a model for shape processing and recognizing objects [36]. In determining the boundaries of a three-dimensional (3D) shape, Gestalt laws which apply good continuation and closure (i.e., encoding and recognition of an object's boundaries) as well as other aspects of the object, such as co-linear terminating lines, are extracted in the prestriate visual cortex. Processing the shape of an object continues rostrally involving the inferior temporal cortex where several 3D shapes are identified. Each object is coded as size-specific as well as orientation-specific. Several components of an object help to understand the appearance of an object, such as orientation and size, which gives the object its 3D appearance. Subsequently, generalization of the object's orientation and size and other sub-components is achieved in the anterior temporal cortex through associative learning. This process appears to be facilitated by ANYB, so that participants were able to identify and discriminate between 3D objects sooner and with less error. Neuroimaging, or at the very least, LORETA images based on high-density quantitative EEG, would help to establish whether these cortical areas are indeed involved, and these speculations form the basis for possible future directions of research in haptic discrimination in yoga practitioners.

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A limitation of the present study is that the reason why state anxiety was reduced after the control session when participants sat quietly is difficult to explain, as their subjective report of what they thought about during the session was not obtained. The prior experience in yoga may have facilitated relaxation in this posture and in a quiet environment. Apart from this, as nostril patency varies throughout the day, it would have been ideal to determine nostril dominance prior to each intervention. This was not done and is thus a limitation of the present study. Despite these limitations, the results suggest that ANYB improves haptic perceptual discrimination, while breath awareness and sitting quietly with eyes closed reduce state anxiety.

Conclusions

Alternate-nostril yoga breathing in a single 18-minute session improves haptic perceptual discrimination. Breath awareness and sitting quietly with eyes closed, also practiced for 18 minutes each, reduce state anxiety.

Conflicts of interest

None.

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University of Patanjali Haridwar

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Effect of yoga on vigilance, self rated sleep and state anxiety in Border Security Force personnel in India

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Abstract.
BACKGROUND: Military occupations require heightened vigilance with resultant sleep disturbances, increased anxiety and reduced vigilance.
OBJECTIVE: To compare yoga with physical training to reduce insomnia, anxiety and increase vigilance in security personnel.
METHODS: One hundred and twelve Border Security Force personnel (BSF group, males; mean age $\pm$ SD = 30.4 $\pm$ 7.4 years) were compared with 112 personnel of a private security firm (SIS group). The BSF group received yoga for nine days and the SIS group received physical training for the same period. Assessments were at baseline and after 9 days, with the digit vigilance test (DVT), Spielberger's STAI-S, and a sleep rating questionnaire.
RESULTS: (1) Between groups: (i) at baseline the BSF group had higher vigilance and more daytime naps compared to the SIS group and (ii) after nine days the SIS group had higher state anxiety compared to the BSF group (ANOVA, Bonferroni adjusted *post-hoc* comparisons; SPSS Version 24.0) (2) In post-pre intervention comparisons (i) the BSF group increased vigilance and decreased state anxiety after yoga, with improved sleep, while (ii) the SIS group showed increased vigilance after physical training.
CONCLUSION: Yoga may improve sleep, reduce anxiety while increasing vigilance in occupations requiring vigilance.

Keywords: Alertness, insomnia, armed forces, unease

1. Introduction

Military occupations can be broadly categorized as combat or support roles. The relevance of this categorization is that a service member would experience difficult levels of stress due to the nature of deployment [1]. Military service members live and work in a unique and challenging environment facing physically and mentally demanding workloads, deployments and exposure to combat [2]. These stressors could contribute to impaired physical and psychological performance. After a simulated combat exercise, U.S. army officers showed impaired vigilance, reaction time, attention, memory, and reasoning [3]. Most military exercises require vigilance, which if prolonged could lead to physiological arousal and stress [4]. Increased vigilance has been associated with increased sympathetic nervous system activity [5].

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University of Patanjali Haridwar

The long-term effects of hyper-vigilance can be devastating and may impact cognition, including attention, concentration, memory, as well as various functions essential for health such as sleep [6]. Military personnel have sleep disorders due to multiple factors apart from hyper-vigilance. These include the need to be on night duty, deployment through different time zones, and managing insomnia and drowsiness with sedatives or caffeine, respectively [7–9]. The most common sleep disorder is insomnia.

In India the Border Security Force (BSF) is the chief force guarding the territorial boundaries of the nation [10, 11]. The BSF is a Central Armed Police Force responsible for guarding India's land borders during peace time and preventing transnational crime [12].

Recent studies conducted on BSF personnel to understand their health and wellbeing, showed a high incidence of physical and mental illness including anxiety and insomnia, many of which were listed as lifestyle-related [13]. In many cases BSF, personnel adopted certain unhealthy stress coping strategies [14].

Yoga practice provides an alternative as a stress reducing strategy with additional health benefits [15]. Five hours of yoga practice per day for seven days improved the quality of sleep, total time spent asleep, time taken to fall asleep and number of arousals in healthy adults [16]. Similar benefits were found in a population with chronic insomnia; who showed improvement in sleep efficiency, total sleep time, total wake time, sleep onset latency and wake time after sleep onset following eight weeks of an hour of yoga every day [17]. Apart from insomnia, yoga was useful for the other problems faced by the BSF, i.e., anxiety and increased arousal due to vigilance. Yoga practice reduced both state and trait anxiety in persons with stress related symptoms, who practiced approximately an hour of yoga every day for ten days [18]. This effect of yoga in reducing anxiety may be the reason why after a single two hour session of yoga, military personnel performed better in an attention task while their state anxiety decreased [19].

The present study was designed to determine whether a yoga intervention could (i) reduce state anxiety, (ii) improve self-reported sleep and (iii) improve performance in a vigilance task in BSF personnel. Comparisons were made with age and gender as comparable to private security personnel whose job involved vigilance and who did not receive yoga but who received physical training during the period of intervention.

2. Methods

2.1. Participants

The trial was carried out on 224 males whose job involved security and vigilance. There were two groups: the Border Security Force, India (BSF group) and the Security and Intelligence Services India Ltd (SIS group from a private security service agency). Both groups had 112 participants (BSF group mean age ± SD = 30.4 ± 7.4 years; SIS group mean age ± SD = 29.1 ± 6.4 years). No incentive was given to either group. To be included in the trial participants had to (i) be male and (ii) spend at least eight hours each day on duty requiring vigilance. The criteria for exclusion were: (i) ill-health at the time of assessment based on a routine case history and clinical examination or (ii) taking any medication or nutraceuticals. None of the participants were excluded for these reasons. The study design was explained to the participants and all participants' signed informed consent was taken. The study was approved by the institution's ethical committee (approval number PRF/16/0014).

2.2. Design

The study was a comparative controlled trial. The two groups were comparable with respect to their age, duty shifts, and lifestyle. The BSF group was given a yoga program consisting of yoga postures (*asanas*), breathing techniques (*pranayamas*) and guided relaxation; for 240 minutes per day for a period of nine days. The SIS group was given a total of 180 minutes of physical training (60 minutes per day for three days) during the nine days. Details of the yoga and physical activity interventions are provided below. The fact that the amount of time allotted to the intervention differed in the two groups is a limitation of the study.

2.3. Assessments

The assessments were done on the day before beginning the intervention and on the day after completing the intervention. The following variables were assessed using tests which have been standardized for use in an Indian population:

2.3.1. Vigilance and sustained attention

The digit vigilance test (DVT) was used to measure vigilance and sustained attention which has

University of Patanjali Haridwar

proven test-retest reliability ($r = 0.91$) and alternate form reliability ($r = 0.90$) [20]. The DVT is not culture sensitive and has been used in an Indian population earlier [4]. The DVT consisted of an A4 size sheet with 1500 digits from 1 to 9 randomly arranged on it in 50 rows with 30 digits in each row. The participants were instructed to cancel the target digits (i.e., 6 and 9) as accurately as possible. Missing any target digits and cancellation of other digits were counted as errors. The score obtained was the total number of digits cancelled minus the errors. The total time given to complete the test was eight minutes.

2.3.2. State anxiety

State anxiety was measured using Spielberger's state-trait anxiety inventory (STAI-S) which has been standardized for use in an Asian population (of which 6.5% was an Indian population) with test-retest reliability ($r = 0.60$–0.94) and Cronbach's alpha score of 0.86 [21]. It is a 4-point Likert scale and comprises 20 items to describe the feelings of anxiety at the moment of testing [22]. The STAI-S The participants had to choose one out of the four options provided for each item i.e., not at all, somewhat, moderately so, and very much so. The scores ranged from 20 to 80.

2.3.3. Self-rated sleep quality

The sleep rating questionnaire (SRQ) was used to self-rate the participants' quality of sleep [23]. The SRQ has been standardized for use in an Indian population with test-retest reliability ($r = 0.20$–0.85) and internal consistency ($r = 0.58$–0.69) [23]. The SRQ consisted of one open-ended and six close-ended items which were: (1) Approximately how long in minutes does it take you to fall asleep? (2) How many hours do you sleep each night? (3) How many times (if any) do you wake up during the night? (4) What are the usual reasons for waking up if you do so? (5) Do you feel rested in the morning (yes/no)? (6) Do you sleep in the day time (yes/no)? (7) If your answer to question 6 was 'yes', for how long do your daytime naps last?

2.4. Intervention

2.4.1. Yoga

The yoga intervention was for 240 minutes in each day. The yoga sessions included a universal prayer, yoga postures (*asanas*), voluntarily regulated breathing techniques (*pranayamas*), loosening exercises and guided relaxation. Yoga practices were derived from teachings in traditional texts (Hatha Pradipika Circa 1500 C.E., Gheranda Samhita Circa 1700 C.E.) [24]. The timings for yoga sessions were between 05:00–07:00 hours and 16:00–18:00 hours daily for nine days. The details of the yoga session are given in Table 1.

2.4.2. Physical training

Physical training (PT) was between 13.00 hours to 14.00 hours each day. The participants attended three PT sessions during nine days. The PT sessions included drill and marching. The details are provided in Table 2.

2.5. Data analysis

Data were analyzed using SPSS (Version 24.0). A repeated measures ANOVA with Bonferroni adjusted multiple *post-hoc* comparisons was performed. The ANOVA had one Within subjects factor i.e., States, with two levels (pre and post) and one Between subjects factor i.e., Groups which were (i) BSF and (ii) SIS. Two items of the SRQ (i.e., number 5 and number 6) were measured on a nominal scale (i.e., yes = 0, no = 1) and analyzed with Pearson's chi-square test.

3. Results

The group mean values ± SD for different values are given in Tables 3 and 4 and ANOVA values are given in Table 5.

3.1. Repeated measures ANOVA

There was a significant difference between groups for vigilance ($p < 0.001$), state anxiety ($p < 0.001$), time taken to fall asleep ($p = 0.02$), number of arousals during the night ($p < 0.001$), and duration of daytime naps ($p < 0.001$). A significant difference within groups was noted in vigilance ($p < 0.001$), state anxiety ($p < 0.001$), arousals during the night ($p < 0.01$), and duration of daytime naps ($p < 0.001$). A significant interaction between groups and states was seen in state anxiety ($p < 0.001$), time taken to fall asleep ($p < 0.01$), numbers of arousals during the night ($p < 0.001$) and duration of daytime naps ($p < 0.001$); suggesting that these variables were interdependent with respect to the groups (i.e., BSF and SIS) and states (i.e., pre and post).

University of Patanjali Haridwar

Table 1
Details of a yoga practice session

S. No		Yoga Practice	Duration
1	Starting	*Mantra* chanting	3 minutes
2	Warming up	Sun salutation *(Surya namaskara)*	10 minutes
3	Standing postures	Swaying palm tree pose *(Tirryaktadasana)*	3 minutes
		Tree pose *(Vrikshasana)*	3 minutes
		Feet and hands posture *(Padahastasana)*	2 minutes
	Sitting postures	Frog posture *(Mandukasana)*	3 minutes
		Rabbit posture *(Sasakasana)*	3 minutes
		Sitting lateral twisting posture *(Vakrasana)*	5 minutes
		Cow face posture *(Gomukhasana)*	5 minutes
5	Prone postures	Crocodile posture *(Makarasana)*	5 minutes
		Cobra posture *(Bhujangasana)*	3 minutes
		Half-locust posture *(Salabhasana)*	3 minutes
6	Supine postures	Half-plough posture *(Ardhhalasana)*	3 minutes
		Rotating leg pose *(Padavritasana)*	6 minutes
		Leg circling pose *(Dwichakrasana)*	6 minutes
7	Relaxation	Supine relaxed posture *(Shavasana)* with breath awareness	5 minutes
8	Yoga breathing series *(pranayamas)*	Yoga bellows type breathing *(Bhastrika)*	3 minutes
		High frequency yoga breathing *(Kapalabhati)*	10 minutes
		External breath holding *(Bahyavriti pranayama)*	3 minutes
		Victorious breath *(Ujjayi)*	3 minutes
		Alternative nostril yoga breathing *(Anlom- vilom)*	10 minutes
		Bee breathing practice *(Bhramari)*	3 minutes
		Om chanting *(Udgeeth)*	3 minutes
9	Relaxation	Supine relaxed posture *(Shavasana)* with breath awareness	5 minutes
10	Loosening exercises	Neck rotation	3 minutes
		Knee & ankle rotation	3 minutes
		Shoulder rotation	3 minutes
		Butterfly pose	1 minute
11		Conclusion prayer	2 minutes

Total duration of the session was 120 minutes and the same practices have been repeated during the evening session too.

Table 2
Details of a physical training session

S No		Practices	Repetitions	Duration
1	Marches	Marching with instructions		10 minutes
2	Stretching exercises	Exercise 1(lateral stretch)	8–10	2 minutes
		Part 1. Bending to the left with right hand extended upwards.		
		Part 2. Bending to the right with left hand extended upwards.	8–10	2 minutes
		Exercise 2.(backward stretch)		
		Bending backward with both hands extended upwards.	10–15	3 minutes
		Exercise 3.(forward stretch)		
		Bending forward with both hands stretched downwards.	10–15	3 minutes
3	Whole body exercises	Exercise 1.		3 minutes
		Arms extended laterally and feet moved apart with a jump, then bringing the feet together and arms to the thighs.		
		Exercise 2.	20	3 minutes
		Arms extended laterally, feet apart. Jumping and bringing the feet together and hands together above the head with a clap.		
		Exercise 3. Jumping and bringing right leg forward and left leg backward with arms akimbo. Then jumping again with bringing left leg forward and right leg backward.	20	
		Exercise 4. Arms extended to the front with feet slightly apart, then twisting to the right, coming back and twisting to the left.	20	3 minutes
		Exercise 5. (simple squat)		
		Hands stretched in front, sitting with knees bent.	10	3 minutes
4	Running	Running in a 750 meters track with medium pace	2	15 minutes
5	Ending	Sitting with eyes closed	–	10 minutes

Total duration of the session was 60 minutes.

University of Patanjali Haridwar

Table 3
Scores of DVT and STAI-S, values are group mean ± SD

Variables	BSF ($n = 112$)			SIS ($n = 112$)		
	Pre	Post	Cohen's d	Pre	Post	Cohen's d
Vigilance	283.5 ± 41.6	309.9 ± 14.2$^{\phi}$	0.85	257.8 ± 60.5$^{\blacklozenge}$	287.5 ± 42.6$^{\phi,\bullet}$	0.56
State anxiety	40.3 ± 10.9	31.3 ± 9.0$^{\phi}$	0.89	41.5 ± 9.8	42.4 ± 7.9$^{\bullet}$	0.10

$^{\phi}p < 0.001$ *post-hoc* within groups analyses with Bonferroni adjustment, post compared with pre.
$^{\blacklozenge}p < 0.001$ *post-hoc* between groups analyses with Bonferroni adjustment, pre compared with pre.
$^{\bullet}p < 0.001$ *post-hoc* between groups analyses with Bonferroni adjustment, post compared with post. BSF = Border Security Force group, who received 9 days of yoga; SIS = Security and Intelligence Services group, who received 9 days of physical training; DVT = digit vigilance test; STAI-S = Spielberger's state-trait anxiety inventory.

Table 4
Scores of sleep rating questionnaire, values are group mean ± SD

	BSF ($n = 112$)				SIS ($n = 112$)			
	Pre	Post	χ^2	Cohen's d/Cramer's V	Pre	Post	χ^2	Cohen's d/Cramer's V
Time taken to fall asleep (minutes)	30.7 ± 19.3	21.0 ± 13.9*	–	0.57^{d}	30.0 ± 19.9	35.2 ± 48.9	–	0.14^{d}
Duration of sleep (minutes)	275.2 ± 53.8	304.2 ± 48.0$^{\phi}$	–	0.57^{d}	359.7 ± 48.2	347.6 ± 59.0	–	0.23^{d}
Number of arousals during night	1.4 ± 0.9	0.8 ± 0.9$^{\phi}$	–	0.62^{d}	1.5 ± 1.0	1.6 ± 0.9	–	0.09^{d}
Duration of daytime naps (minutes)	66.7 ± 37.5	40.3 ± 36.6$^{\phi}$	–	0.71^{d}	7.2 ± 29.4$^{\blacklozenge}$	7.5 ± 25.3$^{\bullet}$	–	0.01^{d}
Feeling of rest in the morning (number of participants reported 'Yes')[a]	79	102$^{\#}$	15.23	0.26^{V}	98	101	0.41	0.04^{V}
Sleep in daytime (number of participants reported 'Yes')[a]	93	67$^{\#}$	14.79	0.25^{V}	77	96	1.43	0.08^{V}

$^{*}p < 0.01$, $^{\phi}p < 0.001$ *post-hoc* analyses with Bonferroni adjustment, post compared with pre.
$^{\blacklozenge}p < 0.001$ *post-hoc* between groups analyses with Bonferroni adjustment, pre compared with pre.
$^{\bullet}p < 0.001$ *post-hoc* between groups analyses with Bonferroni adjustment, post compared with post.
$^{\#}p < 0.001$ Pearson's chi-square test.
[a]Rest of the participants reported 'No'. ^{d}Cohen's d. ^{V}Cramer's V.
BSF = Border Security Force group, who received 9 days of yoga; SIS = Security and Intelligence Services group, who received 9 days of physical training.

Table 5
Details of the Repeated Measures ANOVA

Sl. no.	Factors	Variables	F	df	Huynh-Feldt ε	*p*-value
I	Within Subjects	Vigilance	90.06	1, 222	1	<0.001
		State anxiety	35.98	1, 222	1	<0.001
		Time taken to fall asleep	0.75	1, 222	1	0.388
		Number of arousals during night	9.27	1, 222	1	0.01
		Duration of daytime naps	28.29	1, 222	1	<0.001
II	Between Subjects	Vigilance	23.75	1, 222	1	<0.001
		State anxiety	32.57	1, 222	1	<0.001
		Time taken to fall asleep	5.35	1, 222	1	0.05
		Number of arousals during night	18.91	1, 222	1	<0.001
		Duration of daytime naps	164.36	1, 222	1	<0.001
III	States × Groups	Vigilance	0.291	1, 222 (States) × 222 (Groups)	1	0.590
		State anxiety	54.13	1, 222 (States) × 222 (Groups)	1	<0.001
		Time taken to fall asleep	8.68	1, 222 (States) × 222 (Groups)	1	0.01
		Number of arousals during night	10.62	1, 222 (States) × 222 (Groups)	1	<0.001
		Duration of daytime naps	29.67	1, 222 (States) × 222 (Groups)	1	<0.001

University of Patanjali Haridwar

3.2. Post-hoc analyses

There were two *post-hoc* comparisons i.e., between groups and within groups.

3.2.1. Between groups post-hoc comparisons

The scores obtained in the digit vigilance test were significantly higher for the BSF group at pre assessment ($p<0.001$) and post assessment ($p<0.001$) compared to the SIS group. The post scores of Spielberger's state-trait anxiety inventory were significantly higher for the SIS group ($p<0.001$). The BSF group reported significantly more frequent daytime naps compared to the SIS group at both pre ($p<0.001$) and post assessments ($p<0.001$).

3.2.2. Within group post-hoc comparisons (post-pre)

The BSF group showed a significant increase in DVT scores ($p<0.001$) and a significant decrease in STAI-S scores ($p<0.001$) at post assessment. Also a significant increase in total duration of sleep ($p<0.001$) and a significant decrease in time taken to fall asleep ($p<0.01$), number of arousals during the night ($p<0.001$) and duration of daytime naps ($p<0.001$) was noted. The SIS group showed a significant increase in DVT scores ($p<0.001$) at post assessment.

3.3. Pearson's chi-square test

In the BSF group, 'feeling of rest in the morning' ($\chi^2=15.23$, $p<0.001$, Cramer's $V=0.261$) and 'daytime naps' ($\chi^2=14.79$, $p<0.001$, Cramer's $V=0.257$) differed significantly after yoga compared to before.

4. Discussion

Border Security Force (BSF) personnel showed improved performance in a vigilance test, self-rated sleep and reduced state anxiety after practicing yoga for nine days. A control group of private security personnel (SIS) who received physical training improved their performance in the vigilance task, with no change in their sleep or anxiety.

The two groups did not differ at baseline with respect to their levels of state anxiety or self-rated sleep with one exception, i.e., more frequent daytime naps in the BSF group. Also, the BSF group had better vigilance at baseline. This was possibly due to the heightened vigilance required at night by the BSF. Despite the other changes in self-rated sleep after 9 days of yoga, the BSF group continued to have more frequent daytime naps than the SIS group. Also their DVT scores remained higher compared to the SIS group after nine days.

The Border Security Force guard the country's borders, a job which involves considerable responsibility as well as remaining in a state of hyper vigilance most of the time. In psychology and cognitive science, vigilance is used to describe the ability to sustain attention to a task [25]. When a person attends to a task for a prolonged period it requires alertness and sustained attention which could influence several underlying brain processes including the sleep-wakefulness cycle [6]. Alertness and sustained attention influence parts of the brain which promote wakefulness as well as those which are required for actively inducing sleep [4]. To sustain alertness for long periods the neural systems which are essential include thalamic projections from the upper brainstem, sub-cortical cholinergic nuclei and specific hypothalamic nuclei [26]. Hence sleep-wake pathways are distinct and during tonic alertness, the activity of pathways involved in actively generating sleep may be inhibited [27].

In the Border Security Force personnel who practiced yoga there was an improvement in various aspects of sleep. These improvements included falling asleep in a shorter time (average decrease in time taken to fall asleep = 9.7 minutes), fewer episodes of day time sleep, less awakenings in the night and the feeling of being more rested in the morning.

The reasons for the improvement in sleep are probably many and complex. Dam et al. reported an association between low levels of oxygen saturation (less than 90%) while awake and poor quality of sleep [28]. Yoga practice is believed to improve the respiratory functions with resultant better tissue perfusion and improved oxygen saturation [29]. A particular yoga program (60 minutes/day for 60 days) helped Indian military personnel acclimatize sooner to altitudes of more than 3000 meters [30]. The better acclimatization could be due to an improved ability to adapt to lower levels of atmospheric oxygen at that height, possibly related to better tissue perfusion and oxygen saturation.

The yoga program in the present study included postures (*asanas*), regulated breathing (*pranayama*) and guided relaxation. Considering that BSF personnel are most often based at high altitudes, an

University of Patanjali Haridwar

improvement in their adaptation to rarefied oxygen may have contributed to their better sleep after yoga. In addition the yoga breathing practices used in the present study have been associated with reduced sympathetic activity and lower frequencies in the EEG [31]. Yoga postures are associated with an increase in central nervous system gamma-aminobutyric acid (GABA) levels measured through Nuclear Magnetic Resonance Spectroscopy (NMRs) [32, 33] which would promote cortical inhibition and hence facilitate sleep. Guided relaxation is associated with better relaxation than lying supine without instructions and this could also facilitate sleep [34].

Yoga and meditation based interventions which influence the lifestyle reduce the severity of major depressive disorder and increase systemic biomarkers associated with positive changes in the brain [35]. The physical activity component of yoga could also be beneficial. This was observed in military personnel in Iran, in a comparison between physically active versus inactive persons showing higher cardiovascular risk factors in those who were inactive [36]. While a systematic review did not report sufficient evidence to consider yoga as a definite treatment for diagnosed anxiety disorders the result of the eight studies reviewed was considered encouraging [37]. As mentioned above, the practice of yoga postures (*asanas*) increases the level of GABA in the cortex, while yoga breathing and guided relaxation have been separately shown to reduce sympathetic nervous system activity [34, 38]. Hence yoga practice can be said to reduce physiological arousal both centrally and in the autonomic nervous system. This reduced arousal would facilitate a decrease in anxiety.

Despite reducing arousal certain yoga breathing practices especially alternate nostril yoga breathing have been found to improve performance in the vigilance task used in the present study [19], without the expected rise in sympathetic nervous system activity which is associated with increased vigilance [4]. The present results also show that the BSF personnel performed better in the vigilance task with a decrease in state anxiety. The SIS group in contrast improved performance in the vigilance task but showed no significant change in state anxiety. The results in the BSF group suggest a possible benefit of introducing yoga for persons whose job requires prolonged periods of hyper-vigilance and periodic night shifts or disruption of sleep due to day time heightened vigilance.

The main difference between the BSF and the SIS groups was the duration of yoga practice (i.e., 2160 minutes and 180 minutes over the period of nine days respectively). Hence comparisons with earlier studies which assessed sleep, state anxiety and vigilance using the same questionnaires but where the duration of yoga was considerably less are cited here.

The BSF group showed an improvement of 31.6 percent in the time taken to fall asleep and 10.5 percent improvement in the duration of sleep after 9 days. Similarly an improvement of 8.7 percent in the time taken to fall asleep and 20.1 percent improvement in the duration of sleep occurred after 60 minutes of yoga practice over three months in a geriatric population [23]. After 240 minutes of yoga practice there was a reduction of 22.3 percent in state anxiety in the BSF personnel while in an earlier study on army personnel there was a 10.1 percent reduction in state anxiety after a single session of 45 minutes of yoga practice [19]. Vigilance was improved by 8.5 percent in the BSF personnel who practiced yoga for 240 minutes, while a single session 18 minutes of yoga improved performance in the same vigilance task by 9.4 percent [4].

5. Limitations

The main limitation of the study is in the design. It would have been ideal to randomize the BSF personnel to yoga and control (or an alternate intervention) groups. However the BSF personnel were especially deputed for intensive training in yoga for their stress-related health problems. Hence all of them had to receive the yoga intervention. As an alternative, age matched male security personnel (i.e., the SIS group) whose jobs also required vigilance were selected for comparison. This was not ideal as the levels of vigilance required for the BSF and SIS groups were not comparable. Also the BSF group received 240 minutes of yoga training a day compared to physical training for 60 minutes a day thrice in 9 days for the SIS group. It is impractical to suggest 240 minutes of yoga practice in a day. In order to make the present findings applicable to everyday situations examples are cited from the literature, where single and repeat sessions of 45 to 60 minutes duration also improved sleep, vigilance and reduced anxiety even though the magnitude of change was less than for 240 minutes of yoga.

These limitations suggest guidelines for future studies keeping in mind the regulated tight schedule and job requirements of Border Security Force personnel.

University of Patanjali Haridwar

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Conflict of interest

Authors declare no competing interests with respect to the research, authorship, and/or publication of this article.

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University of Patanjali Haridwar

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University of Patanjali Haridwar

children

MDPI

Brief Report

Immediate Effect of a Yoga Breathing Practice on Attention and Anxiety in Pre-Teen Children

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Abstract: Pre-teen children face stressors related to their transition from childhood to adolescence, with a simultaneous increase in academic pressure. The present study compared the immediate effects of 18 min of (i) high frequency yoga breathing with (ii) yoga-based breath awareness and (iii) sitting quietly, on (a) attention and (b) anxiety, in 61 pre-teen children (aged between 11 and 12 years; 25 girls). Attention was assessed using a six letter cancellation task and Spielberger's State Trait Anxiety Inventory STAI-S was used to measure anxiety before and after the three practices, practiced on separate days. Repeated measures ANOVA, followed by Bonferroni adjusted *post-hoc* analyses showed an increase in total attempts and net scores after high frequency yoga breathing ($p < 0.05$), while wrong attempts increased after yoga based breath awareness ($p < 0.05$). Anxiety decreased comparably after all three interventions. The 25 girls in the group had the same trend of results as the whole group with respect to the attention-based cancellation task, while boys showed no, how since change. For both girls and boys, anxiety decreased after all three 18min interventions. The results suggest that high frequency yoga breathing could be a short, useful school based practice to improve attention and reduce anxiety.

Keywords: pre-teen children; attention; anxiety; yoga breathing; yoga based breath awareness; sitting quietly

1. Introduction

Pre-teen children are at a stage of both promise and challenges, as they transition from childhood to being teenagers. Some of the challenges include an increase in academic pressure, a greater involvement in family and social dynamics, adjusting to changing social and behavioral demands of their peer group, and sometimes a growing difference in values and opinion with their parents and guardians [1]. Along with these stressors, in India pre-teens face a definite increase in academic load as they begin to prepare to answer an important, competitive, and career-determining school leaving examination in the next two to three years [2]. Academic pressure is a particularly important factor in those pre-teens the world over, who see education as a way to improve their own and their family's social and economic prospects [3].

Researchers from medicine and public health disciplines have assessed the usefulness and benefits of yoga for children in school settings [4]. The benefits included improved psychological well-being, reduced rates of being overweight or obese, children being calmer and more attentive, more at ease, and completing assigned tasks successfully. In a separate study, yoga breathing techniques were introduced in a suburban, private, English medium school in north India [5]. Two sections of the third grade (children aged 7–8 years), with approximately 50 students in each section were selected. One section received yoga breathing (i.e., deep breathing and alternate nostril yoga breathing) as a 5min intervention every school day for the academic year. Scores obtained in Math and languages

University of Patanjali Haridwar

(English and Hindi) were noted at the beginning and end of the year. In the group who practiced yoga breathing there was a statistically significant increase in cumulative scores. Though the effect size was small (eta squared = 0.108) the teachers reported other benefits such as better attention, improved classroom behavior, and active participation.

The neurocognitive effects of yoga breathing were further discussed in a narrative review, which searched PubMed, PubMed Central, and IndMed for citations with 'Pranayama' and 'Yogic breathing' as the search words [6]. In the review, 68 studies reported the effects of yoga breathing alone and met other inclusion criteria, and hence were included. The studies were categorized and one sub-category was neurocognitive assessments. The yoga breathing techniques discussed included those which varied the rate of breathing, the depth of breathing, the nostril(s) breathed through, and where exhalation was associated with specific sounds. The details of these yoga breathing practices as well as others mentioned in this study are provided in Table 1.

The neurocognitive assessments included electrophysiological variables (i.e., EEG, evoked potentials, and event related potentials), spatial and verbal memory tasks, auditory and visual reaction time, the Purdue pegboard task, and substitution and cancellation tasks. The authors concluded that pranayama or yoga breathing influenced neurocognitive abilities positively and that some practices were also useful in a clinical setting.

Among yoga breathing techniques the effects of those which influenced the rate of breathing were compared in young adults aged 18–25 years [7]. Into three groups, 84 participants were randomized as (i) fast yoga breathing (rate not specified), (ii) slow yoga breathing (rate not specified) and (iii) a control group. Participants practiced the respective yoga breathing techniques for 35 min, thrice a week for 12 weeks. Assessments included cancellation tasks, trail making tests, digit span forward and backward, and reaction time (auditory and visual). With both fast and slow yoga breathing, performance in cancellation tasks, trail making tests, digit span forward, and auditory and visual reaction time improved, with a greater magnitude of improvement in the group who practiced fast yoga breathing.

Most of the studies described above assessed the effects of yoga breathing practiced for a number of days or weeks. However there are also acute or immediate effects of yoga breathing, which occur directly after the practice. Examples of the immediate effects of yoga breathing studied in children are discussed here. In 60 adolescents (mean age 14.6 years, 38 males), 45 min of yoga bumble bee breathing reduced the heart rate and blood pressure [9]. Yoga breathing with an increased depth of breathing (called bellows breath), when practiced as nine rounds, where one round was one breath cycle, reduced the auditory and visual reaction time significantly in 22 healthy school boys (mean age 14.5 years) [10]. A shorter reaction time suggested that participants responded sooner.

Similarly, the immediate effects of short durations of yoga breathing have been assessed in adults. Into two groups, 94 persons were assigned to(i) high frequency yoga breathing (mean age 39.3 years; 28 females; breath frequency 1.0 Hz) and (ii) breath awareness (mean age 39.8 years; 26 females) [8]. The O'Connor finger dexterity task and a shape and size discrimination task were administered to all participants just before and after 10 min of high frequency yoga breathing or breath awareness. There were improvements in the way participants performed both tasks, though the magnitude of change was greater after high frequency yoga breathing. These tasks require tactile discrimination, fine motor skills, and eye hand co-ordination; hence the results suggest these abilities improved to a greater extent with 10 min of high frequency yoga breathing. A similar trend was seen with an assessment of the degree of optical illusion perceived, which is a measure of visual discrimination, in 30 adult males (mean age 26.9 years), where a greater degree of improvement followed 15 min of high frequency yoga breathing at 1.0 Hz compared to breath awareness [11].

University of Patanjali Haridwar

Table 1. A brief description of the yoga breathing practices mentioned in this study.

No.	Aspect of Breathing Which Was Modified	Name of the Yoga Breathing Practice		Method
		Sanskrit	English	
1.	Rate: Fast yoga breathing	*Kapalabhati*	High frequency yoga breathing	Rapid nasal breathing with forceful exhalation by contracting the anterior abdominal muscles, followed by passive inhalation at a rate of 60 to 120 breaths/min [7,8].
		Kukkuriya	Dog pant like yoga breathing	After sitting in the diamond pose (*vajrasana*) with the palms on the ground in front; rapid breathing through the mouth is practiced with the tongue kept fully out of the mouth [7].
		Bhastrika	Bellows type yoga breathing	Deep inhalation followed by complete exhalation, with an increase in breath rate [7].
	Rate: Slowyoga breathing	*Nadishodhana*	Alternate nostril yoga breathing with breath-holding	The practice begins with exhalation from the left nostril, followed by inhalation from the nostril (while the right nostril is gently occluded with pressure from the fingers), then exhalation from the right nostril (occluding the left), inhalation from the right, followed by exhalation from the left nostril completing the cycle. This practice may include a period of breath-holding [7].
		Pranav	Om repetition with breathing	Practiced in four parts: (i)Lower chest breathing with the sound of AAA, (ii) mid-chest breathing with the sound of UUU, (iii) upper chest breathing with the sound of MMM and (iv) union of the earlier three parts with the sound of AAA, UUU and MMM. Exhalation lasts for duration of 2 to 3 times the duration of the inhalation [7].
		Savitri	Breathing related to the sun	Slow, deep, and rhythmic breathing with inhalation: Inhalation breath holding: Exhalation: Exhalation breath holding: In a ratio of 2:1:2:1 [7].
2.	Nostril breathed through	*Anulom-Vilom*	Alternate nostril yoga breathing	The practice begins with exhalation from the left nostril, followed by inhalation from the nostril (while the right nostril is gently occluded with pressure from the fingers), then exhalation from the right nostril (occluding the left), inhalation from the right, followed by exhalation from the left nostril completing the cycle. This practice does not include breath-holding [5].
3.	Depth	*Bhastrika*	Bellows type yoga breathing	Deep inhalation followed by complete exhalation, with an increase in breath rate [7].
4.	Exhalation with a sound	*Bhramari*	Bumble bee yoga breathing	Deep inhalation followed by prolonged exhalation along with a humming sound like a bumble bee [9].

University of Patanjali Haridwar

High frequency yoga breathing practiced at breath frequencies between 1.0 and 2.0 Hz improved the performance scores in an attention-based cancellation task as an immediate effect of practice across different age groups [12]. The cancellation task requires the ability to focus attention, shift attention, as well as other abilities such as visual scanning and psychomotor speed [13]. There was a 56.1 percent reduction in total errors in the cancellation task in medical students (n = 46, age range 18–23 years); a 32.5 percent improvement in the net scores of middle aged adults (n = 48, age range 30–59 years) and 16.4 percent in older adults (n = 16, over the age of 60 years) [12]. High frequency yoga breathing has not been specifically tested as a classroom based intervention in pre-teen children.

Hence the present study was designed to assess performance in an attention based cancellation task immediately before and after 18 min of high frequency yoga breathing in 61 pre-teen children, compared to sessions of yoga based breath awareness or quiet rest of equal duration, in a random sequence, on separate days.

2. Materials and Methods

2.1. Participants

There were 61 pre-teen children with ages ranging from 11 to 12 years (group mean age (SD), 11.2 (0.5) years) recruited for the study from a residential school in India. They were students of grade 6 and 7 and there were 25 girls. The sample size was not calculated prior to the trial. However, the power was calculated from STAI-S scores, which were significantly different between states in the repeated measures ANOVA and in *post-hoc* analysis comparing post values with pre in the high frequency yoga breathing (HFYB) session. With the sample size of 61, and the Cohen's d of 0.49 (medium), the power obtained was 0.99 [14]. The children were recruited based on the following inclusion criteria: (i) Apparently normal health based on a routine case history and medical examination; (ii) aged between 11 and 12 years, both genders; (iii) staying in a residential school for at least 2 years, with bi-annual home visits; (iv) at least one years' experience (with a frequency of 26 days/month) of yoga practice including high frequency yoga breathing (v) right hand dominant based on Edinburgh handedness inventory [15] and (vi) willingness to take part in the study. The exclusion criteria were: (i) Girls who attained menarche or boys who reached puberty, (ii) presence of any physical or mental illness and (iii) taking any medication.

The school was located in north India. Admission was competitive and students answered an exam and their parents were spoken to, to understand the family background before admission. Boys and girls are housed in separate accommodation but have classes together. The parents are allowed to visit the children 3 to 5 times a year and the children get holidays to go home in summer and winter for a total of two months in a year. There are 4 house-persons, who stay with the children and one class teacher per class. There are 40 to 50 students in a class. The students have activities starting from 04.30 h to 21.30 h, which were supervised. These activities included a 50 min yoga class in the morning, universal prayer, regular classes, games (this included team and individual games as well as competitive and non-competitive games) for 75 min, self-study for 60 min, and time for meals. The remaining time was for their individual activities.

The study was approved by the institution's ethical committee (approval number: YRD-018/018-19). Signed informed consent was taken from the principal of the school. The principal informed the parents of the students about the study and their oral approval was also taken.

2.2. Study Design

The children were randomly assigned to 3 groups, i.e., group A, group B, and group C using an online random sequence generator [16]. The procedure was as follows: Children were given serial numbers from 1 to 61 independent of their name, order of enrolment, or any other factor. Using an online random generator, 61 random numbers were generated [16]. These random numbers were noted beside the serial number assigned to each child. The random numbers were then written on

University of Patanjali Haridwar

identical slips of paper and folded in a similar manner. The slips were mixed and a person who was unaware of the study design put the slips one at a time into three boxes labelled A, B, and C. The letters A, B, and C represented group A, group B and group C respectively.

After allocation of the children to three groups, the online randomizer [16] was used to assign the sequence of the three interventions to the three groups for three days. As a result, group A practiced HFYB, BAW, and QS on day 1, day 2, and day 3 respectively; group B practiced BAW, HFYB and QS on day 1, day 2, and day 3 respectively and group C practiced QS, BAW, and HFYB on day 1, day 2, and day 3, respectively. Assessments of SLCT and STAI were taken before and after each session. The data were taken in November, 2018.

2.3. *Assessments*

2.3.1. Six Letter Cancellation Test (SLCT)

This is a standardized paper-and-pencil test, which is used to assess selective attention [12,13]. The SLCT consists of an A4 size sheet of paper in which letters of the English alphabet are randomly arranged in a 22 × 14 matrix. At the top of the test sheet there were6 target letters; these 6 letters were interspersed with non-target letters in the work sheet below. Participants were instructed to spot the 6 target letters in the work sheet and to cancel them with a slash (/). Cancellation of non-target letters was counted as errors and the total time given to complete the test was 90 s. The net score was calculated by subtracting wrongly cancelled letters from the total letters cancelled.

2.3.2. Spielberger's State Trait Anxiety Inventory – State (STAI-S)

The STAI-S is a standardized 20 item inventory, which assesses the anxiety, i.e., the anxiety at the moment of testing [17]. The 20 items are sentences which describe the feelings of a person which can be assessed on a 4-point (i.e., not at all, somewhat, moderately so, and very much so) Likert scale. The participants had to choose one out of the 4 options provided for each item. This scale was not culture sensitive and had been standardized for use in an Asian population (of which 6.5% was an Indian population) with test-retest reliability (r = 0.60–0.94) and Cronbach's alpha score of 0.86 [17].

2.3.3. Visual Analog Scales (VAS)

Visual analog scales were used to self-rate the quality of practice after each session. Each scale was a 10 cm horizontal line that allowed participants to self-rate the quality of practice on a scale of 0 (worst possible) to 10 (excellent). The participants were told to put a mark on the line to describe how well they were able to follow the instructions during the practice of HFYB, BAW, or QS.

2.4. *Interventions*

There were 3 interventions which each group practiced in 3 days in random order. These were (i) high frequency yoga breathing or HFYB, (ii) breath awareness (BAW), and (iii) quiet sitting (QS).

2.4.1. High Frequency Yoga Breathing (HFYB)

HFYB consisted of rapid breathing with forceful exhalation contracting the anterior abdominal muscles, at a rate of 1.0 Hz (60 breaths per minute). Children were instructed to avoid using excessive force. During the practice the volunteers checked that the children appeared relaxed, especially their facial expression, shoulders, and trunk. The children were instructed to sit cross-legged with their eyes closed and spine and neck erect and aligned during HFYB. During this practice children were instructed to be aware of the passage of air through the nasal and respiratory passages, while also being aware of all the movements during the practice.

There were two teachers of each gender appointed by the school to teach yoga. Each of them had a minimum of 2 years training in yoga, both theory and practice. They were familiar with the contraindications to practice high frequency yoga breathing, i.e., a history of febrile convulsions or

University of Patanjali Haridwar

seizures due to any cause, recent surgery or injury to the thorax or abdomen, and any breathing disorder in the children, which would make it difficult to carry out the practice. The yoga teachers were also aware of the precautions they needed to observe i.e., check that the children were not hyperventilating, over-breathing, or fatigued.

2.4.2. Breath Awareness (BAW)

BAW consisted of being aware of the movement of air in the nasal and respiratory passages without manipulating it. The children were asked to sit cross-legged with their eyes closed and neck and spine erect and aligned, and attention directed to awareness of the breath. Breath awareness was added as an interventional control because being aware of one's breath is an essential part of yoga breathing. Hence this is yoga-based breath awareness, which for the sake of convenience is referred to as 'breath awareness'.

2.4.3. Quiet Sitting (QS)

QS was the control session in which participants were instructed to sit quietly with closed eyes and their neck and spine erect and aligned. They were instructed to allow their thoughts to wander without attempting to regulate or direct them.

The total time for each intervention was 18 min, which consisted of 3.5 min epochs of the respective practice followed by 1 min of rest after each epoch. The SLCT and STAI-S were assessed at the beginning and end of the sessions and the VAS was assessed at the end of each session. Figure 1 represents the study design schematically.

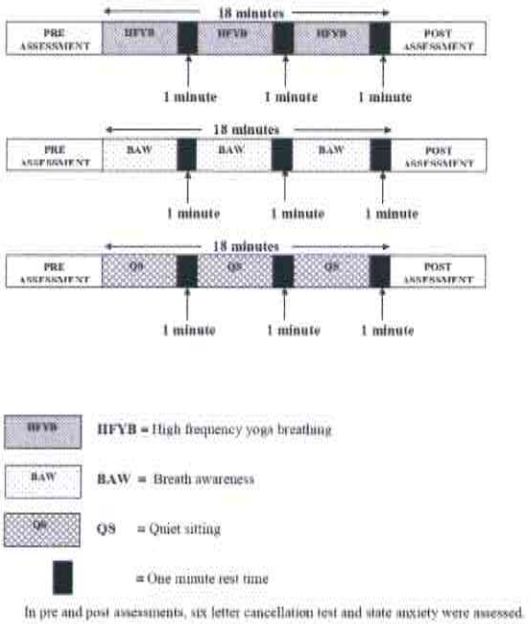

Figure 1. Schematic representation of the study design. This is a schematic representation of the study design. The interventions are as follows: The hatched rectangle indicates high frequency yoga breathing (HFYB), the stippled rectangle indicates breath awareness (BAW), the cross hatched rectangle indicates quiet sitting (QS) and the smaller darkened rectangles indicate rest periods of one minute duration.

2.5. Data Analyses

Data analyses were done using SPSS (24.0). The data obtained before and after the 3 sessions were compared using a repeated measures analysis of variance (RM-ANOVA) followed by Bonferroni adjusted *post-hoc* analyses. The RM-ANOVA had 2 within-subjects' factors i.e., states, with 2 levels (pre

University of Patanjali ★ Haridwar ★

and post), and sessions, with 3 levels (HFYB, BAW and QS). The data were analyzed for the group as a whole, as well as for boys and girls separately.

Parametric tests (i.e., repeated measures ANOVA followed by multiple *post-hoc* tests) were used since with sample sizes greater than 30 whether the data were normally distributed (or not) does not impact accuracy [18].

3. Results

The group mean values (SD) for SLCT, STAI-S, and VAS are given in Table 2. ANOVA values for SLCT and STAI-S are given in Table 3.

3.1. Repeated Measures Analyses of Variance (RM-ANOVA)

In the whole group, the STAI-S scores differed between States ($F = 39.606$, $df = 1,60$, $p < 0.001$). A significant interaction between Sessions × States was noted in net scores of SLCT ($F = 3.766$, $df = 2,120$, $p < 0.05$) suggesting interdependence of the two factors [19]. The STAI-S scores differed between States for boys ($F = 25.420$, $df = 1,35$, $p < 0.001$) as well as for girls ($F = 14.595$, $df = 1,24$, $p < 0.01$). There was a significant interaction between Sessions × States for the total attempted scores ($F = 5.791$, $df = 2, 48$, $p < 0.01$) and net scores ($F = 6.817$, $df = 2,48$, $p < 0.01$) in girls alone.

3.2. Post-Hoc Analyses

For the whole group, there was a significant increase in the total attempted scores ($p < 0.05$; 95% CI = −4.75, −0.34) and net scores ($p < 0.05$; 95% CI = −4.47, −0.15) of SLCT after HFYB, while there was a significant increase in wrong attempts after BAW ($p < 0.05$; 95% CI = −0.97, −0.02). The Anxiety decreased significantly after all three sessions i.e., HFYB ($p < 0.001$; 95% CI = 3.09, 7.17), BAW ($p < 0.001$; 95% CI = 2.59, 6.82), and QS ($p < 0.001$; 95% CI = 2.73, 6.58). The average (SD) visual analog scale scores for HFYB, BAW, and QS were 8.4 (1.8), 8.3 (1.3) and 8.4 (1.6), respectively.

For boys alone, no changes were seen in the scores of SLCT after any of the three sessions; however the anxiety was decreased after all three sessions i.e., HFYB ($p < 0.001$; 95% CI = 3.10, 884), BAW ($p < 0.01$; 95% CI = 1.37, 6.90) and QS ($p < 0.01$; 95% CI = 1.39, 5.78). The average (SD) visual analog scale scores were 8.8 (1.8), 8.6 (1.3), and 8.7 (1.3) for HFYB, BAW and QS respectively for boys.

For girls alone, the total attempted scores ($p < 0.05$; 95% CI = −8.22, −0.58) and the net score ($p < 0.05$; 95% CI = −8.22,−0.58) of SLCT were significantly increased after HFYB. After BAW there was an increase in wrong attempts ($p < 0.05$; 95% CI = −1.83, −0.13) and a decrease in net scores ($p < 0.05$; 95% CI = 0.53, 5.71). The anxiety was decreased after all three sessions in girls also [(HFYB = $p < 0.05$; 95% CI = 0.96, 6.88), (BAW = $p < 0.01$; 95% CI = 2.01, 9.03), (QS = $p < 0.01$; CI = 2.60, 9.80)]. The average (SD) visual analog scale scores for HFYB, BAW and QS were 7.8 (1.2), 7.8 (1.7), and 7.8 (1.6), respectively, for girls.

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Table 2. Mean values (SD) of the SLCT and anxiety pre and post HFYB, BAW, and QS sessions.

Variables	HFYB				BAW				QS			
	PreMean (SD)	PostMean (SD)	Cohen's d	*p*-Value	PreMean (SD)	PostMean (SD)	Cohen's d	*p*-Value	PreMean (SD)	PostMean (SD)	Cohen's d	*p*-Value
Whole Group (n = 61)												
TA	27.15 (7.40)	29.69 (10.47)	0.280	0.024	28.14 (8.43)	27.38 (8.65)	0.089	0.351	27.91 (7.27)	28.72 (8.73)	0.101	0.394
WA	0.59 (1.20)	0.81 (1.91)	0.138	0.391	0.44 (0.89)	0.93 (1.93)	0.326	0.043	0.48 (1.02)	0.85 (2.50)	0.194	0.275
NA	26.55 (7.32)	28.86 (10.33)	0.258	0.036	27.70 (8.34)	26.44 (8.58)	0.148	0.134	27.49 (7.41)	27.87 (8.45)	0.048	0.623
STAI-S	37.59 (10.51)	32.46 (10.10)	0.498	<0.001	37.15 (10.53)	32.44 (9.93)	0.460	<0.001	36.63 (9.98)	31.98 (10.33)	0.458	<0.001
Girls (n = 25)												
TA	27.84 (8.10)	32.24 (12.20)	0.424	0.026	30.76 (8.23)	28.56 (8.16)	0.268	0.097	29.28 (7.09)	29.12 (7.18)	0.022	0.909
WA	0.76 (1.36)	1.28 (2.70)	0.24	0.362	0.4 (0.57)	1.32 (2.06)	0.608	0.047	0.6 (1.08)	0.92 (3.09)	0.138	0.619
NA	27.08 (8.39)	30.96 (12.06)	0.373	0.037	30.36 (8.14)	27.24 (8.32)	0.379	0.020	28.80 (7.40)	28.20 (7.04)	0.083	0.593
STAI-S	35.48 (8.86)	31.56 (8.80)	0.44	0.012	35.76 (9.68)	30.24 (7.48)	0.638	0.003	35.96 (10.64)	29.7 6(9.19)	0.62	0.002
Boys (n = 36)												
TA	26.67 (6.95)	27.92 (8.83)	0.157	0.355	26.33 (8.19)	26.56 (9.0)	0.026	0.835	26.97 (7.40)	28.44 (9.76)	0.169	0.251
WA	0.47 (1.08)	0.5 (1.03)	0.028	0.905	0.47 (1.06)	0.67 (1.82)	0.134	0.455	0.389 (0.99)	0.80 (2.12)	0.248	0.289
NA	26.19 (6.58)	27.42 (8.82)	0.158	0.375	25.86 (8.08)	25.89 (8.83)	0.003	0.979	26.58 (7.40)	27.63 (9.40)	0.124	0.316
STAI-S	39.06 (11.41)	33.08 (10.97)	0.534	<0.001	38.11 (11.20)	33.97 (11.18)	0.369	0.004	37.11 (9.61)	33.53 (10.91)	0.348	0.002

Abbreviations: SLCT: six letter cancellation test; TA: Total attempted in SLCT; WA: Wrongly attempted in SLCT; NA; net attempted in SLCT; STAI-S: Spielberger's state trait anxiety inventory; HFYB: High frequency yoga breathing; BAW: Breath awareness; QS: Quiet sitting.



Table 3. Details of repeated measures analysis of variance.

Sn.	Variables	Sources	df	MS	F	*p*-Value	Partial Eta Squared
Whole Group (n = 61)							
1	STAI	Sessions	2,120	16.167	0.585	0.559	0.010
		States	1,60	2135.126	39.606	<0.001	0.398
		Sessions × States	1893,113.580	2.203	0.103	0.892	0.002
2	TA	Sessions	2.000,120.000	15.257	0.415	0.661	0.007
		States	1,60	67.347	2.462	0.122	0.039
		Sessions × States	2.000,120.000	83.638	2.940	0.057	0.047
3	WA	Sessions	1.820,109.184	0.057	0.020	0.974	0.000
		States	1,60	12.265	3.563	0.064	0.056
		Sessions × States	1.807,108.396	0.584	0.262	0.748	0.004
4	NA	Sessions	1.991,119.486	15.882	0.414	0.661	0.007
		States	1,60	20.680	0.914	0.343	0.015
		Sessions × States	2,120	97.607	3.766	0.026	0.059
Girls (n = 25)							
1	STAI	Sessions	1.828,43.877	6.615	0.199	0.801	0.008
		States	1,24	1019.207	14.595	0.001	0.378
		Sessions × States	1.883,45.201	18.187	1.137	0.327	0.045
2	TA	Sessions	1.872,44.931	9.451	0.191	0.813	0.008
		States	1,24	17.340	0.457	0.505	0.019
		Sessions × States	2,48	142.740	5.791	0.006	0.194
3	WA	Sessions	1.802,43.252	0.954	0.255	0.753	0.011
		States	1,24	12.907	2.282	0.144	0.087
		Sessions × States	1.699,40.044	1.398	0.409	0.630	0.017
4	NA	Sessions	1.795,43.081	3.796	0.066	0.920	0.003
		States	1,24	0.107	0.004	0.951	0.000
		Sessions × States	2,48	157.127	6.817	0.002	0.221
Boys (n = 36)							
1	STAI	Sessions	2,70	13.019	0.492	0.614	0.014
		States	1,35	1125.227	25.420	<0.001	0.421
		Sessions × States	1.848,64.671	30.447	1.220	0.300	0.034
2	TA	Sessions	2,70	29.866	0.977	0.381	0.027
		States	1,35	52.019	2.498	0.123	0.067
		Sessions × States	1.957,68.491	8.181	0.267	0.762	0.008
3	WA	Sessions	1.925,67.378	0.250	0.108	0.891	0.003
		States	1,35	2.449	1.266	0.268	0.035
		Sessions × States	1.885,65.978	0.727	0.470	0.616	0.013
4	NA	Sessions	1.981,69.337	30.132	1.014	0.368	0.028
		States	1,35	31.894	1.615	0.212	0.044
		Sessions × States	2,70	7.532	0.282	0.755	0.008

Abbreviations: TA: total attempted in SLCT; WA: wrongly attempted in SLCT; NA; net attempted in SLCT; STAI-S: Spielberger's state trait anxiety inventory.

4. Discussion

The study was intended to determine whether an 18 min school-based intervention would increase performance in an attention task and decrease anxiety. In 61 pre-teen children the level of anxiety decreased comparably immediately after 18 min of high frequency yoga breathing, breath awareness, and sitting quietly at rest. The performance in an attention-based, cancellation task improved after yoga breathing alone.

The decrease in anxiety after all three interventions may be due to some common as well as some distinct factors. Yoga breathing has been associated with reduced anxiety, which may be due to multiple factors [20–22]. Similarly breath awareness and mindfulness are widely known to reduce anxiety though different mechanisms. During breath awareness and mindfulness the mental state is focused on the breath and is less likely to be diverted to stressful thoughts. This benefit of mindful-awareness has also been shown in school settings [23]. Sitting quietly at rest may have induced a quiet meditative state in these pre-teen children who already had 1–2years' experience of yoga, since an earlier study in adult yoga practitioners showed that persons with experience in yoga have lower levels of arousal demonstrated by lower basal metabolic rates at rest compared to non-yoga practitioners [24]. Sitting in silence has been shown to be stress reducing as an in-school intervention, practiced as quiet time [23].

Breath awareness in the present study cannot be considered the same or as effective as mindfulness meditation or mindful breath awareness. Breath awareness is a part of yoga breathing which may be as effective to reduce anxiety as sitting quietly with random thinking. However yoga-based breath

University of Patanjali Haridwar

awareness and mindful breath awareness can be expected to differ, as mindful breath awareness involvespaying attention to experiences as they occur along with maintaining a non-judgmental and accepting mental state, whilestable attention and associated cognitive processes arehighlighted [25]. The children in the present trial were trained in yoga breathing and in breath awareness as a part of yoga practice.

The cancellation task used in the present study, chiefly assesses the ability to focus and shift attention but also assesses short term recall (of the test letters), as well as visual scanning and motor performance [13]. In 107 adults (age range 18–30 years), active inhalation improved facial expression recognition and object recall [26]. Since high frequency yoga breathing involves exhaling actively and passively inhaling through the nose at an increased rate, this breathing practice may directly influence recognition and recall. In earlier studies on adults the immediate effect of high yoga breathing was an improvement in visual perception [11]. This ability may also have partially accounted for the improvement in the letter cancellation task performance in the present study. The present results suggest that yoga breath awareness, which does not involve breath manipulation is less efficient compared to yoga breathing with respect to the attention-based cancellation task, since an increase in wrong attempts in the group as a whole occurred after breath awareness.

The 25 girls in the study showed the same results as the whole group, i.e., better performance in the attention task following high frequency yoga breathing, increased wrong attempts after breath awareness and reduced anxiety after all three interventions. The boys showed a decrease in anxiety after all three interventions, with no increase in the attention task performance after any of them. This gender-difference may be explained on the basis of another study as follows. The differential effect of gender on the degree of engagement and the degree of effectiveness of a mindfulness program was compared in male and female adolescents [27]. Females were more engaged than males in the class and also reported less stress post-intervention. Despite the small sample size (10 female and 5 male adolescents), the results of the study may also explain the present gender differences following yoga breathing in which girls alone showed an increase in total attempts and net scores after yoga breathing, with increased wrong attempts after breath awareness. Apart from this, normative data for performance in the six letter cancellation task were obtained in India, in 819 school students between 9 and 16 years of age (mean age 12.1 years) [28]. The children had normal health and were proficient in English. The authors reported that girls had higher scores than boys but did not provide a possible explanation for the difference. However, given that girls score better than boys in the cancellation task this advantage may be further enhanced by an intervention, in this case, high frequency yoga breathing. Finally, the program for International Student Assessment, which is a triennial international survey has observed that even though several countries have been able to close gender gaps in learning outcomes—boys and girls differ in their attitudes towards learning—their behavior in school, how they choose to spend their leisure time, and the confidence they have (or do not have) in their own abilities as students [29,30]. These factors may have also been responsible for the gender-difference in the present study.

Since the present study aimed at assessing a yoga breathing intervention for use in a school setting, another study which attempted a similar exercise is discussed here. In this earlier study two yoga breathing practices were introduced for 5 min each school day for a year [5]. This was in an English medium school near New Delhi. Two sections of the third grade, where students are between 7 and 8 years of age were selected. One section (n = 54) was assigned the yoga intervention while the other section (n = 51) acted as the control. The scores in Math and languages (English and Hindi) were noted in both groups at the start and end of a year. The yoga group had a significantly higher cumulative gain in academic scores compared to the control group. The teachers also reported other benefits (e.g., an increase in attention span, more active participation in the class room) in the yoga group. The findings are limited by the fact that the children were not randomly assigned to the two interventions and the additional practice could have been a source of motivation to the yoga group, while the control group may have been less motivated in the absence of this additional attention [31].

University of Patanjali ★ Haridwar ★

Unlike the present study the teachers in the study cited above were trained for a week before introducing the yoga program in the classroom (whereas in the present study yoga teachers had a two year post graduate degree in yoga). The students also took a shorter time, as they were trained in one month (which included many holidays, as mentioned by the authors) [5]. The main reason for this could be the difference in yoga breathing practices. In the earlier study [5], children were taught deep breathing (which involved deep nasal inhalation and exhalation) and alternate nostril breathing (which involves inhalation and exhalation through left and right nostrils alternately). High frequency yoga breathing is appropriate for pre-teens and has been described to take approximately two weeks for beginners to reach a breath frequency of 22 breaths per minute if they started with 11 breaths per minute, after which participants are asked to increase the rate by 11 breaths per minute every two weeks [32]. Hence for novices to reach a breath rate of 55–60 breaths per minute (which was the breath rate practiced by the pre-teen participants in the present study), the time required would be 8–10 weeks.

In the present study the finding that 18 min of high frequency yoga breathing are beneficial, is limited by factors such as (i) the study was conducted in a residential school, which helped regulate experimental conditions but may not be entirely the same for pre-teens living at home, (ii) the children had already been practicing yoga for one to two years (iii) there were no assessments which would have allowed a better understanding of the mechanisms involved, and (iv) the 18 min yoga breathing intervention was not tested in novices to yoga.

5. Conclusions

There were 61 pre-teen children who showed an immediate response to 18 min of high frequency yoga breathing, breath awareness, and quiet sitting in terms of reduced anxiety. Following high frequency yoga breathing they obtained better scores in an attention-based cancellation task. In contrast on another day the same children showed an increase in errors after yoga-based breath awareness.

School curricula are very demanding. Fitting in a stress reduction practice is challenging. The present results suggest that high frequency yoga breathing if correctly taught can improve the ability to focus and shift attention as an immediate effect, while reducing anxiety. Given the immediate effects of the 18 min practice the intervention could be introduced at the start of the school day. Sitting quietly and yoga based breath awareness were also useful to reduce anxiety and could be considered as add-on practices to yoga breathing.

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Mental Wellbeing, Quality of Life, and Perception of Chronic Illness in Yoga-Experienced Compared with Yoga-Naïve Patients

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Background: Perception of chronic illness and a positive outlook improve recovery, and yoga can improve wellbeing. This study aimed to compare perception, mental wellbeing, and quality of life in yoga-experienced compared with yoga-naïve patients with chronic illness and to determine whether the duration of yoga practice in the yoga-experienced group had any correlation with the perception of illness, mental wellbeing, and quality of life.

Material/Methods: A cross-sectional comparative study recruited 419 patients with chronic non-communicable disease. Yoga-experienced patients (n=150) (mean age, 41.9±13.6 years) and yoga-naïve patients (n=269) (mean age, 41.2±12.6 years) were assessed for the perception of their illness, mental wellbeing, and quality of life using the Warwick-Edinburgh mental wellbeing scale (WEMWBS) and the World Health Organization quality of life (WHOQOL-BREF) self-reporting questionnaire.

Results: The yoga-experienced group had significantly increased mental wellbeing, personal control as a dimension of their perception of illness, and psychological and environmental quality of life compared with the yoga-naïve group (all, $p<0.05$), when comparisons were made using the Mann-Whitney U test. The duration of yoga practised in months was positively-correlated with mental wellbeing and different aspects of quality of life. There was a negative correlation with the perception of illness suggesting that the illness was perceived to be less severe (all, $p<0.05$) when correlations were made using Spearman's rank correlation coefficient.

Conclusions: In patients with chronic illness, yoga improved mental wellbeing, aspects of quality of life, and resulted in a positive perception of illness.

MeSH Keywords: Chronic Disease • Cross-Sectional Studies • Perception • Quality of Life • Yoga

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4462 4 1 50

University of Patanjali Haridwar

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Background

The perception of chronic illness by patients has several consequences that can affect wellbeing and quality of life [1]. In chronically ill patients, perception of illness influences self-management behaviors and quality of life, and patients who have a negative perception of their illness also have impaired health [2]. A negative perception of illness, especially negative emotional reactions, perceived consequences, concerns about the illness, and identifying strongly with the illness are significantly associated with high levels of emotional distress, an impaired response to the consequences of illness and low quality of life [2]. A negative perception of illness impacts negatively on quality of life and wellbeing for patients and a positive perception of chronic illness can improve quality of life and wellbeing [2].

Subjective wellbeing and positive emotions are associated with improved immune function and immune defense to common infections [3]. Therefore, a sense of wellbeing is important in disease prevention, and subjective mental wellbeing also favorably influences overall health and recovery from an illness [4]. Mental wellbeing is associated with positive health behaviors such as a healthy diet, engaging in physical activity, and a lower incidence of smoking [5,6]. People with good health generally have a sense of wellbeing. However, the findings from a previously published study reported that 38% of individuals with poor health had high levels of wellbeing, whereas 18% of individuals with good health had low levels of wellbeing [7]. In a dissertation from Ohio State University [8], correlation analysis showed that patient perception of illness was associated with differences in their mental wellbeing and quality of life. Quality of life is often defined ambiguously but may be defined in terms of the subjective and objective domains involved [9].

In 2003, Pollard and Lee [10] described wellbeing as complex and multifaceted, and hence difficult to define. While the quality of life and wellbeing are often used interchangeably, they are not the same [11]. Subjective wellbeing is mainly concerned with the respondent's internal judgments of wellbeing, whereas the quality of life is assessed based on subjective wellbeing as well as social indicators of the quality of life. Therefore, quality of life indicates how illness impacts most aspects of a patient's life. Mental wellbeing indicates how a patient feels when all factors are considered.

In 2014, Henriques, Kleinman, and Asselin provided a comprehensive definition of wellbeing as, '*happiness with the worthiness to be happy*' [12]. This definition was based on a detailed review of previous theories and the presentation of a nested model for wellbeing, which has four domains [12]. These domains include firstly, the subjective domain or the phenomenological experience of happiness, or misery as an inverted view, and satisfaction, or the possible inverted view, dissatisfaction [12]. Second, the biological and psychological aspects of health and functioning [12]. The third domain is the material and social environment [12]. The fourth domain consists of values and ideology, which include ethics, morals and the individual's world view [12]. An inverted view of the nested model can provide insights about how a change in any of the four domains, subjective experience, health, environment, and values/ideology from what is generally considered to be positive to negative could correspondingly influence health, and if continued, could lead to maladaptation and disease.

Yoga is a mind-body practice that positively impacts health [13]. A systematic review of ten randomized controlled trials compared the effectiveness of yoga with conventional care for patients with chronic illnesses including heart disease, stroke and chronic obstructive pulmonary disease (COPD) [14]. The quality of life was assessed using the Cochrane risk of bias tool and included 431 people, with a mean age of 56±8 years. Compared with conventional care, yoga significantly improved health-related quality of life and exercise capacity [14]. Apart from the studies of quality of life in patients, mental wellbeing was found to improve wellbeing in 118 healthy primary school teachers after fifteen days of an intensive residential yoga [15].

Currently, there have been few studies that have evaluated the quality of life and mental wellbeing concerning the perception of illness in patients with chronic illness that have compared patients who have experience of yoga with those who are naïve to yoga. Therefore, this study aimed to compare illness perception, mental wellbeing, and quality of life in yoga-experienced compared with yoga-naïve patients with chronic illness. This study also sought to determine whether the duration of yoga in the yoga-experienced group had any correlation with the perception of illness, mental wellbeing, and quality of life.

Material and Methods

Design of the study

This study was approved by the Local Ethics Committee (approval number: PRF/16/0020). Participation in the study was voluntary and there was no patient remuneration for participation in the study. Signed informed consent was obtained from all study participants. The study design was a cross-sectional single assessment with assessments performed using standard appropriate questionnaires. Data were collected for five months, from April 2017 to August 2017.

Study participants

A total of 468 patients with chronic illness aged between 18–74 years (mean age, 41.4±12.9 years) participated in the study.

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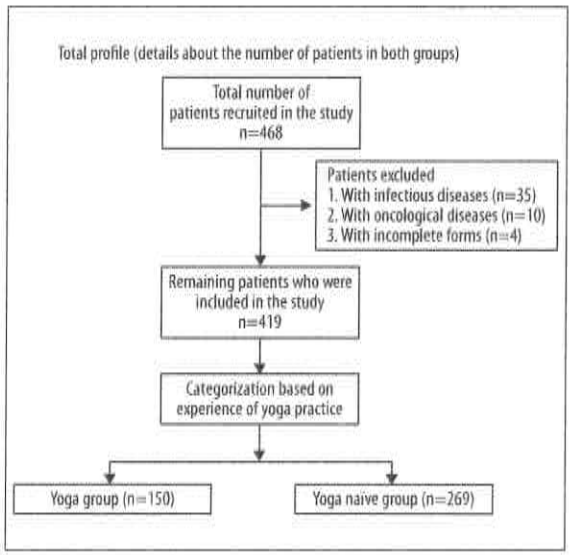

Figure 1. Flowchart of the study design, including details about the number of participants in the yoga-experienced and yoga-naïve patient groups.

At the time of enrollment in the study all participants filled in a social-demographic data form. This included two questions related to the duration of yoga. The first question was close-ended: '*Do you practice yoga?*' (yes/no). The second question was open-ended: '*Since when have you been practicing any form of yoga regularly?*' Based on the responses, 150 participants (mean age, 41.9±13.6 years) were considered as the yoga-experienced group, with at least one month of experience of yoga practice (mean experience, 50.9±73.3 months). In the yoga-naïve group, there were 269 participants (mean age, 41.2±12.6 years) who reported no experience of yoga practice. The participants were patients from the outpatient department in a yoga and Ayurveda hospital located in the north of India.

Inclusion and exclusion criteria

Patients who were diagnosed with chronic non-communicable diseases (NCDs) and those who completed their questionnaires were included in the study. The exclusion criteria were infectious diseases and diseases that could have a fatal outcome during the study, such as malignancy, and 49 participants were excluded for these reasons (Figure 1). With the sample size in the yoga-experienced group (n=92) and the Cohen's d=0.34, the power was 0.75 for a=0.05 calculated using G*Power software version 3.1 from the difference in the quality of life scores between the two groups [16]. Baseline characteristics of both the yoga-experienced group and the yoga-naïve group are shown in Table 1. Disease classification was based on the International Classification of Diseases, 10th edition (ICD-10) (Table 2) [17].

Assessment of perception of illness

The level of perception of illness (POI), mental wellbeing, and quality of life were assessed using three different questionnaires. Perception of illness was assessed using the brief illness perception questionnaire (BIPQ) which is a nine-item scale designed for rapid assessment of perception of illness (POI) and was particularly helpful in this patient population [18]. The BIPQ questionnaire has been standardized for use in an Indian population and included test-retest reliability (r) ranging from 0.42–0.75, and predictive validity (r) ranging from 0.30–0.43 for an Indian population [18,19]. The BIPQ questionnaire used an 11-point response scale that varies between 0–10 and assessed cognitive POI, emotional POI, comprehension POI, and causal perception of illness. Out of a total of nine items, five of the items assessed patients' cognitive perception of illness, including consequences (item 1), timeline (item 2), personal control (item 3), treatment control (item 4), and identity (item 5). Two of the items assessed the emotional perception of illness and included concern (item 6) and emotions (item 8). One item assessed comprehension about the illness (item 7). Assessment of the perceived causes was based on an open-ended response question, which asked patients to list the three most important causes of their illness (item 9).

Assessment of perception of mental wellbeing

Mental wellbeing was evaluated using the Warwick-Edinburgh mental wellbeing scale (WEMWBS) [20]. This scale showed Cronbach's α score of 0.89, test-retest reliability of 0.83, criterion validity of 0.43–0.77, and construct validity of 0.87–0.91 [20]. The WEMWBS has been validated in Asian populations from China and Pakistan, with an internal consistency of 0.88–0.94, test-retest validity of 0.86–0.95, and construct validity of 0.64 [21,22]. While China and Pakistan are culturally different from India, there are many sociocultural aspects that influence mental wellbeing that are similar. The WEMWBS has been previously used in Indian populations [15,23]. The WEMWBS is a fourteen-item scale that asks people to describe their experience of feelings and thoughts over the last two weeks with five possible options as their response: 1, never; 2, rarely; 3, sometimes; 4, often; and 5, very often.

Assessment of quality of life

Quality of life (QoL) was assessed using the WHO quality of life BREF (WHOQOL-BREF), which is a useful tool to assess the changes during the course of treatment of an individual [24]. This scale has previously been standardized for use in an Indian population earlier and has shown internal consistency (Cronbach's α=0.87), content validity (0.50–0.77), and predictive validity (0.44–0.63) [25,26]. WHOQOL-BREF consists of 26 items with five possible responses, including: 1, not at all;

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Table 1. Baseline characteristics of the yoga-experienced and yoga-naïve groups.

S. No.	Baseline characteristics		Yoga-experienced (n=150)	Yoga-naïve (n=269)
1	**Average age of the group** (mean ±SD)		41.86±13.57	41.16±12.57
1.1	**Gender** mean ±SD	Male (M)	41.79±13.59	41.16±12.59
		Female (F)	41.79±13.59	41.13±12.54
2	**Gender**			
2.1	M: F (n)		90: 60	155: 114
2.2	M: F (%)		60.0: 40.0	57.6: 42.4
3	**Education,** n (%)			
3.1	<10 years		27 (18.0)	52 (19.3)
3.2	10 years		9 (6.0)	26 (9.7)
3.3	>10 years		114 (76.0)	191 (71.0)
4	**Socioeconomic** (level based on income per month in INR), n (%)			
4.1	5000 to 16000		50 (33.3)	109 (40.5)
4.2	17000 to 40000		42 (28.0)	56 (20.8)
4.3	41000 to 85000		22 (14.7)	30 (11.2)
4.4	85000 and above		13 (8.7)	11 (4.1)
4.5	No details		23 (15.3)	63 (23.4)
5	**Occupation,** n (%)			
5.1	Business		26 (17.3)	50 (18.6)
5.2	Agriculture		13 (8.7)	30 (11.2)
5.3	House holder		56 (37.3)	118 (43.9)
5.4	Professionals		55 (36.7)	71 (26.4)
6	**Marital status,** n (%)			
6.1	Married		117 (78.0)	219 (81.4)
6.2	Unmarried		30 (20.0)	40 (14.9)
6.3	Widow/widower		2 (1.3)	9 (3.3)
6.4	Separated/divorced		1 (0.7)	1 (0.4)
7	**Use of intoxicants/stimulants,** n (%)			
7.1	**Alcohol**			
7.1.1	Yes		13 (8.7)	21 (7.8)
7.1.2	No		137 (91.3)	248 (92.2)
7.2	**Tobacco**			
7.2.1	Yes		16 (10.1)	25 (9.3)
7.2.2	No		134 (89.3)	244 (90.7)
8	**Yoga experience** (months) (mean ±SD)		50.87±73.31	Not applicable

There were no significant differences for all comparisons ($p>0.05$) using the chi-squared (χ^2) test.

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Table 2. Classification of diseases according to the International Classification of Diseases 10th edition (ICD-10) [17] of the yoga-experienced group and yoga-naïve group.

S. No.	Description of the disease	Disease codes	Yoga-experienced (n=150)		Yoga-naïve (n=269)	
1	Disease of blood and blood forming organs and certain disorders involving the immune mechanism; n (%)	D50-D89	1	(0.7)	3	(1.1)
2	Endocrine nutritional and metabolic diseases; n (%)	E00-E89	16	(10.7)	28	(10.4)
3	Mental, behaviour and neurodevelopmental disorder; n (%)	F01-F99	4	(2.7)	3	(1.1)
4	Disease of the nervous system; n (%)	G00-G99	14	(9.3)	19	(7.1)
5	Disease of the eye and adnexa; n (%)	H00-H59	5	(3.3)	4	(1.5)
6	Disease of the ear and mastoid process; n (%)	H60-H95	2	(1.3)	1	(0.4)
7	Disease of the circulatory system; n (%)	I00-I99	5	(3.3)	12	(4.5)
8	Disease of the respiratory system; n (%)	J00-J99	7	(4.7)	12	(4.5)
9	Disease of the digestive system; n (%)	K00-K95	25	(16.7)	33	(12.3)
10	Disease of the skin and subcutaneous tissue	L00-L99	10	(6.7)	19	(7.1)
11	Disease of the musculoskeletal system and connective tissue; n (%)	M00-M99	34	(22.8)	77	(28.6)
12	Disease of the genitourinary system; n (%)	N00-N99	14	(9.4)	28	(10.4)
13	Symptoms, signs abnormal clinical and laboratory findings, not elsewhere classified; n (%)	R00-R99	12	(8.1)	24	(8.9)
14	Injury, poisoning and certain others; n (%)	S00-T88	1	(0.7)	6	(2.2)

The chi-squared (χ^2) test showed no significant difference ($p>0.05$) between the numbers in the yoga-experienced group and the yoga-naïve group in different disease categories.

2, not much; 3, moderately; 4, a great deal; and 5, completely. Out of the 26-items, question 1 assessed prediction about the overall perception of quality of life, question 2 was used to assess the overall perception of health, and the remaining 24 questions assess four domains on quality of life, physical, psychological, social and environmental.

The initial aim of the study was to assess the perception of illness in relation to mental wellbeing, with a possible provision to add a quality of life questionnaire at a further stage if participants were willing. The WHOQOL-BREF self-reporting questionnaire was used when it was clear that participants had time to answer the questionnaire fully. Therefore, WHOQOL-BREF responses were not obtained from all participants. The results presented of QoL were for the yoga-experienced group (n=92) and the yoga-naïve group (n=178) (Figure 1).

Data extraction

All questionnaires were anonymously scored by an evaluator who was unaware of the patients' diagnosis and their group allocation to the yoga-experienced group or the yoga-naïve group. The group mean ± standard deviation (SD) scores were calculated. For perception of illness, each item of the scale was given a weighted score of 0–10. A standard method was used to score the data [18]. The overall score represents the degree to which the illness is perceived as threatening. A higher score indicated that the patient viewed their illness as particularly severe. For mental wellbeing, each item of the scale was given a weighted score of 1–5, and a standard method was used to score the data [20]. Higher scores are positively correlated with a higher level of mental wellbeing. For the quality of life, each item was scored between 1–5. Questions 3, 4, and 26 were reverse-scored and the remaining questions were scored directly, with a higher score indicating a higher QoL. The mean scores of items within each domain were used to calculate the domain scores in the four domains, physical, psychological, social, and environmental, which indicated an individual's perception of their QoL in each domain, respectively, with higher scores indicating a higher quality of life [24].

Statistical analysis

Data were analyzed using SPSS version 24.0. Three types of analysis were performed for background and patient demographics, comparisons between yoga-experienced and

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Table 3. Comparison between the yoga-experienced and yoga-naïve patients for mental wellbeing, perception of illness, and quality of life using Mann-Whitney U test.

S. No,	Variables	Yoga-experienced (n=150)	Yoga-naïve (n=269)	z-Value	p-Value
1	**Mental wellbeing**	49.99±11.65	47.54±11.63*	1.99	0.05
2	**Brief perception of illness**	43.59±11.49	45.03±11.28	1.26	0.21
2.1	**Consequences**	6.99±2.56	7.00±2.86	0.53	0.59
2.2	**Timeline**	5.53±2.82	5.86±3.08	1.28	0.20
2.3	**Personal control**	4.51±2.52	5.03±2.80#	1.87	0.06
2.4	**Treatment control**	3.47±2.55	3.68±2.82	0.54	0.59
2.5	**Identity**	6.42±2.43	6.15±2.65	1.13	0.26
2.6	**Concern**	7.37±2.99	7.74±2.85	1.52	0.13
2.7	**Coherence**	2.39±2.48	2.73±2.76	0.99	0.32
2.8	**Emotional representation**	6.92±2.84	6.85±3.02	0.04	0.97
2.9	**Cognitive**	26.91±7.59	27.71±7.88	1.19	0.24
3	**Emotional**	14.29±5.23	14.59±5.22	0.75	0.45
4	**WHOQOL-BREF**	**Yoga-experienced (n=92)**	**Yoga-naïve (n=178)**		
4.1	Overall perception of quality of life	3.33±1.04	3.27±1.02	0.33	0.74
4.2	Overall perception of their health	2.99±2.20	2.75±1.05	0.37	0.62
4.3	Physical health	21.97±5.17	21.92±4.76	0.35	0.81
4.4	Psychological	19.09±5.08	17.77±4.47*	2.11	0.05
4.5	Social relationship	10.55±3.00	10.19±2.76	1.06	0.24
4.6	Environmental	26.27±6.10	24.27±5.81*	2.43	0.02
4.7	Total quality of life	84.20±17.13	80.16±16.02#	1.89	0.07

* p<0.05 at two tailed level, # p<0.05 at one tailed level, level of significance between the groups; Mann-Whitney U test for non-parametric data. WHOQOL-BREF – the World Health Organization quality of life self-reporting questionnaire.

yoga-naïve groups, and correlation analysis. At baseline, the data included scores for mental wellbeing, quality of life, and perception of illness, which were tested for a normal distribution using the Shapiro-Wilk test. In all cases, the data were not normally distributed, the data were analyzed for equal or comparable variance using Levene's test for equality of variance. There was inequality of variance of the data between the yoga-experienced and yoga-naïve groups, and the chi-squared (χ^2) test was used to compare the sociodemographic characteristics and different categories of diseases based on the ICD-10 categories. A Mann-Whitney U test was performed to compare mental wellbeing, dimensions of perception of illness, and quality of life between the yoga-experienced and the yoga-naïve groups. Spearman's rank correlation coefficient was used to determine the correlation between yoga experience in months with mental wellbeing, dimensions of perception of illness, and quality of life in the yoga-experienced group. For all comparisons and statistical analysis, the α-value was pre-set as 0.05.

Results

Background patient demographics

The yoga-experienced group (n=150) and the yoga-naïve group (n=269) showed no significant differences in the following variables at baseline: gender, number of years of education, and socioeconomic level, based on a standard categorization [27], occupation, marital status, consumption of

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Table 4. Correlation of mental wellbeing, quality of life, and perception of illness with experience of yoga practice in months in the yoga-experienced group.

S. No.	Variables	Yoga experience	
		rs-Value	p-Value
1	**Mental wellbeing**	0.21**	0.01
2	**Brief perception of illness**	−0.24**	<0.01
2.1	Consequences	−0.20*	0.01
2.2	Timeline	−0.21*	0.01
2.3	Personal control	−0.12	0.16
2.4	Treatment control	−0.11	0.17
2.5	Identity	−0.05	0.54
2.6	Concerned	−0.17*	0.04
2.7	Coherence	−0.08	0.32
2.8	Emotional representation	−0.03	0.73
2.9	Cognitive	−0.25**	<0.01
3	Emotional	−0.12	0.13
4	**WHOQOL-BREF**		
4.1	Overall perception of quality of life	0.15	0.15
4.2	Overall perception of their health	0.01	0.91
4.3	Physical health	0.14	0.19
4.4	Psychological	0.19#	0.07
4.5	Social relationship	0.01	0.99
4.6	Environmental	0.21*	0.04
4.7	Total quality of life	0.79#	0.07

* p<0.05 at two tailed level; ** p<0.01 at two tailed level; # p<0.05 at one tailed level; level of significance based on Spearman's rank correlation coefficient. WHOQOL-BREF – the World Health Organization quality of life self-reporting questionnaire.

alcohol, and consumption of nicotine in any form, with the chi-squared (χ^2) test result of p>0.05 in all cases. The details of the baseline characteristics of both groups are shown in Table 1. The participants were also categorized at baseline using the International Classification of Diseases, 10th edition (ICD-10) [17]. The number of patients in the yoga-experienced and yoga-naïve groups in the 14 categories of disease showed no significant difference, with the chi-squared (χ^2) test result being p>0.05 in all cases.

Comparisons between yoga-experienced and yoga-naïve groups

The yoga-experienced group (n=150) had significantly higher scores compared with the yoga-naïve group (n=269) in mental wellbeing (Mann–Whitney U test; p<0.05). The yoga-experienced group (n=92) and yoga-naïve group (n=178) differed significantly in the three dimensions of quality of life, based on the World Health Organization quality of life (WHOQOL-BREF) self-reporting questionnaire. The yoga-experienced group had a significantly better psychological quality of life (p<0.05), environmental quality of life (p<0.05), and total quality of life (p<0.05; one-tailed level). In the perception of illness questionnaire, there was one significant difference between the yoga-experienced group and the yoga-naïve group (n=269), which was in personal control which was significantly better in the yoga-experienced group (p<0.05; one-tailed) (Table 3). In all the comparisons described above the levels of significance were low and Cohen's d-values were small, which was a limitation in the interpretation of the findings.

Correlations

The yoga-experienced group (n=150) showed a positive correlation between the duration of yoga experience in months and the mental wellbeing scores (r_s=0.214; p<0.01). The quality of life was positively correlated with the duration of yoga experience for the three dimensions of quality of life (n=92),

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psychological (r_s=0.91; p<0.05; one-tailed), environmental (r_s=0.206; p<0.05), and total quality of life (r_s=0.79; p<0.05; one-tailed). The perception of illness was negatively correlated with duration of yoga experience in months (n=150) for five aspects that included, overall perception of illness (r_s=0.241; p<0.01), consequences (r_s=0.201; p<0.05), timeline (r_s=0.206; p<0.05), level of concern (r_s=0.168; p<0.05), and cognitive perception (r_s=0.248; p<0.01) (Table 4).

Discussion

The findings of this study showed that patients with chronic illness who practiced yoga had significantly increased self-reported scores for total mental wellbeing and psychological and environmental aspects of the quality of life when compared with patients who were naïve to yoga. The patients in the present study all had chronic illnesses which were non-communicable and not expected to be fatal.

Yoga influences the mental state in different ways. Yoga has an effect on voluntary breath regulation, or *pranayama*, which is an important part of the practice of yoga [28]. Breathing in an involuntary activity but it can be controlled voluntarily and bridges volition and those functions considered to be chiefly involuntary. In the text of the Hatha Yoga Pradipika from around 300 A.D., in chapter II, verse 2.a the yoga text states that, '*through steadying the breath, control over the mind is achieved*' [29].

There are several *pranayama* practices including those in which the breathing becomes slow and the depth of breathing increases [30]. One way in which breath regulation might result in physiological changes is through the close association between breathing and the vagus nerve. While the role of the vagus nerve in cardiac sinus arrhythmia and the stress response are well known, there are other more complex effects of vagal activity that influence the psycho-physiological regulation of physical and mental health. The neurovisceral integration model has been proposed to improve understanding in the integration of the brain-body integration and emphasizes the role of the vagus in adapting to the environment [31]. The polyvagal theory [32] describes a neural circuit which regulates behavioral flexibility in response to environmental changes as well as social bonding.

Both the neurovisceral integration model and the polyvagal theory might influence mental wellbeing. A further model, the Genomics Environmental vagus Nerve social Interaction Allostatic regulation Longevity (GENIAL) model considers the vagus nerve as a method to regulate multisystem pathways that can influence psychological factors, social ties, and regulate physiological or behavioral change [33]. Therefore, increased levels of overall mental wellbeing, psychological wellbeing, and environmental wellbeing in patients who practiced yoga compared with patients who were naïve to yoga, may be explained by the activation of the vagal nerve and associated with yoga modulated breathing. Modulation of breathing as slow, deep, and regular is a part of all yoga practices such as yoga postures and yoga meditation and is not restricted to yoga breathing techniques or *pranayamas*.

A hypothetical association between the practice of yoga and the benefits obtained has been provided in a literature review which focused on a school-based yoga intervention [34]. Yoga practice, which included yoga postures, breathing techniques, relaxation, and meditation were believed to impact mind-body awareness, self-regulation, and physical fitness, with all three factors being interconnected [34]. These three factors were considered as responsible for the positive effects of yoga on behavior, the mental state, physical health, cognitive performance, relationships and the quality of life [34].

In the present study, the findings showed that the perception of illness significantly varied in the single dimension of personal control between patients who practiced yoga versus those who were yoga-naïve, although the degree of significance was weak (p<0.05, one-tailed). This finding might be explained by the validity of the brief illness perception questionnaire (BIPQ) for personal control and its association with self-sufficiency [17,35]. One of the aims of the practice of yoga is to empower a person to be self-sufficient and functionally effective [13]. In a previously published study that included patients with diabetes, blood sugar control was positively associated with personal control [35]. These findings support that when a patient has better personal control of their illness, their ability to manage their chronic illness independently can be improved. Also, the practice of yoga has been shown to improve awareness [36] and interoception or the sense of the internal state of the body [37], which could increase the feeling of being personally involved in the healing process and hence feeling a sense of control. In the Yoga Sutras of Patanjali, chapter II, verse 9, the practice of yoga is supposed to reduce fear, including the fear of death, or *abhinivesha* [38]. However, in the present study, there was no attempt to measure interoception, fear, or feelings of empowerment, which mean that their role can only be speculated.

In 2008, Deci and Ryan developed a theory to explain the factors that motivate people to grow and achieve fulfillment, which is also relevant to feelings of personal control [39]. Special emphasis was placed on intrinsic motivation, or internal sources of motivation, such as competence, connection or feeling related to other people, and a sense of autonomy or being in control of their own goals [39]. Intrinsic motivation and self-determination are considered to be comparable in the continuum of self-motivation, as people who have high levels of

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self-determination and have the belief that their behaviors can influence outcomes which are important to their life [39]. Such people are usually highly self-motivated and are good at setting goals and working with a sense of purpose, and their behaviors are directed towards realizing their goals and attempting to achieve the outcome they desire [39].

The perception of illness also could influence the choice of medical care. In a previously reported study conducted in Mexico [40], patients were considered to have three options for treatment, including conventional treatment from physicians, surgeons, and paramedical professionals, self-care that included treatment by close relatives and people associated with the patients, and lay-care that included contacting traditional healers, and other alternative treatments [40]. The findings showed that if patients perceived their illness as threatening or severe, they would contact conventional practitioners, depending on factors such as their economic status and access to conventional health providers [40]. In the present study, both the yoga-experienced group and the yoga-naïve group of patients were seeking treatment at an outpatient department of a yoga and Ayurveda hospital. The two groups did not differ in their socioeconomic status or level of education. Therefore, it may be assumed that the selection of treatment was an informed choice. However, it would be important to have further details about why the patients selected this treatment, and if this was their first choice or if they had already consulted a physician for traditional treatment.

Mental wellbeing, social interaction, and the way in which a person responds to their environment are also influenced by other physiological changes that impact brain function. Oxytocin is a nine amino acid peptide secreted by the hypothalamus, which can positively impact socio-emotional cues facilitating interpersonal trust and positive social interaction [41]. A previously published study demonstrated that the practice of yoga for one month increased plasma oxytocin levels by 7.2 pg/ml, whereas a control group showed no significant change [42]. The effects of the vagus and neurochemical changes are two examples of psychophysiological changes that could explain the benefits seen in patients who practiced yoga. However, in the absence of quantitative methods of evaluation, these psychophysiological effects require further study.

In this study, correlations for the yoga-experienced group were performed between the duration of experience of yoga in months and the dimensions of mental wellbeing, quality of life, and perception of illness. There was a significant positive correlation between the duration of the practice of yoga and mental wellbeing, perception of quality of life, psychological aspects of quality of life, quality of life related to the environment, and total quality of life. There may be many ways in which the practice of yoga may positively influence mental wellbeing, especially in relation to the environment and the ways a person perceives their quality of life.

Mental wellbeing includes hedonic and eudemonic aspects of wellbeing [43]. The hedonic aspects include happiness and subjective wellbeing, while positive functioning is a eudemonic aspect. The mental wellbeing scale used in this study assessed both aspects of mental wellbeing. The hedonic elements include happiness, joy, and contentment. In yoga, contentment is a necessary prerequisite to practice yoga postures (*asanas*), yoga breathing (*pranayama*) and meditation, or *santosha* [28]. It has been traditionally described that through the practice of yoga, a person reaches the state of physical and mental balance or homeostasis, which leads to perfect bliss or *ananda* [44]. These examples from traditional texts can be correlated with scientific findings based on contemporary research [45,46]. The eudemonic elements of wellbeing are psychological functioning, autonomy, a sense of purpose in life, and a positive relationship with others, and yoga increases the sense of self-sufficiency and independence. The practice of yoga also increases emotional resilience [47] and self-esteem [48], which could contribute to increased feelings of autonomy.

In the present study, the duration of the practice of yoga was negatively correlated with the way the patients perceived their illness, the consequences of the illness, and the timeline or course. As described above, yoga enhances positive feelings and increases self-sufficiency, which could possibly give patients a more positive view of their illness. Also, yoga is known to reduce anxiety [49]. Anxiety in patients who are chronically ill is often related to the way they perceive the outcome or consequences of being ill, as well as the timeline or course of the illness. It is possible that the positive mental attitude and reduced anxiety levels due to yoga helped patients with chronic illness to perceive their outcome and course of the illness as less threatening.

Worldwide, the burden of chronic non-communicable illnesses continues to increase, due to an increasing proportion of elderly patients and unhealthy lifestyles [50]. The findings of the present study showed that patients with chronic illness who practiced yoga had a more positive mental state with better mental wellbeing and a greater sense of being in control of their illness when compared with yoga-naïve patients. Also, mental wellbeing, quality of life, and a positive perception of their illness were significantly greater in yoga-experienced patients who had a long experience of yoga.

This study had several limitations. In some cases, there were inadequate details about the type of yoga, such as the yoga school, the name of the specific yoga practices, and the intensity and the frequency of yoga. Also, this study relied entirely on questionnaires without other forms of assessment to

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understand the underlying mechanisms of the effects. The levels of significance in all cases were low ($p<0.05$) and Cohen's d values were small. Despite these limitations, the results suggest that yoga is a useful intervention in patients with non-communicable chronic illness, and can improve mental state, the way patients perceive their illness, and their overall quality of life.

Conclusions

A cross-sectional study compared yoga-experienced and yoga-naïve patients with chronic illness in terms of mental wellbeing, quality of life, and perception of their illness. Both groups included patients attending a yoga and Ayurveda outpatient department for treatment of chronic non-communicable illnesses without fatal outcome. The yoga-experienced group had significantly better mental wellbeing, psychological quality of life, environmental quality of life and total quality of life when compared with the yoga-naïve group. In their perception of illness, the yoga-experienced group had better personal control than the yoga-naïve patients suggesting that they felt more in control of their illness. The levels of mental wellbeing, aspects of quality of life and dimensions of perception of illness were significantly correlated with the duration of yoga in months suggesting that a longer duration of yoga experience improved mental wellbeing, quality of life and the way persons perceive their illness. The way in which an illness is perceived can impact the outcome in several ways. In patients who perceive their illness as severe and that they have little control over the illness this would negatively influence their recovery. However, patients who are optimistic about their illness might have a better chance of improvement. Illness perception can also influence patient choice of medical care, as patients who perceive their illness as life-threatening may be more likely to seek conventional medical care, whereas those who perceive their illness as chronic may choose complementary and alternative methods of treatment. Therefore, the findings of this study suggest the importance of evaluating mental wellbeing, overall quality of life, and the way illness is perceived, in patients with chronic non-communicable diseases.

Conflict of interest

None.

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Short Communication

Performance in a Corsi Block-tapping Task following High-frequency Yoga Breathing or Breath Awareness

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Abstract

Background: Uninostril yoga breathing practices have improved spatial memory scores. There has been no assessment on the effect of high-frequency yoga breathing (HFYB) on working memory and spatial memory scores using the Corsi block-tapping task (CBTT). **Objectives:** The present study was planned to assess the immediate effects of HFYB and breath awareness (BAW) compared to a control session on performance in a CBTT. **Methods:** Fifteen participants of both sexes with ages between 18 and 24 years (group mean age ± standard deviation, 20.0 ± 1.6 years; 10 females) were recruited for the trial from a university in North India. Each participant was assessed in three sessions conducted on 3 separate days at the same time of the day. The three sessions were (i) HFYB, (ii) BAW, and (iii) quiet sitting (QS). The duration of the intervention was 18 min. The participants were assessed before and after all the three sessions. Repeated-measures-analyses of variance followed by *post hoc* tests with Bonferroni adjustment were performed to compare data before and after all the three sessions. **Results:** BAW resulted in an improvement in backward total scores ($P < 0.05$) and the backward Corsi span ($P < 0.05$; one tailed). **Conclusions:** The results suggest that BAW improves primary working memory, spatial memory, and spatial attention. HFYB did not cause any change.

Keywords: *Breath awareness, Corsi block-tapping task, high-frequency yoga breathing*

Introduction

Voluntary breath regulation (*pranayama*, in Sanskrit) consists of yoga practices which modify the depth, rate, and the other dimensions of respiration.[1] The breath rate can be voluntarily increased as high as 2.0 Hz in a practice called *kapalabhati* (*kapala* = forehead; bhati = shining in Sanskrit), described as high-frequency yoga breathing (HFYB). HFYB is a yoga breathing technique which is practiced by increasing the breath rate and forceful exhalation.

All *pranayama* practices include breath awareness (BAW) as an important component to direct the attention inward and ultimately reduce awareness of all other stimuli and sensations.[2] Both HFYB and BAW have been shown to influence attention. The performance in a cancellation task on 110 participants (Cohen's $d = 0.99$) whose age ranging from 18 years to over 60 years was improved after 1 min of practice of HFYB at 2.0 Hz. The results suggest an improvement in ability to shift attention and in selective and sustained attention.[3] Similarly, in another study, on assessments with the P300 event-related potential task, there was a decrease in P300 peak latency in thirty practitioners (Cohen's $d = 0.61$) after 1 min of the practice of HFYB at 2.0 Hz.[4] These results suggested that HFYB reduced the time taken to complete the P300 task which measures selective attention. In the similar study, the practice of BAW showed an increase in the P300 peak amplitude which indicates an increase in neurons recruited to perform the task.[4] The results suggested beneficial effects of these practices (i.e., HFYB and BAW) on conscious arousal and attention.

Mindfulness does bear some resemblance with BAW. In a study, 18 long-term practitioners showed an improvement in attention, working memory, and cognitive flexibility,[5] when they were compared to age-matched control group.

One dimension of attention is visuospatial attention which involves directing the attention to the location of an object in

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space. After directing attention to a specific spatial location, further cognitive processing may be required, which may involve working memory.[6]

The Corsi block-tapping task (CBTT) is a nonverbal test[7] to measure executive functions such as visuospatial short-term memory, working memory,[8] and spatial attention.[9]

Yoga practice including *pranayamas* improved spatial memory scores by 43% when thirty schoolchildren (Cohen's d = 0.89) with ages between 11 and 16 years were assessed using verbal and spatial memory tests.[10] Similar effects were found when four specific types of *pranayamas* improved spatial memory scores by 84% in schoolchildren.[11]

However, to the knowledge of the authors, no study has attempted to study the effects of an individual *pranayama* on visuospatial memory using CBTT, which is a more objective way of assessing primary working memory. Hence, the present study was designed to assess the immediate effects of HFYB and BAW on performance in CBTT in comparison with a control session.

Methods

Participants

Fifteen volunteers of both sexes with ages between 18 and 24 years (group mean age ± standard deviation (SD), 20.0 ± 1.6 years; 10 females) were recruited as participants. Because menstrual cycle affects different aspects of attention,[12] female participants were assessed after 7 days of their period of menstrual cycle. The sample size was based on changes in backward total scores after BAW gave an effect size = 0.52 (medium) and power = 0.95 using G Power software version 3.1, Germany.[13] The inclusion criteria were (i) minimum 3 months of experience in the yoga breathing practices, (ii) ability to practice HFYB at the rate of 1.0 Hz (range, 0.83–1.17 Hz); their breath rate was checked using Quark cardio pulmonary exercise test, and (iii) normal health based on a routine clinical examination. The exclusion criteria were (i) any history of epilepsy, (ii) recent chest or abdominal surgery (because the intervention was high-frequency breathing), (iii) taking medication or using other wellness strategies, and (iv) use of stimulants or intoxicating substances. The study conditions were explained to the participants. Their signed informed consent was written in English and explained in both English and Hindi for those who were not able to understand English adequately. The study was approved by the institutional ethics committee (approval number YRD/017/032).

Study design

Each participant was assessed in all the three sessions on 3 separate days at the same time of the day. These sessions were (i) HFYB, (ii) BAW, and (iii) quiet sitting (QS) as a control group. The sequence of the practices was randomized for 15 participants using a randomizer (www.randomizer.org). The total duration of each session was 18 min, with 1 min of rest after each 5 min of practice. During the sessions, participants were asked to sit erect and keep their eyes closed.

Assessment

Corsi block-tapping task

The CBTT is an individual test which measures visuospatial short-term and working memory.[8] Nine blue squares appear on the screen. For each trial, the squares "light up" as yellow one by one in a varying sequence. After the presentation, the participants had to click each of the boxes in the similar order in which they had "lit up" the first part of the task, i.e. forward tapping. In the second part of the task, they maintained the reverse order, i.e., backward tapping. The task begins with a two-box sequence to a maximum of nine. The test gets terminated when the participant is not able to remember the sequence for two consecutive trials at any one level. Hence, the test assesses the following four variables: (i) forward Corsi span, (ii) forward total score, (iii) backward Corsi span, and (iv) the backward total score. The sample of the square presentation along with forward and backward tapping is shown in Figure 1.

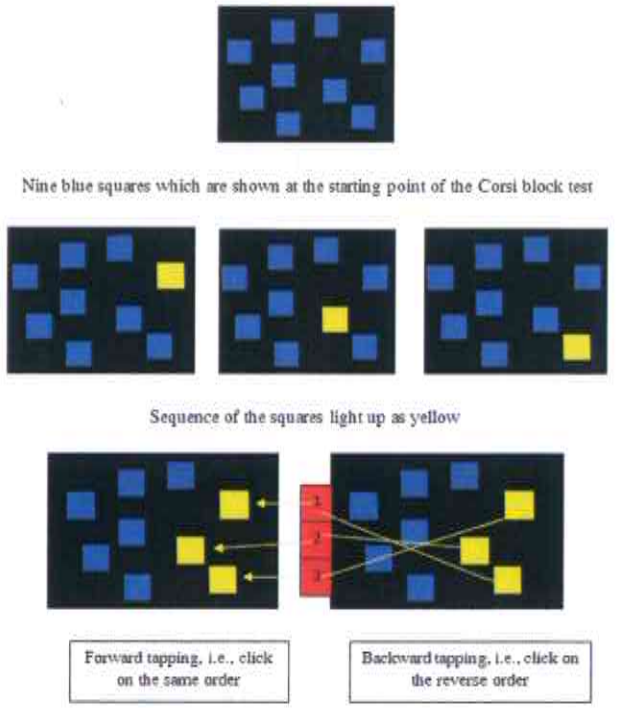

Figure 1: Sequence of the square presentation along with forward and backward tapping

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Intervention

Each participant performed three yoga techniques namely (1) HFYB, (2) BAW, and (3) QS. The total time for each intervention session was 18 min, with 1 min of rest after each 5 min of all the sessions.

High-frequency yoga breathing

The participants were asked to sit in a comfortable posture (*sukhasana*), keeping their spine erect, neck aligned, and eyes closed. They practiced HFYB at approximately 1.0 Hz with forceful exhalation, for 3 periods of 5 min each.

Breath awareness

The participants were asked to be aware of the flow of the air as it enters and passes through the nasal passages without modifying their breathing. The participants were asked to maintain similar posture in all the three sessions, seated with spine erect and eyes closed.

Quiet sitting

In the QS as a control session, the participants allowed their thoughts to wander at random without modifying them or being aware of their breathing. They were asked to sit with their spine erect and eyes closed. No other activity was given to them.

Data analysis

Repeated-measures-analyses of variance was performed for (i) forward Corsi span, (ii) forward total score, (iii) backward Corsi span, and (iv) backward total score in which the three sessions (HFYB, BAW, and QS) and two states (before and after sessions) were compared. *Post hoc* analysis was performed to compare data before and after all the three sessions which were Bonferroni adjusted.

Results

BAW improved total scores in backward tapping ($P < 0.05$) and backward Corsi span ($P < 0.05$; one tailed). HFYB did not show any changes in Corsi span and total scores of backward as well as forward tapping. Changes in mean, SD, and Cohen's *d* for both forward and backward Corsi span with total scores are summarized in Table 1. The *df*, mean square, *F*, and partial *eta* squared values are summarized in Table 2.

Discussion

Fifteen minutes of BAW resulted in an improvement in the backward total scores and backward Corsi span using the CBTT. This suggested an improvement in executive functions in terms of increased visuospatial short-term memory, primary working memory,[8] and specific spatial processes.[14]

The forward digit span test measures material-specific slave systems while the backward test measures primarily tax central executive resources.[15]

Previously, attention was improved during and after HFYB and BAW using the P300 event-related potential task in thirty male adult volunteers[4] who had experience in yoga breathing practices for at least 3 months. Similar improvement after BAW occurred when performance in a letter cancellation task was assessed in twenty male volunteers whose ages ranged from 20 to 45 years.[16] The findings suggested that BAW can improve performance in attention tasks.[16]

In the studies cited above, attention was measured using the P300 event-related potential task and a letter cancellation task, whereas in the present study, visuospatial attention was measured using the CBTT. As described below, yoga breathing practices or *pranayamas* were found to improve performance in recall in the digit span test.

Table 1: Mean, SD, and Cohen's d for forward and backward Corsi span with total scores

Variables	HFYB		BAW		QS	
	Pre	Post	Pre	Post	Pre	Post
Forward Corsi span	6.0±1.00	5.93±0.88	6.07±1.10	6.27±1.22	6.13±0.92	6.0±0.93
P	0.827		0.531		0.582	
Cohen's *d*	0.074		0.17		0.14	
Forward total score	51.27±15.99	54.07±17.80	53.53±17.62	58.33±24.82	53.2±15.32	51.13±16.94
P	0.629		0.407		0.630	
Cohen's *d*	0.17		0.22		0.13	
Backward Corsi span	5.93±0.46	6.13±0.74	6.13±0.64	6.47±0.83	5.8±0.68	6.00±0.76
P	0.271		(0.048, one-tailed)		0.334	
Cohen's *d*	0.32		0.460		0.28	
Backward total score	55±11.23	54.47±15.39	52.67±15.99	61.53±18.61	48.87±14.93	54.07±15.89
P	0.875		0.027*		0.104	
Cohen's *d*	0.04		0.51		0.34	

Variables in the Corsi block-tapping test pre- and post-HFYB, BAW and QS session. Postvalues were compared with the prevalues for three sessions, i.e., HFYB, BAW, and QS. *P<0.05, RM-ANOVA, with Bonferroni adjustment. HFYB=High-frequency yoga breathing, BAW=Breath awareness, QS=Quiet sitting, RM-ANOVA=Repeated-measures-analyses of variance

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Table 2: Details of four repeated-measures-analyses of variance

Variables	Sources	df	MS	*F*	Partial η^2
Forward Corsi span	Sessions	2, 28	0.300	0.340	0.010
	States	1, 14	0.000	0.000	0.000
	Sessions × states	2	0.233	0.403	0.002
Forward total score	Sessions	2, 28	125.544	0.567	0.001
	States	1, 14	76.544	0.463	0.032
	Sessions × states	2	93.544	0.421	0.022
Backward Corsi span	Sessions	2, 28	1.244	3.664	0.044
	States	1, 14	1.344	3.651	0.207
	Sessions × states	1.362, 19.069	0.065	0.211	0.000
Backward total score	Sessions	2, 28	240.033	1.361	0.055
	States	1, 14	457.878	3.239	0.188
	Sessions × states	1.900	177.212	3.173	0.125

Details of four repeated-measures-analyses of variance of forward Corsi span, forward total score, backward Corsi span, and backward total score. MS=Mean square

Eighty-four participants with an age range between 18 and 25 years showed an improvement in both forward and backward digit span tests suggestive of an improvement in executive functions after practicing a combination of yoga breathing practices.[17] In another study, 67 healthy medical students (37 females) with an age range of 18–25 years showed an improvement in both forward and backward digit span tests after 4 weeks of practicing a combination of *bhramari*, *anulom-vilom*, *kapalabhati*, and *bhastrika* for 30 min per day.[18] Digit span test differs from the CBTT in the brain regions involved[19] and cognitive activities.[8]

BAW does bear some resemblance to mindfulness. Tomasino and Fabbro showed that 8 weeks of mindfulness meditation increased activity in the right dorsolateral prefrontal cortex (PFC) and in the left caudate/anterior insula, while activation in the rostral PFC and right parietal area 3b (subdivision of the brodmann area) reduced.[20]

The dorsolateral PFC was found to be associated with processing of information such as integrating different dimensions of cognition and behavior,[21] ability to maintain and shift set, planning and working memory.[22,23]

Another possible mechanism for the improvement in attention after BAW could be increased sympathetic and decreased parasympathetic activities.[24] This is relevant because attention and vigilance are associated with higher sympathetic modulation in human volunteers.[25]

The findings were limited by (i) the small sample size (n = 15) though the power was 0.95 which is high compared to an earlier study, (ii) recruitment of both sexes, and (iii) the levels of significance in all cases were low ($P < 0.05$; one tailed) and Cohen's d values were small. Unlike earlier studies, the participants in the present study were not assessed using the standard digit span task, which is a limitation when attempting to view these findings based on the CBTT in light of earlier studies which used the digit span task. A possible future direction of research could be simultaneous assessment of the CBTT performance with the digit span test.

Conclusions

BAW significantly improved backward total scores and backward Corsi span, suggesting an improvement in primary working memory, spatial memory, and spatial attention.

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Conflicts of interest

There are no conflicts of interest.

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University of Patanjali Haridwar

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Research Article

Quality of Life in Yoga Experienced and Yoga Naïve Asian Indian Adults with Obesity

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Background. Obesity adversely affects quality of life which then acts as a barrier to weight loss and weight loss maintenance. Hence, those interventions which positively influence the quality of life along with weight reduction are considered useful for sustained weight loss in persons with obesity. An earlier study showed better quality of life in obese adults who had experience of yoga compared to yoga naïve obese adults. However, the main limitation of the study was the small sample size ($n = 20$ in each group). *Objective.* The present study aimed to determine whether with larger sample sizes the quality of life would differ in yoga experienced compared to yoga naïve adults with obesity. *Methods.* There were 596 Asian Indian obese adults (age range 20 to 59 years; group mean age ± SD; 43.9 ± 9.9 years): of whom (i) 298 were yoga experienced (154 females; group mean age ± SD; 44.0 ± 9.8 years) with a minimum of 1 month of experience in yoga practice and (ii) 298 were yoga naïve (154 females; group mean age ± SD; 43.8 ± 10.0 years). All the participants were assessed for quality of life using the Moorehead–Ardelt quality of life questionnaire II. Data were drawn from a larger nationwide trial which assessed the effects of yoga compared to nutritional advice on obesity over a one-year follow-up period (CTRI/2018/05/014077). *Results.* There were higher participant-reported outcomes for four out of six aspects of quality of life in the yoga experienced compared to the yoga naïve ($p < 0.008$, based on t values of the least squares linear regression analyses, Bonferroni adjusted, and adjusted for age, gender, and BMI as covariates). These were enjoyment in physical activities, ability to work, self-esteem, and social satisfaction. *Conclusion.* Obese adults with yoga experience appear to have better quality of life in specific aspects, compared to yoga naïve persons with a comparable degree of obesity.

1. Introduction

As of June 2017, the Asia Pacific region had the largest absolute number of overweight and obese people equivalent to one billion [1]. In these regions, two out of every five adults are either overweight or obese [1]. Various aspects of quality of life are impaired in persons with obesity; these include low self-esteem, impaired psychosocial functions, disability, reduced physical activity, and sexual dysfunction [2–7]. It has been reported that the quality of life improves after intentional weight loss in persons with obesity [8, 9].

However, this is not always the case. For example, weight loss through severe calorie restriction, use of laxatives, diuretics, and excessive exercise is associated with decreased health-related quality of life in persons with obesity [10–12]. Hence, those interventions which could positively influence health-related quality of life and measures of obesity (e.g., a reduction in BMI and waist circumference) are considered clinically useful for persons with obesity [13]. Examples of clinically useful interventions include increased physical activity and a healthy diet [13]. However, it is known that obese persons experience several challenges in initiating and adhering to increased physical activity [14, 15]. Therefore, pragmatic interventions which increase the level of physical activity and are easy to follow have been recommended for sustained weight loss in obese persons [13].

Yoga is one such intervention with studies reporting long-term adherence and benefits in various health

University of Patanjali Haridwar

conditions including obesity [16, 17]. Effects of yoga on the quality of life were seen in a single-arm interventional study on 279 overweight and obese Asian Indian persons of both sexes aged between 20 and 60 years who showed a significant improvement in physical, psychological, and environmental domains of the quality of life based on the World Health Organization Quality of Life Instruments (WHOQOL-BREF) questionnaire, after 10 days of a yoga-based lifestyle intervention [18].

Apart from this, in a cross-sectional study, twenty obese Asian Indian obese adults of both sexes who had experience of yoga were compared with an equal number of yoga naïve obese persons of both sexes for six domains of quality of life in the Moorehead–Ardelt quality of life questionnaire II (i.e., enjoying physical activities, ability to work, self-esteem, social satisfaction, sexual pleasure, and approach towards food) and overall quality of life [19]. The yoga group showed significant improvements in three of the six domains (i.e., enjoying physical activities, ability to work, and self-esteem) and overall quality of life compared to the yoga naïve group. The main limitation of the study [19] was the small sample size ($n = 20$; in each group).

Hence, the present cross-sectional study was planned primarily to compare the overall quality of life using the Moorehead–Ardelt quality of life questionnaire II in a larger sample of Asian Indian obese persons ($n = 596$), of both sexes, of whom 298 had experience in practicing yoga, whereas 298 were yoga naïve. The secondary aim of the study was to compare the six different subdomains (i.e., general self-esteem, enjoyment in physical activities, satisfactory social contacts, satisfaction concerning work, sexual pleasure, and focus on eating behavior) of the Moorehead–Ardelt quality of life questionnaire II in the same sample of yoga experienced and yoga naïve obese adults ($n = 596$).

2. Materials and Methods

2.1. Study Design. The present data were taken as part of a larger trial conducted across India to compare the effects of yoga with nutritional advice over a one-year follow-up period (CTRI/2018/05/014077). At the time of recruitment in 55 centers across India, participants were asked whether they had prior experience of yoga practice or not, as only yoga naïve persons who did not plan to adopt any other physical activity regimen were included in the larger trial. The present data were collected during the recruitment of participants for the larger trial, for which data analysis is still on-going.

The present study was a secondary analysis of data collected for screening eligibility criteria of an interventional trial designed to assess the effects of yoga and nutritional advice on obese adults. The screening for the interventional trial was done in two phases.

Phase 1: the participants were assessed for anthropometry (i.e., weight and height using standard methods) to determine their body mass index (BMI). Those with BMI $\geq 25\,kg/m^2$ were considered for the second phase.

Phase 2: In this phase, the participants were screened for the following: (i) any metabolic abnormality (e.g., hypothyroidism), (ii) obesity secondary to hormonal imbalance, secondary to medications such as steroids, or secondary to any other medical conditions, and (iii) any psychiatric illness (e.g., depression). At this stage, all the participants gave their signed informed consent to be included in the trial, and if they did not meet the criteria, their consent included using their data for research. All of them provided their sociodemographic details and filled in the Moorehead–Ardelt Quality of life questionnaire II at this stage. The sociodemographic form included their name, age, gender, occupation, years of education, and other details. Participants were asked a single question about yoga practice, viz., "Do you practice yoga? If "yes," please mention the duration in months" (where yoga meant yoga postures (*asanas*), yoga breathing (*pranayamas*), and/or yoga meditation (*dhyana*)). Based on this response, the participants were categorized as yoga experienced or yoga naïve. Equal numbers of yoga experienced and yoga naïve participants were selected for comparison from the larger data set. The person who selected the participants had no access to the quality of life scores data, and hence, the selector was blinded to these scores but matched participants of both groups for their age, gender, and body mass index (BMI).

2.2. Participants. There were five hundred and ninety-six obese adults (age range between 20 and 59 years; group mean age ± SD; 43.9 ± 9.9 years): of whom 298 were yoga experienced (154 females; with group mean age ± SD; 44.0 ± 9.8 years) with a minimum of 1 month of experience in yoga practice, an mean of 3.2 ± 4.7 years, and a range of experience from 1 to 480 months. The remaining 298 obese adults (154 females; group mean age ± SD; 43.8 ± 10.0 years) did not have any prior experience in yoga practice and were described as yoga naïve. In the present study, a priori calculation of the sample size was not done. However, the *post hoc* analyses showed that, for the present study, with the sample size of 298 in each group and Cohen's d of 0.40 calculated from the mean and SD of the overall quality of life score, the power was 0.998201. Inclusion criteria were as follows: (i) BMI $\geq 25\,kg/m^2$ [20] and (ii) age range between 20 and 59 years. Exclusion criteria were as follows: (i) any metabolic abnormalities (e.g., hypothyroidism), (ii) obesity secondary to hormonal imbalance, medication such as steroids or secondary to any other medical condition, (iii) any psychiatric illness (e.g., depression), and (iv) incompletely filled in Moorehead–Ardelt quality of life questionnaires II. None of the participants had to be excluded for these reasons. The study had the approval of the institution's ethical committee (Approval number YRD-017/022).

2.3. Assessment

2.3.1. Quality of Life. The quality of life was assessed using the Moorehead–Ardelt quality of life questionnaire II [21]. The questionnaire has been used to assess the quality of life in overweight and obese persons in India [16, 19], where the present study was carried out. In addition, the questionnaire

University of Patanjali Haridwar

is not culture sensitive [22] and has been used in different countries to assess the quality of life in obese persons [22, 23]. The questionnaire is designed to assess different aspects of quality of life such as general self-esteem, enjoyment in physical activities, satisfactory social contacts, satisfaction concerning work, sexual pleasure, and focus on eating behavior, on an equally weighted 10-point Likert scale with scores ranging from −0.5 to +0.5 [21]. The sum of these 6 scores provides an overall quality of life score. In the present study, English version of the questionnaire was used. However, for those who were not able to understand English, the questionnaire was translated in the local language, i.e., Hindi, by two language experts as follows: two independent bilingual experts translated the questionnaire from English to Hindi. Discrepancies between the two translators were discussed and resolved by the translators. After this, Hindi version was back translated to English by two independent translators to ensure the accuracy of the translation. Unclear wordings or any misunderstandings were again resolved by mutual discussion.

2.4. Statistical Methods. The analyses of the data were carried out using PASW (Version 18.0, SPSS Inc). Three types of analyses were performed which are mentioned below.

2.4.1. Q-Q (Quantile-Quantile) Plots for Normal Distribution. The data (overall quality of life scores and six subdomains) were tested for normal distribution using Q-Q plots.

2.4.2. Chi-Square Test. Ages and BMI values of the two groups were compared using the chi-square test.

2.4.3. Regression Analysis

(1) Groups, Quality of Life Scores, and Three Covariates. The data of the two groups (i.e., yoga and yoga naïve groups) were compared using the least squares regression analysis adjusted for three covariates, i.e., age, gender, and BMI. These covariates were selected based on the outcomes of the earlier studies [24–26]. Separate linear regression models were used to compare the two groups for (i) overall quality of life and (ii) the six subdomains of the quality of life (i.e., enjoying physical activities, ability to work, self-esteem, social satisfaction, sexual pleasure, and focus on eating behavior). In each model, scores of either overall quality of life or one of the six subdomains of the quality of life acted as the dependent variable. Statistical significance (α) and confidence interval (CI) were Bonferroni adjusted and set at 0.008 and 99.2 percent, respectively, when analyzing the six subdomains of the Moorhead–Ardelt Quality of Life Questionnaire II.

(2) Yoga Experience in Months, Overall Quality of Life Scores, and Three Covariates. The association between duration of yoga experience in months with overall quality of life scores was evaluated using least squares regression analysis adjusted for three covariates, i.e., age, gender, and BMI.

3. Results

The details of baseline characteristics of both groups are mentioned in Table 1.

3.1. Q-Q (Quantile-Quantile) Plots for Normal Distribution. Visual inspection of the Q-Q plots showed that data were not normally distributed. However, the parametric test (least squares regression) was used to compare the data of the two groups as parametric tests are considered robust enough for a large sample size [27].

3.2. Chi-Square Test. At baseline, there were no statistically significant differences between the yoga ($n = 298$) and yoga naïve ($n = 298$) groups, for the following variables: (i) age ($\chi^2 = 0.02$, $p = 0.99$) and (ii) BMI ($\chi^2 = 1.54$, $p = 0.21$).

3.3. Regression Analysis

3.3.1. Groups, Quality of Life Scores, and Three Covariates. Least squares regression analysis adjusted for three covariates (i.e., age, gender, and BMI) showed that there was a statistically significant difference between the groups for overall quality of life ($t = 4.825$, $p < 0.001$) (Figure 1). Also, the least squares regression analyses adjusted for the three covariates showed a statistically significant difference between the groups for (i) enjoying physical activities ($t = 4.172$, $p < 0.001$), (ii) ability to work ($t = 4.465$, $p < 0.001$), (iii) self-esteem ($t = 2.976$, $p = 0.003$), and (iv) social satisfaction ($t = 3.295$, $p = 0.001$). The details of the analyses are provided in Table 2. Also, the group mean values ± SD scores along with Cohen's d (an effect size used to indicate the standardized difference between two means) of quality of life for both groups are given in Table 3.

3.3.2. Yoga Experience in Months, Overall Quality of Life Scores, and Three Covariates. Least squares regression analysis adjusted for three covariates (i.e., age, gender, and BMI) showed no statistically significant association ($F = 4.965$, df = 4,293, adjusted $R^2 = 0.05$) of yoga experience in months with overall quality of life scores ($\beta = -0.075$, $p = 0.202$).

4. Discussion

Higher participant-reported outcomes were found in the overall quality of life and in four subdomains of quality of life in persons with obesity who had experience in yoga compared to obese persons who were yoga naïve. These subdomains of quality of life were enjoyment in physical activities, ability to work, self-esteem, and social satisfaction.

The overall quality of life was significantly better in yoga experienced obese persons compared to the yoga naïve. The magnitude of difference between the two groups based on Cohen's d was 0.40, which is considered as average [28]. Given that four out of six subdomains of the Moorehead–

University of Patanjali Haridwar

Table 1: Baseline characteristic profile of participants: yoga experienced and yoga naïve group.

Characteristics of participants	Yoga group	Yoga naïve group
Number (n)	298	298
Age (years): mean ± SD	44.0 ± 9.8	43.8 ± 10.0
20 to 30 years, n (%)	35 (11.7)	34 (11.4)
31 to 50 years, n (%)	175 (58.7)	175 (58.7)
51 to 59 years, n (%)	88 (29.5)	89 (29.9)
Age range (years)	20–59	20–59
BMI (kg/m^2): mean ± SD	32.1 ± 4.5	32.3 ± 4.5
25.0 to 32.4 kg/m^2: n (%)	178 (59.7)	163 (54.7)
≥32.5 kg/m^2: n (%)	120 (40.3)	135 (45.3)
Gender		
Male : female	144 : 154	144 : 154
Percentage values	48.3 : 51.7	48.3 : 51.7
Years of education: n (%)		
<10 years	50 (16.8)	78 (26.2)
10–12 years	43 (14.4)	41 (13.8)
>12 years	205 (68.8)	179 (60.0)
Marital status: n (%)		
Married	264 (88.6)	262 (87.9)
Unmarried	29 (9.7)	23 (7.7)
Widow/widower	3 (1)	8 (2.7)
Occupation information: n (%)		
Business	87 (29.2)	82 (27.5)
Agriculture	7 (2.3)	19 (6.4)
Household	81 (27.2)	71 (23.8)
Professionals	52 (17.4)	40 (13.4)
Secretarial/clerical/officers	43 (14.4)	47 (15.8)
Self-employed	14 (4.7)	21 (7)
Skilled labour	1 (0.3)	2 (0.7)
Not mentioned	13 (4.4)	16 (5.4)
Socioeconomic information: n (%)		
Low income	43 (14.4)	52 (17.4)
Pre-middle income	98 (32.9)	103 (34.6)
Middle income	91 (30.5)	83 (27.9)
High income	52 (17.4)	48 (16.1)
Not mentioned	14 (4.7)	12 (4.0)
Dietary information: n (%)		
Vegetarian	211 (70.8)	187 (62.8)
Nonvegetarian	87 (29.2)	111 (37.2)
Consumption of addictive substances (alcohol and/or tobacco): n (%)		
Yes	26 (8.7)	39 (13.1)
No	253 (84.9)	248 (83.2)
Not mentioned	19 (6.4)	11 (3.7)

Ardelt quality of life questionnaire II (i.e., enjoyment in physical activities, ability to work, self-esteem, and social satisfaction) were higher in yoga experienced obese persons, the overall score of quality of life which is the sum of all the scores could be expected to be higher in yoga experienced obese persons.

Previously, a ten-day longitudinal trial reported the effects of an integrated yoga module which included yoga practice and theory for overweight and obese persons [18]. This single-arm interventional trial reported better physical, psychological, and environmental dimensions of the WHOQOL-BREF questionnaire following yoga. There was a

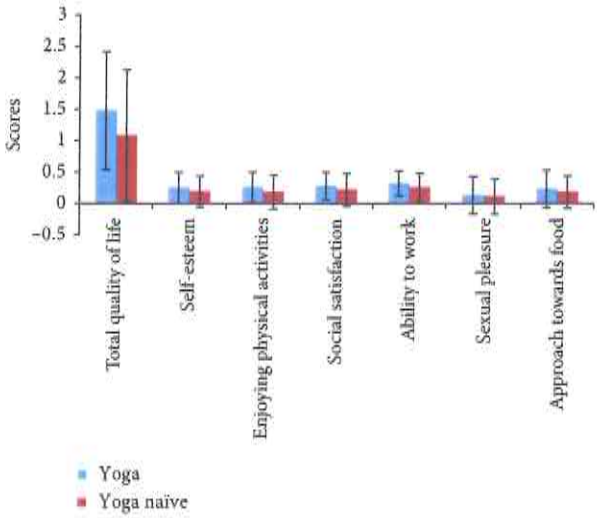

Figure 1: Graphical presentation of adjusted mean scores of quality of life of the yoga experienced and yoga naïve obese adults. Error bar showing the standard deviation of the quality of life scores.

single group of 279 participants of both sexes who did not differ significantly. The improvement in the physical dimension of quality of life is comparable to the increased enjoyment of physical activities seen in yoga practitioners in the present trial.

This higher self-reported enjoyment of physical activities in the present study could be explained by the outcomes of previous studies on yoga for obesity. In a fifteen-day comparative controlled trial, yoga reduced the body mass index and waist circumference, while the ability to balance and the handgrip strength increased [29]. A randomized controlled trial assessing the effects of yoga on female adults with abdominal obesity reported a reduction in perceived stress levels along with other favourable changes in mental health-related outcomes such as the health-related quality of life, self-esteem, better body awareness, and trust in bodily sensations following twelve weeks of yoga [30]. The results of these studies indicate that yoga decreases physical and psychological efforts required to be physically active in persons with obesity.

Obesity adversely affects workplace productivity [31]. Persons with obesity were more likely to be absent from their workplace and less productive while at work due to health-related conditions associated with obesity [32, 33]. Participation in a lifestyle intervention which included increased physical activity was reported to enhance workplace productivity by improving physical and mental health in the obese [34]. With these health benefits, absenteeism due to sickness decreases and enhances the ability to work better [31].

In an earlier study mentioned above [18], higher levels of psychological well-being in the WHOQOL-BREF questionnaire can be considered to be partially based on higher levels of self-esteem in yoga experienced persons compared to those who are yoga naïve. Practicing gives specific emphasis to body awareness and responsiveness to self-

University of Patanjali Haridwar

Table 2: Details of the regression analyses adjusted for the three covariates (age, gender, and BMI) for overall quality of life and six subdomains.

Quality of life	F	df	Adjusted R^2	Related to covariates		
				Covariates	β	p value
Total quality of life	8.547	1, 590	0.048	Age	0.024	0.557
				Gender	−0.029	0.479
				BMI	−0.116	0.005
Enjoying physical activities	5.253	1, 591	0.001	Age	0.007	0.869
				Gender	0.015	0.727
				BMI	−0.074	0.072
Ability to work	7.970	1, 591	0.045	Age	−0.075	0.066
				Gender	0.046	0.269
				BMI	−0.109	0.008
Self-esteem	4.953	1, 591	0.026	Age	0.070	0.090
				Gender	−0.020	0.641
				BMI	−0.104	0.012
Social satisfaction	3.634	1, 591	0.017	Age	0.052	0.211
				Gender	−0.026	0.532
				BMI	−0.039	0.350
Sexual pleasure	8.986	1, 591	0.051	Age	−0.810	0.418
				Gender	−5.435	<0.001
				BMI	−1.232	0.218
Approach towards food	4.237	1, 591	0.021	Age	0.095	0.021
				Gender	0.090	0.032
				BMI	−0.085	0.041

Table 3: Quality of life scores in yoga experienced and yoga naïve persons with obesity.

Overall quality of life and subdomains	Group as a whole				Cohen's d	Mean difference	t value	p value##
	Yoga (n = 298)		Yoga naïve (n = 298)					
	Mean ± SD	95% CI#	Mean ± SD	95% CI#				
Total quality of life	1.5 ± 0.94	1.39, 1.61	1.1 ± 1.05@	0.98, 1.22	0.40	0.40	4.82	<0.001
Enjoying physical activities	0.27 ± 0.24	0.24, 0.3	0.18 ± 0.27**	0.15, 0.21	0.35	0.09	4.17	<0.001
Ability to work	0.34 ± 0.2	0.32, 0.36	0.26 ± 0.23**	0.23, 0.29	0.37	0.08	4.46	<0.001
Self-esteem	0.25 ± 0.25	0.22, 0.28	0.19 ± 0.25*	0.16, 0.22	0.24	0.06	2.98	0.003
Social satisfaction	0.29 ± 0.22	0.27, 0.32	0.23 ± 0.26*	0.2, 0.26	0.25	0.06	3.29	0.001
Sexual pleasure	0.15 ± 0.3	0.12, 0.18	0.13 ± 0.28	0.1, 0.16	0.07	0.02	0.87	0.384
Approach towards food	0.25 ± 0.3	0.22, 0.28	0.19 ± 0.26	0.16, 0.22	0.21	0.06	2.32	0.021

@$p < 0.001$ at the two-tailed level, level of statistical significance between the groups was analysed using separate least squares regression. *$p < 0.008$ and **$p < 0.001$ at the two-tailed level, level of significance between the groups was analysed using separate least squares regression. #95% CI was Bonferroni adjusted for the six subdomains of quality of life scores (i.e., 99.2%); ##Bonferroni adjusted statistical significance level for the six subdomains of quality of life scores ($\alpha = 0.008$). Values are group mean ± SD.

objectification [35]. When body awareness and responsiveness to how the body is viewed increases, there is a greater sense of body satisfaction and lesser chances of self-objectification. These factors could have contributed to the better self-esteem in yoga experienced obese persons. Improved self-esteem could in turn influence interaction with other persons. Yoga practice creates more interpersonal interactions [36, 37]. These factors also increase mental well-being associated with yoga practice [36, 37] which could explain the higher levels of social satisfaction in the yoga experienced compared to the yoga naïve participants. These findings, i.e., better social satisfaction were not observed in the earlier study conducted on smaller numbers (n = 20, each group) of yoga experienced and yoga naïve obese persons [19].

The significance of present findings is that if a person who is obese enjoys physical activities, they are likely to adhere to any physical activity program including yoga which would be definitely beneficial to maintain and possibly further weight loss.

A limitation of the present cross-sectional study is that factors other than yoga could have influenced the results. There was no association between the duration of yoga practice and overall quality of life scores. However, adequate details were not obtained about the frequency of yoga practice in terms of number of days in a week or the intensity of the yoga practice based on number of minutes of practice in a day. Also, while "yoga" included physical postures (*asanas*), regulated breathing (*pranayamas*), and yoga meditation (*dhyana*), the exact details about the school of

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yoga followed were not obtained. It would have been ideal to know these details and take them into account. Hence, the results suggest that practicing yoga possibly influences the quality of life in obese persons though the quantum of practice does not appear to influence the results.

Data Availability

The group mean data are given in the paper. The individual data are available in the archives of the laboratory and can be obtained from the corresponding author on request.

Conflicts of Interest

The authors declare they have no conflicts of interest.

Acknowledgments

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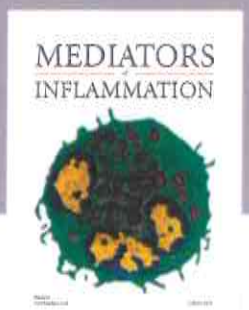



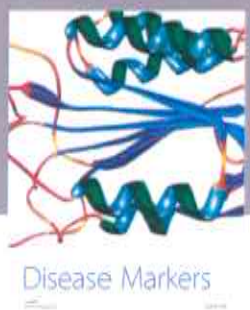

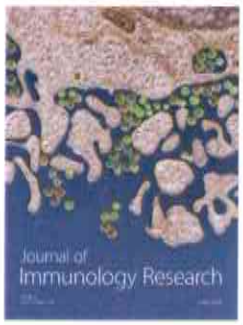

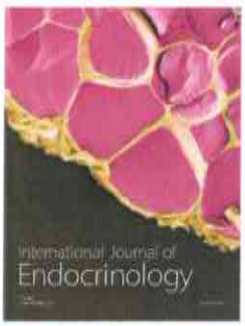

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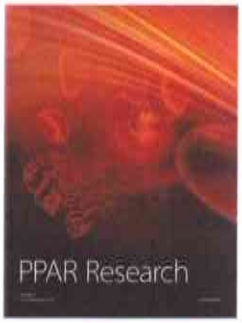

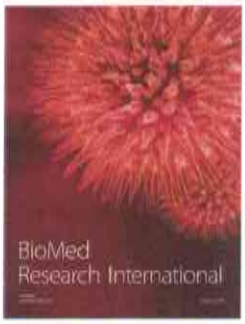

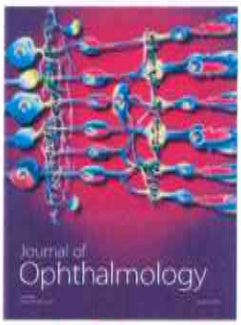

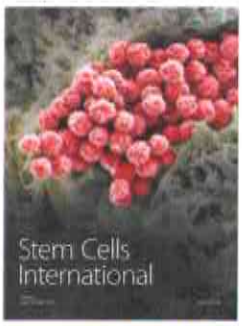

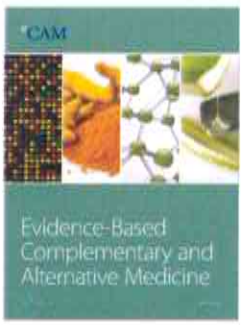

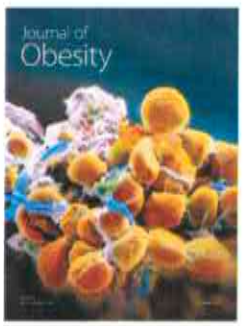

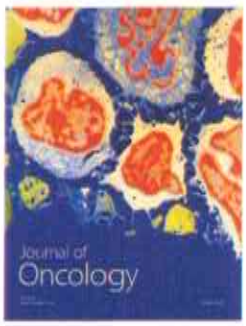

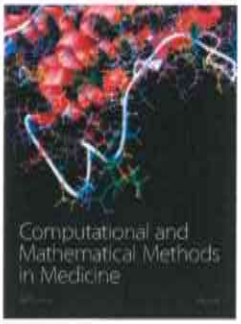

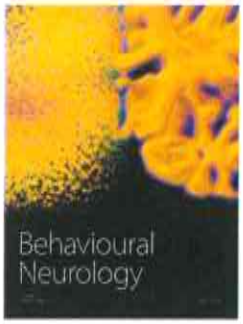

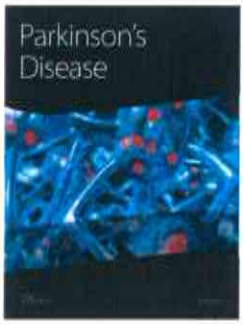

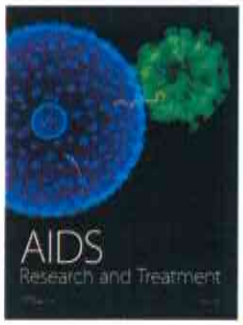

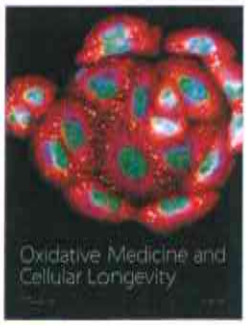

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Short Communication

Self-Esteem and Performance in Attentional Tasks in School Children after 4½ Months of Yoga

Kankan Gulati, Sachin Kumar Sharma, Shirley Telles, Acharya Balkrishna

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Abstract

Introduction: Physical activity is known to improve self-esteem of children. Low self-esteem causes distraction of attention which leads to decline in performance in attentional tasks. The performance of a child at school depends on multiple factors, a major factor being attention. Hence, the present study was designed to see (i) the effect 4½ months of yoga practice had on children's (a) performance in attentional tasks, (b) self-esteem and (ii) the correlation between yoga performance and (a) academic performance, (b) behavior with peers, (c) behavior with teachers, (d) punctuality, (e) participation in extra-curricular activities. **Methods:** Participants were 116 children with group mean age ± standard deviation; 10.2 ± 0.6 years. We assessed them for (i) self-esteem using Indian Adaptation of Battle's Self Esteem Inventory for Children and (ii) performance in attentional tasks using two different tests, i.e., six letter cancellation test (SLCT) and digit letter substitution test (DLST) and (iii) the teacher's rating scale which analyzed the teacher's assessment of the children's academic performance, behavior with peers, behavior with teachers, punctuality, yoga practice, and participation in extracurricular activities on an analog scale, before and after the intervention. Data were analyzed with PASW (SPSS Statistics 24) using the *t*-test for paired data. **Results:** There was a significant improvement in the scores of (i) SLCT ($P < 0.001$), (ii) DLST ($P < 0.001$), (iii) social self-esteem ($P < 0.01$), (iv) academic self-esteem ($P < 0.001$), and (v) total self-esteem ($P < 0.001$) after 60 min/day of yoga practice for 4½ months. Pearson correlation showed a positive correlation between yoga performance and the behavior with teachers ($r = 0.221$ and $P < 0.05$). **Conclusions:** Yoga practice is beneficial for school children as it improves attention, concentration, memory, motor speed, and self-esteem (social, academic and total). In addition, improved yoga performance improves behavior with teachers, thus improving discipline in school.

Keywords: *Attention, children, performance, self-esteem, yoga*

Introduction

Yoga helps in the mental development and well-being of school going children.[1] Self-esteem is a student's general feeling of doing well in school, level of satisfaction with his/her achievements and the attitude that one has toward oneself.[2] Increasing incidence of mental health issues and bullying in India may be attributed to low self-esteem and a sense of purposelessness among children.[3] In a study, it was found that 30% of the adolescents suffer from behavioral and emotional issues.[4] Another study reported that children studying in residential schools may have issues related to self-esteem.[5] People with low self-esteem are more conscious of themselves than people with high self-esteem[6] which leads to the distraction of attention.[7] Therefore, their performance in an attentional task is lower as compared to a person with high self-esteem. High levels of attention help children to follow instructions given in the classroom, focus better on assignments and easily engage in completing them.[8] Hence, performance of a child at school is associated with multiple intrinsic factors such as attention, memory, and motor speed.[9] Physical activity is known to improve the self-esteem of children.[10] Keeping this in mind, the present study was designed to see (i) the effect, 4½ months of yoga practice had on children's (a) performance in attentional tasks, (b) self-esteem and (ii) the correlation between yoga performance and (a) academic performance, (b) behavior with peers, (c) behavior with teachers, (d) punctuality, (e) participation in extracurricular activities.

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Methods

Subjects

The total sample was 116 children (78 boys) with group mean age ± standard deviation (SD); 10.2 ± 0.6 years. The present study with a sample size of 116 using Cohen's formula for the effect size 0.53 (medium) and an alpha of 0.05 had a power of 0.99 (G*Power 3.1). The Cohen's d was calculated from mean and standard deviation value of scores in the Six Letter Cancellation Test (SLCT) which showed the least change in magnitude among the attentional tasks was used in the present study. The inclusion criteria were (i) children of both sexes who were willing to participate in the study and (ii) those whose ages were between 9 and 12 years. The exclusion criteria were (i) any physical or mental illness based on routine case history and medical examination due to which they were not able to complete the assessments (ii) those that did not complete the questionnaires required for the study. None of the participants had to be excluded from the study due to the above-mentioned reasons. Participation in the study was voluntary with no remuneration.

Study design

The present study was a longitudinal follow-up study where the participants were selected using a convenience sampling technique i.e., participants were selected based on their availability to take part in the trial. Prior approval from the principal of the school was obtained. The study had the approval of the institution's ethics committee, with an approval number YRD-017/026.

Assessments

The participants were assessed for (i) self-esteem using Indian Adaptation of Battle's Self Esteem Inventory for Children (SEIC) and (ii) performance in attentional tasks using two different tests i.e., SLCT and digit letter substitution test (DLST) and (iii) the Teacher's Rating Scale (TRS) which analyzed the teacher's assessment of the children's academic performance, behavior with peers, behavior with teachers, punctuality, yoga practice, and participation in extracurricular activities on an analog scale. The order of assessments was as follows: (i) SLCT, (ii) DLST and (iii) SEIC and (iv) TRS.

Intervention

Children practiced yoga (breathing techniques, postures, guided relaxation, and chanting), 60 min each day, 7 days a week. The yoga session began with Om chanting (2 min), followed by *Pratah kaleen mantra paath* (6 min). Then, loosening practices i.e., *yogic sukshma vyayama* (10 min) were taught. For warm up children were made to do *Suryanamaskar* (Sun salutation)/*Bhuminamaskar* (Earth salutation)/ *Chandranamaskar* (Moon salutation) (5 min). The yoga session proceeded with *asanas* (15 min) which included standing postures-*Chandrasana* (Moon posture) with left and right hand, *Tadasana* (Palm tree posture), *Vrikshasana* (Tree posture); sitting postures – *Padmasana* (Lotus posture), *Yogmudrasana* (Psychic union posture), *Matsyasana* (Fish pose), *Janushirshasana* (Head-to-knee posture) with left and right leg, *Paschimottanasana* (Back stretching posture), *Aakarnadhanurasana* (Archer's yoga posture) with left and right leg, *Vakasana* (Crane posture) with left and right leg, *Gomukhasana* (Cow's face posture), *Vajrasana* (Diamond posture) with left and right leg, *Ushtrasana* (Camel posture), *Shashankasana* (Rabbit posture); supine postures-*Uttanpadasana* (Raised legs posture), *Sarvangasana* (Shoulder stand posture), *Halasana* (Plough posture), *Naukasana* (Boat posture); prone postures-*Bhujangasana* (Cobra posture), *Shalabhasana* (Locust posture), *Dhanurasana* (Bow posture). Succeeding these practices, Yoga *Nidra* (3 min), *Pranayama* (15 min) including *Bhastrika* (Bellows breathing), *Kapalabhati* (High frequency yoga breathing), *Ujjayi* (Victorious breathing), *Anulom-vilom* (Alternate nostril yoga breathing), *Chandrabhedi* (Left nostril yoga breathing), *Suryabhedi* (Right nostril yoga breathing), *Naadishuddhi* (Alternate-nostril yoga breathing), *Sheetali* (Cooling breath), *Sheetkaari* (Hissing breath), *Bhramari* (Bumble bee breathing), *Udgeeth* (OM chanting) were exercised followed by 1 min each of meditation, *Hasyasana* (Laughter yoga) and *Gayatri mantra* with meaning. The session was closed with *Shanti path* (Mantra Chanting).

Data analysis

Data were analyzed with PASW IBM SPSS Statistics 24 (Armonk, New York) using the t-test for paired data.

Results

There was a significant improvement in the scores of (i) SLCT ($P < 0.001$), (ii) DLST ($P < 0.001$), (iii) social self-esteem ($P < 0.01$), and (iv) academic self-esteem ($P < 0.001$) and (v) total self-esteem ($P < 0.001$) after 60 min/day of yoga practice for 4½ months. Pearson correlation showed a positive correlation between yoga performance and the behavior with teachers ($r = 0.221$ and $P < 0.05$) [the group mean ± SD. are given in Table 1].

Discussion

The increase in scores of SLCT and DLST can be related to the fact that yoga practice improves attention, enhances concentration, boosts memory (visual and spatial)[11,12] and elevates motor speed[13] in school children. Improvement in social, academic and total self-esteem on pre-post comparison can be supported by findings from earlier studies which state that yoga helps in promoting a positive attitude, increasing confidence, recovering self-esteem, and reducing stress and anxiety of school children.[14,15] The present study also showed a decline in the scores of

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Table 1: Results of six letter cancellation test, digit letter substitution test, and self-esteem measures in 116 children before and after yoga

Variables	Before/after	Mean±SD	Significance level (*P*)	Cohen's d
SLCT scores	Before	20.12±6.83	<0.001***	0.53
	After	24.07±7.99		
DLST scores	Before	44.17±10.78	<0.001***	0.56
	After	49.89±9.62		
General self-esteem scores	Before	15.63±2.10	<0.001***	0.15
	After	15.29±2.23		
Social self-esteem scores	Before	6.78±1.54	<0.01**	0.01
	After	6.81±1.54		
Academic self-esteem scores	Before	8.90±1.29	<0.001***	0.17
	After	9.16±1.06		
Parental self-esteem scores	Before	8.25±1.09	>0.05	0.22
	After	8.48±0.97		
Total self-esteem scores	Before	39.56±4.30	<0.001***	0.04
	After	39.75±3.95		

**P<0.01, ***P<0.001, paired sample t-test used to compare before and after values. SLCT=Six letter cancellation test, DLST=Digit letter substitution test, SD=Standard deviation

general self-esteem in a span of 4½ months. The possible causes of the decline in the self-esteem of children studying in a residential school might be the lack of parental support,[5] medium of language used to impart education,[16] and migration from one school to the other.[17] Yoga improves discipline[18] and self-awareness which influences counter-normative behavior[19] in children. This may explain the positive correlation between yoga performance and improvement in behavior with teachers. Earlier studies assessed the effect of yoga on children attending day school.[20] The present study is the first attempt to evaluate the effect of yoga on children studying in a residential school. One limitation of the present study was that it did not have a control group.

Conclusions

Yoga practice is beneficial for school children as it improves attention, concentration, memory, motor speed, and self-esteem (social, academic, and total). In addition, improved yoga performance improves behavior with teachers, thus improving discipline in school.

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Conflicts of interest

There are no conflicts of interest.

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RESEARCH NOTE Open Access

The impact of yoga on teachers' self-rated emotions

Shirley Telles*, Sachin Kumar Sharma, Ram Kumar Gupta, Deepak Kumar Pal, Kumar Gandharva and Acharya Balkrishna

Abstract

Objectives: To assess (i) if teachers' age or gender could predict their baseline levels of mental well-being and anxiety and any change after yoga. (ii) Whether mental well-being or anxiety changed following 15 days of yoga in primary school teachers. Primary school teachers took part in this single group longitudinal trial (n = 302, group mean age ± SD; 41.8 ± 5.90 years). They received 240 min of yoga practice and 120 min of yoga theory each day. At baseline and after 15 days of yoga the assessments were (i) mental well-being (Warwick-Edinburgh scale) and (ii) state anxiety (Spielberger's State Trait Anxiety Inventory).

Results: Gender acted as a significant predictor for mental well-being scores (P = 0.001) and state anxiety (P = 0.005) in the group at baseline. Females showed higher anxiety scores and lower mental well-being scores. Following yoga the teachers showed a significant increase in mental well-being by 5.84% and a decrease in state anxiety by 4.48%.

Trial registration The trial was registered retrospectively (August 15, 2019; Trial Registration Number: ISRCTN90253431).

Keyword: Teachers, Yoga, Mental well-being, State anxiety

Introduction

Teachers' emotions are recognized to be of critical importance to the quality and effectiveness of their teaching in the classroom [1–5]. Teachers' emotional intelligence, assessed in 559 basic and secondary school teachers is positively correlated with their ability to maintain classroom discipline [6]. Teachers' emotions also influence their health and psychological well-being [7].

Yoga is known to positively influence physical and mental well-being [8]. Previously, the same authors assessed primary school teachers in India (n = 118, both sexes) who, after 15 days of yoga in a residential setting had an increase in mental well-being (small Cohen's d effect size = 0.36) and a decrease in state anxiety (small Cohen's d effect size = 0.25), compared to an equal number of their colleagues who carried on with their routine [9].

Professional well-being was evaluated in teachers in relation to individual, professional or organizational factors; data were collected as part of the Teaching and Learning International Survey (TALIS) [10]. Twenty-three countries took part in the survey with participation from 72,190 teachers from 4401 schools. Multiple hierarchical regression analyses were carried out to determine which categories of variables, i.e., individual, professional or organizational could maximally influence teachers' professional well-being. Individual factors, including gender and level of teaching experience did not powerfully predict professional well-being in teachers.

The present single group study aimed at determining (i) if teachers' age or gender could predict their baseline levels of mental well-being and anxiety and any change in these variables after yoga. (ii) Whether mental well-being or state anxiety changed following 15 days of yoga in 302 primary school teachers.

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Main text

Methods

Participants

Three hundred and two primary school teachers from an Indian north-eastern state were deputed for a 15 day residential yoga training to a yoga centre in north India. All teachers completed the trial. The state government deputed one teacher per government-funded primary school. The teachers were between 26 and 55 years (group mean age ± SD; 41.83 ± 5.90 years; 192 females). During the yoga training all related expenses were met by the school and the teachers received their full salary.

To be included in the study the participants had to be (i) full time primary school teachers, (ii) naïve to yoga, and (iii) not following any other wellness strategy. The criteria for exclusion included: (i) any illness or chronic use of medication (based on the response to questions) and (ii) the use of alcohol or any intoxicant. None of the teachers were excluded for these reasons. The self-contained, residential campus had a dining hall, a walking track and shops to buy basic necessities.

Participants gave their signed consent to take part in the trial. The trial was approved by the institution's ethics committee (approval number: PRF/16/0012) and was completed between January 16–January 31, 2016.

With a sample size of 302 and effect size of 0.421 (for mental well-being scores), the power was 1.0000 for alpha pre-set at 0.05, determined using G Power Software [11].

The data of 118 teachers from the 302 teachers presented here were analyzed and published elsewhere by the same authors [9].

Design

The study was reported according to standard CONSORT guidelines and was a single group longitudinal study [trial registration number: ISRCTN90253431]. The absence of a control group is a limitation in interpreting the effects of yoga on mental well-being and state anxiety. Participants were assessed at the beginning and end of their 15 day yoga program.

Their day began at 04:00 h and ended at 21:00 h. During the 15 days yoga was taught as practice and theory. Yoga practice was for 240 min (2 sessions per day, each session lasted 2 h). Theory (120 min per day) was derived from the yoga texts, especially the Patanjali's Yoga *Sutras* (*Circa* 900 B.C.) [12].

Assessments

Participants were assessed at the beginning and end of the 15 day yoga intervention. Two questionnaires were used to assess (i) mental well-being and (ii) state anxiety.

Mental well-being

The Warwick-Edinburgh Mental Well-being Scale was used [13]. It has 14 items, with five options: never (scored as 1), rarely ('2'), sometimes ('3'), often ('4') and very often ('5').

Spielberger's State Trait Anxiety Inventory—State (STAI-S)

State anxiety was assessed with a sub-scale of the Spielberger's State-Trait Anxiety Inventory with 20 items to assess state anxiety (i.e., anxiety at the moment of assessment) [14]. Participants chose the number which most appropriately described the intensity of their feelings at the moment of testing: "1" for "not at all", "2" for "somewhat", "3" for "moderately", and "4" for "very much so".

Yoga Intervention

The yoga intervention was for 15 days with two practice sessions each day. Each session was for 120 min. In practice sessions the participants were taught: (i) loosening exercises, (ii) physical postures (*asanas*), (iii) breathing techniques (*pranayamas*), and (iv) meditation and relaxation. The details are given in Table 1. Also, participants were given practical suggestions to achieve a calm mental state and have healthy coping strategies to manage stressors. This information was in a 2 h theory session every day. The information was derived from yoga texts, such as the Patanjali's Yoga *Sutras* (*Circa* 900 B.C.) [12].

Yoga sessions were conducted in a hall where 4000 people can practice yoga simultaneously. The 302 teachers were seated in 20 rows and 16 columns (with 16 participants in each row) separated by 3.0 feet. The yoga sessions were led by an expert in yoga with over 45 years of experience in the practice and theory of yoga. Also, there were 20 yoga teachers with a minimum of 5 years of yoga teaching experience as assistants. Audio-visual aids helped ensure that the yoga expert, who practiced yoga at the front of the hall on a raised stage, was visible and audible to all participants. Instructions were in Hindi, a microphone was used with 24 speakers, each with an output of 136 dB. There were also two LED screens (10 × 16 feet each) at the front of the hall, approximately 200 feet from the last row.

Data extraction and analyses

The data were analyzed using SPSS Version 24.0. The group average values ± SD and Cohen's effect size for the mental well-being scores and scores for state anxiety were calculated.

University of Patanjali Haridwar

Table 1 Details of a yoga practice session

No.	Type of the practice	Name of the practice	Duration (min)
1	Meditation	On *sanskrit* syllable, OM	10
2	Warming up	Sun salutation (*Surya namaskara*)	10
3	Loosening exercises	i. Neck rotation	20
		ii. Knee and ankle rotation	
		iii. Shoulder rotation	
		iv. Butterfly pose	
4	Postures (*Asanas*)		30
4.1	Standing postures	Swaying palm tree pose (*Tirryaktadasana*)	
		Angle pose (*Konasana*, both sides)	
		Feet and hands pose (*Padahastasana*)	
4.2	Sitting postures	Frog pose (*Mandukasana*)	
		Rabbit pose (*Sasakasana*)	
		Sitting lateral twisting pose (*Vakrasana*, both sides)	
		Cow face pose (*Gomukhasana*, both sides)	
		Mill churning pose (*Chakkiasana*)	
4.3	Prone postures	Crocodile pose (*Makarasana*)	
		Cobra pose (*Bhujangasana*)	
		Half-locust pose (*Salabhasana*)	
4.4	Supine postures	Half-plough pose (*Ardhhalasana*)	
		Rotating leg pose (*Padavritasana*, both sides)	
		Leg circling pose (*Dwichakrasana*, both sides)	
5	Relaxation	Supine relaxed pose (*Shavasana*)	10
6	Yoga breathing series (*pranayamas*)	Yoga bellows type breathing (*Bhastrika*)	20
		High frequency yoga breathing (*Kapalabhati*, 1.0 Hz)	
		Alternate nostril yoga breathing (*Anulom-vilom*)	
		Bee breathing practice (*Bhramari*)	
		Victorious breath (*Ujjayi*)	
		Om chanting (*Udgeeth*)	
7	Relaxation	Supine relaxed pose (*Shavasana*) with breath awareness	10
8	Meditation and concluding prayer		10

Total duration of the session was 120 min and the same session was repeated in the evening

There were two types of analyses.

i. These analyses determined whether age or gender could predict mental well-being or state anxiety at (A) baseline or Pre-yoga and (B) after 15 days of yoga practice and theory.

ii. Comparison of post data versus pre was with the *t* test for paired data. The t and p values are presented in Table 2.

Table 2 Changes in positive and negative emotions after 15 days of yoga intervention

No.	Variables	Yoga intervention		Percentage change (direction of change)	Cohen's d-value	t-value	P-value
		Before	After				
1	Mental wellbeing scores	52.08 ± 7.35	55.12 ± 7.07***	5.84 (↑)	0.421	−7.932	< 0.001
2	Anxiety scores	34.12 ± 8.43	32.59 ± 8.36**	4.48 (↓)	0.182	3.149	0.002

Values are group mean ± SD

** P < 0.01; ***P < 0.001 (two tailed) level of significance, comparing pre and post positive (mental wellbeing) and negative (anxiety) emotions using paired t-test

University of Patanjali Haridwar

Results

None of the participants reported any adverse effects. This was specifically checked after the yoga practice sessions.

i. Age and gender as predictors of mental well-being or state anxiety Pre-Yoga and Post-yoga.

Gender acted as a significant predictor for mental well-being scores at baseline (Pre-Yoga) {adjusted $R^2 = 0.036$; beta coefficient = −0.197; P = 0.001, 95% CI of [−4.746, −1.317]; tolerance = 1.000; variance inflation factors (VIF) = 1.000}.

Gender significantly predicted state anxiety scores at baseline/Pre-Yoga {adjusted $R^2 = 0.023$; beta coefficient = 0.162; P = 0.005; 95% CI of [0.885, 4.841]; tolerance = 1.000; variance inflation factors (VIF) = 1.000}.

Neither gender nor age acted as predictors for the change in mental well-being or state anxiety Post-Yoga (P > 0.05 in both cases).

(ii) Comparison of Post versus Pre data.

There was a significant increase in mental well-being in the 302 teachers after yoga compared to before (P = 0.002). State anxiety scores were significantly lower after yoga compared to before (P < 0.001). The pre and post values of mental well-being and state anxiety scores are provided in Table 2.

Discussion and conclusion

Gender acted as a significant predictor for 302 primary school teachers' mental well-being and state anxiety pre-yoga, with females showing higher anxiety scores and lower mental well-being scores.

Earlier, data were collected as part of the Teaching and Learning International Survey (TALIS) [10]. Twenty-three countries took part in the survey with participation from 72,190 teachers from 4401 schools. Multiple hierarchical regression analyses were carried out to determine which categories of variables, i.e., individual, professional or organizational would most influence the teachers' professional well-being. Gender and level of teaching experience were not powerful predictors of professional well-being in the teachers of the survey. These findings are in contrast to the present results where gender did significantly predict mental well-being pre-yoga.

The present study assessed general mental well-being using the Warwick-Edinburgh scale. Mental well-being is defined as a state of physical and psychological good health [15]. Teachers' professional well-being involves more specific factors such as job satisfaction, self-efficacy, aspiration, motivation and authority [10]. The difference between the present results and those reported earlier may be attributed to the focus of the present study being overall mental well-being, whereas the earlier study reported the effects of gender on teachers' professional well-being [10]. While some earlier studies reported that gender has an effect on professional well-being [16], it appears as if teachers' professional well-being (TPW) is chiefly influenced by job-related factors such as the school climate, co-operation among teachers, fair and helpful assessments and the relationship between the principal and the teachers, while individual factors such as gender have less impact on TPW. The present study reported that gender predicted differences in (overall) mental well-being.

Gender acted as a predictor for the pre-yoga scores, with females showing higher anxiety scores and lower mental well-being scores. This finding is supported by a study on gender differences in emotional responses, in which a functional magnetic resonance imaging (fMRI) study was carried out on 25 young adults (13 female) to compare the responses of both sexes when participants were asked to cognitively evaluate and down-regulate their responses to negatively valenced pictures [17]. The results suggested that females process emotional experiences more complexly than males, which also included simultaneously appraising situations in both negative and positive ways.

The primary school teachers showed a significant increase in mental well-being and decrease in state anxiety after 15 days of yoga compared to their pre-yoga scores.

The increase in mental well-being and decrease in state anxiety are comparable to results reported elsewhere for a sub-sample of 118 teachers from the present group studied by the same authors [9]. When the earlier (n = 118) [9] and the present study (n = 302) were compared, there were no clear differences in the effects of yoga, as in both studies there was an increase in mental well-being (n = 302, Cohen's d = 0.421, 5.84% increase for the present study; n = 118, Cohen's d = 0.361, 4.95% increase for the earlier study) and decrease in state anxiety (n = 302, Cohen's d = 0.182, 4.48% decrease for the present study; n = 118, Cohen's d = 0.246, 5.89% decrease for the earlier study).

In the earlier study [9] the yoga group were compared with an equal number of teachers in a control group who continued with their regular teaching schedule. The control group showed no change in mental well-being or state anxiety. This suggests that repeating the tests after 15 days may not cause a change in well-being or anxiety; however this cannot be conclusively stated for the

University of Patanjali Haridwar

present study where there was no control group for the 302 teachers who practiced yoga.

Limitations

The limitations include (i) the absence of a control group, (ii) the present yoga program was residential and intensive; it would be ideal to test a yoga program which can be incorporated in the work day and (iii) since the data were not blind scored there could be bias. The results cannot be considered conclusive due to these limitations, but the results suggest that it would be worth evaluating yoga to positively impact teachers' overall health and performance.

Abbreviations

B.C.: before Christ; CI: confidence intervals; CONSORT: consolidated standards of reporting trials; dB: decibels; fMRI: functional magnetic resonance imaging; ISRCTN: international standard registered clinical/soCial sTudy number; LED: light emitting diodes; PRF: Patanjali research foundation; SD: standard deviation; SPSS: statistical package for social sciences; STAI-S: Spielberger's state trait anxiety inventory-state; TALIS: teaching and learning international survey; TPW: teachers' professional well-being; VIF: variance inflation factors.

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Authors' contributions

ST designed the study, interpreted the data and prepared the manuscript. SKS and RKG helped in designing the study, supervising data scoring and manuscript preparation. RKG and DKP collected the data, scored and analyzed the data, the literature review and assisted in manuscript preparation. KG assisted in data collection and data analysis. AB helped in designing the study and providing the funds and infrastructure. All authors read and approved the final manuscript.

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Availability of data and materials

The individual data are available in the archives of the laboratory and can be obtained from the corresponding author on request.

Ethics approval and consent to participate

The study was approved by the ethical committee of Patanjali Research Foundation (Approval Number: PRF/16/0012) and written signed informed consent was taken from each participant before beginning the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Yoga as a Holistic Treatment for Chronic Illnesses: Minimizing Adverse Events and Safety Concerns

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Keywords: yoga, chronic illness, contraindications, adverse effects, safety

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INTRODUCTION

Yoga is widely practiced for its health benefits (Alter, 2004; Singleton, 2010), especially for chronic non-communicable diseases (Holte and Millis, 2013). The Consortium of Academic Health Centers for Integrative Medicine located at Michigan, U.S. teaches yoga in most of its branches (Holte and Millis, 2013; https://imconsortium.org/)[1]. Yoga is one of the top ten complementary health practices used by adults in the U.S. where 45 percent of this population have at least one chronic illness (Wu and Green, 2000). Two meta-analyses were carried out to examine yoga in the context of stroke (Lawrence et al., 2017; Thayabaranathan et al., 2017). The authors of the meta-analyses concluded that yoga is effective but did not report any adverse event associated with yoga practice (Lawrence et al., 2017; Thayabaranathan et al., 2017). Despite this, safety is important during stroke rehabilitation, especially for practices which involve maintaining balance. Similarly, we found that in meta-analyses of yoga used for multiple sclerosis or cardiac disease there was a lack of information related to the safety of yoga interventions as adverse events related to yoga practice were not usually mentioned (Cramer et al., 2014, 2015a). Apart from this, when safety related data were reported there were no adverse events (Cramer et al., 2014, 2015b). Safety issues in yoga practice apply to all chronic illnesses.

The Need for Safety in Yoga Practice

An ancient *Hatha* yoga text gives importance to the method of practice, stating "....by the proper practice of *pranayama* (voluntarily regulated yoga breathing), all diseases are eradicated, whereas through the improper practice all diseases can arise" (*Hatha Yoga Pradipika*, *Circa* 1500 A.D., Chapter II Verse 16; Muktibodhananda, 1998).

William Broad (2012) attempted to highlight the adverse events which could occur with yoga practice in his book "*The Science of Yoga: The Risks and Rewards*" (Broad, 2012). This evoked a wide range of responses, especially from those who have benefitted from yoga practice. However the adverse events related to yoga cannot be discounted.

Hence this opinion article has two aims. (i) The first aim is to cite published examples of adverse events occurring from yoga practice due to: (a) an unusually long duration of yoga practice, (b) practice of a yoga technique more frequently than is recommended, (c) excess strain on a specific joint during yoga practice, or (d) ignoring any health condition which would be a contraindication for yoga practice. (ii) The second aim is to suggest recommendations to improve safety and reduce adverse events related to yoga practice as therapy.

[1] Academic Consortium for Integrative Medicine and Health [Internet]. *Academic Consortium for Integrative Medicine and Health* [cited 2019 Feb 15]. Available online at: https://imconsortium.org/

University of Patanjali Haridwar

Search Strategy for Published Reports on Adverse Events Related to Yoga Practice

The search strategy was carried out in two stages. (i) The authors identified common reasons which could lead to an adverse event due to yoga practice, based on (a) the authors' experience with yoga practitioners and (b) their awareness of adverse events resulting from yoga reported by conventionally trained medical practitioners. This information was in the form of oral reports from 1997 to 2018. The most common reasons for adverse events were (a) practicing yoga for an extra duration, (b) practicing yoga more frequently than is recommended, (c) excess strain on a specific joint during yoga practice and (d) adverse event related to a prior health condition. (ii) Two researchers independently searched PubMed abstracts from 1970 to 2018 for examples to demonstrate the four points mentioned above. Four examples were selected as the most appropriate and are described in the manuscript.

Published Reports on Examples of the Four Causes of Adverse Events Following Yoga Practice

An Example of Practicing Yoga for an Extra Duration

A 22 year old male, healthy college student who practiced the diamond pose (*vajrasana*, in Sanskrit) for 6 h a day for 2 months reported an abnormal gait due to foot drop (Chusid, 1971). The student had 18 months of experience in yoga. The subject recovered from foot drop after 9 weeks of discontinuing the posture. Practicing a yoga posture for 6 h a day is unusual; the recommended duration is 5–10 min for a beginner and not more than 30 min for an experienced practitioner (The divine life society[2], http://yogaindepth.blogspot.com/p/detailed-description-of-yoga-asanas.html)[3]. In this case foot drop could be considered a consequence of practicing a yoga posture for a longer duration than is recommended.

An Example of Practicing Yoga More Frequently Than Is Recommended

In certain cases it may not be the duration but the frequency of the practice which was excessive. Regurgitative cleansing (*kunjal-kriya* in Sanskrit) involves voluntarily induced vomiting after drinking saline water on an "empty stomach" upto a point where the practitioner feels the urge to vomit (Saraswati, 2012). This yoga cleansing technique resulted in dental erosion in a 38 year old male who had practiced the technique every morning for 12 years (Meshramkar et al., 2007). While an ancient *Hatha* Yoga text describes *kunjal kriya* as useful to reduce digestive disorders, it is stated that the practice should be done once a week under the supervision of an experienced yoga teacher (Saraswati, 2012). Endogenous gastric acid enters the oral cavity during vomiting (José et al., 2008). The pH of gastric acid is approximately 1.2, which is below the critical value for demineralization of the teeth (José et al., 2008). This may explain the dental erosion in the 38 year old male in the study cited above, where a yoga technique was practiced more frequently than is recommended.

An Example of Excess Strain on a Specific Joint During Yoga Practice

Another factor which could be responsible for the adverse events following yoga practice include techniques which could either strain a joint or makes it unstable (Nagura et al., 2002). A cross-sectional study conducted in southern Thailand included 576 persons (276 females; 40 years or older) without any rheumatic diseases (Tangtrakulwanich et al., 2007). The aim was to correlate radiographic knee osteoarthritis with the habit of sitting on the floor for various activities, in sitting postures which resembled yoga postures as mentioned below. Those participants who reported squatting (similar to the chair pose or *uttakatasana*), side-knee bending (similar to the hero pose or *veerasana*), the lotus pose (*padmasana*) and total life time floor activities in highest tertile, showed a two time increased risk of osteoarthritis of the knee compared to those in the lowest tertile of exposure to floor seated activities (Tangtrakulwanich et al., 2007). These postures involve extreme flexion of the knee which causes excessively large contact stress on the knee joint (Dahlkvist et al., 1982; Nagura et al., 2002), which in turn causes cartilage damage and also acts as a precursor for degenerative diseases of the joint. Whether squatting is indeed harmful definitely needs thorough investigation, however the report cited above suggests the necessity for such studies and for precautions during yoga practice.

An Example of an Adverse Event Related to a Prior Health Condition

Another factor which could result in ill effects of yoga practice is an existing condition which may predispose the practitioner to deformity or illness (Cramer et al., 2013). A case study reported that sitting in the lotus pose during a meditation session resulted in a spontaneous supracondylar femoral fracture in a 58 year old Buddhist monk who was human immunodeficiency virus (HIV) positive (Pinto Neto et al., 2011). Patients with the HIV virus have compromised bone density due to the use of antiretroviral therapies which are associated with bone loss and fractures (Puthanakit et al., 2012). The lotus pose exerts stress on the supracondylar femur through upward force from the ankles and downward force from the knees. Stress on the compromised femur of the patient who was HIV positive could have caused the supracondylar fracture. This case report shows the importance of knowing if a person practicing yoga has any health condition which could make it dangerous for them to practice specific yoga techniques.

Reporting of Adverse Events in Existing Trials

In contrast to the above mentioned reports on the adverse events associated with specific yoga practices there are a large number of studies on the benefits of yoga practice to improve physical and mental health (Hagen and Nayar, 2014; Jeter et al., 2015).

[2]Compression Design [Internet]. *How Long to Hold a Yoga Pose* [cited 2019 Mar 19]. Available online at: https://www.compressiondesign.com/how-long-to-hold-a-yoga-pose/

[3]Yoga Asanas in Depth [Internet]. *Detailed Description of Yoga Asanas Vajrasana* [cited 2018 Aug 27]. Available online at: http://yogaindepth.blogspot.com/p/detailed-description-of-yoga-asanas.html

University of Patanjali Haridwar

TABLE 1 | Recommendations for safe use of yoga at different levels.

Persons involved	Recommendations
YOGA PRACTITIONER	
a. Yoga practitioner (a person with normal health who learns and practices yoga for his/her own physical, psychological, cognitive, social and spiritual wellbeing)	1. The person should be motivated to learn yoga. 2. Yoga practice should be under the supervision of a reliable and trained yoga instructor. 3. The yoga practitioner should view yoga instructors with respect, but should not be confused by concepts of a "*guru*" or the "need to surrender" which could lead to weakness, a dissolution of boundaries and hence exploitation (Khouri, 2018, https://www.yogitimes.com/article/yoga-business-teacher-student-boundaries-relationships-friendship). 4. Any earlier accident/injury or surgery should be mentioned to the yoga instructor. 5. The person should approach yoga for self-improvement without a sense of competiveness which could lead to going beyond his/her physical ability and hence resulting in injury.
b. Yoga practitioner (a person with a diagnosed health condition who learns and practices yoga primarily for the management of his/her health condition as well as his/her own physical, psychological, cognitive and spiritual wellbeing)	1. The person should give a detailed description of their medical condition to their yoga therapist. 2. The person should be clear about the objectives to practice yoga i.e., the practice of yoga to alleviate symptoms of a chronic illness and possibly to help manage the cause of the condition. 3. Yoga practitioner should have realistic expectations and not expect miraculous cures. 4. There should not be any attempt to modify the practice given to the person. For example if a person misses the yoga session on 1 day increasing the practice the next day may not be appropriate. 5. If the yoga practitioner notices any changes in their symptoms or their medication is altered by the physician, this should be reported to yoga therapist.
Yoga instructor (a person who has undergone training to teach yoga to healthy persons)	1. The person should be motivated to teach yoga. 2. The yoga instructor should be experienced in yoga practice and theory especially with an understanding about the exact way in which a yoga technique should be practiced as well as the duration, frequency and contraindications of the practice. This should be based on knowledge of traditional yoga texts (please see the footnote below)[a] and the commentaries written on them. 3. A yoga instructor should be aware about the contraindications of yoga practices. 4. The yoga instructor should communicate with complete clarity about the method of practice and the contraindications of the practice. 5. All yoga instructors should have basic knowledge of physiology, functional anatomy and biomechanics. 6. The person should know the basics of first aid (e.g., treating minor injuries such as sprain). 7. A yoga instructor should be able to report an adverse event with sufficient accuracy (even with a diagram if necessary) to a relative of a yoga practitioner or even to a medical practitioner (if necessary).
Yoga therapist (a person who has undergone training to teach yoga for therapeutic benefits to patients)	1. A yoga therapist should have detailed case histories and knowledge of their patients. 2. A yoga therapist should be cautious attempting to treat patients who are weak, liable to fall, have poor balance or are otherwise "high risk cases." 3. Yoga therapists require additional training compared to a yoga instructor. They need to know therapeutic yoga, in theory and practice and additional information about basic diagnostic methods and the disorders they may treat. 4. A yoga therapist should be able to record the pulse, blood pressure and body temperature accurately at the very least. 5. A yoga therapist needs knowledge of first aid and on-the-spot emergency treatments (e.g., cardiopulmonary resuscitation, managing choking, bleeding and fractures) as well as the contact details of a properly equipped hospital nearby. 6. If a person experiences any injury or harm during yoga, the yoga therapist should be able to report it to a doctor with details about the patient's medical history, the yoga practice (with a diagram if necessary) and the injury.
A doctor (a conventional medical practitioner)	A doctor who treats a patient with an injury or other discomfort believed to be arising from yoga should ask for clear details about the yoga practice performed, its duration, method and frequency. This information may be supplemented with diagrams or source material. Yoga practitioners should be clear that they are not being disloyal to their yoga teacher/school when giving this information.

[a] *Hatha Yoga Pradeepika (Circa 1500 A.D.; Muktibodhananda, 1998), Gheranda Samhita (Circa 1700 A.D.; Saraswati, 2012), Patanjali's Yogasutras (Circa 900 B.C.; Ramdev, 2008) and Bhagwad Gita (Circa 400–600 B.C., Prabhupada, 2015).*

Most of the studies which were conducted to assess the efficacy of yoga practice did not identify or report adverse events in the trials (Cramer et al., 2015b) In the meta-analyses of yoga used for stroke, multiple sclerosis and cardiac disease there was a lack of information about the safety of yoga practice, as adverse events were not usually mentioned (Cramer et al., 2014, 2015a; Lawrence et al., 2017; Thayabaranathan et al., 2017). This may be due to the fact that in such studies the yoga interventions were designed and delivered under the supervision of experienced yoga teachers (Cramer et al., 2015b) whereas in the four studies mentioned above on the adverse effects associated with yoga practice the subjects were either (i) practicing the yoga technique incorrectly, (ii) having precondition(s) related to the reported adverse effect, or (iii) were not aware that the particular yoga technique they were performing could worsen the precondition that they had. It could also be that adverse events were not reported or noted by the yoga teachers as they were not trained to do so.

University of Patanjali Haridwar

Precautions for Safe Yoga Practice

Descriptions From the Traditional Yoga Texts

Ancient *Hatha* yoga texts emphasize that yoga practices should be performed under the supervision of an able teacher stating "one should practice yoga as instructed by his guru" (*gurupadiûha-mārgheṇa yoghameva samabhyaset*, in Sanskrit; *Hatha Yoga Pradipika*, *Circa* 1500 A.D., Chapter I, Verse 14; Muktibodhananda, 1998). Hence though there is an increase in the number of studies reporting the efficacy of yoga to improve physical and mental health, the practice should be done with caution and under the supervision of an experienced yoga teacher.

Organizations Related to Providing Guidelines for Yoga Practice in India, the U.S. and Australia

There are known organizations to train yoga teachers and give them guidelines in different parts of the world. Examples are cited here from India, the U.S. and Australia. This is not all-inclusive as (i) there may be other organizations in India, U.S. and Australia and (ii) other countries also have similar organizations. Hence this is a non-representative description.

In India there are three main institutions which give guidelines for yoga practice. These are (i) the Morarji Desai National Institute of Yoga[4] started in 1976 as the Central Research Institute of Yoga which continued as MDNIY from 1988, (ii) the Central Council for Research in Yoga and Naturopathy (Central Council for Research in Yoga & Naturopathy, www.ccryn.gov.in)[5] and (iii) the Indian Yoga Association (Indian Yoga Association, http://www.yogaiya.in/about/)[6]. The CCRYN and the IYA were established in 1978 and 2008, respectively. The MDNIY and CCRYN are non-profit organizations funded by the Ministry of AYUSH, Government of India while the IYA is a non-profit, self-regulatory body approved by the Ministry of AYUSH and the Ministry of Health and Family Welfare, Government of India. The three organizations have no specific guidelines for reporting adverse events which occur during yoga practice.

In the U.S. there are the International Association of Yoga Therapists (IAYT, https://yogatherapy.health/about-iayt/)[7] and Yoga Alliance (www.yogaalliance.org)[8] which provide guidelines about teaching yoga. IAYT was established in 1989 while Yoga Alliance was started in 1997. The institutions are not-for-profit organizations which prepare national standards for training of yoga teachers in the United States and support research and education related to yoga as a therapy. These organizations do not have guidelines for adverse event reporting related to yoga practice. Also the National Center for Complementary and Integrative Health (Briggs, 2013) has mentioned safety concerns in yoga practice but there are no suggestions about reporting of adverse events due to yoga.

In Australia, the Australasian Association of Yoga Therapists (www. yogatherapy.org.au/)[9] and Yoga Australia (www. yogaaustralia.org.au)[10] are two associations which provide guidelines for yoga teachers and those who use yoga therapy. The associations were established in 1991 and 1999 respectively. They are not-for-profit organizations which were founded to bring yoga teachers from different traditions together and establish yoga therapy as a recognized, professional mode of treatment. Both these associations have no specific guidelines for reporting adverse events due to yoga practice.

Recommendations for Safe Use of Yoga at Different Levels

It is recommended that (a) the duration and frequency of yoga practice, (b) the amount of strain on a specific joint during yoga practice, and (c) prior health conditions should be taken into account before starting yoga, to minimize adverse events associated with yoga practice. At various levels care should be taken to ensure that yoga practice is safe and to reduce the chance of adverse events. The recommendations for the safe use of yoga at different levels have been summarized in **Table 1**.

There appears to be no organization responsible to record adverse events related to yoga. Hence an existing organization should take the initiative by having a centralized mechanism to report and track adverse events in a standard way. Organizations within a country and in different countries should come to a consensus so that this information is reported uniformly. This would be useful for yoga practitioners, yoga instructors and yoga therapists. It would also act as a resource for teaching and even to form policies.

AUTHOR CONTRIBUTIONS

ST compiled the manuscript. SS and NK assisted in compilation of the manuscript. AB assisted in compilation of the manuscript and provided the infrastructure.

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University of Patanjali Haridwar

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Body Temperature and Energy Expenditure During and After Yoga Breathing Practices Traditionally Described as Cooling

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Background: In traditional yoga texts, *sheetali* and *sitkari pranayamas* are described as cooling. The present study was aimed at recording the surface body temperature, oxygen consumed, and carbon dioxide eliminated before, during, and after performance of *sheetali* and *sitkari pranayamas*.

Material/Methods: Seventeen healthy male volunteers with ages between 19 to 25 years (average age 20.7±1.8 years) were assessed in 4 sessions, viz. *sheetali pranayama, sitkari pranayama,* breath awareness and quiet lying, on 4 separate days, in random sequence. The axillary surface body temperature (TRUSCOPE II, Schiller, China) and metabolic variables (Quark CPET, COSMED, Italy) were recorded in 3 periods: before (5 minutes), during (18 minutes), and after (5 minutes), in each of the 4 sessions. The heat index was calculated in the before and after periods, based on recordings of ambient temperature and humidity. Data were analyzed using SPSS (Version 24.0).

Results: Body temperature increased significantly during *sheetali and sitkari* ($p<0.05$, $p<0.01$; respectively) while it decreased after breath awareness and quiet lying down ($p<0.01$, $p<0.001$; respectively) when compared with respective post-exercise states. Oxygen consumption increased by 9.0% during *sheetali* ($p<0.05$) and by 7.6% during *sitkari* ($p<0.01$) while it decreased significantly during ($p<0.05$) and after ($p<0.01$) quiet lying down compared to respective pre-exercise states.

Conclusions: The results do not support the description of these yoga breathing practices as cooling. These yoga breathing practices may be used to induce a mild hypermetabolic state.

MeSH Keywords: Body Temperature Changes • Carbon Dioxide • Oxygen Consumption • Yoga

Full-text PDF: https://www.basic.medscimonit.com/abstract/index/idArt/920107

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Background

In yoga, considerable emphasis is placed on the breath. Yoga breathing techniques are ultimately intended to enhance a practitioner's ability to achieve a calm mental state at will [1]. However, since these practices regulate and modify different aspects of the breath (the rate, depth, or adding a period of breath-holding), they have a direct effect on physiological functions such as oxygen consumption [2].

An early study examined oxygen consumption (VO_2) during 3 yoga breathing practices in a single subject (male, aged 32 years) [2]. The VO_2 increased significantly by (i) 11.9% during high-frequency yoga breathing (*kapalabhati*, at 80 breaths per minute for 30 minutes), (ii) 18.9% during slow deep breathing (*bhastrika* practiced for 24 minutes), and (iii) 18.0% during breathing with retention after inhalation (*ujjayi*, practiced for 22 minutes). All comparisons were made with the previous values. The results of this early study were supported by later research.

High-frequency yoga breathing was found to increase VO_2 compared to the preceding values in at least 2 other studies [3, 4]. Three males (average age 35.7±11.7 years) who breathed at 232 breaths per minute for 30 minutes showed a 203% increase in VO_2 [3]. A slower rate of high-frequency yoga breathing showed a similar trend, but with a smaller magnitude of change; 47 males (average age 23.2±4.1 years) breathed at 60 breaths per minute for 15 minutes, and VO_2 increased by 40% [4].

Similarly, 3 studies found that yoga breathing with a period of breath retention also increased VO_2 compared to the preceding values [5–7]. The findings were as follows: (i) in 10 males (ages 28–50 years), after 15 minutes of practice, there was a 52% increase in VO_2 [5], (ii) in a single subject (male, 26 years of age) with a slow breath rate of 1 breath per minute for 60 minutes, there was an increase of 11% [6], and (iii) in 9 experienced yoga practitioners (5 males, average age 44.0±11.6), yoga breathing with retention practiced for 30 minutes after inhalation increased VO_2 by 20% [7].

Another form of breath regulation involves inhalation through the mouth. This has 2 categories, called *sheetali* (Chapter 2; Verse 57) and *sitkari* (Chapter 2; Verse 54) [1]. These are commonly referred to as cooling *pranayamas*. In Sanskrit, *sheetali* means calming or cooling breath, while *sitkari* is the process of cooling or achieving coolness [1]. In these Sanskrit definitions, the word 'cool' not only indicates a decrease in body temperature, but also signifies a calm mental state.

To the best of our knowledge, there has been no study examining body temperature, oxygen consumption, and energy expenditure related to the practice of these 2 *pranayamas*, which have been traditionally described as cooling. Hence, the present study aimed to assess the effect of *sheetali* and *sitkari pranayamas* on surface body temperature, energy expenditure, and oxygen consumption, among other variables, in healthy participants compared to breath awareness (which is a part of all *pranayama* practice) as an interventional control and quiet lying down as the control.

Material and Methods

Design of the study

Each participant was assessed in 4 sessions. The 4 sessions were on 4 separate days at the same time of day, with 24 hours between sessions. The 4 sessions were: (i) *sheetali pranayama*, (ii) *sitkari pranayama*, (iii) breath awareness, and (iv) quietly lying down, as a control. The sequence of the sessions was randomized with a standard randomizer (www.randomizer.org), so that the order of the sessions was not the same for the 17 participants. The order of sessions for the first 2 participants is given below as an example. For the first participant, the sequence for the 4 sessions was as follows: (i) *sheetali pranayama*, (ii) breath awareness, (iii) quietly lying down, and (iv) *sitkari pranayama*. For the next participant, the sequence for the 4 sessions was as follows: (i) quiet lying, (ii) breath awareness, (iii) *sitkari pranayama*, and (iv) *sheetali pranayama*. Hence, the sequence differed for the participants.

The sessions were recorded between August and October 2018. For all these sessions, the total duration was 28 minutes (5 minutes before, 18 minutes during, and 5 minutes after). The 18 minutes 'during' consisted of (i) *sheetali pranayama*, (ii) *sitkari pranayama*, (iii) breath awareness, and (iv) quietly lying down. The 18-minute duration of the intervention consisted of three 5-minute epochs with 3 periods of 1-minute rest in between the 3 epochs. In the last 8 years, the authors have found that participants can practice different *pranayamas* effectively and without fatigue if they have rest periods between [8,9]. Three 5-minute epochs were selected as the most practical for participants to include in their daily practice. Hence, this duration is based on laboratory investigations [8,9] and communication with the participants, asking them to self-rate their level of comfort, and practical considerations. This study design is depicted in schematic form in Figure 1.

Experimental conditions

The participants maintained the same duration after a meal for all 4 sessions. The minimum gap was 2 hours after a meal for all participants, who were residents of a university campus. The diet was comparable for the participants, consisting of a

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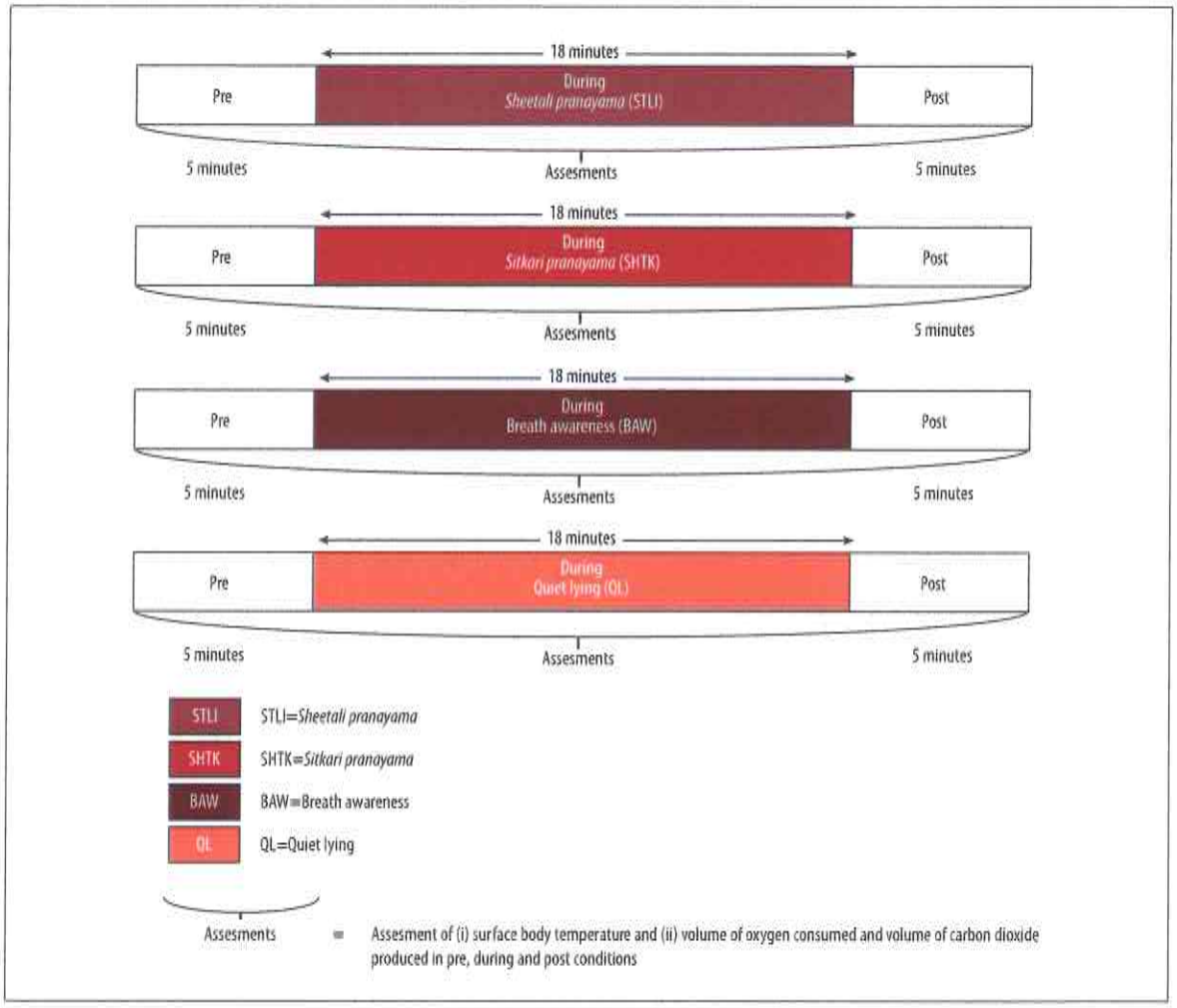

Figure 1. The study design is schematically presented here.

lacto-vegetarian meal with an average of 500 to 600 Kcal/meal prior to the recording sessions. The participants wore light, comfortable clothing. Recordings were carried out in a dimly-lit sound-attenuated cabin while the researcher monitored the participants from an adjacent recording room. The participants were not exposed to high external temperatures while coming to the laboratory prior to testing. They were in an indoor environment comparable to that of a laboratory. The participants were asked not to practice any form of exercise including yoga techniques for 24 hours prior to testing. Their compliance to this was checked when they came to the laboratory. In addition, each participant was asked to sit quietly in the laboratory for 10 minutes prior to each of the 4 sessions so that they could adapt to the laboratory conditions. In the experimental room, the ambient temperature and humidity were regulated by air-conditioning; the temperature range was 24.5–25.6°C on all recording days, and humidity was 45–53%. The room temperature and humidity were measured with a digital wireless electronic hygrometer and a thermometer (HTC-I, China). The thermometer was accurate to 1°C and the hygrometer was accurate to 1% humidity. From the ambient temperature and humidity, the heat index was derived, as described later. Throughout the assessment, the participants were monitored with an infra-red camera and observed on a closed-circuit television by the researcher in the adjacent recording room, and participants were informed of this observation, which allowed the researcher to detect the participants' movement or any episode of sleep or signs of discomfort. No such episodes occurred during the sessions.

Study participants

Seventeen healthy males ages 19–25 years (group average age±SD, 20.7±1.8 years) participated in the study. The sample of 17 participants was drawn from 57 students who were in the final year of a 2-year postgraduate course run by a

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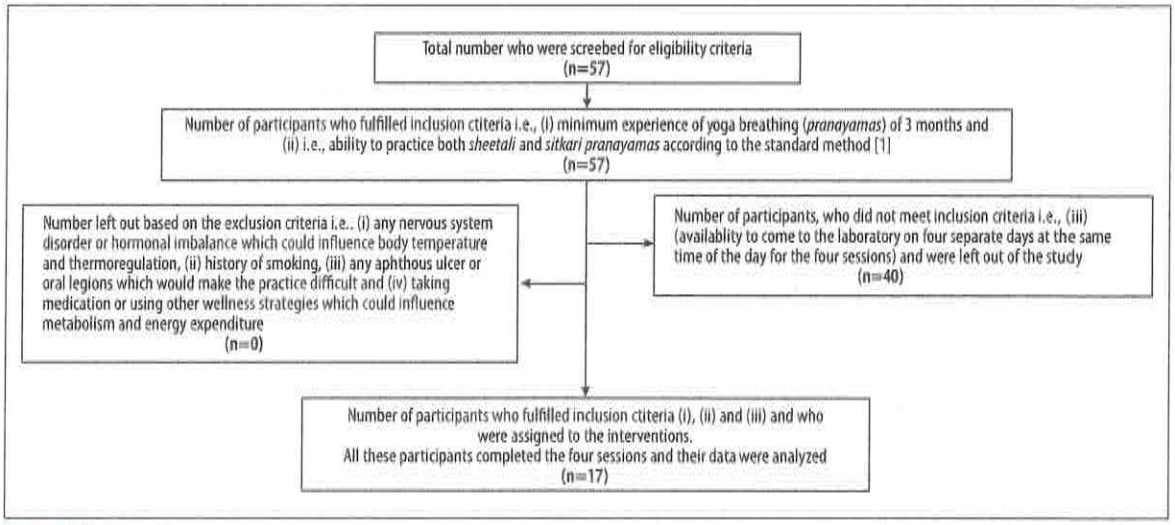

Figure 2. Trial profile.

university in northern India. Participants were recruited using flyers on the university and research foundation notice boards. There was no incentive to take part in the study. With a sample size of 17 in a session and with average effect size of 0.69 based on the average change in energy expenditure per hour in these sessions, the study was powered at 0.99 for alpha preset at 0.05 [10].

Inclusion and exclusion

The inclusion criteria were: (i) minimum experience of yoga breathing (*pranayamas*) of 3 months (group average experience±SD, 30.3±14.6 months), (ii) ability to practice both *sheetali* and *sitkari pranayamas* according to the standard method [1], and (iii) their availability to come to the laboratory on 4 separate days at the same time of day for the 4 sessions. The participants were not selected based on their: (i) interest in yoga, (ii) their involvement in yoga research, (iii) interest in practicing cooling *pranayamas*, or (iv) any other factor. Hence, all participants had an equal chance of being included in the trial if they met the inclusion criteria mentioned above. The exclusion criteria were: (i) any nervous system disorder or hormonal imbalance that could influence body temperature and thermoregulation, (ii) history of smoking, (iii) any aphthous ulcer or oral legions that would make the practice difficult, and (iv) taking medication or using other wellness strategies that could influence metabolism and energy expenditure. None of the participants had to be excluded for these reasons. The details of the study were explained to the participants when they were recruited to the study. The actual number of participants at different stages of the trial is detailed in Figure 2. Prior to the experiment, each participant provided signed informed consent. This study was approved by the institution's ethics committee (IEC), following the guidelines of the Indian Council of Medical Research, which are based on the Helsinki Declaration (IEC approval number: YRD/18/06).

Assessment of body temperature

Body temperature was assessed with a multi-use patient monitor (TRUSCOPE II, Schiller, China) [9]. Before each session, the sensor was cleaned with 2% Savlon™, which contains cetrimide and chlorhexidine gluconate. The sensor was then dried with cotton wool and set aside for 5 minutes before use. For the recording, the sensor was positioned in the left axilla between anterior and posterior axillary folds, at the vertical mid-point of the axilla, and was kept in position with 2 strips of micro-pore plaster. The diameter of the sensor is 9 mm and it measures surface body temperature with an accuracy of 0.1°C. Prior to the study, the sensitivity of the sensor was determined by comparing the values with those of a mercury thermometer, using 7 samples of water at known temperature. The sensor used for the study recorded 0.1°C less than the mercury thermometer. The results were similar to those of another study, which compared a digital temperature sensor with a mercury thermometer in a clinical setting [11]. There have been concerns about the accuracy of surface body temperature recorded from the axilla [12,13]. However, we used the axilla as the recording site due to its ease of access.

During recording, 2 minutes were given for the sensor to stabilize before the actual recording. The body temperature was recorded continuously during 28-minute sessions, noting the reading at the end of each minute.

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Assessment of metabolic and ventilatory variables

An open-circuit oxygen consumption analyzer (Quark CPET, COSMED, Italy) was used to assess the metabolic and ventilatory variables [4]. The COSMED Quark CPET (Cardio-Pulmonary Exercise Testing) equipment is designed to evaluate cardiopulmonary functions. The program algorithm and the presentation of the measured data were developed according to the specifications of the American Thoracic Society (ATS) [14] and European Respiratory Society (ERS) [15]. The equipment has a built-in paramagnetic gas analyzer to evaluate the volume of oxygen consumed (VO_2) and the volume of carbon dioxide eliminated (VCO_2). Prior to acquiring data, the flow or volume calibration of the equipment was performed with a 3-liter calibration syringe, and the gas analyzer was calibrated with atmospheric air and with a cylinder that has a fixed amount of O_2 (16%) and carbon dioxide CO_2 (5%). This calibrates the equipment for ambient temperature, humidity, barometric pressure, flow rate, and gas analysis. The COSMED Quark CPET was used to measure: (i) volume of oxygen consumed (VO_2), (ii) volume of carbon dioxide eliminated (VCO_2), (iii) rate of respiration (RR), (iv) estimated energy expenditure (EE Kcal/day), and (v) the non-protein respiratory quotient (npRQ).

Because the yoga breathing practice (*pranayamas*) involved mouth-breathing with the protrusion of the tongue (*sheetali* and *sitkari pranayamas*), the conventional masks used with the QUARK CPET were not suitable. The participants were fitted with a canopy hood to be able to easily perform the *pranayama* breathing. In the canopy hood, air exhaled by the participants blends with ambient air, and the built-in measurement system calculates partial oxygen consumption, CO_2 production, and other metabolic and ventilatory variables. To fit the canopy comfortably, participants were asked to lie down in supine position. The canopy was fitted around the waist to ensure that it was air-tight.

Interventions

Ideally, all *pranayamas* are practiced in the sitting position with erect spine and straight neck. However, the recording had to be made in the canopy for all 4 sessions (*sheetali pranayama*, *sitkari pranayama*, breath awareness, and quietly lying down). Hence, the supine lying position was used in the 'pre', 'during' and 'post' period of all 4 sessions. Participants were asked to keep their legs extended in this position (lying supine). None of the participants mentioned that they had difficulty in this posture in any particular practice, including maintaining breath awareness and other aspects of breathing. In both practices (*sheetali* and *sitkari*), inhalation is ideally deep and diaphragmatic, while exhalation should be longer than inhalation.

Sheetali pranayama

The participants were asked to keep their eyes closed. To practice oral (mouth) breathing, participants were asked to extrude the tongue comfortably and roll the sides of the tongue up to form a tube and to breathe in slowly and deeply through the tongue. At the end of inhalation, the mouth was closed and exhalation was performed through the nose. This was continued for 18 minutes.

Sitkari pranayama

The upper and lower teeth were clenched together and the lips were drawn aside as much as was comfortable. Participants were asked to breathe in slowly and steadily through the gaps between the teeth. At the end of inhalation, participants were asked to close their mouths and to exhale through the nose. This was continued for 18 minutes.

Breath awareness

Breath awareness (BAW) was practiced with eyes closed. Participants were asked to be aware of their breath but not to modify it in any way. Participants did not perform mouth breathing. They were asked to direct their attention to the flow of air through the nasal passages and respiratory system as much as possible.

Quiet lying

The quiet lying session formed the control session. Participants were asked to keep their eyes closed. Participants did not practice mouth breathing. They were not given any instructions about directing their thoughts or about modifying their breath. Participants were observed on closed-circuit television to ensure that they did not move or fall asleep, which could be detected for example, by nodding movements of the head, for 18 minutes. This was also verified by talking to the participants after the session.

Data extraction

Values of the body temperature were noted every minute from the TRUSCOPE II equipment. The average values were calculated for "5 minutes before", '18 minutes during' and '5 minutes after".

Similarly, average values of the volume of oxygen consumed (VO_2), volume of carbon dioxide eliminated (VCO_2), rate of respiration (RR), estimated energy expenditure (EE Kcal/day), and estimated non-protein respiratory quotient (npRQ) were also calculated for pre-exercise, during exercise, and post-exercise periods. This was done separately for each of the 4

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Table 1. Mean, standard deviation, and Cohen's *d*-value of the variables assessed before, during, and after cooling *pranayamas* breath awareness and quietly lying down.

Variables	*Sheetali pranayama*					*Sitkari pranayama*				
	Pre (Mean± SD)	During (Mean ±SD)	Post (Mean± SD)	C's *d*#	95% CI (Upper limit, lower limit)##	Pre (Mean ±SD)	During (Mean ±SD)	Post (Mean ±SD)	C's *d*#	95% CI (Upper limit, lower limit)##
Surface body temperature (°C)	35.72± 0.52	35.9± 0.53*	35.83± 0.62	0.34	(–0.18, –0.33)	35.79± 0.66	35.96± 0.69**	35.89± 0.76	0.25	(–0.52, –0.29)
VO_2 (ml/min) STPD	269.05± 53.14	293.26± 52.51*	255.59± 48.36***	0.46	(–4.53, –43.89)	257.74± 30.78	277.23 ±37.23**	249.68± 36.18*	0.57	(–8.79, –30.19)
VCO_2 (ml/min) STPD	229.2± 112.52	266.82± 132.14**	183.99± 120.39**	0.31	(–14.83, 60.42)	189.57± 46.23	228.03± 65.34**	163± 53.37*	0.69	(–12.76, –64.14)
RR (breath per min)	12.02± 0.01	12.02± 0.01	12.02± 0.01	0.00	(0.004, –0.003)	12.02± 0.01	12.02± 0.01	12.02± 0.01	0.00	(0.003, –0.001)
EE Kcal/day	1873.15± 411.39	2072.01± 448.1**	1719.38± 412.71	0.46	(–63.25, –334.46)	1741.01± 213.12	1915.63± 287.11**	1649.81± 256.3	0.70	(–73.75, –275.49)
npRQ	0.84± 0.41	0.89± 0.41*	0.7± 0.42***	0.12	(–0.004, –0.100)	0.73± 0.18	0.8± 0.20*	0.64± 0.20**	0.37	(–0.010, –0.13)
Heat index###	25.05± 0.24		25.17± 0.52	0.32	(–0.132, –0.367)	25± 0.35		25± 0.35	0.00	(0.000, 0.000)

Variables	Breath awareness					Quiet lying				
	Pre (Mean± SD)	During (Mean ±SD)	Post (Mean± SD)	C's *d*#	95% CI (Upper limit, lower limit)##	Pre (Mean ±SD)	During (Mean ±SD)	Post (Mean ±SD)	C's *d*#	95% CI (Upper limit, lower limit)##
Surface body temperature (°C)	35.56± 0.83	36.82± 3.60	35.92± 0.61**	0.57	(1.47, –3.99)	35.63± 0.70	35.81± 0.85	36.01± 0.54***	0.23	(0.59, –0.41)
VO_2 (ml/min) STPD	263.24± 47.57	257.87± 41.18	245.86 ±58.08	0.12	(19.98, –9.23)	265.77± 40.7	252.53± 39.27*	249.49± 37.69**	0.33	(22.72, 3.76)
VCO_2 (ml/min) STPD	226.47± 138.22	218.33± 140.71	202.52± 145.9*	0.06	(23.54, –7.27)	249.25± 142.44	229.21± 134.25*	224.1± 129.73*	0.14	(36.82, 3.27)
RR (breath per min)	12.02± 0.01	12.02± 0.01	12.03± 0.02	0.00	(0.003, –0.003)	12.02± 0.01	12.02± 0.01	12.02± 0.01	0.00	(0.002, –0.005)
EE Kcal/day	1836.71± 427.3	1792.95± 418.78	1699.38± 517.94	0.10	(146.32, –58.80)	1891.02± 428.38	1783.24± 416.76**	1757.61± 402.01**	0.26	(183.85, 31.72)
npRQ	0.84± 0.45	0.81± 0.42	0.78± 0.41*	0.07	(0.06, 0.009)	0.9± 0.44	0.87± 0.40	0.86± 0.39	0.07	(0.085, –0.020)
Heat index###	24.94± 0.24		24.88± 0.33	0.21	(0.28, –0.16)	25.17± 0.39		25.05± 0.55	0.26	(0.37, –0.13)

* p<0.05; ** p<0.01, *** p<0.001; post hoc analyses with Bonferroni adjustment, during and post compared with respective pre periods. # Cohen's *d* values for during *vs.* pre comparisons; ## 95% confidence interval for during *vs.* pre differences; ### Heat index was calculated using pre and post conditions.

sessions (*sheetali pranayama, sitkari pranayama*, breath awareness, and quietly lying down).

Statistical analysis

The group average values±SD for oxygen consumption (VO_2), carbon dioxide eliminated (VCO_2), rate of respiration (RR), estimated energy expenditure (EE Kcal/day), and estimated non-protein respiratory quotient (npRQ) are provided in Table 1.

A repeated-measures analysis of variance (RM-ANOVA) was performed with SPSS (version 24.0). There were 2 within-subject factors: Sessions with 4 levels (*sheetali pranayama, sitkari pranayama*, breath awareness, and quietly lying down

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Table 2. ANOVA table for the variables.

S. No.	Variables	Factors	F-value	Degrees of freedom (df)	Partial eta squared	Huynh-Feldt ε	p-Value
1	Surface body temperature (°C)	States	2.94	1.08, 17.25	0.155	0.55	0.102
		Sessions×States (interaction)	1.01	1.02, 16.25	0.6	0.17	0.33
2	Volume of oxygen consumed [VO_2] (ml/min) STPD	States	16.28	1.86, 29.77	0.5	0.93	<0.001
		Sessions×States (Interaction)	5.85	3.20, 51.19	0.27	0.68	0.001
3	Volume of carbon dioxide eliminated [VCO_2] (ml/min) STPD	States	38.01	2.00,32.00	0.7	1	<0.001
		Sessions×States (interaction)	11.67	3.02, 48.32	0.42	0.63	<0.001
4	Rate of respiration (breaths/min)	States	2.66	1.59, 25.54	0.14	0.87	0.1
		Sessions×States (interaction)	0.89	1.73, 27.65	0.05	0.32	0.41
5	Estimated energy expenditure (Kcal/day)	States	24.99	1.98, 31.76	0.61	0.99	<0.001
		Sessions×States (interaction)	7.9	3.23, 51.68	0.33	0.69	<0.001
6	Non-protein respiratory quotient (npRQ)	States	39.56	1.98, 31.71	0.71	0.99	<0.001
		Sessions×States (interaction)	9.75	2.97, 47.63	0.38	0.62	<0.001
7	Heat index	States	0.09	1.00, 16.00	0.01	1	0.77
		Sessions×States (interaction)	1.06	2.25, 35.99	0.06	0.88	0.36

sessions) and States (pre, during, and post). This had 2 levels (pre and post) for the heat index and 3 levels for all other variables (pre, during, and post).

Multiple comparisons were carried out with Bonferroni adjusted post hoc tests.

Results

Repeated-measures analyses of variance (RM-ANOVA)

There was a significant difference between States for: (i) oxygen consumption (VO_2), (ii) carbon dioxide eliminated (VCO_2), (iii) estimated energy expenditure (EE Kcal/day), and (iv) non-protein respiratory quotient (npRQ).

We also found significant interaction between States and Sessions for: (i) oxygen consumption (VO_2), (ii) carbon dioxide eliminated (VCO_2), (iii) energy expenditure (EE Kcal/day), and (iv) non-protein respiratory quotient (npRQ). A significant interaction between States and Sessions for any variable suggests that they are interdependent.

The F, df, Huynh-Feldt epsilon, and p values are provided in Table 2.

Post hoc analyses

(i) *Sheetali pranayama*. The following variables were significantly increased during *sheetali pranayama*: body temperature, oxygen consumption (VO_2), carbon dioxide eliminated (VCO_2), estimated energy expenditure (EE Kcal/day), and non-protein respiratory quotient (npRQ).

(ii) *Sitkari pranayama*. The following variables were significantly increased during *sitkari pranayama*: body temperature, oxygen consumption (VO_2), carbon dioxide eliminated (VCO_2), estimated energy expenditure (EE Kcal/day), and non-protein respiratory quotient (npRQ).

(iii) Quiet lying down: The oxygen consumption (VO_2), carbon dioxide eliminated (VCO_2) and estimated energy expenditure (EE Kcal/day) were significantly decreased during quiet lying down.

The changes in the post-exercise and during-exercise periods compared to the respective pre-exercise period, the level of significance for both during and post comparisons,

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the Cohen's *d* (for during *vs.* pre comparison), and 95% confidence intervals for during *vs.* pre differences are presented in Table 1.

Discussion

The axillary surface body temperature increased significantly during the practice of both *sheetali* and *sitkari pranayamas*. These results do not support the traditionally accepted idea that these *pranayamas* are 'cooling'. Changes in body temperature are known to occur with simultaneous changes in oxygen consumption ('At a temperature of 32°C (89.6°F), oxygen consumption decreases as a function of hypometabolism...') [16]. During *sheetali* and *sitkari pranayamas*, there was a significant 9% increase in oxygen consumption (VO_2), (*sheetali pranayama*) and 7.6% (*sitkari pranayama*), compared to the preceding value. The carbon dioxide elimination also increased significantly during both *sheetali* (16%) and *sitkari* (20%) *pranayamas*.

The non-protein respiratory quotient increased during both *pranayamas*; this was significant for *sitkari pranayama* (with a 10% increase). The respiratory quotient gives an indication of the macronutrients metabolized. There was a significant decrease in the percentage of fats utilized during *sheetali pranayama*, and the percentage of carbohydrates metabolized increased significantly during *sitkari pranayama*. Apart from the increased oxygen consumption being related to the respiratory quotient and the metabolism of macronutrients, the increase in oxygen consumption and hence in energy expenditure could be related to other factors as well.

Sheetali and *sitkari pranayamas* involve mouth breathing, not nasal breathing. Nasal breathing is the physiological mode of breathing in all humans, irrespective of age [17,18]. Breathing through the nose facilitates filtering, heating, and humidification of inhaled air [18]. Nasal obstruction due to mechanical factors, inflammatory conditions, tumors, and congenital malformations lead to non-physiological mouth breathing. Hence, most studies on mouth breathing are carried out in persons who are forced to breathe through the mouth due to nasal obstruction and the results may not be directly applicable to the participants in the present study who chose mouth breathing as a part of *pranayama* practice. All the same, the findings in cases of mouth breathing are relevant and are presented here. After reviewing 18 articles from a total of 378 abstracts from PubMed and Web of Science, which described the implications of mouth breathing, the authors concluded that in long-term mouth breathing, a cycle is established with altered respiratory functions, involvement of the accessory muscles of respiration, and postural compensations, which in turn further perpetuate the respiratory changes [19]. Therefore, mouth breathing can be expected to increase the work of breathing. This could explain the increase in oxygen consumption and increased energy expenditure during *sheetali* and *sitkari pranayamas*.

Another possible mechanism which could explain the increase in oxygen consumption (VO_2) during both *sheetali* and *sitkari pranayamas* is that *pranayama* breathing involves the diaphragm [1]. A previous study enrolled 38 healthy participants randomly assigned to a feedback breathing exercise group or a diaphragmatic breathing exercise group; while the metabolic and respiratory responses of both groups were assessed [20]. The diaphragmatic breathing group showed a 19% increase in oxygen consumed (VO_2) as a short-term effect of the practice, whereas the feedback breathing exercise showed only a 10% increase in oxygen consumption (VO_2). Diaphragmatic breathing activates the muscles of respiration and thus increases the oxygen consumed and energy spent [20]. This increase in oxygen consumption (VO_2) during diaphragmatic breathing may explain the increase in oxygen consumed in high-frequency yoga breathing (10–14%) [4], as well as in other *pranayamas* [21].

The contribution of environmental physical factors to this increase in surface body temperature was also ruled out. The room temperature and humidity were maintained at fairly constant levels during the recording sessions. The heat index was obtained from the recorded room temperature and humidity was derived using an algorithm [22]. The heat index indicates the level of thermal comfort and is often used in environmental health research [23,24]. There was no change in the heat index after any of the sessions in post-pre comparisons.

The participants were covered with the canopy in the 'pre', 'during' and 'post' states of all 4 sessions (*sheetali pranayama*, *sitkari pranayama*, breath awareness, and quiet lying down). Thus, the recording conditions were the same for all 4 sessions. If being in the canopy had resulted in warming, it would be expected that that the surface body temperature would have steadily increased during the 3 states (pre, during, and post) in all 4 sessions. If this was the case, the highest surface body temperature would have been recorded in the post period. It was apparent that the surface body temperature only increased steadily in the quiet lying down session. In the (i) *sheetali pranayama*, (ii) *sitkari pranayama*, and (iii) breath awareness sessions, the surface body temperature increased in the 'during' period and decreased in the 'post' period. This suggests that wearing the canopy was not warming.

In previous studies on yoga breathing, the magnitude of percentage increase in oxygen consumption (VO_2) was more than the increase found during *sheetali pranayama* (9.0%) and *sitkari pranayama* (7.6%) in the present study. High-frequency yoga breathing at 232 breaths per minute increased VO_2 by 208% [3], while breathing at 60 breaths per minute increased VO_2 by 40% [4]; which could be attributed to increased work of

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breathing. This difference could not be related to the method of measuring VO_2, which differed between the studies, in which some used the Douglas bag method as well as closed and open-circuit methods. No relationship could be found with the method and the increase in VO_2. Similarly, the increase in VO_2 during yoga breathing with a period of breath-holding following inhalation was greater than the increase during *sheetali* and *sitkari pranayamas* in the present study [5–7]. This greater magnitude of increase in VO_2 may also be attributed to the greater work of breathing associated with yoga breathing, which included a period of breath-holding.

There was a significant decrease in VO_2 after quiet lying down, suggesting that this recumbent position, without specific instructions about the breath or about awareness, was relaxing. There was no change in VO_2 during or after breath awareness exercises. Possibly, the awareness paid to the breath prevented the decrease in oxygen consumption seen in quiet lying down. The increase in body temperature in the post periods of these sessions is more difficult to explain.

Conclusions

The increase in VO_2 which occurred during the 2 mouth-breathing yoga practices could be the basis of using these practices as a form of mild exercise, especially since the oxygen consumption decreased (though not significantly) after both *sheetali* and *sitkari pranayamas*. Further assessments are required to understand the psychophysiological mechanisms involved in the changes occurring with these yoga breathing practices, which could involve the autonomic nervous system, the endocrine system, and top-down cortical regulation of these systems. At present this remains a speculation.

Conflicts of interest

None.

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Short Communication

Body Temperature in Practitioners of a Yoga Breathing Technique Considered to be Heat Generating

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Abstract

Context: *Suryabheda pranayama* is traditionally described as "increasing the inner fire" and is believed to be heat generating. **Aims:** The present study aimed at determining whether the surface body temperature would increase after *Suryabheda pranayama* practice compared with sitting quietly for the same duration as a control. **Materials and Methods:** Nineteen participants with experience of *Suryabheda pranayama* practice (group mean experience ± standard deviation, 30.2 ± 22.8 months) were assessed in 3 sessions on separate days. The sessions were (i) *Suryabheda pranayama* with physiological locks or breath retention, (ii) *Suryabheda pranayama* without physiological locks or breath retention, and (iii) quiet sitting (control session). The axillary surface body temperature was monitored in all three sessions before (5 min), during (15 min), and after (5 min) the intervention. Ambient temperature and humidity in the recording cabin used for testing were noted. From the ambient temperature and humidity, the heat index was derived **Statistical Analysis:** Repeated measures analyses of variance were performed to compare values before, during, and after the 3 sessions, using SPSS version 24.0. **Results:** The surface body temperature increased during and after *Suryabheda pranayama* with physiological locks ($P < 0.001$; $P < 0.001$), *Suryabheda pranayama* without physiological locks ($P < 0.01$; $P < 0.001$), and quiet sitting ($P < 0.001$; $P < 0.001$) compared to the respective before values. **Conclusion:** The control (i.e., quiet sitting) and experimental sessions (i.e., *suryabheda* with locks and *suryabheda* without locks) showed a comparable increase in the surface body temperature. Hence, the increase in surface body temperature during and after experimental sessions does not appear to be related to the *pranayama* techniques. The possible factors which may have contributed to increased surface body temperature in the control and experimental sessions have been discussed.

Keywords: *Body temperature, heat index, room temperature, Suryabheda pranayama, unilateral nostril breathing, yoga breathing*

Introduction

Voluntary yoga breath regulation (called *pranayama* in Sanskrit) is a way to modify specific physiological functions through the respiration.[1] Among *pranayamas*, breathing through a particular nostril is considered important to alter the functioning of the body and the mental state. Breathing through the right nostril is traditionally called *Suryabheda pranayama* (= "piercing like the sun" yoga breathing, in Sanskrit). The notion that *Suryabheda pranayama* is heat generating is supported by a verse in a yoga text, i.e., the *Gheranda Samhita* (*Circa* 1700, A. D.), Chapter V, Verse 69. The verse states that the practice of *Suryabheda pranayama* reduces aging and can even delay death (*Gheranda Samhita*, Chapter V, Verse 69).[2] This verse continues to state that the practice of *Suryabheda pranayama* augments the inner digestive fire (in Sanskrit; *Bodhayetkundaleem shaktim dehaanalavivardhanam; Gheranda Samhita*, Chapter V, Verse 69; where *deha* = body and *anal* = inner fire).[3] Based on this verse, commentators have stated that *Suryabheda pranayama* can increase the body temperature.[2,4]

When both inhalation and exhalation were practiced through the right nostril, there was an increase in oxygen consumption both as an immediate effect of 45 min of practice, where the oxygen consumption increased by 17%,[5] and as a longitudinal effect following 1 month of *Suryabheda pranayama* practice every day, where the oxygen consumption increased by 37%.[6]

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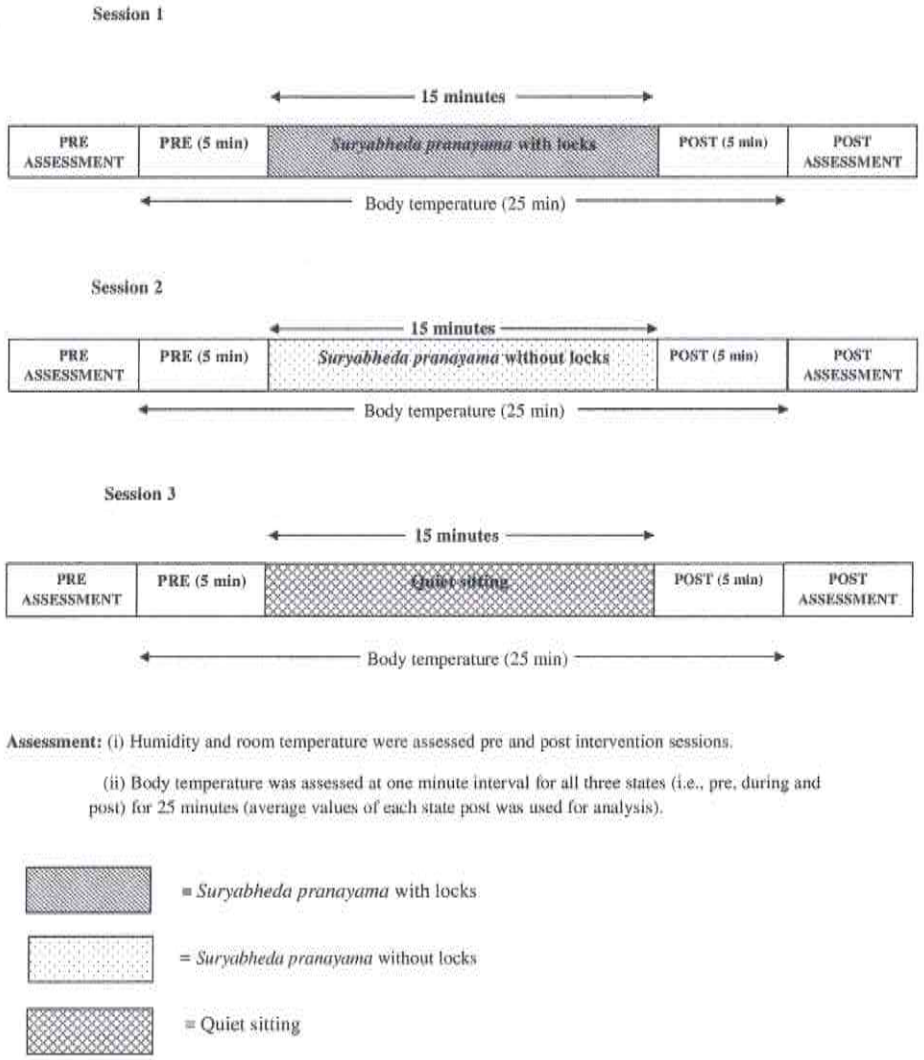

Figure 1: Schematic presentation of the study design

Oxygen consumption is an indicator of energy expenditure.[7] These effects of increased energy expenditure are compatible with the traditional descriptions of *Suryabheda pranayama* in the yoga texts. The effects of specific *pranayamas* as heat generating or heat dissipating[8] are not related to thermoregulation. The normal expectation based on traditional descriptions of the ideal conditions to practice yoga is that yoga is practiced under conditions which are not physically or mentally challenging (*Hatha Pradipika,* Chapter I, Verses 12–14).[4] Hence, the expectation is that irrespective of environmental conditions, if *Suryabheda pranayama* is actually heat generating, it would raise the body surface temperature within the normal range.

However, the effect of *Suryabheda pranayama* on the body temperature has not been assessed. Hence, the present study aimed at determining whether the surface body temperature would increase after *Suryabheda pranayama* practice compared with sitting quietly for the same duration as a control for comparison.

Materials and Methods

Participants

Nineteen healthy male participants between 18 and 30 years (group mean age ± standard deviation (SD), 25.0 ± 3.7 years) were recruited for the study. With $n = 19$ and with an average effect size of 1.72 (based on the average of the change in body temperature in the three sessions), the power was 1.0 for alpha = 0.05.[9] Participants had at least 1-year experience of *Suryabheda pranayama* practice with and without physiological locks (called *bandhas* in Sanskrit). Participants with (i) any hormonal imbalance or nervous system disorder which could influence thermoregulation, (ii) a history of smoking, (iii) any recent surgery (which is a contraindication for practicing *bandhas*), and (iv)

University of Patanjali Haridwar

taking medication or using other wellness strategies were excluded from the study. None of the participants had to be excluded for these reasons. Signed informed consent was obtained from the participants. The study was approved by the institution's ethics committee (approval number YRD/017/004).

Design

Participants were assessed in three sessions each. The three sessions were on three separate days at the same time of the day with 24 h between each session. The three sessions were (i) *Suryabheda pranayama* with both chin and perineal locks (*jalandhar bandha* and *mula bandha*, respectively, in Sanskrit), (ii) *Suryabheda pranayama* without the physiological locks, and (iii) quiet sitting. The sequence of the practices was randomized for the participants using a standard randomizer (www.randomizer.com). For all three sessions, the total duration of each session was 25 min, i.e., 5 min (before), 15 min (during), and 5 min (after). This study design is schematically depicted in Figure 1.

Assessments

Ambient room temperature and humidity

Assessments were carried out in a separate recording room which was temperature regulated. The study was conducted between June and October 2017. The ambient room temperature and humidity were monitored before and after each session using a digital wireless electronic hygrometer and a room temperature meter, respectively (HTC-1, HTC, Thailand). The room temperature meter had an accuracy of 0.1°C, while the hygrometer was accurate to 1% humidity.

Body temperature

The surface body temperature was recorded from the left axilla using a multi-utility patient monitor (TRUSCOPE II, Schiller, Switzerland), after cleaning the area with Savlon™ 2%. The thermometer was accurate to 0.1°C. The body temperature was recorded 5 min before, 15 min during, and 5 min after all three interventions, i.e., (i) *Suryabheda pranayama* with both chin and perineal locks, (ii) *Suryabheda pranayama* without the physiological locks, and (iii) quiet sitting.

During all three sessions, participants were seated in a temperature regulated, dimly lit room. They were asked to close their eyes while seated in a comfortable pose keeping their spine and neck aligned and erect.

Intervention

Suryabheda pranayama with physiological locks

During *Suryabheda pranayama* with chin and perineal locks, participants were instructed to close their left nostril and inhale slowly and deeply through the right nostril. At the end of inhalation, participants were asked to close both nostrils and lower their head to perform two physiological locks while holding their breath; these were (i) the chin lock (= *jalandhara bandha* in Sanskrit) in which the chin rests on the suprasternal notch[10] and (ii) the perineal lock in which the external urogenital organs are drawn upward toward the perineum called (*mulabandha* in Sanskrit).[11] Participants were asked to hold their breath to the extent they could with comfort. This was approximately 15 s. The perineal lock was released first followed by the chin lock, and then, participants were asked to raise their head. After this, participants kept the right nostril closed and the left nostril patent and exhaled slowly through the left nostril. This was a complete cycle of *Suryabheda pranayama*.[4] The cycle was repeated during the 15-min period.

Suryabheda pranayama without physiological locks

During *Suryabheda pranayama* without physiological locks or breath retention, participants were asked to close their left nostril and inhaling deeply through their right nostril, followed by exhalation through the right nostril without breath retention.[4] This was a complete cycle of *Suryabheda pranayama*. The cycle was repeated during the 15-min period.

Quiet sitting

The participants allowed random thoughts to pass through their mind without modifying them, and they were instructed to avoid modifying their breath or being aware

Table 1: Analyses of variance table for the variables

Variables	Sources	*F*	Degree of freedom	Mean square	Partial η^2	Huynh-Feldt ε	*P*
Body temperature	Sessions	2.538	1.234, 22.210	1.576	0.124	0.693	0.120
	States	30.470	1.152, 20.744	15.667	0.629	0.590	<0.001
	Sessions × States	1.082	1.164, 20.944	1.025	0.057	0.299	0.322
Room temperature	Sessions	3.205	1.128, 20.309	29.907	0.151	0.576	0.084
	States	32.080	1,18	9.322	0.641	1.000	<0.001
	Sessions × States	1.554	1.647, 29.640	0.092	0.790	0.823	0.229
Humidity	Sessions	0.017	1.684, 30.312	1.636	0.001	0.842	0.971
	States	38.616	1, 18	72.64	0.682	1.000	<0.001
	Sessions × States	2.048	1.845, 33.207	1.436	0.102	0.922	0.149
Heat index	Sessions	3.943	1.169, 21.049	41.692	0.180	0.601	0.055
	States	35.437	1, 18	15.474	0.663	1.000	<0.001
	Sessions × States	1.053	2, 360	0.184	0.055	1.000	0.359

University of Patanjali Haridwar

Table 2: Average values of body temperature, room temperature, humidity, and heat index in three sessions

Sessions	Before	During	After	*P* (during versus before)	*P* (after versus before)
Suryabheda pranayama **with physiological locks or breath regulation**					
Body temperature (°C)	35.83±0.39	36.46±0.36	36.6 2±0.37	<0.001	<0.001
Room temperature (°C)	24.19±3.67	-	24.67±3.35	-	<0.001
Humidity (%)	53.37±11.48	-	54.95±11.80	-	<0.001
Heat index (°C)	24.21±4.01	-	24.84±3.64	-	<0.001
Suryabheda pranayama **without physiological locks or breath regulation**					
Body temperature (°C)	35.99±0.34	36.90±1.55	36.67±0.31	<0.01	<0.001
Room temperature (°C)	24.43±3.80	-	25.03±3.48	-	<0.001
Humidity (%)	53.11±13.08	-	55.11±12.85	-	<0.001
Heat index (°C)	24.42±3.91	-	25.32±3.86	-	<0.001
Quiet sitting					
Body temperature	35.91±0.36	36.41±0.29	36.52±0.29	<0.001	<0.001
Room temperature (°C)	23.13±3.95	-	23.78±3.82	-	<0.001
Humidity (%)	53.16±10.38	-	54.42±11.36	-	<0.01
Heat index (°C)	23.00±4.31	-	23.68±4.19	-	<0.001

Values are group mean±SD. SD: Standard deviation

of their breathing. The participants were asked to sit cross-legged (*sukhasana*) with their spine erect and eyes closed. There was no other activity.

Data analysis

Data were analyzed with SPSS version 24.0 (IBM Corp., Armonk, N.Y., USA). Repeated measures analyses of variance were performed to analyze body temperature with two within-subjects factors, i.e., sessions (three) and states (before, during, and after). In the case of room temperature, humidity, and heat index for all three sessions, the states were two (before and after). Multiple comparisons were Bonferroni adjusted.

Results

Repeated measures analyses of variance

The F, df, Huynh–Feldt epsilon, partial eta squared, and *P* value for states, sessions, and sessions × states for different variables are provided in Table 1. A significant interaction between the sessions and states indicates the interdependence of the two.

Post hoc analyses

Body temperature

The surface body temperature increased during and after *Suryabheda pranayama* with physiological locks ($P < 0.001$; $P < 0.001$), *Suryabheda pranayama* without physiological locks ($P < 0.01$; $P < 0.001$), and quiet sitting ($P < 0.001$; $P < 0.001$) compared to the respective before values.

Room temperature

Room temperature increased after (i) *Suryabheda pranayama* with physiological locks ($P < 0.001$), (ii) *Suryabheda pranayama* without physiological locks ($P < 0.001$), and (iii) quiet sitting ($P < 0.001$). Humidity increased after (i) *Suryabheda pranayama* with physiological locks ($P < 0.001$), (ii) *Suryabheda pranayama* without physiological locks ($P < 0.001$), and (iii) quiet sitting ($P < 0.01$).

Heat index

The heat index was also increased after (i) *Suryabheda pranayama* with physiological locks ($P < 0.01$), (ii) *Suryabheda pranayama* without physiological locks ($P < 0.001$), and (iii) quiet sitting ($P < 0.001$).

The details of the average values and SDs are given in Table 2.

Discussion

Suryabheda pranayama is associated with increased sympathetic nervous system activity and increased energy expenditure. The present study aimed at assessing the surface body temperature with *Suryabheda pranayama* practice.

The axillary surface body temperature increased after both experimental sessions of *Suryabheda pranayama* practice and the control session of quiet sitting. The magnitude of increase was comparable. Hence, these results do not support the speculation that *Suryabheda pranayama* may be a heat-generating practice. Since the surface body temperature increased after all three sessions, an attempt was made to understand why this may have happened.

Other physical factors which could have contributed to changes in body temperature were the room temperature and humidity. In both experimental sessions and the control session, the room temperature increased significantly after the session compared to before, by an average of 0.6°C. Ambient humidity also increased significantly after the three sessions by an average of 2%.

University of Patanjali Haridwar

In all three sessions, there was a significant increase in the heat index. The heat index was obtained from the recorded room temperature and humidity using an algorithm.[12] The heat index measures thermal comfort and is used often in environmental health in areas of environmental health research including air pollution exposure[13] and to develop a warming system for changes in prevalent weather conditions.[14]

Apart from the heat index, factors related to the posture of the participants during the sessions may have influenced their body temperature.

In all three sessions, participants sat in an upright yoga posture (i.e., *sukhasana*). This involved sitting on a flat noncompliant surface in an upright position, with their legs crossed. Rai *et al.* and others in 1994 studied the energy expenditure during a comparable upright seated yoga posture *siddhasana* "the accomplished posture" in Sanskrit which also involved crossing the legs but with the feet closer to the perineum.[15] After sitting in *siddhasana* for 20 min, ten healthy practitioners showed a 21% increase in energy expenditure compared to an equal duration of sitting in a chair, possibly related to maintaining an upright posture. In the present study, the duration was almost comparable to the earlier study[15] and sitting upright may have similarly increased energy expenditure, which could have been resulted in an increase in surface body temperature.

Earlier studies which demonstrated an increase in oxygen consumption and increased energy expenditure as an immediate effect of 45 min of practice of *Suryabheda pranayama* (17% increase)[16] or as a longitudinal effect over 1 month of practicing *Suryabheda pranayama* every day (37% increase)[17] did not measure surface body temperature.

Since the body temperature did not increase after *Suryabheda pranayama* practice, the way in which the energy spent is utilized may be speculated upon. The increase in energy expenditure with *Suryabheda pranayama* may be used for other internal functions such as the digestion. This is supported by the effects of *Suryabheda pranayama* as described in yoga texts.[8] Food is assimilated and converted to energy by an active process which is known as the specific dynamic action (SDA) of food.[18] Out of the total energy consumed in a day, 10% of energy is utilized for SDA. Whether this proportion increased after the practice of *Suryabheda pranayama* is not known. However, all participants resided in the university and had comparable levels of physical activity and a comparable diet which was plant-based lacto-vegetarian.

Conclusion

Multiple commentaries which describe *Suryabheda pranayama* as heat generating or increasing the body temperature are not supported by the present findings. This may mean that *Suryabheda pranayama* increases energy expenditure as reported earlier to perform various vital functions optimally without increasing the body temperature.

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Conflicts of interest

There are no conflicts of interest.

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EDITORIAL

Positioning yoga in the COVID-19 pandemic

The Government of India as well as various yoga organizations worldwide have recommended yoga and yoga-based lifestyle suggestions to help persons remain mentally healthy, as well as promote optimal immune functions during the current pandemic (Ministry of AYUSH, 2020). To contain the COVID-19 pandemic and resume activity, there will be new norms, such as social distancing, increased numbers of persons working from home, and other obvious reminders of the pandemic (e.g., wearing masks in public). In order to reduce the negative impact this could have, there is an increasing role for yoga in public health.

The COVID-19 pandemic has impacted everyone's life. The range of impact differs according to whether a person is (i) healthy and in lockdown, (ii) COVID-19 positive yet asymptomatic and in mandatory quarantine, (iii) COVID-19 positive with mild symptoms in quarantine and surveillance, and (iv) COVID-19 positive with moderate-to-severe symptoms being treated in a designated hospital. Along this spectrum, persons would face varying degrees of social isolation. Symptomatic patients have been reported to experience the symptoms of respiratory distress and if the condition worsens, to develop respiratory distress which would be a cause for concern (WebMD, 2020). These symptoms are further heightened by the unusual situation which could seem threatening, namely, health-care providers in hazardous material (HAZMAT) suits, the stress associated with sounds associated with an intensive care unit (Dias, Resende, & Diniz, 2015), knowledge of fatal outcomes, and social isolation as an additional factor.

Psychological distress during quarantine (and indeed any form of isolation) has been reported in a review of 3166 studies (Brooks et al., 2020). All quantitative studies reported a high prevalence of symptoms of psychological disorder and distress. More specific details were collected during the severe acute respiratory syndrome (SARS) epidemic of 2003 (Pan, Chang, & Yu, 2005). At this time, people who were quarantined related to their contact with SARS cases, reported fear (20%), nervousness (18%), sadness (18%), and in the case of 10% of cases, there were reports of guilt (Reynolds et al., 2008). Qualitative studies identified other psychological consequences of being in quarantine, such as fear (DiGiovanni, Conley, Chiu, & Zaborski, 2004) and sleep disorders related to anxiety (Pan et al., 2005).

Commonly used anti-anxiety and hypnotic medications have a respiratory depressant effect (Garner, Eldridge, Wagner, & Dowell, 1989). For this reason, nonpharmacological interventions have been tried in people with anxiety or insomnia considered to be at risk of developing respiratory symptoms.

Recently, a randomized controlled trial assessed 51 asymptomatic COVID-19-positive cases in an isolation ward located in Hainan General Hospital, China, who were randomly assigned to progressive muscle relaxation as the experimental group and to a control group (Liu et al., 2020). Progressive muscle relaxation sessions were for ½ h a day for 5 consecutive days, whereas the control group received routine treatment alone. The average anxiety and sleep quality scores of the two groups were significantly different after the interventions.

Based on the benefits of practicing progressive muscle relaxation (above), yoga may be a potential psycho-social intervention to reduce anxiety and insomnia and positively impact immune responses in COVID-19 cases. A review evaluated yoga for anxiety disorders or elevated levels of anxiety (Cramer et al., 2018). Eight randomized controlled trials (RCTs) covering 319 participants showed that in individuals with elevated levels of anxiety, there was evidence for small short-term effects of yoga on elevated anxiety compared to no treatment (standardized mean difference [SMD] = −0.43; 95% confidence interval [CI] = −0.74, −0.11; $p = 0.008$) and for large effects compared to active comparators (SMD = −0.86; 95% CI = −1.56, −0.15; $p = 0.02$). Apart from these effects on reducing elevated anxiety levels, yoga practice helps correct sleep disorders, particularly insomnia. Electronic searches of the Cochrane Central Register of controlled trials and of standard bibliographic databases such as MEDLINE, EMBASE, and PsycINFO were performed until April 2011 (Balasubramaniam, Telles, & Doraiswamy, 2013). Based on three RCTs, there was considered to be adequate Grade C evidence to use yoga for sleep disorders (i.e., optional use based on the clinician's discretion and the patient's preference). This supports beliefs about the benefits of yoga for sleep disorders.

These findings are relevant in the management of COVID-19 because the field of *affective immunology* supports the cellular and molecular connections between the emotional and immunological systems (D'Acquisto, 2017). It is also recognized that sleep influences immunity, especially the production and release of cytokines (Besedovsky, Lange, & Born, 2012). Kiecolt-Glaser et al. (2010) demonstrated that when novices were compared to experts in yoga (i.e., those who practiced two sessions of 90 min of yoga for 12 weeks), the novices had 41% higher interleukin (IL)-6 levels than experts and were 4.75 times more likely to have detectable C-reactive protein levels (Kiecolt-Glaser et al., 2010). This trend of lower pro-inflammatory markers in experts of yoga continued to be evident in 200 breast cancer survivors, where the levels of IL-6, tumor necrosis factor-α, and IL-1β were 10%–15% lower in experts (Kiecolt-Glaser et al., 2014).

A retrospective multicentric cohort study reported significantly higher IL-6 levels in nonsurvivors of COVID-19 than those who survived (Zhou et al., 2020). Several other reports also confirmed

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higher levels of IL-6 in critically unwell patients with COVID-19 (Zhang et al., 2020). These findings support the benefits of yoga to reduce the harmful levels of chronic inflammation in COVID-19 cases.

The main difficulty faced in proposing yoga as an intervention is that the level of evidence does not meet the strict criteria required for complementary and alternative therapies to be adopted as clinical interventions (Weiger et al., 2002). The reasons for this include: (i) small sample sizes, (ii) variable or inconsistent results across different studies; (iii) research designs which lack attention to randomization, blinding, allocation; as well as (iv) reporting without sufficient details regarding withdrawals from the study and reporting of adverse events (Weiger et al., 2002). The other inadequacies are: (v) insufficient statistical power (possibly due to the small sample sizes), (vi) poor controls, (vii) inconsistency of descriptions of the yoga practices, and (viii) lack of comparisons with other treatments or with a placebo or with both.

Inconsistency of descriptions is related to the complexity of yoga, which includes physical postures (*asanas*), voluntarily regulated breathing (*pranayamas*), cleansing practices (*kriyas*), and meditation and philosophical principles (Nagarathna, & Nagendra, 2001). Clinical trials have included these practices as part of a lifestyle change intervention (Bijlani et al., 2005; Nagarathna & Nagendra, 2001) and have also tested the effects of individual practices (e.g., physical postures for anxiety) (Streeter et al., 2010). These differences in the techniques practiced, approaches to yoga by different schools of yoga, and nature (duration and intensity) of treatment, make it difficult to describe yoga therapy concisely, in a way which would be understood to mean the same method by all people, everywhere. In the absence of such standardization, research on yoga therapy requires detailed descriptions of the interventions.

Also, yoga therapy advocates individual diagnosis and treatment; emphasizing optimizing the body's innate capability to heal itself and a "whole systems" approach, wherein the physical, mental, and spiritual attributes of a patient are included (Nahin & Straus, 2001). The criteria for including and excluding persons in a RCT differ between conventional medicine and yoga therapy. For example, in a yoga therapy trial, having selected yoga as a therapy could be a criterion for exclusion, to reduce bias. If these exclusions are not observed, the value of the RCT would be lowered. Other difficulties encountered are in randomization, use of a placebo, and/or a comparable alternate intervention, as well as in masking and blinding. Randomizing persons to yoga as a therapy is limited by the fact that yoga therapy is often delivered in specialized residential settings, under the supervision of a trained yoga therapist (Telles, Sharma, Yadav, Singh, & Balkrishna, 2014). Often, the residential center is in quiet surroundings, which have their own healing effects (Kuo, 2015). If the comparison group receives conventional treatment in a hospital setting or in their homes, it is questionable whether the comparison between the two has any meaning, as administering yoga therapy in a quiet setting (Manjunath & Telles, 2004) with the attention of a yoga therapist could positively impact the way the person feels and hence influence the reported outcome (Kuo, 2015). Another problem encountered with yoga therapy is selecting a suitable placebo. Interaction between the yoga therapist and the participant could have a placebo effect (Roberts, Kewman, Mercier, & Hovell, 1993; Brody, 2000). The participant is actively involved in yoga therapy. A single study attempted to use a device to simulate yoga breathing, because breathing through the device altered the ratio of inhalation and exhalation to the 1:2 ratio, characteristic of yoga breathing (Singh, Wisniewski, Britton, & Tattersfield, 1990). A placebo device was used, which was identical to the active device but did not change respiration. However, practitioners of yoga may well question whether yoga breathing can be limited to a change in the inhalation-to-exhalation ratio alone. Most of these techniques require subtle mental changes as well (Taimni, 1999), hence attempting to find a placebo for yoga therapy may result in evaluating limited components of the intervention.

The difficulties mentioned above suggest the need for new methods to conduct research on yoga therapy. These future directions include (i) standardization; (ii) training of researchers in yoga therapy, to combine conventional research methods and those relevant to yoga therapy alone; (iii) financing research on yoga as a therapy with suitably modified guidelines to write and review research grant proposals; and (iv) planning and designing studies in yoga therapy, with attention to the required standards for efficacy and safety, but with the necessary modifications to include most aspects of yoga therapy.

(i) Standardization is perhaps the most difficult challenge in yoga therapy (Payyappallimana, 2010). There are differences across schools of yoga in the description of yoga interventions and in the way yoga therapists are trained. For example, some courses may emphasize the physical aspects of yoga therapy, whereas courses conducted elsewhere may emphasize mental and spiritual aspects. To make it possible for yoga therapy to be integrated into mainstream medical care, it is essential to attempt to standardize yoga therapy and courses involved in training those who deliver it. This would require having policies and specific nodal agencies to control and provide guidelines for this to be done uniformly.

(ii) Training of researchers in yoga therapy in research methods and those especially relevant to yoga therapy is an essential step to increasing the standards of research in yoga and yoga therapy. It is important to realize that many persons trained in using yoga have a deep and abiding belief in the system of healing. This fact and the fact that they may not be trained in a basic understanding about physiology and anatomy may make them less suitable to carry out unbiased research on yoga therapy. Hence, an important step is to select motivated yet unbiased persons who preferably have a basic knowledge of human anatomy and physiology. Many researchers in conventional medicine are trained to practice conventional medicine. Similarly, if motivated persons trained in yoga therapy are trained in research methods with the adaptations needed for yoga therapy (Bijlani, 2008), these trained persons would be ideal to conduct research on yoga.

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(iii) Obtaining funds for research on yoga and yoga therapy is another essential step. Just as the National Center for Complementary and Integrative Health of the National Institutes of Health has allocated separate funds for research in traditional medicine, this is true for other countries as well. For example, the Department of AYUSH, Government of India, India, has separate funds allocated for research in Ayurveda, Yoga, Unani, Siddha, and Homeopathy (AYUSH) (Ministry of AYUSH, n.d.). However, the format for research proposals is often more suited to research in conventional medicine. Apart from this, the reviewers often have a distinguished career in conventional medicine with a partial or peripheral interest in traditional medicine. Hence, only those research projects which investigate yoga therapy using the standards and norms set for conventional medicine are considered worth financing. Many areas related to understanding the mechanisms underlying the benefits of yoga therapy may be considered "unscientific" or "dubious" by conventional researchers, as they involve concepts such as the subtle energy (*prana* in Indian medicine and *chi* in Chinese medicine). Nonetheless, these concepts are a part of yoga therapy and if they are disregarded as scientifically unacceptable, the risk is that yoga therapy would not be understood in its entirety. Hence, an effort should be made to review all research grant proposals on yoga therapy by a panel comprising of experts in research on conventional medicine, researchers in yoga therapy, and persons with an in-depth knowledge of yoga therapy who are not biased in their approach to investigating yoga therapy.

(iv) Planning and designing a research study on yoga therapy is challenging and requires a modified approach. When planning efficacy trials, it is necessary to accept that randomization and finding the proper controls are difficulties peculiar to yoga therapy and not found in efficacy trials in conventional pharmacotherapy. Hence, instead of randomization and attempting to have placebo-controlled trials, research on yoga therapy has to take into account various issues. For example, (i) if a patient who selects yoga therapy with a belief in the treatment, this could have its own placebo effect; (ii) the complexity of the interventions in yoga therapy often does not allow for a placebo; and (iii) there is a basic difficulty of comparing a whole lifestyle change with the approach of evaluating specific prescribed medicines in conventional medicine. Probably, the only way forward in the efficacy trials of yoga therapy as a lifestyle intervention, is to adopt a "all-systems approach" where the entire set of practices which make up a yoga therapy module are compared with the conventional treatment, without any attempt to consider different aspects of the treatment, separately. Separate trials can be designed to evaluate individual practices. Research on the mechanisms underlying the effects of yoga also requires a shift in the way of thinking so as to include complex concepts not used in conventional medicine such as "subtle energy" and "psychological and even spiritual benefits."

The ultimate goal would be to arrive at standardized systems of yoga therapy which can be integrated into mainstream health care, after having sufficient research-based information about their efficacy, safety, and mechanisms of action. With such research, yoga would receive the position it deserves as a prophylactic intervention, and much more, as a therapeutic intervention for COVID-19.

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Yoga as an Add-on Therapy in the Management of Migraine

Sir,

Migraine is a chronic neurological condition which is associated with pain, disability, and impaired quality of life.[1] A recent study reported that the 1 year prevalence of migraine is about 14.12% in India.[2] Both pharmacological and nonpharmacological strategies have been recommended for the management of migraine.[3] The guidelines for the management of migraine in India suggest nonpharmacological treatment for those who have: (i) poor tolerance/medical contraindications/or insufficient response to pharmacologic treatment and (ii) been diagnosed with high stress levels.[3] For such patients, tailored behavioral and physical therapies, which can reduce their stress levels in addition to the management of migraine, have been proposed.[3] Yoga is an ancient lifestyle intervention which includes changes in behavior, physical exercises in the form of specific postures (*asanas*), breathing techniques (*pranayamas*), and relaxation techniques.[4] Yoga in stress management is widely reported. Due to this, there is an increasing interest in the use of yoga as a nonpharmacological approach in the management of migraine.[5] With this background, there have been attempts to assess the effectiveness, suitability, and safety of yoga either alone or as an add-on treatment in the management of migraine.

There have been four studies on the therapeutic benefits of yoga for migraine. A 2007 study reported 72 patients of both sexes (16 males) with migraine without aura who were randomized to the two groups.[6] One group received yoga therapy for 5 days/week (60 min/day) for 12 weeks, whereas the other group received educational sessions on migraine (1 session/month). Both groups were allowed to take similar acute medication prescribed by neurologists, if required, but not to use any other symptomatic medication. After 12 weeks, compared to the control group, the yoga group showed a significant reduction in (i) headache intensity, (ii) headache frequency, (iii) pain rating index, (iv) affective pain rating index, (v) total pain rating index (vi) anxiety depression score, and (vii) use of symptomatic medication.

Endothelial dysfunction has been seen in patients with migraine.[7] This increases the risk of several vascular diseases in patients with migraine.[8] The practice of yoga has been reported to improve endothelial functions in patients with migraines.[9] In a study, 42 female patients with migraine were randomized to either a yoga group or a control group.[9] The yoga group received 75 min of yoga session (3 days/week) in addition to the standard medical care for 12 weeks, whereas the control group was given standard medical care for the same duration. All the patients were assessed for serum intercellular adhesion molecules and vascular cell adhesion molecules (VCAM) at the beginning and end of 12 weeks. Following 12 weeks, the yoga group showed a significant decrease in VCAM levels compared to the control group suggesting that yoga may be useful to reduce the risk of developing vascular diseases by altering endothelial dysfunction.

The effects of yoga in decreasing the frequency and intensity of headache in patients with migraine were supported by a subsequent study on sixty patients with migraine who were randomized to the two groups.[10] One group received yoga (5 days/week) with conventional care for 6 weeks, whereas the other group was given conventional care for the same duration. After 6 weeks, both groups showed a significant reduction in the frequency and intensity of migraine as well as headache impact on life scores; however, the magnitude of change was significantly higher in the yoga group.

Among other factors, intense physical exercises act as a trigger for migraine headache.[11] Intense physical exercise increases blood nitric oxide (NO) levels in patients with migraine,[11] who already have significantly higher blood NO levels compared to normal healthy persons.[12] Increase in NO levels after exercise leads to excess blood NO levels in patients with migraine which had been attributed to exercise-induced migraine.[11] A randomized controlled trial assessed the effect of yoga on blood NO levels in female patients with migraine.[13] Thirty-two patients were randomized to either a yoga ($n = 18$) or control group ($n = 14$). The control group received medication, whereas the yoga group received yoga training for 3 days/week (75 min/day) for 12 weeks in addition to the same medication. After 3 months, a significant reduction in headache frequency and severity was observed, but no significant difference in plasma NO levels were seen between yoga and control groups. The study concluded that yoga may be a safe add-on treatment for the management of migraine.

The studies above provide an insight that the practice of yoga may be useful as an add-on therapy in the management of migraine.

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Conflicts of interest

There are no conflicts of interest.

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	Bewusste Yogaatmung Angst Aufmerksamkeit

Keywords Third Language	

Abbreviations	

Abstract	Abstract

Background: Previous studies assessed yoga breathing practices individually. This exploratory, randomized crossover study assessed attention and anxiety following four yoga breathing practices, breath awareness, and quiet seated rest. **Materials and Methods:** Thirty-eight male volunteers between 20 and 37 years (group mean age ± SD; 24.08 ± 4.01 years) were assessed in six sessions in random order (www.randomizer.org) on separate days. The sessions were: (i) alternate nostril yoga breathing, (ii) bellows yoga breathing, (iii) bumblebee yoga breathing, (iv) high-frequency yoga breathing, (v) breath awareness, and (vi) quiet seated rest. The sessions were for 18 min each. Six letter cancellation test (SLCT) and Spielberger's State Trait Anxiety Inventory-state (STAI-s) were administered pre and post each session. Data analysis used general linear mixed model analysis, with fixed effect of states (pre and post) and sessions. **Results:** A significant main effect of states was observed on total attempted ($F_{1,407}$ = 5.374, p = 0.021) and net attempted scores ($F_{1,407}$ = 6.178, p = 0.013) of the SLCT, with a significant increase in scores following high-frequency yoga breathing (p_{adj} = 0.031 for total

University of Patanjali Haridwar

attempted scores; p_{adj} = 0.029 for net attempted scores). Also, a significant main effect of states on STAI-s scores was observed ($F_{1,407}$ = 33.979, p < 0.001), with a significant decrease in scores following alternate nostril yoga breathing (p_{adj} = 0.001), bellows yoga breathing (p_{adj} = 0.008), bumblebee yoga breathing (p_{adj} = 0.002), and high-frequency yoga breathing (p_{adj} = 0.042) compared to the corresponding pre state. There was a significant main effect of sessions ($F_{5,407}$ = 3.043, p = 0.010) on STAI-s scores, with scores post alternate nostril yoga breathing significantly lower than post breath awareness (p_{adj} = 0.037). **Conclusion:** Following high-frequency yoga breathing sustained attention was better than before while state anxiety decreased in post-pre comparisons of alternate nostril yoga breathing, bellows yoga breathing, bumblebee yoga breathing, and high-frequency yoga breathing. The differences between breathing practices may be due to differences in degree of volitional regulation of breathing and in the breath patterns modified volitionally. The generalizability of the findings was limited by including an all male, yoga experienced sample. Future research should include participants of both genders and could include different levels of yoga experience, with assessments including objective measures of attention and anxiety.

Abstract Second Language | Zusammenfassung

Hintergrund: In vorhergehenden Studien wurden verschiedene Yoga-Atemtechniken separat untersucht. In dieser explorativen, randomisierten Crossover-Studie wurden Aufmerksamkeit und Angst nach vier verschiedenen Yoga-Atemtechniken sowie achtsamem Atmen und ruhigem Stillsitzen untersucht. **Materialien und Methoden:** 38 männliche Probanden im Alter zwischen 20 und 37 Jahren (mittleres Alter der Gruppe ± SD: 24,08 ± 4,01 Jahre) wurden in sechs Sitzungen in zufälliger Reihenfolge (www.randomizer.org) an verschiedenen Tagen untersucht. Die Sitzungen waren: (i) Wechsel-Yogaatmung, (ii) Blasebalg-Yogaatmung, (iii) Hummel-Yogaatmung, (iv) hochfrequente Yogaatmung, (v) achtsames Atmen und (vi) ruhiges Stillsitzen. Jede Sitzung dauerte 18 Min. Vor und nach jeder Sitzung wurden der SLCT (Six Letter

University of Patanjali Haridwar

Cancellation Test) und der STAI-s-Test nach Spielberger (State-Trait-Angstinventar – State) durchgeführt. Die Auswertung der Daten erfolgte mit einem allgemeinen linearen gemischten Modell mit Zeitpunkt (vorher und nachher) und Sitzung als festen Effekten. **Ergebnisse:** Beobachtet wurde ein signifikanter Haupteffekt des Zeitpunkts auf den SLCT laut Gesamtzahl der Streichungen ($F_{1,407}$ = 5,374; p = 0,021) und Netto-Streichungen ($F_{1,407}$ = 6,178, p = 0,013) bei signifikant höherer Anzahl der Streichungen nach hochfrequenter Yogaatmung (p_{adj} = 0,031 für die Gesamt-Streichungen; p_{adj} = 0,029 für die Netto-Streichungen). Außerdem zu beobachten war ein signifikanter Haupteffekt des Zeitpunkts auf den STAI-s-Score ($F_{1,407}$ = 33,979; p < 0.001), mit signifikantem Rückgang der Scores nach Wechsel-Yogaatmung (p_{adj} = 0,001), Blasebalg-Yogaatmung (p_{adj} = 0,008), Hummel-Yogaatmung (p_{adj} = 0,002) sowie hochfrequenter Yogaatmung (p_{adj} = 0,042), jeweils im Vorher-Nachher-Vergleich. Darüber hinaus gab es einen signifikanten Haupteffekt der Sitzung ($F_{5,407}$ = 3,043; p = 0,010) auf den STAI-s-Score, wobei die Scores nach der Wechsel-Yogaatmung signifikant niedriger waren als nach dem achtsamen Atmen (p_{adj} = 0,037). **Schlussfolgerung:** Nach der hochfrequenten Yogaatmung war die anhaltende Aufmerksamkeit besser als vorher; gleichzeitig verringerte sich die State-Angst im Vorher-Nachher-Vergleich bei Wechsel-Yogaatmung, Blasebalg-Yogaatmung, Hummel-Yogaatmung und hochfrequenter Yogaatmung. Die Unterschiede zwischen den verschiedenen Atemtechniken könnten auf Unterschiede im Grad der willentlichen Regulierung der Atmung sowie in den willentlich modifizierten Atemmustern zurückzuführen sein. Die Verallgemeinerbarkeit der Ergebnisse ist dadurch limitiert, dass eine rein männliche, yogaerfahrene Population eingeschlossen wurde. In künftige Studien sollten Teilnehmer beiderlei Geschlechts und möglicherweise auch unterschiedlicher Yogaerfahrung eingeschlossen und objektive Maße für Aufmerksamkeit und Angst angewendet werden.

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University of Patanjali Haridwar

Key Messages

Body

Introduction

A bidirectional association is believed to exist between breathing and attention [1]. Intracranial EEG was recorded during volitional breath regulation and while attending to the breath [2]. These two activities activated brain areas which are involved in cognition, especially attention [3–5]. The association between attention and anxiety is complex [6], with heightened anxiety resulting in greater attention paid to information perceived as threatening, while specific training is aimed at increasing selective attention to engage with non-threatening or neutral stimuli [7].

Yoga voluntarily regulated breathing includes both volitional breathing and paying attention to the breath [8]. There are several studies which have demonstrated that brief episodes of yoga breathing practice improved the performance in tasks which require attention in children and adults [9–13]. Separate studies demonstrated the benefits of yoga breathing practice in anxiety reduction [10, 14].

During yoga breathing, breath is volitionally regulated modifying the (i) rate, (ii) ratio of inhalation to exhalation, (iii) depth, or other features which vary between yoga breathing practices [15]. Differences in the effects of yoga breathing practices may be attributed to these volitionally regulated differences in respiration [16]. Four commonly practiced yoga breathing practices have two features in common, viz. (i) volitional regulation and (ii) attentional breathing.

University of Patanjali Haridwar

but differ with respect to respiration. These differences include increased depth of respiration (bellows yoga breathing or bhastrika pranayama), increased breath frequency (high-frequency yoga breathing or kapalabhati pranayama), a possible decrease in breath frequency with bilateral nasal breathing (alternate nostril yoga breathing or anulom vilom pranayama), and a prolonged exhale (bumblebee yoga breathing or bhramari pranayama) [8].

In order to determine whether the change in breathing (i.e., changes in rate, depth, nostril, or phase duration) influences the effect of yoga breathing on attention or on state anxiety, the present study was designed to compare the performance in the same participants in a task for attention and state anxiety after a fixed duration of the following practices: (i) high-frequency yoga breathing, (ii) alternate nostril yoga breathing, (iii) bellows yoga breathing, (iv) bumblebee yoga breathing, (v) breath awareness as an interventional control, and (vi) quiet seated rest as a control intervention, with all six practices of equal duration on separate days in random order.

Methods

Participants

Thirty-eight healthy adult males with ages between 20 and 37 years (group mean age ± SD; 24.08 ± 4.01 years) were recruited for the trial. The sample size was not determined a priori. Participants were student volunteers from a state private university in north India. Student participants were recruited by oral announcements in the lecture halls. The criteria for inclusion in the trial were: (i) apparent normal health based on a routine clinical exam, (ii) experience of yoga breathing for at least 6 months, and (iii) willingness to take part in the study, including all participants' written signed informed consent. The exclusion criteria were: (i) females were excluded based on reported differences in attention and anxiety during phases of the menstrual cycle [17, 18], (ii) regular intake of any prescribed or non-prescribed medication or herbal

University of Patanjali Haridwar

remedies, and (iii) any history of a learning disorder. None of the participants were required to be excluded due to any of the above reasons. Signed informed consent was obtained from each participant before their enrolment. The study had approval from the institutional ethical committee (approval number: PRF/YRD/012/1-4) and was carried out in full accordance with the World Medical Association Declaration of Helsinki.

Study Design

The trial was not registered with the clinical trials registry of India. The study has been reported according to the CONSORT guidelines (please see CONSORT checklist, which is provided as online supplementary file available at www.karger.com/doi/10.1159/000519715). In the present exploratory, randomized crossover study, participants were assessed for state anxiety and six letter cancellation test (SLCT) performance before and after four yoga breathing intervention sessions (i.e., alternate nostril yoga breathing, bellows yoga breathing, bumblebee yoga breathing, and high-frequency yoga breathing) and two control sessions (i.e., breath awareness and quiet seated rest). Each session was on separate days and the sequence of the sessions for each participant was randomized. Hence each participant was assessed for six consecutive days for the six sessions in a random order. The method of randomization and allocation concealment was as follows: (i) A serial number from 1 to 6 was assigned to each of the six sessions by an individual who was unaware of the details of the trial. (ii) After this, thirty-eight sets of six digits (i.e., 1 to 6) in randomized order were generated using an online randomizer (www.randomizer.org). In each of the sets generated, each digit represented one of the six sessions according to the serial number assigned to the sessions while the order of the six digits represented the order of the sessions. Participants were allocated to the sessions by a person who was not involved in the trial. (iii) Participants did not know the order of sessions to which they were assigned though they were aware of the six sessions.

The order of assessment for each session was as follows: (i) pre-intervention state where participants were assessed for state anxiety followed by SLCT, (ii) intervention state where

University of Patanjali Haridwar

participants performed any of the six sessions for 18 min including 1 min rest after every 5 min of the practice, and (iii) post-intervention state where participants were re-assessed for state anxiety followed by the letter cancellation test. In order to rule out a learning effect on the performance in the SLCT separate worksheets with different target letters were used each time. The assessments were conducted in a well-ventilated, dimly lit sound attenuated room. Participants were monitored from an adjacent room throughout the session on a closed circuit television and the instructions were given through a two-way intercom to allow the participant to be undisturbed during the session.

Assessments

The scoring and extraction of the below assessments was blinded, i.e., the scorer was not aware of the hypothesis of the study as well as the sessions to which the participants belonged.

Six Letter Cancellation Test (SLCT)

The SLCT assesses sustained attention, selective attention, and visual scanning [19, 20]. The test consists of an A4 size sheet of paper with letters of the English alphabet randomly arranged in a 22 × 14 matrix. At the top, there are six letters in bold upper case, below which is the array of letters in which the six target letters are interspersed randomly with other letters called the non-target letters. Participants were instructed to find the six target letters in the worksheet and to cancel them with a slash (/) while avoiding cancelling the non-target letters. The total time to complete the task was 90 s, which was monitored with a stopwatch. Cancellation of the non-target letters was counted as errors. Three scores, i.e., total attempted scores, wrong attempted scores, and net attempted scores were calculated. Total attempted scores were total number of letters cancelled, wrong attempted scores (i.e., errors) were non-target letters cancelled, and net attempted scores were total attempted scores minus wrong

University of Patanjali Haridwar

attempted scores. Task performance was considered improved if there was an increase in total or net attempted scores or a decrease in wrong attempted scores or errors.

Spielberger's State Trait Anxiety Inventory-State (STAI-s)

The Spielberger's State Trait Anxiety Inventory (STAI-s) was used to assess the state anxiety, i.e., the anxiety at the moment of testing [21]. STAI-s consists of 20 items that are sentences describing the feelings of a person at the time of testing on a 4-point Likert scale (i.e., not at all, somewhat, moderately so, and very much so). Each item of the STAI-s was given a weighted score of 1 to 4. A standard method was used to score the data [21]. The possible scores range from 20 to 80, where higher scores represent higher levels of state anxiety.

Interventions

Participants were seated cross legged (sukhasana) on a firm couch with their spine erect, spine and neck aligned, and eyes closed during an entire session. The following interventions were given for 18 min each on separate days: alternate nostril yoga breathing, bellows yoga breathing, bumblebee yoga breathing, high-frequency yoga breathing, breath awareness, and quiet seated rest.

Alternate Nostril Yoga Breathing (anulom-vilom pranayama)

The nostrils are closed with the fingers of the right hand alternately, to breathe through the nostrils without breath holding. To begin with the right nostril is occluded with the right thumb while exhaling through the left nostril, then inhaling through the left nostril, followed by left nostril occlusion with the right middle and ring fingers and exhaling through the right nostril, then inhaling through the right nostril and exhaling through the left nostril. This sequence is repeated as mentioned above. Breathing through both nostrils alternately results in a small decrease in breath frequency during the practice.

Bellows Yoga Breathing (bhastrika pranayama)

University of Patanjali Haridwar

Bellows yoga breathing involved inhaling to maximum followed by exhaling to the maximum possible. In this practice the depth of breathing is emphasized. The breath rate during the practice was not intentionally altered.

Bumblebee Yoga Breathing (bhramari pranayama)

In bumblebee yoga breathing practice, the thumbs on both sides exert gentle pressure on both tragi in front of the ear canals, occluding them. The remaining fingers rest on the closed eyes. In this position, the participants are required to inhale for around 3–5 s followed by a prolonged exhalation of approximately 15–20 s while producing a humming sound like a bumblebee. This is one cycle of bumblebee yoga breathing. Bumblebee yoga breathing results in a decrease in breath frequency during the practice.

High-Frequency Yoga Breathing (kapalabhati pranayama)

High-frequency yoga breathing consisted of breathing at increased rate, with contraction of the anterior abdominal muscles during exhalation. The respiratory rate remained between 50 and 65 breaths per minute during the practice.

Breath Awareness

During breath awareness attention is consciously directed to the flow of air as it passes through the nasal passage. Participants were instructed not to alter breathing in any way and only to pay attention to the breathing process. Breath awareness was selected as an intervention because being aware of the breath is an inherent part of all yoga breathing techniques. The breath rate and other aspects of breathing were not intentionally modified.

Quiet Seated Rest

Participants were instructed not to focus their attention on any particular subject but to allow their thoughts wander without restraint. The breath rate was not intentionally modified.

Statistical Analysis

University of Patanjali Haridwar

The effects of yoga breathing techniques on performance of the SLCT and STAI-s were examined using linear mixed model analyses in SPSS (version 24.0). Four separate models were constructed (one for each of the four dependent variables, i.e., total attempted, wrong attempted, and net attempted scores of the SLCT and STAI-s scores), each with fixed effect of states (representing stages of assessments, i.e., the points at which SLCT and STAI-s were administered in relation to each session; two levels included, i.e., pre-intervention state and post-intervention state) and sessions (representing total number of sessions, i.e., four yoga breathing technique sessions, breath awareness, and quiet seated rest; six levels included). The level of significance was set at $\alpha = 0.05$ (two tailed). For models with a significant main effect of states, post hoc pairwise comparison of estimated marginal means of outcome variables (e.g., total attempted scores, wrong attempted scores, net attempted scores, and STAI-s scores) was conducted between post and pre state of each session, adjusting for multiple comparisons using the Bonferroni correction. For models with a significant main effect of sessions, post hoc pairwise comparison of estimated marginal means of the outcome variables (e.g., total attempted, wrong attempted, and net attempted scores of the SLCT and STAI-s scores) was conducted between data obtained at post state of each yoga breathing session (i.e., alternate nostril yoga breathing, bellows yoga breathing, bumblebee yoga breathing, and high-frequency yoga breathing) with post state of the control sessions (i.e., breath awareness and quiet seated rest).

Results

In the present study, thirty-eight male participants were assigned to six randomly ordered sessions on separate days. The number of participants at different stages of the trial is given in Figure 1. The sample size was not calculated a priori; however, the power was calculated from total attempted scores of the SLCT, which increased significantly after high-frequency yoga

University of Patanjali Haridwar

breathing compared with the pre state. With the sample size of 38, and the Cohen's *d* of 0.38, the power obtained was 0.995, calculated using the G-Power program [22]. The study was carried out between August 2016 and July 2018. The baseline characteristics of the participants have been presented in Table 1.

The estimated marginal means and standard deviations for total attempted, wrong attempted, and net attempted scores of the SLCT and STAI-s scores pre and post yoga breathing (i.e., alternate nostril yoga breathing, bellows yoga breathing, bumblebee yoga breathing, and high-frequency yoga breathing), breath awareness, and quiet seated rest are given in Table 2.

In the linear mixed model analyses there was a significant main effect of states on total attempted scores of the SLCT ($F_{1,407} = 5.374$, $p = 0.021$), net attempted scores of the SLCT ($F_{1,407} = 6.178$, $p = 0.013$), and STAI-s scores ($F_{1,407} = 33.979$, $p < 0.001$). There was also a significant main effect of the sessions on the STAI-s scores ($F_{5,407} = 3.043$, $p = 0.010$).

There was no significant main effect of states on wrong attempted scores of the SLCT ($F_{1,407} = 0.724$, $p = 0.395$). Also, there was no significant main effect of sessions on total attempted scores ($F_{5,407} = 5.407$, $p = 0.416$), wrong attempted scores ($F_{5,407} = 0.490$, $p = 0.784$), and net attempted scores ($F_{5,407} = 1.039$, $p = 0.394$) of the SLCT.

In pairwise comparisons, when the post state of a session was compared with the respective pre state, there was a significant increase in total attempted and net attempted scores following high-frequency yoga breathing ($p_{adj} = 0.031$ for total attempted scores; $p_{adj} = 0.029$ for net attempted scores). Also, STAI-s scores were decreased significantly following alternate nostril yoga breathing ($p_{adj} = 0.001$), bellows yoga breathing ($p_{adj} = 0.008$), bumblebee yoga breathing ($p_{adj} = 0.002$), and high-frequency yoga breathing ($p_{adj} = 0.042$) compared to the respective pre states.

In a pairwise comparison between sessions, STAI-s scores at post alternate nostril yoga breathing were significantly lower than post breath awareness ($p_{adj} = 0.037$).

University of Patanjali Haridwar

Discussion

After 18 min of high-frequency yoga breathing there was an increase in total and net scores in the cancellation test. Following alternate nostril yoga breathing, bellows yoga breathing, bumblebee yoga breathing, breath awareness, and quiet seated rest there was no change in cancellation test scores. Following all four yoga breathing practices, but not after breath awareness or quiet seated rest, there was a decrease in state anxiety. Anxiety scores post alternate nostril yoga breathing were significantly lower compared to post breath awareness.

Cancellation tests are used to evaluate attention and combine visual selectivity with a motor response [19, 23]. Improvement in cancellation test scores after high-frequency yoga breathing is comparable to the improved scores in an earlier study [13], though participant characteristics, study design, and duration of the intervention differed.

Respiration rhythmically influences brain activity by conscious and unconscious signals to the brain [24]. Conscious sensations include proprioception of movements of the chest and abdomen, whereas unconscious sensory signals arise from mechanical consequences of respiratory movements and chemosensitive signals [24]. This respiration-locked cortical activity contributes to the effects of respiration on cognition, including attention [24]. High-frequency yoga breathing includes respiration at a breath frequency several times the normal breath rate with exhalation as an active process [25]. These factors could increase both mechanical and chemosensitive inputs to the brain, contributing to greater respiration-locked cortical activity and hence possibly improving attention after the practice. The extent to which high-frequency yoga breathing influences respiration-locked brain activation could hence be greater than the other breathing practices, which involve lesser changes in the resting breath pattern. For the same reason high-frequency yoga breathing may require a greater degree of volitional regulation to

University of Patanjali Haridwar

increase the breath frequency. Volitional modification of the breath frequency was shown to increase neural activity in areas associated with attention [2].

In the present study a reduction in state anxiety levels was noted following the four yoga breathing techniques. The reduction in state anxiety is supported by previous studies [26–28]. In a previous study, eleven advanced yoga practitioners who were assessed during 15 min of high-frequency yoga breathing showed increased alpha activity in the electroencephalogram during the initial 5 min of practice and increased theta activity during the remaining practice compared to the preceding baseline [26]. The short-term effect of 18 min of alternate nostril yoga breathing in thirteen participants demonstrated a decrease in beta activity in the EEG after alternate nostril yoga breathing compared to the preceding baseline [27]. In eight participants an increase in theta range activity in the EEG was recorded during bumblebee yoga breathing [28]. This change was described by the authors as a theta state of "blissful mental quiescence" characterized by low anxiety. An fMRI longitudinal study on the effects of bellows yoga breathing in thirty healthy adults who practiced 30 min of bellows breath thrice a week for 4 weeks showed changes in activity and connectivity in areas involved in emotion processing and appraisal [10]. In addition, the study reported a decrease in state anxiety and reduced negative affect following 4 weeks of bellows breath. Hence in all four yoga breathing practices studied here previously reported changes support the practices helping to reach a calm mental state with reduced state anxiety [26–28]. This mental state is conducive to focus attention, though improvement in the cancellation task performance appears to be related to the degree of volitional regulation required during the breathing practice [29].

Limitations

The generalizability of the findings is limited by including male participants exclusively and requiring a minimum of 6 months of yoga experience for inclusion in the trial. The trial was not registered with the Clinical Trials Registry-India (CTRI) which has limitations related to making the trial details, data, and findings available where required. The findings of this study

University of Patanjali Haridwar

can be considered exploratory. Future studies should address these limitations and should additionally use objective assessments for anxiety and attention in relation to yoga breathing practices.

Conclusion

After 18 min of high-frequency yoga breathing practice there was an improvement in sustained attention based on cancellation test performance, whereas state anxiety levels reduced after all four yoga breathing practices. The differences between breathing practices may be due to differences in degree of volitional regulation of breathing and in the breath patterns modified volitionally. The findings of the present exploratory study highlight the importance of yoga breathing practices as non-pharmacological interventions with implications for healthcare research and for future studies in this field.

Statement of Ethics

The study had approval from the institutional ethical committee (approval number: PRF/YRD/012/1-4) and was carried out in full accordance with the World Medical Association Declaration of Helsinki. Signed informed consent of each participant was obtained.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest in relation to this study.

Funding Sources



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Author Contributions

Conceptualization: S.T. Methodology: S.T., S.K.S., N.K. Validation: S.T. Formal analysis: N.K., S.K.S. Investigation: N.K. Resources: S.T. Data curation: N.K, S.K.S. Writing – original draft: S.T. Writing – review & editing: S.T., S.K.S., and N.K. Visualization: S.T. Supervision: S.T. Project administration: S.T. Funding acquisition: S.T.

Data Availability Statement

The datasets generated during analysis for the current study are available from the corresponding author on reasonable request.

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Appendix after References (Editorial Comments)

Legend(s)

Fig. 1. Flowchart showing number of participants at different stages of the trial.

Table(s)

Footnote(s)



Table 1. Baseline characteristics of the participants

S. No.		Characteristics	Details
1	Sample size	Number of participants Group average age ± SD, years	38 24.08±4.01
2	Yoga practice	Range of yoga experience, months Group average yoga experience ± SD, months	6–108 30.8±23.1
3	Occupation	Student, *n* Other, *n*	38 0
4	Health	Presence of any disease, *n* Taking any medication, *n*	0 0
5	Tobacco and alcohol	Consumption of tobacco including smoking, *n* Consumption of alcohol, *n*	0 0



Table 2. Changes in six letter cancellation test scores and Spielberger's state trait anxiety inventory-state scores

Variables	Estimated marginal mean ± standard deviation						
	States	Alternate nostril yoga breathing	Bellows yoga breathing	Bumblebee yoga breathing	High-frequency yoga breathing	Breath awareness	Quiet seated rest
Six letter cancellation test – total attempted scores	Pre	28.53±9.03	29.11±8.13	26.33±7.75	27.13±7.78	27.74±9.24	27.82±7.79
	Post	29.83±9.52	28.97±9.28	29.13±6.66	30.32±8.85*	27.03±9.79	29.74±9.51
Six letter cancellation test – net attempted scores	Pre	27.73±8.79	28.45±8.01	25.70±7.45	26.39±7.56	27.18±9.26	26.97±7.83
	Post	29.47±9.74	28.26±9.28	28.17±6.67	29.61±8.86*	26.50±9.3	29.34±9.46
Six letter cancellation test – wrong attempted scores	Pre	0.80±0.94	0.66±1.66	0.63±0.75	0.74±2.26	0.55±1.18	0.84±1.88
	Post	0.37±0.75	0.71±1.35	1.00±1.32	0.66±1.34	0.53±1.86	0.39±0.86
Spielberger's state trait anxiety inventory-state scores	Pre	28.90±6.49	29.71±7.73	29.27±6.59	30.16±7.05	30.18±8.91	29.37±7.61
	Post	25.79±5.98* †	27.29±6.3*	26.37±6.78*	28.29±7.79*	28.58±8.96	28.21±8.57

* $p_{adj} < 0.05$; Bonferroni adjusted pairwise comparisons, post values compared with pre values. † $p_{adj} < 0.05$; Bonferroni adjusted pairwise comparisons, post values of alternate nostril yoga breathing compared with post values of breath awareness.

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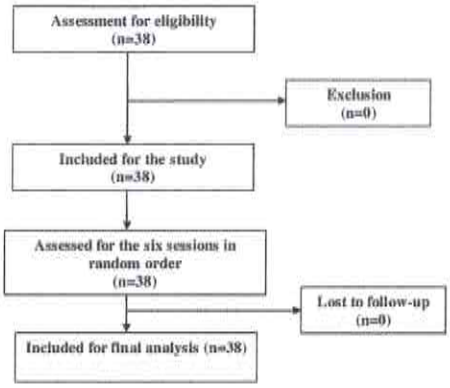

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Yoga instructors' reported benefits and disadvantages associated with functioning online: A convenience sampling survey

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ABSTRACT

Background: Among numerous changes in response to the COVID-19 pandemic, most yoga classes have repositioned online. However benefits, difficulties and satisfaction of teaching yoga online remain to be studied. With this background the present survey aimed to determine: (i) benefits, disadvantages and satisfaction of teaching yoga online and (ii) their association with characteristics related to (a) socio-demographic, (b) online yoga teaching experience and (c) yoga practice.

Methods: Three hundred and five yoga instructors were invited to take part in the online survey. Of these, 181 (m: f = 98:83) responded to the survey satisfactorily and were included.

Results: The three most common benefits of teaching yoga online were: (i) a sense of safety from risk of COVID-19 (93.92%), (ii) cost saving (82.87%) and (iii) wider access to trainees within India (77.90%). The three most common disadvantages were: (i) technical difficulties (74.03%), (ii) missing in-person contact (63.90%) and (iii) concern that online instructions can lead to injury (59.16%). Around 66.30% respondents were satisfied with the monitoring of trainees during online yoga classes while 70.16% respondents were satisfied with the level of attention they could pay to the topic they were teaching during online yoga class. The benefits and disadvantages of teaching yoga online varied with the characteristics of yoga instructors ($p < 0.05$, $\chi 2$ test).

Conclusions: The benefits and disadvantages of teaching yoga online are of relevance during and beyond the pandemic. Characteristics related to (i) socio-demographics, (ii) online yoga teaching and (iii) yoga practice influence reported benefits and disadvantages of teaching yoga online.

1. Introduction

Among numerous changes in response to the COVID-19 pandemic, most yoga classes have repositioned online. The acceptability, feasibility and usefulness of tele-yoga for stress reduction was assessed during the pandemic for ninety-five persons who attended yoga classes online twice a day, five days/week for four weeks [1]. Participants self-reported feelings of calmness, reduced stress, being refreshed and of yoga being safe which was supported by a reduction in their perceived stress scores. There was also a report of benefits of online yoga for chronic pain during the pandemic, with positive mental health and pain reduction following yoga [2]. Also, participants reported ease in attending online yoga classes which depended on their internet connection and the quality of their video.

Accessibility and convenience may extend the use of online yoga beyond the pandemic. A hybrid model of online yoga and in-person yoga classes was used before the pandemic for sixty-four veterans in the form of thirteen classes per week, of which three classes were provided with a tele-yoga option, to manage chronic pain and other health problems [3]. Equal numbers of veterans attended yoga classes in-person and online allowing for comparisons between them. For both formats of yoga classes there was a comparable degree of satisfaction with the class and improvement in sleep, energy levels and reduction in pain.

Hence online yoga has been reported to be safe and effective by participants who attended yoga classes online. In order for online yoga to be acceptable as a realistic alternative to in-person classes, yoga instructors would need to be convinced about the effectiveness and safety of delivering yoga online. The present study was designed to understand the benefits, disadvantages and assessment of satisfaction related to teaching yoga online, as described by yoga instructors.

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2. Materials and methods

2.1. Respondents

Respondents to the survey were yoga instructors of both sexes recruited from across India using a database of three hundred and five yoga instructors who completed a yoga instructor course from a yoga institution located in north of India. On request the institution provided information of the yoga instructors which was relevant to the present survey. These were (i) individual characteristics (e.g., age and gender) and (ii) contact details (i.e., e-mail id and telephone number). An e-mail invitation with link to the survey questionnaire was sent to each yoga instructor. After this, the instructors were informed telephonically about the survey and the e-mail invitation sent to them. Participation in the survey was voluntary. No incentive was given to any respondent for participation in the survey. Respondents were included if they: (i) were teaching yoga online, (ii) had taught yoga in person (e.g., in a classroom or yoga studio), and (iii) had completed 18 years of age. Respondents were excluded if they: (i) did not have a minimum of one month of experience in teaching yoga online; here the one month duration was selected arbitrarily considering that a minimum of one month of experience would be required to judge the benefits, disadvantages and satisfaction of teaching yoga online and (ii) filled the survey incompletely or incorrectly. A total of two-hundred twenty two responses were received. After excluding responses of those respondents who did not have a minimum of one month experience of teaching yoga online, responses from 181 respondents (m:f = 98:83) were analyzed. The baseline characteristics of the respondents are provided in Table 1. The informed consent of each respondent was taken.

2.2. Study design

The study was an online cross-sectional survey administered using Google Form. Yoga instructors who completed a yoga instructor course from a yoga institution were invited to take part in the survey. Hence this was convenience sampling. Each yoga instructor was contacted on telephone followed by an e-mail invitation to take part in the survey. Two telephone reminder calls were made as an attempt to collect responses of those who did not respond to the survey after the first telephone call. The reminder calls were made after 15 and 30 days of the first telephone call. The study was carried out between December 2020 and March 2021.

Table 1
Baseline characteristics of the respondents.

Characteristics	n = 181
Age (years)	
Group mean age ±SD	40.66 ± 11.23
Age range	18–76
Gender	
Male: Female	
Actual values	98:83
Percentage values	54.15:45.85
Years of Education (%)	
10 years and less	8.2
11–12 years	17.12
13–15 years	39.77
16 years and above	34.80
Experience of yoga (%)	
3–12 months	11.60
13–60 months	45.85
60 months and above	42.54
Occupation (%)	
Own business	28.12
Professional	18.78
Office job (clerical)/Office job (managerial)	11.05
Agriculture	3.32
Home maker	11.05
Other	27.62

Prior clearance from the institutional ethical committee was obtained to conduct the survey (Approval number PRF/YRD/020/006). The study is reported according to the recommendations of "Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)" guidelines for reporting observational studies.

2.3. The survey

The survey questionnaire was developed in English. However it was expected that most of the respondents would prefer Hindi for communication. Hence with the help of two bilingual experts the questionnaire was translated to Hindi using the following method. (i) Two independent bilingual experts translated the English version of the survey to Hindi. (ii) Discrepancies between the two translations were discussed and resolved. (iii) Two independent translators back-translated the Hindi version of the survey to English to determine if there were any discrepancies. (iv) Any discrepancy was again resolved with mutual discussion.

The survey was developed to determine: (i) benefits, disadvantages and satisfaction of teaching yoga online and (ii) whether (a) socio-demographic characteristics (e.g., age, gender, education), (b) experience of teaching yoga online and (c) yoga practice related characteristics (e.g., experience of yoga practice in months) influence reported benefits and disadvantages of teaching yoga online.

The survey design was as follows: (i) The participants were required to respond to a screening question before completing the survey. The screening question intended to determine whether the participants had prior experience of teaching yoga online or not. Those with no prior experience of teaching yoga online were screened out from the survey. (ii) The survey had two parts. The first part of the survey determined respondent's: (a) socio-demographic characteristics (i.e., age, gender, education and occupation), (b) characteristics of the respondents' online yoga teaching (i.e., experience of teaching yoga online (in months), time spent on internet in a day other than teaching yoga (in minutes) and whether respondents have taught yoga online before COVID-19 pandemic) and (c) yoga practice related characteristics [i.e., time spent in practicing yoga/day, number of days/week a respondent practices yoga, and overall experience of yoga practice (in months)]. A screenshot of the first part of the survey to obtain information regarding (a) socio-demographic characteristics and (b) characteristics of the respondents' online yoga teaching is presented in Fig. 1.

The second part of the survey was designed to determine benefits, disadvantages and satisfaction of teaching yoga online. The second part of the survey has been depicted in Fig. 2.

The survey questions were selected by the author ST who has over thirty years of experience of practicing and researching yoga.

2.4. Data cleaning

Two researchers independently went through the obtained data to verify whether a respondent fulfilled the exclusion criteria (i.e., a minimum of one month experience of teaching yoga online and complete survey response).

A total of two hundred and twenty two responses were received. Of these, 41 were excluded due to lack of minimum experience of teaching yoga online. Hence responses from 181 respondents (59.34% response rate) were analyzed.

2.5. Data analyses

The percentages of respondents who reported benefits, disadvantages and satisfaction of teaching yoga online were calculated.

$\chi 2$ tests were carried out to determine association of benefits and disadvantages of teaching yoga online with (i) socio-demographic characteristics (i.e., age, gender, education or occupation), (ii) online yoga teaching related characteristics (i.e., time spent using the internet

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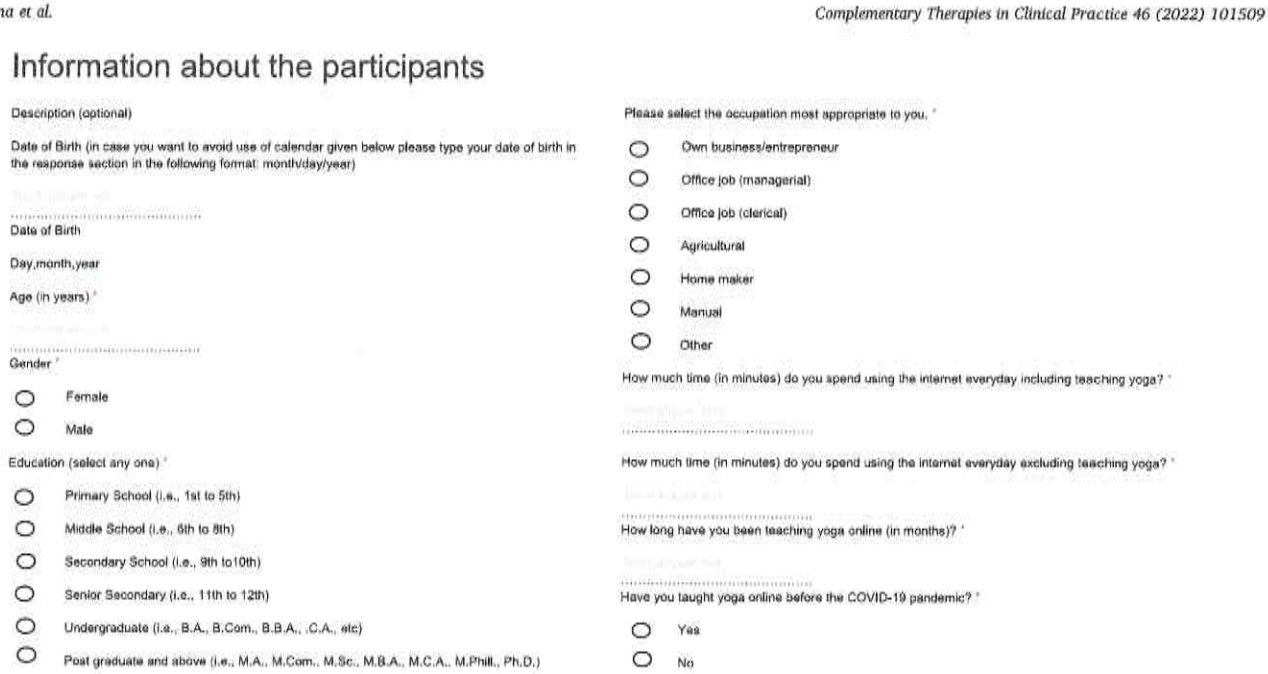
Information about the participants

Description (optional)

Date of Birth (in case you want to avoid use of calendar given below please type your date of birth in the response section in the following format: month/day/year)

Date of Birth

Day,month,year

Age (in years) *

Gender *

- Female
- Male

Education (select any one) *

- Primary School (i.e., 1st to 5th)
- Middle School (i.e., 6th to 8th)
- Secondary School (i.e., 9th to10th)
- Senior Secondary (i.e., 11th to 12th)
- Undergraduate (i.e., B.A., B.Com., B.B.A., .C.A., etc)
- Post graduate and above (i.e., M.A., M.Com., M.Sc., M.B.A., M.C.A., M.Phill., Ph.D.)

Please select the occupation most appropriate to you. *

- Own business/entrepreneur
- Office job (managerial)
- Office job (clerical)
- Agricultural
- Home maker
- Manual
- Other

How much time (in minutes) do you spend using the internet everyday including teaching yoga? *

How much time (in minutes) do you spend using the internet everyday excluding teaching yoga? *

How long have you been teaching yoga online (in months)? *

Have you taught yoga online before the COVID-19 pandemic? *

- Yes
- No

Fig. 1. A figure representing screenshot of the first part of the survey using which (a) socio-demographic characteristics and (b) characteristics of respondents' online yoga teaching were acquired.

everyday other than teaching yoga, experience of teaching yoga online in months and online yoga teaching before Covid-19 and (iii) yoga practice related characteristics (i.e., time spent in practicing yoga and overall yoga experience in months).

The $\chi 2$ tables were arranged as follows: (i) the categories of characteristics (as shown in Tables 2–5) were presented as rows of the $\chi 2$ tables. (ii) Responses of the participants to each question (i.e., 'Yes' or 'No') related to the benefits and disadvantages of teaching yoga online under each category of a characteristic (as shown in Tables 2–5) were presented as columns of the $\chi 2$ tables. (iii) The sum of each row was calculated and the sum of each column of a table was also determined. (iv) The sum of rows sum or columns sum of a table was presented as the grand sum. (v) Number of responses in a response option for a category of characteristics represented the observed frequency. (vi) Expected frequency for each response under each category of $\chi 2$ table was determined using the following equation: Row Total x Column Total/N (where N = grand sum; i.e., row totals or column totals). (vii) determination of $\chi 2$ was based on the equation = $\sum$(Observed frequency – Expected frequency)^2/Expected frequency.

Cramer's V was calculated for those characteristics which showed significant association with benefits and disadvantages of teaching yoga online based on $\chi 2$ tests, to determine the strength of association between the characteristics and benefits or disadvantages of teaching yoga online. The calculation was based on the following equation:

Cramer's V = $\sqrt{(\chi 2/n)/\min}$ (c-1, r-1) where $\chi 2$ is derived using Pearson's chi-square statistics; min = minimum dimension; c = number of columns; r = number of rows.

Cramer's V > 0.10 was considered as the critical value to report moderate association between the variables studied.

3. Results

One hundred and eighty one respondents (group average age ± SD; 40.66 ± 11.23 years) completed the survey satisfactorily and their responses were analyzed (see Table 1 for baseline characteristics of the respondents). Though the sample size was not determined *a priori*, the *post-hoc* power of the study was determined. The present study with a sample size of 181 and Cramer's V of 0.34 (determined from association between years of education with wider access of trainees within India), had a power of 0.980. The number of participants at different stages of the trial is given in Fig. 3.

The three most common benefits of teaching yoga online were: (i) a sense of safety from risk of COVID-19 (93.92%), (ii) cost saving (82.87%) and (iii) wider access to trainees within India (77.90%). The three most common disadvantages of teaching yoga online were: (i) technical difficulties (74.03%), (ii) missing in-person contact (63.90%) and (iii) concern that online instructions can lead to injury (59.16%).

About 66.30% of the respondents reported that they were satisfied with the monitoring of the trainees during an online yoga class while 70.16% percent respondents were satisfied about the way they were able to pay attention to the topic they were teaching.

3.1. Association of socio-demographic characteristics with reported benefits

Respondents aged 31 years and above were more likely to mention a sense of safety from risk of COVID-19 as a benefit of teaching yoga online (Cramer's V = 0.17) while those aged between 18 and 30 years were more likely to mention wider access to trainees outside India (Cramer's V = 0.17).

Respondents with 16 years or more of education (i.e., tertiary educated) were more likely to mention (i) wider access to trainees within India (Cramer's V = 0.34), (ii) wider access to trainees outside India (Cramer's V = 0.25) and (iii) convenience related to saving time (Cramer's V = 0.22) as benefits of teaching yoga online.

Respondents with an office job (managerial/clerical) were more likely to mention a sense of safety from risk of COVID-19 (Cramer's V = 0.18).

Respondent-entrepreneurs were more likely to mention cost saving (Cramer's V = 0.19) while those with agriculture as an occupation were more likely to mention convenience related to saving time (Cramer's V = 0.26).

The responses of respondents (in percentage) for benefits of teaching yoga online in relation to socio-demographic characteristics along with $\chi 2$ statistics are provided in Table 2.

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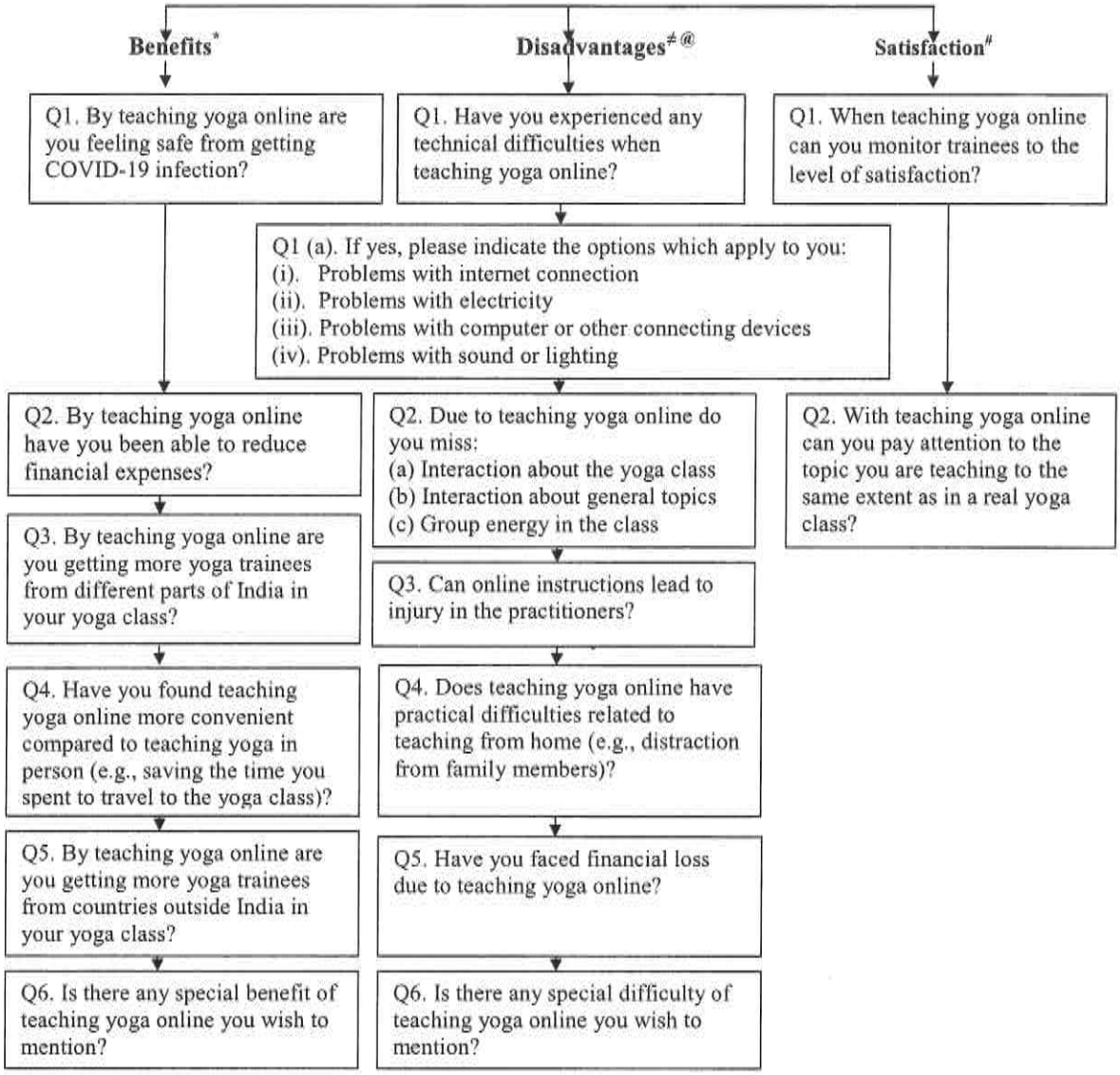

*Question number 1 to 5 were dichotomous questions with 'Yes' and 'No' options. The question number 6 was an open ended question.
≠Question number 1 to 5 (except question 1 (a)) were dichotomous questions with 'Yes' and 'No' options. The question number 6 was an open ended question.
@ Question 1 (a) was a multiple choice question in which respondents were allowed to select more than one option applicable to them.
#Dichotomous questions with two options i.e., 'Yes' and 'No.'

Fig. 2. Survey questions related to benefits, disadvantages and satisfaction of teaching yoga online.

3.2. Association of online yoga teaching related characteristics with reported benefits

Respondents who used the internet (other than for teaching yoga) for more than 240 min/day were more likely to mention (i) cost saving (Cramer's V = 0.29), (ii) convenience related to saving time (Cramer's V = 0.15) and (iii) wider access to trainees outside India (Cramer's V = 0.19) as benefits of teaching yoga online.

Respondents who had 7–14 months of experience of teaching yoga online were more likely to mention (i) wider access to trainees within India (Cramer's V = 0.21) and (ii) wider access to trainees outside India (Cramer's V = 0.28). Respondents who had taught yoga online before COVID-19 pandemic were more likely to mention convenience related to saving time as a benefit of teaching yoga online (Cramer's V = 0.19).

The responses of respondents (in percentage) for benefits of teaching yoga online in relation to the online yoga teaching related characteristics along with $\chi 2$ statistics are provided in Table 3.

3.3. Association of yoga practice related characteristics with reported benefits

Respondents who had 5-12 months of experinece of yoga practice were more likely to report a sense of safety from risk of COVID-19 as a benefit of teaching yoga online (Cramer's V = 0.19).

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Table 2
Showing reported benefits of teaching yoga online in relation to socio-demographic characteristics.

S. No	Characteristics	Categories	Number of respondents (N = 181)	Benefits of teaching yoga online (in percentages)									
				1		2		3		4		5	
				Safe from risk of COVID-19*@		Cost saving @		Wider access within India$@		Convenience related to saving time $@		Wider access internationally*$@	
				Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1.	Age (in years)	18–30 years	39	87	13	87	13	79	21	74	26	49	51
		31–45 years	74	96	4	81	19	74	26	73	27	30	70
		46 years and above	68	96	4	82	18	81	19	81	19	47	53
2.	Gender	Male	98	94	6	85	15	79	21	79	21	39	61
		Female	83	94	6	81	19	77	23	73	27	42	58
3.	Education (in years)	10 years and below	15	93	7	87	13	47	53	73	27	20	80
		11–12 years	31	94	6	81	19	80	19	84	16	26	74
		13–15 years	72	90	10	78	22	76	24	64	36	43	57
		16 years and above	63	98	2	89	11	86	14	87	13	49	51
4.	Occupation	Own business/entrepreneur	51	90	10	92	8	84	16	80	20	43	57
		Professional	34	97	3	85	15	91	9	85	15	65	35
		Office job (clerical)/Office job (managerial)	20	100	0	90	10	80	20	80	20	25	75
		Agriculture	6	83	17	67	33	50	50	100	0	17	83
		Home maker	20	95	5	85	15	80	20	85	15	50	50
		Other	50	94	6	72	28	64	36	58	42	28	72

*$p < 0.05$; Chi square test for association between the age and reported benefits.
$ $p < 0.05$, Chi square test for association between the education and reported benefits.
@ $p < 0.05$, Chi square test for association between the occupation and reported benefits.

Table 3
Showing reported benefits of teaching yoga online in relation to (1) yoga teaching related characteristics and (2) yoga practice related characteristics.

Benefits of teaching yoga online (in percentages)													
Factors	Sub-factors	Categories	Number the respondents (N = 181)	1		2		3		4		5	
				Safe from risk of COVID-19$@		Cost saving$		Wider access within India $*		Convenience related to saving time$&		Wider access internationally $*	
				Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1. Yoga teaching related characteristics	i. Time spent using internet every day other than teaching yoga	30–60 min	67	91	9	82	18	70	30	76	24	39	61
		90–120 min	59	92	8	55	45	81	19	69	31	31	69
		150–180 min	23	100	0	74	26	87	13	83	17	52	48
		240 and above minutes	32	100	0	88	12	81	19	84	16	53	47
	ii. Experience of teaching yoga online in months	1–6 months	103	93	7	79	21	70	30	73	27	28	72
		7–14 months	78	95	5	88	12	87	13	81	19	56	44
	iii. Taught yoga online before Covid-19	Yes	70	93	7	87	13	84	16	86	14	47	53
		No	111	95	5	80	20	74	26	70	30	36	64
2. Yoga practice related characteristics	i. Time spent in practicing yoga	Upto 450 min	89	93	7	88	12	79	21	82	18	45	55
		Above 450 min	92	95	5	78	22	77	23	71	29	36	64
	ii. Overall yoga experience in months	5–12 months	21	100	0	86	14	86	14	76	24	43	57
		13–60 months	83	90	10	83	17	72	28	80	20	35	65
		60 months and above	77	96	4	82	18	82	18	72	28	45	55

$ $p < 0.05$, Chi square test for association between time spent on internet everyday other than teaching yoga and reported benefit.
* $p < 0.05$, Chi square test for association between experience of teaching yoga online in months and reported benefit.
& $p < 0.05$, Chi square test for association between taught yoga online before COVID-19 pandemic and reported benefit.
@ $p < 0.05$, Chi square test for association between overall yoga experience in months and reported benefit.

3.4. Association of socio-demographic characteristics with reported disadvantages

Respondents aged between 31 and 45 years were more likely to report (i) financial loss (Cramer's V = 0.26) and missing in-person interaction related to yoga class (Cramer's V = 0.20).

Respondents who had 10 or less years of education more often reported (i) technical difficulties (Cramer's V = 0.23) and (ii) financial loss (Cramer's V = 0.29). Those who had 11–12 years of education were more likely to mention (i) concern that online instructions can lead to injury (Cramer's V = 0.17), (ii) missing in-person interaction related to yoga class (Cramer's V = 0.16), (iii) missing group energy (Cramer's V = 0.23) and (iv) practical difficulties, such as lack of space at home (Cramer's V = 0.18) as disadvantages of teaching yoga online.

Males rather than females missed group energy (Cramer's V = 0.16) and reported practical difficulties (Cramer's V = 0.15) as disadvantages of teaching yoga online. Entrepreneurs with their own business (Cramer's V = 0.12) were more likely to report practical difficulties (e.g., difficulties with space and noise levels) as a disadvantage of teaching yoga online.

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Table 4
Showing disadvantages of teaching yoga online related to socio-demographic characteristics of the respondents.

S. No	Characteristics	Categories	Number the respondents of (N = 181)	Disadvantages of teaching yoga online (in percentages)											
				1		2						3		4		5	
				Technical difficulties$^{\$@}$		Missed in-person contact								Practical difficulties $^{*\$@}$		Financial loss$^{\mu\$@}$	
						(i) Missed interaction related to yoga class $\$^{\mu@}$		(ii) Missed interaction related to general topics		(iii) Missed group energy$^{*\$}$		Concerns that online instructions can lead to injury$^{\$}$					
				Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1.	Age (in years)	18–30 years	39	77	23	49	51	49	51	77	23	62	38	54	46	46	54
		31–45 years	74	77	23	73	27	50	50	81	19	62	38	59	41	55	45
		46 years and above	68	69	31	63	37	54	46	71	29	54	46	49	51	24	76
2.	Gender	Male	98	71	29	64	36	56	44	83	17	64	36	61	39	42	58
		Female	83	77	23	64	36	46	54	69	31	53	47	46	54	41	59
3.	Education (in years)	10 years and below	15	93	7	60	40	33	67	80	20	47	53	40	60	73	27
		11–12 years	31	68	32	77	23	52	48	94	6	71	29	65	35	42	58
		13–15 years	72	74	26	65	35	54	46	72	28	58	42	56	44	38	62
		16 years and above	63	73	27	57	43	52	48	71	29	57	43	51	49	38	62
4.	Occupation	Own business/ entrepreneur	51	80	20	67	33	51	49	82	18	63	37	63	37	43	57
		Professional	34	68	32	59	41	53	47	79	21	53	47	62	38	47	53
		Office job (clerical)/ Office job (managerial)	20	70	30	55	45	60	40	75	25	75	25	50	50	40	60
		Agriculture	6	100	0	50	50	17	83	67	33	33	67	50	50	67	33
		Home maker	20	70	30	65	35	55	45	80	20	50	50	45	55	40	60
		Other	50	72	28	70	30	50	50	68	32	60	40	46	54	34	66

$^{\mu}p<0.05$, Chi square test for association between the age and reported disadvantages.
$^{*}p < 0.05$, Chi square test for association between the gender and reported disadvantages.
$^{\$}p < 0.05$, Chi square test for association between the education and reported disadvantages.
$^{@}p < 0.05$, Chi square test for association between the occupation and reported disadvantages.

The responses of respondents (in percentage) for disadvantages of teaching yoga online in relation to socio-demographic characteristics along with $\chi 2$ statistics are provided in Table 4.

3.5. Association of online yoga teaching related characteristics with reported disadvantages

Respondents who had between 1 and 6 months of experience of teaching yoga online more often reported concern that online instructions can lead to injury with online teaching of yoga (Cramer's V = 0.23).

The responses of respondents (in percentage) for disadvantages of teaching yoga online in relation to online yoga teaching related characteristics along with $\chi 2$ statistics are provided in Table 5.

3.6. Association of yoga practice related characteristics with reported disadvantages

Those with 60 and above months of experience of yoga practice were least likely to mention financial loss (Cramer's V = 0.15) as a disadvantage of teaching yoga online.

The responses of respondents (in percentage) for disadvantages of teaching yoga online in relation to yoga practice related characteristics along with $\chi 2$ statistics are provided in Table 5.

4. Discussion

Most of the yoga instructors (93.92%) reported feeling safe from COVID-19 as a benefit of teaching online. The other reported benefits are of relevance post pandemic, viz. cost saving (82.87%) and wider access to trainees across the country (77.90%).

While cost saving is most often reported by yoga trainees or students as a factor related to online yoga practice [4], here instructors also reported cost saving as a benefit of online teaching.

Wider access is a recognized benefit of online learning, where it is possible for independent persons from any location to learn and interact with instructors and others at a distance [5,6]. Trainees who are hesitant to participate actively in a classroom, may be more comfortable and productive online [7]. A single respondent to this survey mentioned that teaching yoga online helped hesitant trainees participate actively.

The benefits of online yoga were reported more often by those with tertiary education, prior experience of online teaching and more frequent internet use, whereas their nature of work appeared to influence the benefits they reported. For example, entrepreneurs appreciated cost saving as a benefit of online yoga, whereas farmers appreciated the time saved by not needing to commute. Occupation can influence the way services are perceived and utilized [8]. Understanding this can help determine which populations may be most benefitted by online or hybrid model yoga programs.

The disadvantages of online yoga reported by the instructors included technical difficulties (74.03%), missing aspects of in-person interaction and concern that online instructions can lead to injury (59.16%). Technical difficulties are recognized to be challenging for online education programmes [9]. From these difficulties it appears that a collaboration between yoga instructors and technical experts would be ideal to facilitate online practical demonstrations and to exchange feedback with participants, which has been recommended for online physical education [10,11].

Missing the chance to interact face-to-face reported here (by 63.90% of respondents) has been reported for other online learning programs as well [12,13]. A hybrid model as well as separate online sessions with smaller sub-groups of persons can be effective to overcome this disadvantage.

The reported concern that online instructions can lead to injury (59.16%) with online teaching of yoga is worthy of attention. Online yoga programs were reported to be safe and effective for pain management [2] and stress reduction [1]. Hence, the reported concern is not adequately supported by existing research in this area perhaps because

University of Patanjali Haridwar

Table 5
Showing disadvantages of teaching yoga online related to (1) yoga teaching related characteristics and (2) yoga practice related characteristics.

Factors			Disadvantages of teaching yoga online (in percentages)														
	Sub-factors	Categories	Number the respondents of (N = 181)	1 Technical difficulties		2 Missed in-person contact						3		4 Practical difficulties[&]		5 Financial loss[&β]	
						(i) Missed Interaction related to yoga class[#]		(ii) Missed interaction related to general topics[$]		(iii) Missed group energy[&#]		Concerns that online instructions could lead injury[#]					
				Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1. Yoga teaching related characteristics	i. Time spent using internet every day excluding teaching yoga	30–60 min	67	81	19	70	30	54	46	79	21	61	39	52	48	40	60
		90–120 min	59	66	34	68	32	59	41	76	24	61	39	53	47	42	58
		150–180 min	23	78	22	48	52	35	65	78	22	47	53	43	57	39	61
		240 and above minutes	32	72	28	56	44	44	56	69	31	59	41	50	50	44	56
	ii. Experience of teaching yoga online in months	1–6 months	103	76	24	70	30	54	46	82	18	69	31	56	44	44	56
		7–14 months	78	72	28	56	44	47	53	69	31	46	54	51	49	38	62
	iii. Taught yoga online before Covid-19	Yes	70	73	27	64	36	57	43	87	13	64	36	66	34	50	50
		No	111	75	25	64	36	48	52	69	31	56	44	47	53	36	64
2. Yoga practice related characteristics	i. Time spent in practicing yoga	Upto 450 min	89	73	27	69	31	58	42	75	25	58	42	58	42	44	56
		Above 450 min	92	75	25	60	40	45	55	77	23	60	40	50	50	39	61
	ii. Overall yoga experience in months	5–12 months	21	81	19	57	43	52	48	81	19	48	52	52	48	48	52
		13–60 months	83	70	30	67	33	54	46	71	29	60	40	59	41	48	52
		60 months and above	77	77	23	62	38	48	52	81	19	61	39	49	51	32	68

[$]$p < 0.05$, Chi square test for association between time spent on internet everyday other than teaching yoga and reported disadvantages.
[#]$p < 0.05$, Chi square test for association between experience of teaching yoga online in months and reported disadvantages.
[&]$p < 0.05$, Chi square test for association between taught yoga online before COVID-19 pandemic and reported disadvantages.
[β]$p<0.05$, Chi square test for association between overall yoga experience in months and reported disadvantages.

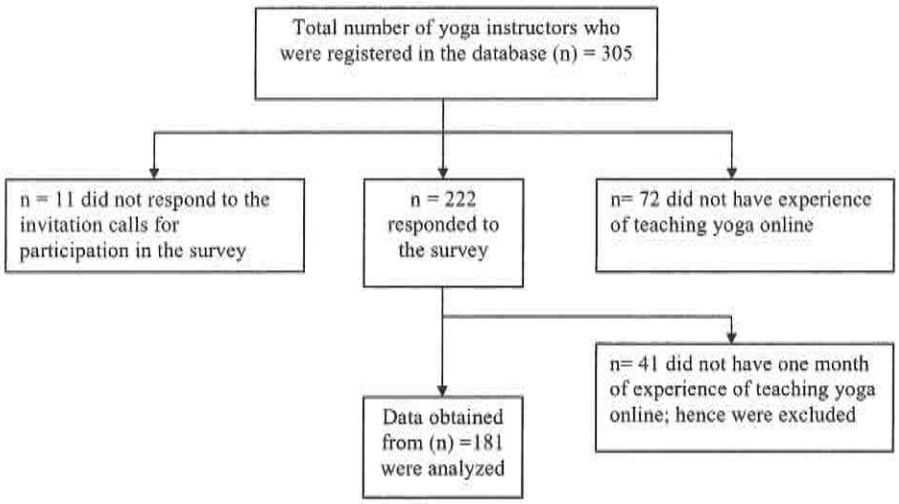

Fig. 3. Number of the respondents at different stages.

the research is limited. Varying degrees of injury are possible in any yoga class whether online or in-person. Hence instructors should be able to provide trainees with clear instructions and demonstrations, as well as to give them continuous repeated feedback, to avoid incorrect yoga practice which could be harmful. The two areas which require particular attention are (i) body alignment [14,15] and striking a balance between effort and ease of practice [16]. These considerations are even more important if a trainee has a pre-existing health condition or injury [17]. In the present study, less educated (who had 11–12 years of education; 71%) and less experienced (who had 1–6 months of experience of teaching yoga online; 69%) respondents more often reported concern that online instructions can lead to injury as a disadvantage of teaching

University of Patanjali Haridwar

yoga online. This suggests that lack of familiarity with communicating online may increase concerns about the risk of injury during online yoga teaching [18].

After the COVID-19 pandemic, if yoga instructors choose to impart yoga instruction online, the benefits can be optimized and disadvantages reduced if a hybrid model is adopted. However in situations where all instruction is online, necessary focus is required for clarity of online demonstrations with facilities for trainees to receive feedback when required, to reduce risk of injuries and incorrect learning.

In the present survey 66.30% of the respondents reported satisfaction with online monitoring of the trainees while 70.16% percent were satisfied to the way they were able to pay attention to the topic they were teaching in an online yoga class. Satisfaction of the yoga instructors is of importance to determine whether online teaching will be used or not. Factors such as technical problems (e.g., poor internet connection) and lack of technical training may lead to reduction in satisfaction related to online yoga teaching [19,20]. Hence use of reliable technology along with basic technical training may be useful to improve overall satisfaction of yoga instructors.

It is possible that teaching yoga online will be more popular after the pandemic, with a hybrid model being used by yoga teachers more often. Hence researchers will need to be aware of the ways in which online yoga classes influence the efficacy and safety of yoga from the point of view of yoga practitioners and yoga teachers. This understanding will help in planning details while designing yoga interventions online as part of research studies.

The study has several limitations including (i) a small sample size, (ii) restriction to a population of yoga instructors in India and (iii) the fact that the study employed a convenience sample which relied on motivated respondents.

5. Conclusions

The benefits and disadvantages of teaching yoga online are of relevance during and beyond the pandemic. Characteristics related to (i) socio-demographics, (ii) online yoga teaching and (iii) yoga practice influence reported benefits and disadvantages of teaching yoga online.

Author contributions

Conceptualization- ST, AB, Funding acquisition-AB, Conception and design of study- ST, AB, SKS, Writing - original draft-ST, SKS, Writing - review & editing-ST, SKS, Formal analysis-SKS, KG, Interpretation of data -ST, SKS.

All the authors critically read the initial manuscript, commented on all parts of the text, and approved the final version of the manuscript.

Data availability statement

The datasets generated during analysis for the current study are available from the corresponding author on reasonable request.

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Declaration of competing interest

The authors declare that there are no conflicts of interest in relation to this study.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ctcp.2021.101509.

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Original Article

Cerebrovascular Dynamics Associated with Yoga Breathing and Breath Awareness

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Abstract

Aims: Breath frequency can alter cerebral blood flow. The study aimed to determine bilateral middle cerebral arterial hemodynamics in high-frequency yoga breathing (HFYB) and slow frequency alternate nostril yoga breathing (ANYB) using transcranial Doppler sonography. **Methods:** Healthy male volunteers were assessed in two separate trials before, during, and after HFYB (2.0 Hz for 1 min, $n = 16$) and ANYB (12 breaths per minute for 5 min, $n = 22$). HFYB and ANYB were separately compared to breath awareness (BAW) and to control sessions. **Statistical Analysis:** The data were analyzed using repeated-measures ANOVA with Bonferroni adjusted *post hoc* tests. **Results:** During HFYB there was a decrease in end-diastolic velocity (EDV) and mean flow velocity (MFV) ($P < 0.01$ for left and $P < 0.05$ for right middle cerebral arteries; MCA) with an increase in pulsatility index (PI) for the right MCA ($P < 0.05$). During ANYB, there was a bilateral decrease in peak systolic velocity ($P < 0.05$ for left and $P < 0.01$ for right MCA), EDV ($P < 0.01$) and MFV ($P < 0.01$ for left and $P < 0.001$ for right MCA) and an increase in PI ($P < 0.01$). During BAW of the two sessions there was a decrease in lateralized flow and end-diastolic velocities ($P < 0.05$) and an increase in PI ($P < 0.05$). **Conclusions:** Changes in peak flow velocities and pulsatility indices during and after HFYB, ANYB, and BAW suggest decreased cerebrovascular blood flow and increased flow resistance based on different mechanisms.

Keywords: *Breath awareness, cerebrovascular hemodynamics, transcranial Doppler sonography, yoga breathing*

Introduction

Changes in cerebral blood flow (CBF) are recorded through functional near-infrared spectroscopy (FNIRs) and transcranial Doppler sonography (TCD).[1,2] A transcranial Doppler sonography recording showed a decrease in right middle cerebral artery diastolic blood flow velocity after high-frequency yoga breathing (HFYB) (2.0 Hz practiced for 1 min; *kapalabhati pranayama*) and hyperventilation, whereas after hyperventilation alone there was a decrease in left systolic blood flow velocity.[3] The results were attributed to carbon dioxide washout and hypocapnia following high-frequency yoga breathing and hyperventilation.

Yoga-regulated breathing can also be practiced at a slower than resting respiratory frequency. *Anulom-vilom pranayama* (alternate nostril yoga breathing [ANYB]) is a practice which involves breathing through the left and right nostrils alternately with a decrease in respiratory rate.[4] Slow breathing with a decrease in breath depth is associated with hypoventilation resulting in hypercapnia.[5] Hence in ANYB, the arterial carbon dioxide levels may be expected to increase depending on breath frequency, depth, and duration of breathing.[6]

Hence, the present study was planned to determine the effects of (i) HFYB and (ii) slow frequency ANYB on bilateral middle cerebral artery blood flow in volunteers with normal health. Both practices were compared to breath awareness (BAW) as a control since BAW is a part of all yoga breathing practices,[7] but does not involve changing the breath pattern.

Methods

Participants

Trial-1 assessed HFYB (2.0 Hz) and in the second trial (Trial-2) ANYB (<10

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breaths/min) was assessed. In Trial-1 sixteen healthy male volunteers (group mean age ± Standard deviation [SD], 23.7 ± 4.5 years) and in Trial-2 twenty healthy male volunteers (group mean age ± SD, 22.9 ± 5.4 years) were recruited. Two trials differed by three factors: (i) the yoga breathing, (ii) duration of yoga breathing, i.e., 1 min in Trial-1 and 5 min in Trial-2; these durations were determined based on comparable durations used in previously published research[8,9] and (iii) number of participants (i.e., 16 in Trial-1 and 22 in Trial-2). Other methodological details were the same for both trials. The participants were recruited based on: (i) normal health based on a semi-structured examination, (ii) a minimum of 3 months experience of yoga breathing practices (iii) right-hand dominance based on the Edinburgh handedness inventory[10] and (iv) willingness to take part in the study. Hand dominance was recorded to determine which hand would be used to regulate nostril airflow during ANYB, as this motor activity could influence cerebral blood flow contralaterally. The exclusion criteria were: (i) consumption of alcohol and tobacco, (ii) taking any conventional or nonconventional medication, (iii) epilepsy for Trial-1, and (iv) nasal septal deviation for Trial-2.

Institutional ethical committee approval (YRD-018/016-17) was obtained. Participants' signed informed consent was obtained.

Study design

Participants were assessed in three separate sessions in random order on three consecutive days. For Trial-1 the three sessions were: (i) HFYB, (ii) BAW, and (iii) quiet sitting (QS). For Trial-2 the sessions were: (i) ANYB, (ii) BAW, and (iii) QS. There were baseline assessments for 5 min, followed by yoga breathing (in Trial-1 HFYB for 1 min; in Trial-2 ANYB for 5 min)[8,9] and postassessment for 5 min. Figure 1 shows a schematic representation of the study design.

Assessment of cerebral blood flow

Transcranial Doppler sonography was used to monitor the middle cerebral arteries (MCA) bilaterally (Digi-Lite™-Rimed Ltd, Israel). Separate 2.0 Mega Hz ultrasound probes (RIMED, SN 17-3681) were placed at the transtemporal acoustic window to simultaneously record the insonation of both MCA. A headframe was used to reduce motion and to secure a constant angle of the middle cerebral artery insonation depth at 40–65 mm from the skull surface. The sample volume was adjusted to get an acoustically optimal and visually stable ultrasound signal.

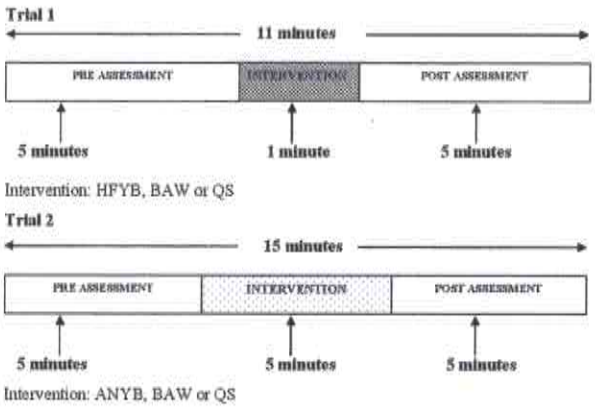

Figure 1: Schematic representation of the study design

The TCD settings were as follows: intensity spatial-peak temporal-average: 420 mW/cm^2; sample volume: 15 mm in length and thermal index: 1.6. The average peak systolic velocity (PSV) in cm/s, end-diastolic velocity (EDV) in cm/s, mean flow velocity (MFV) in cm/s, and pulsatility index (PI) were recorded in pre, during, and post states of each session.

Qualitative self-assessment of practice

Visual analog scales were used for volunteers to self-rate their quality of practice. These were 10 cm horizontal lines to rate the quality of practice from 0 (the worst possible) to 10 (excellent) at the end of each session. A minimum reading of 7.0 cm was considered to indicate a satisfactory practice. No sessions needed to be excluded for a reading <7.0.

Interventions

During each session, participants were seated comfortably on a chair with their hands resting on their knees and eyes closed. Since the participants were yoga practitioners, no training of breathing practices was given to them before data recording. However, the breath rate for the two yoga breathing practices was observed before the recordings. Participants were observed during a single trial before recording and their breath rate was counted by visual inspection of thoracoabdominal movements, approximately 11 cpm (range 9–12 cpm) for ANYB and 120 cpm (range 110–124 cpm) for HFYB. Furthermore, at the end of a session participants were asked if they were able to maintain their breath rate constant during the practice, and indicate this on a 10 cm, visual analog scale.

High-frequency yoga breathing

HFYB included voluntary rapid breathing with forceful contraction of the anterior abdominal wall during expiration. The respiratory rate was 2.0 Hz and the total duration of practice was 1 min.

Alternate nostril yoga breathing

Participants were instructed to inhale through the left nostril and exhale through the right nostril, followed by inhalation through the right nostril and exhalation through the left nostril. Nostril patency was regulated with gentle pressure from either the ring finger (to occlude the left nostril) or the thumb (to occlude the right nostril) of the

University of Patanjali Haridwar

right hand, while the index and middle finger were kept flexed against the palm of the right hand. The right hand was noted as the dominant hand for all participants.[10] When breathing through the left or right nostril, pressure of the ring finger (for the left nostril) or the thumb (for the right nostril) of the right hand were released keeping the finger or thumb close to the nose but not touching it. This sequence was repeated during the 5 min practice. Participants were instructed to be aware of the passage of air through the nasal passage as well as other sensations during the practice.

Breath awareness

Throughout the practice, participants were asked to consciously maintain their awareness on the movement of air in the nasal passage and other sensations related to respiration. They were instructed not to alter the respiration in any way and only to pay attention to the breathing process. BAW was selected as an intervention because being aware of the breath is an inherent part of all yoga breathing techniques.

Quiet sitting

Participants were instructed to allow their thoughts to wander freely without any attempt to direct their thoughts. They were told not to alter their breathing in any way and let breathing be spontaneous. Quiet sitting was different from yoga breathing as it did not involve voluntary changes in respiration and it was different from BAW as it did not involve conscious awareness on breathing.

Data analysis

The data were analyzed using repeated-measures analysis of variance (RM-ANOVA) followed by Bonferroni adjusted *post hoc* tests using SPSS (version 24.0, IBM SPSS, New York, USA). The RM-ANOVA had two within-subjects factors: States, with three levels, i.e., pre, during, and post; and Sessions, with three levels, i.e., yoga breathing (HFYB in Trial-1 and ANYB in Trial-2), BAW and quiet sitting.

Results

The group mean values ± SD for PSV, EDV, MFV, and PI are given in Table 1.

Repeated measures analyses of variance

Trial-1

In Trial-1, MFV differed significantly between states for the left and the right MCA ($F = 8.81$; $df = 1.88, 28.15$; Huynh-Feldt $\varepsilon = 0.94$; $P < 0.001$). A significant difference between states was noted for the left MCA ($F = 11.92$; $df = 1.58, 23.72$; Huynh-Feldt $\varepsilon = 0.79$; $P < 0.001$) and the right MCA ($F = 12.71$; $df = 1.58, 23.76$; Huynh-Feldt $\varepsilon = 0.79$; $P < 0.001$) in EDV as well as for the right MCA in PI. A significant interaction between sessions x states was found in MFV ($F = 8.09$; $df = 1.55, 23.30$; Huynh-Feldt $\varepsilon = 0.39$; $P < 0.004$) and EDV for the left MCA ($F = 11.13$; $df = 1.57, 23.56$; Huynh-Feldt $\varepsilon = 0.39$; $P < 0.001$) while for the right MCA the EDV ($F = 5.25$; $df = 1.91, 28.67$; Huynh-Feldt $\varepsilon = 0.48$; $P = 0.012$) and PI ($F = 6.16$; $df = 2.05, 30.71$; Huynh-Feldt $\varepsilon = 0.51$; $P = 0.005$) showed a significant interaction between sessions x states suggesting interdependence between factors.

Trial-2

In Trial-2, for the left MCA as well as for the right MCA, there was a significant difference in states in PSV ($F = 0.814$; $df = 2.00, 42.00$; Huynh-Feldt $\varepsilon = 1.00$; $P < 0.001$ in left MCA); ($F = 8.96$; $df = 2.00, 42.00$; Huynh-Feldt $\varepsilon = 1.00$; $P < 0.001$ in right MCA), EDV ($F = 15.62$; $df = 1.61, 33.71$; Huynh-Feldt $\varepsilon = 0.80$; $P < 0.001$ in left MCA); ($F = 19.39$; $df = 1.40, 29.47$; Huynh-Feldt $\varepsilon = 0.70$; $P < 0.001$ in right MCA), MFV ($F = 13.31$; $df = 1.85, 38.75$; Huynh-Feldt $\varepsilon = 0.92$; $P < 0.001$ in left MCA); ($F = 15.97$; $df = 1.63, 34.28$; Huynh-Feldt $\varepsilon = 0.82$; $P < 0.001$ in right MCA), and PI ($F = 16.07$; $df = 1.64, 34.44$; Huynh-Feldt $\varepsilon = 0.82$; $P < 0.001$ in left MCA); ($F = 14.57$; $df = 1.24, 26.02$; Huynh-Feldt $\varepsilon = 0.62$; $P < 0.001$ in right MCA)., Also there was a significant interaction between sessions x states suggesting interdependence of these factors in PSV ($F = 4.11$; $df = 3.42, 71.75$; Huynh-Feldt $\varepsilon = 0.85$; $P = 0.007$ in left MCA); ($F = 4.33$; $df = 3.69, 77.56$; Huynh-Feldt $\varepsilon = 0.92$; $P = 0.004$ in right MCA), EDV ($F = 4.67$; $df = 2.04, 42.91$; Huynh-Feldt $\varepsilon = 0.51$; $P = 0.014$ in left MCA); ($F = 6.04$; $df = 2.63, 55.22$; Huynh-Feldt $\varepsilon = 0.66$; $P = 0.002$ in right MCA), MFV ($F = 4.64$; $df = 2.40, 50.33$; Huynh-Feldt $\varepsilon = 0.60$; $P < 0.01$ in left MCA); ($F = 5.62$; $df = 3.29, 69.18$; Huynh-Feldt $\varepsilon = 0.82$; $P < 0.001$ in right MCA), and PI ($F = 5.40$; $df = 2.07, 43.46$; Huynh-Feldt $\varepsilon = 0.52$; $P = 0.007$ in left MCA); ($F = 5.60$; $df = 2.05, 43.01$; Huynh-Feldt $\varepsilon = 0.51$; $P = 0.007$ in right MCA), for both left and right MCA. In addition, there was a significant difference between sessions in PSV, EDV, and MFV for the right MCA only ($F = 3.58$; $df = 2.00,42.00$; Huynh-Feldt $\varepsilon = 1.00$; $P = 0.037$ in PSV), ($F = 2.73$; $df = 2.00,42.00$; Huynh-Feldt $\varepsilon = 1.00$; $P = 0.077$ in EDV), and ($F = 3.36$; $df = 2.00,42.00$; Huynh-Feldt $\varepsilon = 1.00$; $P = 0.04$ in MFV of right MCA

Post hoc analyses

Trial-1

MFV reduced significantly during the practice of HFYB for the left ($P = 0.001$; Cohen's d = 0.55; 95% confidence interval [CI] = 1.70, 13.25) and for the right MCA ($P = 0.04$; Cohen's d = 0.50; 95% CI = 0.19, 10.05). EDV also decreased during the practice for the left ($P = 0.003$; Cohen's d = 0.82; 95% CI = 2.800, 14.10) and for the right MCA ($P = 0.016$; Cohen's d = 0.75; 95% CI=-1.03, 10.79). PI increased during HFYB for the right MCA ($P = 0.018$; Cohen's d = 0.83; 95%

University of Patanjali Haridwar

Table 1: Bilateral middle cerebral arterial flow velocities and pulsatility index

Session	State	Left MCA				Right MCA			
		Peak velocity	Diastolic velocity	Mean velocity	Pulsatility index	Peak velocity	Diastolic velocity	Mean velocity	Pulsatility index
					Trial-1				
HFYB	Pre	68.23±20.20	29.13±9.32	42.17±12.39	0.94±0.24	63.71±16.21	25.25±7.43	38.07±9.88	1.02±0.18
	During	64.23±18.71	21.61±9.00†	35.82±10.84†	1.26±0.49	60.17±18.80	19.34±8.29*	32.95±10.39*	1.29±0.42*
	Post	67.34±19.98	28.20±9.99	41.25±13.01	0.98±0.20	62.20±14.10	24.86±7.39	37.31±9.16	1.03±0.18
BAW	Pre	67.69±14.20	28.63±8.59	41.65±9.77	0.96±0.21	65.21±18.54	26.64±7.97	39.50±10.95	0.98±0.19
	During	67.32±13.76	26.68±8.49†	40.23±9.49*	1.04±0.24	64.65±16.99	24.59±7.43†	37.94±9.80	1.07±0.22*
	Post	67.65±15.17	28.48±9.10	41.53±10.59	0.97±0.20	65.35±17.51	26.45±7.80	39.42±10.49	1.00±0.20
QS	Pre	67.70±16.23	27.85±6.94	41.13±9.65	0.98±0.16	63.05±17.94	25.70±9.10	38.15±11.78	1.00±0.16
	During	67.84±16.37	27.62±7.01	41.02±9.71	0.99±0.17	61.40±20.48	24.97±10.36	37.11±13.46	1.03±0.21
	Post	67.50±16.08	27.51±6.88	40.84±9.58	0.99±0.16	60.93±21.96	24.73±10.55	36.80±14.08	1.06±0.30
					Trial-2				
ANYB	Pre	66.88±11.95	27.85±5.01	40.86±6.72	0.95±0.15	65.27±14.22	27±6.68	39.75±8.97	0.97±0.12
	During	62.21±14.85*	23.66±7.07†	36.51±9.47†	1.08±0.15†	59.72±16.32†	22.45±8.21†	34.88±10.7‡	1.12±0.19†
	Post	65.68±12.35	27.34±5.41	40.12±7.08	0.96±0.17	63.93±14.68	26.6±6.8	39.04±9.1	0.97±0.15
BAW	Pre	69.33±15.17	27.76±6.45	41.62±9.14	1.01±0.1	69.52±16.5	27.82±7.21	41.72±10	1±0.12
	During	66.52±15.42*	25.3±6.99*	39.04±9.53*	1.07±0.14	66.02±16.15†	24.93±7.43†	38.63±10.02†	1.08±0.18
	Post	67.46±14.81	27.47±6.61	40.8±9.07	0.99±0.12	68.28±18.5	28.03±8.06	41.46±11.25	0.98±0.13
QS	Pre	68.4±10.36	28.22±5.11	41.61±6.43	0.97±0.13	70.67±13.16	28.59±6.52	42.61±8.26	1±0.18
	During	68.16±10	27.81±5.39	41.26±6.46	0.98±0.15	70.93±12.91	28.55±6.72	42.68±8.3	1.01±0.19
	Post	67.5±10.37	27.49±5.31§	40.82±6.51	0.99±0.15	70.66±13.31	28.36±6.61	42.46±8.36	1.01±0.19

*P<0.05, †P<0.01, ‡P<0.001; *post hoc* analyses with Bonferroni adjustment, during compared with pre, §P<0.01; *post hoc* analyses with Bonferroni adjustment, post compared with pre. Values are group mean±SD. SD=Standard deviation, MCA=Middle cerebral arteries, HFYB=High frequency yoga breathing, BAW=Breath awareness, QS=Quiet sitting, ANYB=Alternate nostril yoga breathing

CI=-0.495,-0.043). There was no significant difference between pre- and post-values in any of the four variables.

BAW caused a reduction in MFV (P = 0.025; Cohen's d = 0.14; 95% CI = 0.157, 2.693), as well as EDV (P = 0.003; Cohen's d = 0.23; 95% CI = 2.796, 14.10) during the practice for the left MCA. At the right MCA BAW increased PI (P = 0.003; Cohen's d = 0.44; 95% CI=-0.127,-0.042) and decreased EDV (P = 0.010; Cohen's d = 0.27; 95% CI = 0.475, 3.638) during the practice. No significant differences were observed between pre and post values. There were no significant changes during and after QS.

Trial-2

Five minutes of ANYB caused the following changes. For the left MCA, there was a significant decrease in PSV (P = 0.013; Cohen's d = 0.35; 95% CI = 0.854, 8.477), MFV (P = 0.008; Cohen's d = 0.54; 95% CI = 1.026, 7.673) and EDV (P = 0.009; Cohen's d = 0.69; 95% CI = 0.949, 7.435) as well as an increase in PI (P = 0.004; Cohen's d = 0.87; 95% CI=-0.207,-0.035) during the practice of ANYB. The same changes were also apparent for the right MCA, with a significant decrease in PSV (P = 0.002; Cohen's d = 0.36; 95% CI = 2.015, 9.080), MFV (P = 0.001; Cohen's d = 0.49; 95% CI = 1.890, 7.863) and EDV (P = 0.002; Cohen's d = 0.61; 95% CI = 1.652, 7.433) as well as an increase in PI (P = 0.009; Cohen's d = 0.97; 95% CI=-0.259,-0.033) during ANYB. There were no significant differences when pre and post values were compared.

For the left MCA, there was a significant decrease in PSV (P = 0.036; Cohen's d = 0.18; 95% CI = 0.152, 5.480), MFV (P = 0.021; Cohen's d = 0.28; 95% CI = 0.331, 4.826) and EDV (P = 0.020; Cohen's d = 0.37; 95% CI = 0.333, 4.583) during BAW. For the right MCA, there was a significant decrease in PSV (P = 0.002; Cohen's d = 0.21; 95% CI = 1.236, 5.777), MFV (P = 0.002; Cohen's d = 0.31; 95% CI = 1.070, 5.123) and EDV (P = 0.003; Cohen's d = 0.39; 95% CI = 0.918, 4.862) during BAW. No significant changes were observed between pre- and post-values. QS caused a significant decrease in EDV (P = 0.008; Cohen's d = 0.06; 95% CI = 0.176, 1.293) after the practice for the left MCA.

Visual analog scale

For all trials, participants had visual analog scales' scores for maintaining the breath rate constant during the intervention, which was required to be greater than 7.0 on the 10.0 cm scale, for inclusion in the trial.

Discussion

Healthy volunteers showed a decrease in bilateral middle cerebral artery MFV and EDV during 5 min of ANYB, 1 min of HFYB, and during equal durations of BAW. During 1 min of HFYB alone, PSV decreased. In both

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ANYB and HFYB as well as the corresponding BAW practice, the PI was higher compared to the respective preceding period. The changes did not persist in the post periods.

A decrease in cerebral blood flow velocity is correlated with decreased cerebral blood flow[11] while PI assesses resistance to intracranial blood flow.[12] Hence lower flow velocities and higher pulsatility indices of bilateral MCA during both yoga breathing practices are suggestive of reduced cerebrovascular flow volume and higher flow resistance, respectively.[13,14]

In HFYB the increased breath rate (around 2.0 Hz) and forceful exhalation are believed to increase the volume of carbon dioxide exhaled.[15] This is supported by a previous study on 47 healthy participants, where 15 min of HFYB resulted in a decrease in PaCO2 from 35.79 ± 2.23 mmHg (Pre) to 26.80 ± 2.40 mmHg (During) and 35.05 ± 2.14 mmHg (Post).[16] Hence HFYB appears to produce hypocapnia similar but of a lesser magnitude than hyperventilation-induced hypocapnia, which is relevant since hyperventilation decreases cerebral blood flow, cerebral blood volume and changes intracranial pressure.[17] The magnitude of hypocapnia may be speculated to be lesser during HFYB compared to frank hyperventilation since participants in the present study did not report symptoms of hyperventilation. This is consistent with previous assessments on 140 participants who performed HFYB but showed no evidence of hyperventilation discomfort.[18] Discomfort was determined using the Nijmegan Discomfort Questionnaire designed to detect symptoms of over-breathing.[19] Hence hypocapnia-induced changes may explain some, but possibly not all changes in CBF associated with HFYB. Other mechanisms are postulated below.

During ANYB, the changes in flow velocity and PI could be related to ventilation if the depth of breathing was increased. Previously, it was demonstrated that slow-paced breathing at 0.1 Hz can exert different effects on end-tidal CO2 based on the depth of breathing.[20] Hence, in the present study, during 5 min of slow breathing achieved during ANYB, the decrease in middle cerebral artery flow velocities and increase in the PI could be a consequence of hyperventilation-induced hypocapnia, only if ANYB practice was both slow as well as deep in excess of tidal breathing when it could be associated with hyperventilation rather than the speculated normoventilation. However, as for HFYB, after ANYB the participants in the present study did not report symptoms of hyperventilation, suggesting that the depth of breathing was not increased during ANYB. Future research could determine if maintaining yoga breathing during ANYB close to tidal breathing, would make a difference to cerebral blood flow changes.

An alternative explanation for the decreased cerebral blood flow velocity during ANYB, BAW and also during HFYB could be a decrease in the level of neural activity. Based on recognized principles of autoregulation of cerebral blood flow, the blood flow to the brain decreases when neural activity is low.[21] This kind of decrease in cerebral blood flow occurs during deep sleep (i.e., Slow Wave Sleep stages 3 and 4), when neural activation is considerably lower than during wakefulness, leading to reduced cerebral blood flow velocities compared to the wakeful state.[22] In the present study, all three practices (i.e., HFYB, ANYB, and BAW) may be associated with lower neural activation than the preceding state, based on previously published EEG studies.[23-25] Previously, increased relative power in the theta band and decreased beta activity were reported after ANYB practice,[23] increased alpha activity was reported during HFYB[24] and (iii) during BAW, alpha increased despite the performance of mentally engaging tasks.[25] These previous reports supported a mental state with low neural activity during the three practices (i.e., ANYB, HFYB and BAW).

Hence, the mechanisms involved in cerebrovasular hemodynamic changes during HFYB, ANYB and BAW appear to be complex. The findings during HFYB may be mediated partially by hyperventilation and also by reduced neural activity. The explanation for the effects of ANYB appears less likely to be due to hyperventilation, but more likely to be due to reduced neural activity. In BAW, reduced levels of neural activity could explain the changes in cerebral blood flow. Hence, chemical as well as changes in neural activity levels appear to influence cerebral blood flow in the MCA during these practices.

Yoga breathing was originally intended to develop control over the mental state as a training for meditation and more advanced spiritual practice. In a traditional yoga text (i.e., Hatha Yoga Pradipika Chapter II, Verse 2 (*Circa* 1350 CE), it is stated that 'When the breath wanders, or is irregular, the mind is also unsteady, but when the breath is still, so also is the mind steady'. These descriptions are based on the experiences of the ancient sages.[26] In the ancient texts, there is also a description of spontaneous breath suspension described as *Kewala kumbhaka*, considered challenging to attain (Hatha Yoga Pradipika Chapter II, Verse 71–77).[26] This breath suspension could be attained through practices which are intended to induce hyperventilation. Hence, it is possible that the ancient sages did experience a degree of hypocapnia in advanced yoga breathing practice. Such a practice would have been motivated by an interest in regulating the mental state as a part of spiritual practice. Nowadays, yoga breathing is practiced for health benefits. While these breathing practices may not be harmful to healthy individuals, understanding the physiological effects of these practices can promote effective and safe practice by persons of different ages and baseline health levels. The findings are limited by the omission of training to the participants in the breathing techniques, exclusion of assessment of respiration rate and blood gas analysis

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during the intervention sessions, and different durations of interventions. Restricting the participants to males with prior experience of yoga limits the generalizability of the findings.

Conclusions

Changes in peak flow velocities and pulsatility indices during and after HFYB, ANYB, and BAW suggest decreased cerebrovascular blood flow and increased flow resistance based on different mechanisms.

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Ethical clearance

Institutional ethical committee approval (YRD-018/016-17) was obtained.

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Conflicts of interest

There are no conflicts of interest.

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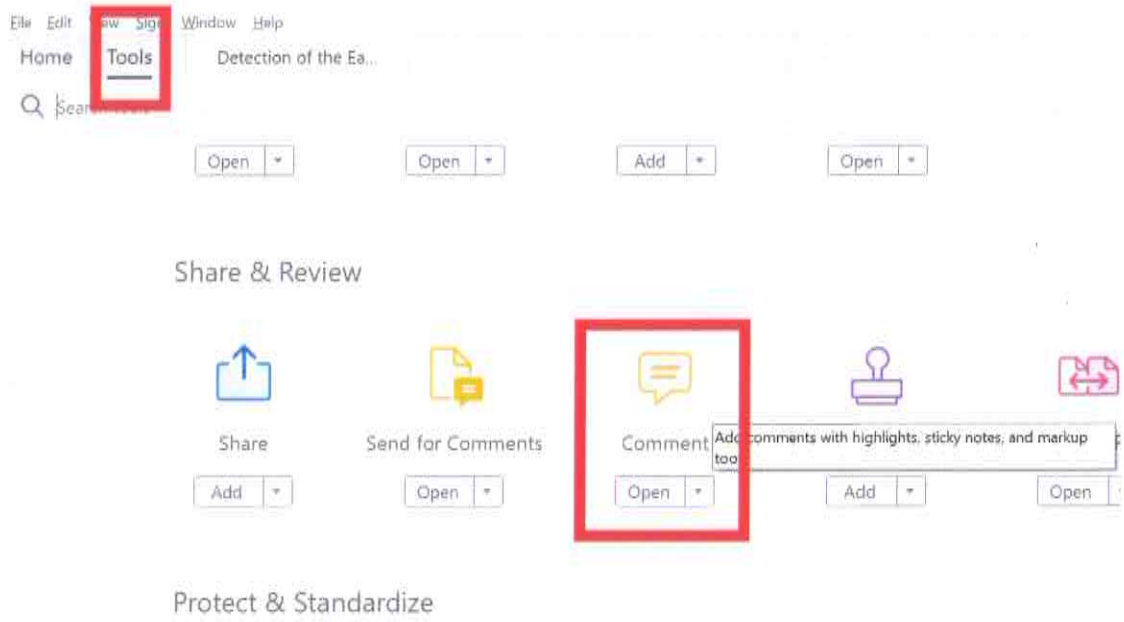

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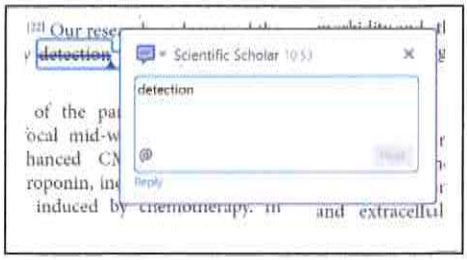

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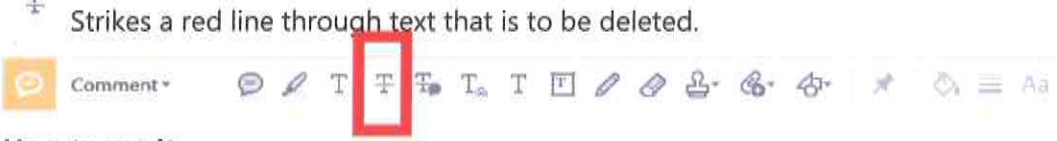

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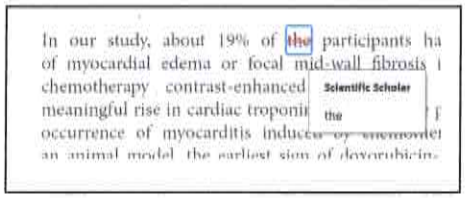

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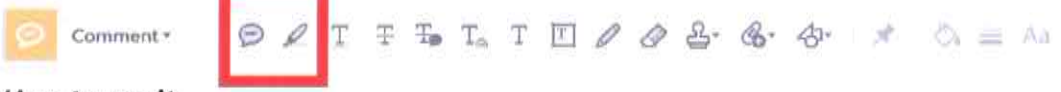

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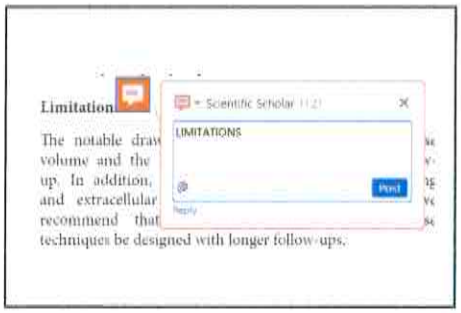

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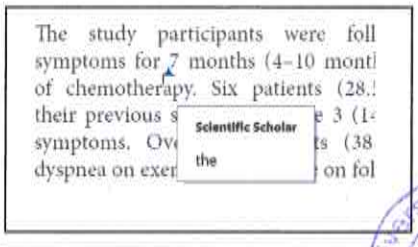

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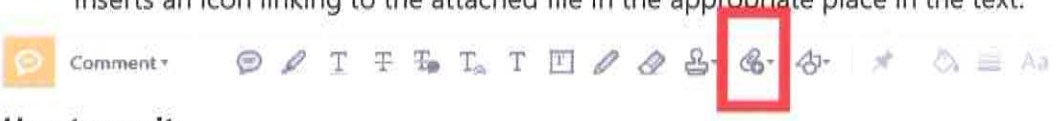

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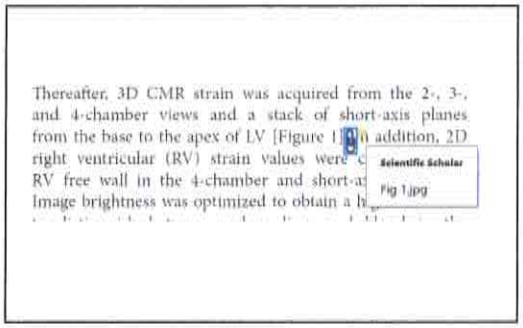

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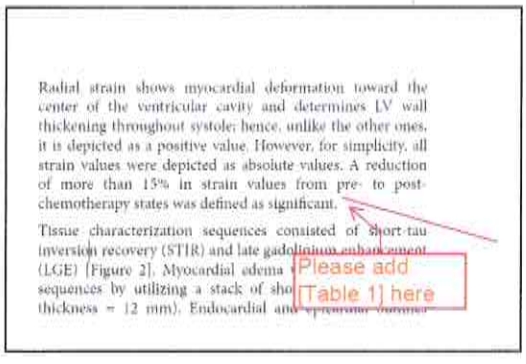

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Letter to the Editor

Heart rate variability following an integrative treatment consisting of Ayurveda, biomedicine, and yoga in patients with lymphedema

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Dear Sir,

Lymphedema is a chronic, progressive and debilitating condition associated with persistent accumulation of protein-rich fluid in interstitial spaces leading to swelling of one or more parts of the body.[1] Lymph drainage may be facilitated by shifting the autonomic balance toward vagal dominance.[2] Yoga and Ayurveda are known to modulate autonomic activity. Previously, a treatment protocol integrating Ayurveda, biomedicine, and yoga was reported to be clinically useful in patients with lymphedema.[3] With this background, the present study was intended to (i) compare the heart rate variability (HRV) of patients with lymphedema with age- and gender-matched healthy volunteers and (ii) determine the effect of an integrative treatment on the HRV in patients with lymphedema.

Eleven patients with lymphedema (group mean age ± S.D.; 46.09 ± 12.47 years; m: f = 9:2) and (ii) 11 age (group mean age ± S.D.; 46.90 ± 5.78 years) and gender- (m: f = 9:2) matched healthy adults were assessed during a 5 min recording of HRV and breath rate (MP 45, BIOPAC System, U.S.A.). The patients received a treatment protocol integrating Ayurveda, biomedicine, and yoga for 10 days. The protocol includes washing of skin of the affected limb/limbs, *phanta* (=herbalised infusion) soaking, manual lymph drainage, and yoga practice. The study was approved by the Ethics Committee of the Institution (approval number: YRD - 019/006). The signed consent was obtained from each participant.

The EKG data were visually inspected offline and only noise-free data were included for analysis. Frequency domain measures (i.e., the low-frequency band [0.04–0.15 Hz] and (ii) high-frequency band [0.15–0.40 Hz]) and time-domain components (i.e., mean RR interval [the mean of the intervals between adjacent QRS complexes or the instantaneous heart rate], RMSSD [the square root of the mean of the sum of the squares of differences between adjacent NN intervals], NN50 [the number of interval differences of successive normal to normal intervals >50 ms] and pNN50 [the proportion derived by dividing NN50 by the total number of NN intervals]) of HRV were extracted using Kubios HRV software.[4] The respiration rate was determined as cycles per minute by averaging the breath rate in each 5 min state recorded at baseline and after 10 days.

The baseline data of patients with lymphedema and of normal healthy volunteers were compared using Mann–Whitney U test. The data obtained at baseline and after 10 days of integrative

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treatment were analysed using Wilcoxon sign rank test. RMSSD was significantly lower ($P < 0.05$; one-tailed) in patients with lymphedema compared to normal healthy volunteers. RMSSD reflects vagal activity.[5] This suggests that patients with lymphedema may have lower cardiac vagal activity compared to age- and gender-matched normal healthy volunteers. Following 10 days of integrative treatment, the LF/HF ratio decreased significantly ($P < 0.05$; one-tailed). LF/HF ratio is an index of sympathovagal balance. Higher values of the index suggest sympathetic dominance. Hence, a decrease in LF/HF ratio after 10 days of integrative treatment suggests a shift in autonomic activity toward vagal dominance in patients with lymphedema. This may explain the clinically beneficial effects of the integrative treatment reported in the previous studies.[3] The findings may also be extended to cases of lymphedema following oncological lymphadenectomy.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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P300 Following Four Voluntarily Regulated Yoga Breathing Practices and Breath Awareness

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Abstract

Attention was influenced by yoga breathing in previously published research. Each yoga breathing practice uniquely modifies specific breath characteristics. Differences in the study designs, assessment methods and interventions resulted in difficulty in comparing effects between yoga breathing practices. This study aimed (i) to compare four yoga breathing practices on attention using an auditory oddball task and (ii) to determine cardiac autonomic activity associated with attention using heart rate variability. P300 event related potential was recorded simultaneously with heart rate variability before and after 18-minute periods each of (i) high frequency yoga breathing (with increased breath frequency), (ii) bellows yoga breathing (with increased depth of respiration), (iii) alternate nostril yoga breathing (with alternate nostril patency), (iv) bumblebee yoga breathing (with prolonged exhale), (v) breath awareness (with attention to the breath) and (vi) quiet seated rest as control in 38 yoga experienced males (average age ± *SD*; 24.08 ± 4.01 years). The six sessions were on separate, randomly allocated days. The P300 peak amplitude recorded at Pz was significantly increased after four yoga breathing practices (Bonferroni adjusted *post-hoc* tests, repeated measures ANOVA). No significant changes were noted in heart rate variability following yoga breathing or control sessions. These findings suggest that the four yoga breathing practices increase the attentional neural resources engaged for this auditory oddball task, irrespective of the characteristic of breath uniquely regulated in the four yoga breathing practices.

Keywords

auditory oddball task, yoga regulated breathing, heart rate variability, attention, volitional breathing

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Introduction

Yoga practice considers attention training through voluntary breath regulation as a step towards attaining the ultimate goal of mental silence.[1] Yoga voluntarily regulated breathing (called *pranayama* in Sanskrit; *prana* = life energy and *ayama* = control) includes several techniques which differ in the dimension of breathing being modified voluntarily.[2]

Previously the effects of two yoga breathing practices on attention were studied by recordings of the P300 event related potential (ERP) in response to a two stimulus auditory oddball task.[3,4] The P300 components (eg, amplitude and latency) reflect information processing associated with attention, speed of stimulus processing, error awareness and memory performance.[5] The P300 was recorded before and after one minute of high frequency yoga breathing at 2.0 Hz compared with one minute of breath awareness.[3] The study reported significant changes in the P300 event related potential after high frequency yoga breathing.[3] In a separate study also using the same auditory oddball paradigm, the P300 was recorded before and after alternate nostril yoga breathing and breath awareness for forty minutes each in separate sessions on alternately allocated days.[4] Following alternate nostril yoga breathing there were significant changes in the P300 event related potential.[4] Hence following both high frequency yoga breathing and alternate nostril yoga breathing there were significant changes in the P300 in response to an auditory oddball task.[3,4]

The short term benefits of yoga breathing practices on attention have also been reported based on better performance in cancellation tests.[6,7] Improved performance was reported following ten minutes of bumblebee yoga breathing with prolonged exhalation[6] and following one minute of bellows yoga breathing with increased depth of breathing for twelve weeks.[7]

High frequency yoga breathing, alternate nostril yoga breathing, bellows yoga breathing and bumblebee yoga breathing separately modify the rate, depth, patent nostril or phase

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duration of respiration respectively,[2,8] though these four yoga breathing practices are all associated with changes suggestive of improved attention.[3,4,6,7,9]

There is a complex relationship between attention and the autonomic nervous system.[10] Among several factors, respiration influences cardiac autonomic regulation.[11] In separate studies, high frequency yoga breathing reduced time domain indices of the heart rate variability (HRV)[12] principally related to parasympathetic activity,[13] whereas both alternate nostril yoga breathing and bumblebee yoga breathing increased time domain indices of the HRV.[14,15] None of these studies reported the HRV simultaneously with a test for attention.

Inferences about the comparative effects of different yoga breathing practices on attention are difficult to make due to differences between individual studies with respect to the participants, duration of breathing and assessment methods for attention, among other factors.[3,4,6,7,9]

With this background the present study intended to assess the effect of yoga breathing techniques on the physiological response (ie, the ERP and HRV responses) of the participants during an attentive mental state which was achieved by the participants attending to a two-stimulus auditory oddball task.

Methods

Participants

Thirty eight healthy male volunteers aged between 20 and 37 years (group mean age ± *SD*; 24.08 ± 4.01 years) took part in the study. Participants were recruited from a state private university located in north India where they were enrolled in different courses for their graduate degree. Participants were recruited by oral announcements in the lecture halls. Students who participate in a research project get exposure to research facilities of the university, which students acknowledge as an incentive to enrol in research as a participant. The required sample size was calculated *a priori* using G Power Program.[16] For the present study, with Power of 0.90, Cohen's *d* of 0.54 and alpha = 0.05, the required sample size was 19. The Cohen's *d* was computed from P300 peak amplitude data recorded at Pz electrode site which significantly increased in an earlier study[4] when the value after a yoga breathing session was compared with preceding value. The inclusion criteria were: (i) age range 20-45 years, (ii) normal health status based on an unstructured interview and (iii) a minimum of 6 months of experience of the four yoga breathing techniques and of breath awareness (based on the experimenters' observation that this is the required duration of practice required for 18 min of consistent volitional yoga breathing). The exclusion criteria were: (i) females, to reduce inter subject variability, based on changes in P300 ERP and HRV with the phases of menstrual cycle,[17,18] (ii) consumption of alcohol or tobacco (in any form), (iii) use of medication, (iv) presence of physical or neurological illness which prevents participants practicing any of the four yoga breathing techniques (e,g., deviated nasal septum in case of alternate nostril yoga breathing and epilepsy for high frequency yoga breathing) and (v) extra systole in the EKG (to avoid abnormal HRV recordings).

Table 1. Baseline Characteristics of the Participants.

S. No		Characteristics	Details
1		Number of participants	38
2		Group average age ± SD (years)	24.1 ± 4.0
3	Yoga practice	Range of yoga experience (months)	6-108
		Group average yoga experience ± SD (months)	30.8 ± 23.1

The baseline characteristics of the participants are given in Table 1. The signed informed consent was obtained from each study participant after explaining to them the details of the study relevant to them. The study was approved by the ethics committee of the institution (approval number: PRF/YRD/012/1-4).

Study Design

Each participant was assessed for six different sessions on six separate days. The allocation of the participants to the six sessions was in a random sequence which was generated using an online randomizer (www.randomizer.org). The randomization and allocation concealment were carried out in three steps. (1) A person unaware of the details of the trial assigned a serial number from 1 to 6 to each of the six interventions. (2) An online randomizer (www.randomizer.org) was used to generate thirty eight sets of six digits (ie, 1 to 6) appearing in a random sequence. Each of the six digits represented one of the six interventions assigned in step (1) and the order in which the digits appeared in a set determined the order of the sessions. (3) A person not involved in the trial allocated the participants to the sessions. Participants did not know the order of sessions to which they were assigned though they were aware of the six interventions. The recordings were conducted in a well ventilated, dimly lit sound attenuated room. The participants were monitored from an adjacent room throughout the session on a closed circuit television and instructions were given through a two way intercom to allow the participants to be undisturbed during the sessions.

The six sessions consisted of four yoga breathing sessions and two control sessions. The yoga breathing sessions were (listed in alphabetical order) as follows: (i) alternate nostril yoga breathing (*anulom-vilom pranayama*), (ii) bellows yoga breathing (*bhastrika pranayama*), (iii) bumblebee yoga breathing (*bhramari pranayama*) and (iv) high frequency yoga breathing (*kapalabhati pranayama*). The control sessions were breath awareness (an interventional control session) and quiet seated rest (a control session). The total duration of each session was 28 min. Each session consisted of three

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states ie, (i) pre (5 min), (ii) during (18 min) and (iii) post (5 min). The P300 ERP and HRV were recorded simultaneously before and after each yoga breathing and control session. The self rated quality of practice was assessed through a visual analog scale after each of the six sessions.

The schematic presentation of the study design is given in Figure 1.

Assessments

P300 ERP. An auditory oddball task which is free of any motor response was selected to determine the effects of yoga breathing on attention by eliciting a P300 response (Nicolet EDX system; U.S.A). The two stimulus auditory oddball task required discrimination between the two auditory tones of different frequencies presented in a random series in an 80:20 ratio, while counting the target stimulus and ignoring the non-target stimulus. The EEG was amplified with a sensitivity of 100 μV. The low cut and high cut filters were set at 0.05 Hz and 30 Hz respectively. Total sweeps were 300 with 80% non-target and 20% target stimuli. The target and non-target sweeps were separately computer averaged. The sweep width was 750 ms with 75 ms pre stimulus delay. The level of artifact rejection was set at 90% which is expressed as a percentage of the full-scale range of the analog to digital converter. The stimulus intensity was kept at 80 dBSPL for both target and non-target stimuli. The non-target tone stimuli had a frequency of 1 KHz, plateau of 50 cycles, ramp of 10 cycles whereas the target stimuli had a frequency of 2 KHz, plateau of 10 cycles, ramp of 20 cycles. The inter-stimulus interval was 1 second.

AQ5 *Recording.* Participants were asked to shampoo their hair and avoid using any hair product prior to testing. The scalp was cleaned at the electrode placement sites with a skin preparation gel (NuPrep Skin Prep Gel) before electrode placement.

Based on the standard 10-20 electrode placement system,[19] Ag/AgCl electrodes were fixed with an electrode gel (Ten 20 conductive EEG paste) at three active sites (*viz.*, Fz, Cz and Pz) referenced to linked earlobes (A1-A2) with the ground electrode on the forehead (FPz). The electrode impedance was kept below 5 kΩ at each site.

Target and non-target tones were delivered through close-fitted headphones (Amplivox, UK). The participants were asked to distinguish between the two tones and mentally count the "target" stimuli immediately on hearing while ignoring the "non-target" stimuli. Mental counting was to rule out motor activity as a confounder. The participants were asked the number of target stimuli they counted during the task. This was done to ensure that the participants were attentive to the stimuli. Ninety five percent accuracy in counting the target stimuli in a trial was set as the minimum required, while for counts less than this the trial was to be repeated. No trials had to be repeated for this reason.

Recordings were made in a sound attenuated room [sound level below 5 dBSPL based on readings of a hand-held audiometer (Extech, China)]. From an adjacent room participants were monitored on a closed circuit television during all sessions and the instructions were given through a two way intercom.

Heart Rate Variability and Respiration Rate. Heart rate variability (HRV) and respiration rate were recorded simultaneously with the P300 ERP using the same ambient settings as described above. HRV was measured using a two-channel EKG and respiration recording system (MP45 Biopac Student Lab, BIOPAC System Inc, USA). The EKG was recorded with Ag/AgCl pre-gelled electrodes for a limb lead I configuration. The respiratory rate was recorded using a volumetric pressure transducer fixed around the trunk about 8 cm below the lower costal margin when the participant sat erect.

Self Rated Quality of Practice. Self rated quality of practice was assessed using a visual analog scale. The visual analog scale consisted of a 10 cm horizontal line with two word descriptors at the two ends ie, "worst possible" and "excellent". The participants were asked to make a vertical mark on the line rating their practice between worst possible and excellent. For all sessions the self-rated quality of practice had to be greater or equal to an arbitrarily decided 65% (6.5 cm) for inclusion of sessions in the trial. All sessions met this criterion.

Interventions

Participants were asked to sit on a firm couch keeping their legs crossed with their spine erect, resting both hands on the respective knees and with eyes closed throughout each session. Hence the sitting position was common during each session.

Alternate Nostril Yoga Breathing (Anulom-Vilom Pranayama). Alternate nostril yoga breathing (*anulom-vilom pranayama*) involves breathing alternately through the left and right nostrils without retention of the breath. The participants were asked to close the right nostril with the right thumb and exhale slowly through the left nostril. After this they were instructed to inhale through the left nostril to their maximum capacity and then to close the left nostril with the ring and little finger of the right hand while raising the thumb to unblock the right nostril and exhale slowly through the right nostril. This was followed by inhaling through the right nostril and closing the right nostril with the right thumb while raising the ring and little finger of the right hand to unblock the left nostril, followed by exhalation through the left nostril. The sequence is repeated as mentioned above. The breath rate is maintained between 6 and 10 breaths per minute during the practice.

Bellows Yoga Breathing (Bhastrika Pranayama). Participants were asked to inhale so that the lungs were filled to their maximum capacity and then to exhale to the maximum extent possible. In this practice increasing the volume of air inhaled and exhaled is emphasized, resembling a blacksmith's bellows.

University of Patanjali Haridwar

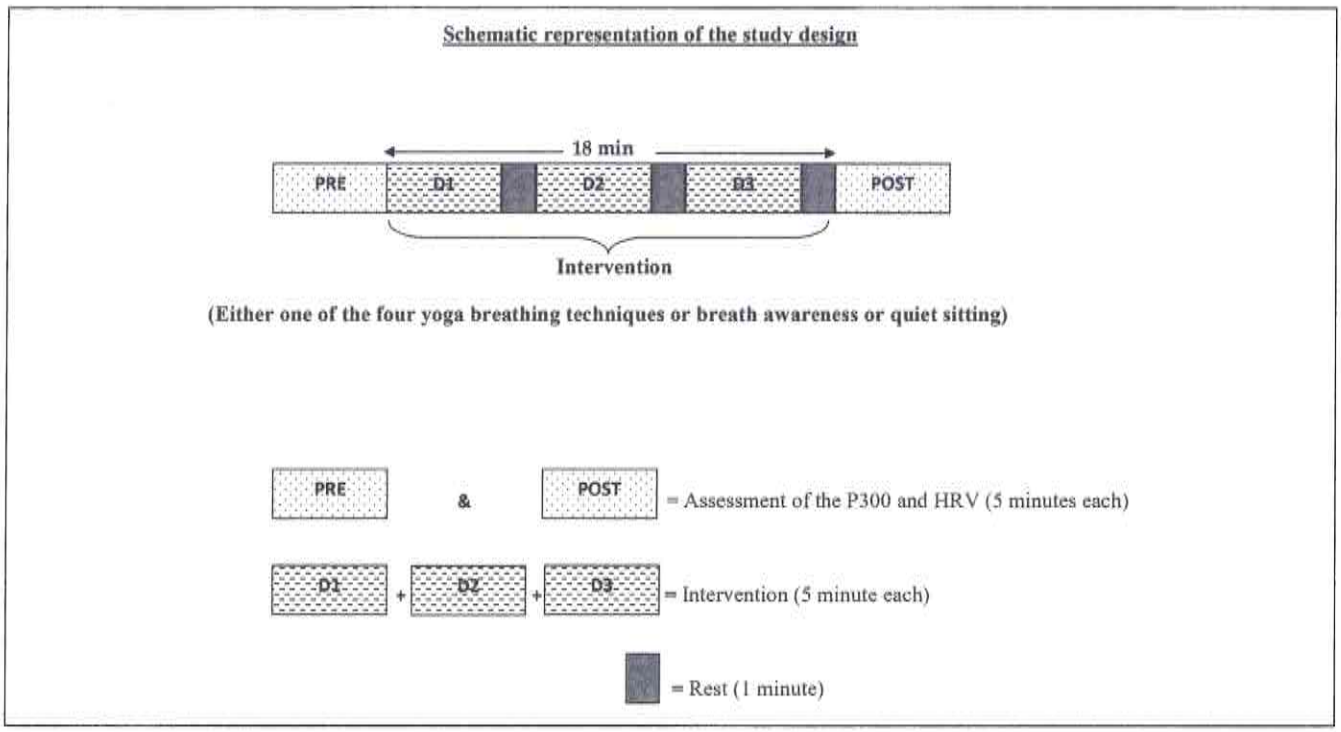

Figure 1. Schematic representation of the study design.

Participants were asked to maintain the duration of inhalation approximately 2.5 seconds and duration of exhalation 2.5 seconds approximately. The breath rate during the practice is maintained between 8 and 12 breaths per minute.

Bumblebee Yoga Breathing (Bhramari Pranayama). Participants were asked to press lightly at the root of the nose near the eyes with the middle fingers of both hands, keeping their mind centred and to close the ears with thumbs, then to inhale for 3-5 seconds with a rhythmic flow, and exhale humming like a bee while breathing out taking 15-20 seconds for the exhalation. The breath rate during the practice is maintained between 2 and 3 breaths per minute.

High Frequency Yoga Breathing (Kapalabhati Pranayama). Participants were asked to inhale slowly and exhale with force with contraction of the abdominal muscles. The breath rate is maintained between 55 and 65 breaths per minute during the practice.

Breath Awareness (Interventional Control). The participants were asked to be aware of the flow of air as it enters and passes through the nasal passage. Hence throughout the practice the attention of the participants was directed toward the breath. Breath awareness was selected as an alternate intervention, since being aware of the breath is an essential part of all yoga breathing techniques.

Quiet Seated Rest (Control Session). Participants were asked to sit cross-legged (*sukhasana*) with their spine erect, eyes closed and both hands resting on the respective knees. They were asked to allow their thoughts to wander freely.

Data Extraction

P300 ERP. The peak amplitude of the P300 ERP was defined as the voltage difference between the baseline at stimulus delivery and the maximum positive peak of the ERP waveform within 250 to 500 ms latency.[20] The peak latency was defined as the time from stimulus onset to the point of largest positive amplitude within 250 to 500 ms.

HRV. The data were visually inspected offline and only noise free data were included for analysis. Frequency domain and time domain components of HRV were extracted using Kubios HRV software developed by the Biosignal Analysis and Medical Imaging Group, University of Eastern Finland.[21]

Frequency Domain Analysis. The energy in the HRV series was studied for three frequency bands with Fast Fourier Transformation: (i) very low frequency band (0.003-0.04 Hz), (ii) low frequency band (0.04-0.15 Hz) and (iii) high frequency band (0.15-0.40 Hz). The values of the low frequency (LF) and high frequency (HF) band were expressed as normalized units. The LF/HF ratio was also determined.

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Time Domain Analysis. The following time domain indices of HRV were obtained: mean RR interval (the mean of intervals between adjacent QRS complexes); mean heart rate, RMSSD (root mean square of the successive differences of NN intervals); NN50 (the number of interval differences of successive normal to normal intervals greater than 50 ms), and pNN50 (the proportion derived by dividing NN50 by the total number of NN intervals).

Respiration Rate. The respiration rate was calculated as cycles per minute (CPM) by averaging the breath rate in each 5 minute state (ie, pre and post).

Data Analysis

The data were analyzed using SPSS (version 24.0) with separate repeated measures analyses of variances (RM-ANOVA) followed by Bonferroni adjusted *post-hoc* analyses. For each ANOVA there were two Within subjects factors, *viz.* Sessions (with six levels ie, four *pranayamas* and two controls) and States (with two levels ie, Pre and Post). Sequentially rejective Bonferroni test (also known as Bonferroni-Holm correction) was performed to control the family-wise error rate for primary contrasts of interests (ie, States, Sessions and Session × States interactions).[22] The level of significance (α) was set at 0.05, after which significant p values obtained in ANOVA results for a variable in the three tests (ie, States, Sessions and Session x States) were sorted in ascending order. The adjusted alpha levels (α_{adj}) were computed for each of the P value as follows: for the smallest P value, α_{adj} was computed by dividing α level (ie, 0.05) by the number of tests (ie, 3 in the present case). Hence α_{adj} for the smallest P value was $0.05/3 = 0.0167$. For the middle P value, α_{adj} was computed by dividing α level (ie, 0.05) by the number of tests minus 1 (ie, 2 in the present case). The α_{adj} for the middle P value was $0.05/2 = 0.025$ (in the present case). For the final P value, α_{adj} equals to α divided by 1 (ie, the total number of tests minus 2). Hence the α_{adj} for the final P value was $0.05/1 = 0.05$ (in the present case). After this, each P value was evaluated sequentially (ie, smallest P value first) against the adjusted α levels. If the smallest P value was not less than from the corresponding adjusted α levels, then remaining P values were not evaluated and were considered non-significant.

To determine the association between change in P300 peak amplitude and duration of yoga experience, percentage change in P300 amplitude at Pz was calculated (post value minus pre value divided by pre value multiplied by 100), followed by Pearson correlation analysis.

Results

Self Reported Quality of Practice

The self reported quality of practice for the six sessions (group mean ± SD) based on the visual analog scales was as follows: (i) 8.45 ± 0.98 for alternate nostril yoga breathing, (ii) 8.22 ± 0.94 for bellows yoga breathing, (iii) 8.43 ± 1.04 for bumblebee yoga breathing, (iv) 8.09 ± 1.08 for high frequency yoga breathing, (v) 7.94 ± 0.85 for breath awareness and (vi) 8.03 ± 0.89 for quiet seated rest.

P300 ERP

The target stimuli counted in both pre and post task recordings were above 95% (the pre determined criterion for inclusion) and up to 100%, without the possibility for marked difference in counts after any of the interventions. Hence the percentage of the accuracy in target counts were 98.96% and 99.21% before and after alternate nostril yoga breathing, 99.24% and 99.49% before and after bellows yoga breathing, 98.92% and 99.18% before and after bumblebee yoga breathing, 98.68% and 99.36% before and after high frequency yoga breathing, 98.36% and 99.06% before and after breath awareness and 99.32% and 98.70% before and after quiet seated rest. There was no significant difference in accuracy of target stimuli count before and after each session. Since there was no way of determining whether participants' mental counts reflected target stimuli alone or target and non-target stimuli, no correlation was attempted between the counts and physiological responses.

Repeated Measures ANOVA. Following *Bonferroni-Holm correction* test, a significant interaction between Sessions and States was found for the P300 peak amplitude at Pz electrode site ($F = 5.109$, $P < 0.001$). There was a significant main effect across States for P300 peak amplitude at Cz electrode site ($F = 8.007$, $P = 0.007$), Pz electrode site ($F = 9.543$, $P = 0.004$) and for the P300 peak latency at Pz electrode site ($F = 8.447$, $P = 0.006$). There was a significant main effect between Sessions for the P300 peak latency at Cz electrode site ($F = 5.379$, $P = 0.015$).

HRV

Repeated Measures ANOVA. No significant interaction between States and Sessions was found for any of the HRV variables. There was a significant main effect across States for mean RR intervals ($F = 9.091$, $P = 0.005$), heart rate ($F = 8.915$, $P = 0.005$), NN50 ($F = 10.447$, $P = 0.003$) and pNN50 ($F = 8.418$, $P = 0.006$).

The details of the repeated measures analyses of variance are presented in Tables 2 and 3.

Post hoc Analysis

Bonferroni adjusted *post-hoc* analyses were carried out for variables which showed significant interaction between States and Sessions. Bonferroni adjusted *post-hoc* tests showed a significant increase in P300 peak amplitude at Pz electrode site following (i) alternate nostril yoga breathing ($P = 0.003$; 95%

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Table 2. Details of Repeated Measures ANOVA for P300 Peak Amplitude and Peak Latency.

Variable	Factor	*F* value	*df*	Hyunh-Feldt epsilon	*P* value	α_{adj}
Peak amplitude at Fz	Sessions	1.694	5185	1	0.138	0.05
	States	3.720	1,37	1	0.061	0.017
	Sessions x States	1.910	4.801,177.65	0.960	0.098	0.025
Peak amplitude at Cz	Sessions	0.700	4.644,171.825	0.929	0.614	0.025
	States	8.007	1,37	1	0.007	0.017
	Sessions x States	0.564	4.566,168.941	0.913	0.712	0.05
Peak amplitude at Pz	Sessions	1.683	5185	1	0.141	0.05
	States	9.543	1,37	1	0.004	0.025
	Sessions x States	5.109	5185	1	<0.001	0.017
Peak latency at Fz	Sessions	1.837	4.085,150.146	0.812	0.124	0.017
	States	1.509	1,37	1	0.227	0.025
	Sessions x States	0.458	4.610,170.560	0.922	0.793	0.05
Peak latency at Cz	Sessions	2.993	4.654,172	0.931	0.015	0.017
	States	5.379	1,37	1	0.026	0.025
	Sessions x States	0.612	4.048,149.773	0.810	0.656	0.05
Peak latency at Pz	Sessions	0.347	4.912,181.741	0.982	0.881	0.05
	States	8.447	1,37	1	0.006	0.017
	Sessions x States	0.711	4.335,160.413	0.867	0.597	0.025

Table 3. Details of Repeated Measures ANOVA for HRV Components.

Variable	Factor	F value	df	Hyunh-Feldt epsilon	p value	α_{adj}
Mean RR intervals (s)	Sessions	0.103	3.85,142.25	0.769	0.976	0.05
	States	9.091	1,37	1	0.005	0.017
	Sessions x States	2.198	4.49,166.02	0.897	0.064	0.025
HR (bpm)	Sessions	1.301	4.18,154.75	0.836	0.271	0.05
	States	8.915	1,37	1	0.005	0.017
	Sessions x States	2.139	1.84,68.2	0.369	0.129	0.025
RMSSD (ms)	Sessions	1.470	2.44,90.30	0.488	0.233	0.025
	States	4.480	1,37	1	0.041	0.017
	Sessions x States	0.456	2.33,86.06	0.465	0.665	0.05
NN50 (count)	Sessions	1.502	4.59,170	0.919	0.197	0.025
	States	10.447	1,37	1	0.003	0.017
	Sessions x States	0.654	4.55,168.29	0.910	0.645	0.05
pNN50 (%)	Sessions	0.861	4.47,165.44	0.894	0.499	0.05
	States	8.418	1,37	1	0.006	0.017
	Sessions x States	0.952	4.27,158.09	0.855	0.440	0.025
LF power (n.u.)	Sessions	0.837	4.53,167.73	0.907	0.516	0.05
	States	0.432	1,37	1	0.515	0.025
	Sessions x States	2.060	4.35,160.86	0.870	0.083	0.017
HF power (n.u.)	Sessions	0.908	4.51,166.77	0.901	0.470	0.025
	States	0.294	1,37	1	0.591	0.05
	Sessions x States	2.163	4.2,155.25	0.839	0.073	0.017
VLF peak (Hz)	Sessions	1.148	2.45,90.76	0.491	0.329	0.025
	States	0.911	1,37	1	0.346	0.05
	Sessions x States	2.151	2.26,83.74	0.453	0.116	0.017
LF to HF ratio	Sessions	1.552	2.87,106.05	0.573	0.207	0.025
	States	0.122	1,37	1	0.729	0.05
	Sessions x States	2.373	3.02,111.63	0.603	0.074	0.017
Respiration rate (cpm)	Sessions	1.202	4.43,163.98	0.886	0.312	0.025
	States	0.383	1,37	1	0.540	0.05
	Sessions x States	2.850	5185	1	0.017	0.017

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Table 4. P300 Peak Amplitude and Peak Latency Recorded at Fz, Cz and Pz Scalp Sites Before and After Four Yoga Breathing Practices, Breath Awareness and Quiet Seated Rest. Values are Group Mean ± *SD*.

			n = 38					
			Alternate nostril yoga breathing	Bellows yoga breathing	Bumblebee yoga breathing	High frequency yoga breathing	Breath awareness	Quiet seated rest
P300 peak amplitude (μV)	**Fz**	**Pre**	6.21 ± 2.63	5.33 ± 3.12	5.89 ± 3.23	5.14 ± 2.98	6.6 ± 3.56	6.24 ± 3.67
		Post	7.13 ± 3.6	5.79 ± 2.92	6.04 ± 2.7	6.82 ± 3.65	6.54 ± 3.33	6.21 ± 2.79
		Cohen's *d*	0.35	0.15	0.05	0.50	0.01	0.01
	Cz	**Pre**	8.55 ± 3.88	8.05 ± 4.48	8.3 ± 4.36	7.79 ± 4.01	9.01 ± 4.68	8.65 ± 5.12
		Post	9.52 ± 4.74	8.92 ± 4.08	9.2 ± 4.46	8.62 ± 3.99	9.01 ± 3.7	9.18 ± 4.29
		Cohen's *d*	0.22	0.20	0.20	0.20	<0.001	0.11
	Pz	**Pre**	8.74 ± 3.6	8.42 ± 4.7	8.96 ± 4.29	7.69 ± 3.88	9.28 ± 4.8	8.99 ± 4.53
		Post	10.04 ± 4.16**	9.64 ± 4.25**	10.57 ± 4.88***	8.63 ± 3.06*	8.53 ± 4	8.61 ± 4.26
		Cohen's *d*	0.33	0.27	0.35	0.27	0.17	0.08
P300 peak latency (ms)	**Fz**	**Pre**	341.95 ± 22.76	349.59 ± 35.78	346.8 ± 26.08	341.28 ± 33.53	337.12 ± 39.51	341.13 ± 29.45
		Post	345.71 ± 31.53	346.12 ± 27.81	340.18 ± 24.86	336.04 ± 34.68	333.64 ± 39.73	338.76 ± 31.04
		Cohen's *d*	0.14	0.10	0.26	0.15	0.08	0.07
	Cz	**Pre**	340.56 ± 26.24	342.99 ± 37.42	347.14 ± 26.15	341.14 ± 34.33	331.72 ± 46.31	336.56 ± 35.51
		Post	342.42 ± 32.53	339.52 ± 37.59	340.76 ± 30.01	333.9 ± 37.41	323.44 ± 44.55	328.36 ± 43.07
		Cohen's *d*	0.06	0.09	0.22	0.20	0.18	0.20
	Pz	**Pre**	349.73 ± 32.3	347.96 ± 37.46	352.06 ± 28.61	352.16 ± 33.36	350.06 ± 40.65	349.48 ± 38.47
		Post	346.21 ± 34.71	347.27 ± 38.66	347.11 ± 32.38	339.33 ± 36.79	337.5 ± 41.94	345.98 ± 43.86
		Cohen's *d*	0.10	0.01	0.16	0.36	0.30	0.08

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$; *post-hoc* analyses following RM-ANOVA with Bonferroni adjustment, post values compared with respective pre values.

$CI = 2.116, 0.487$; Cohen's $d = 0.33$), (ii) bellows yoga breathing ($P = 0.004$; 95% $CI = 2.044, 0.405$; Cohen's $d = 0.27$), (iii) bumblebee yoga breathing ($P < 0.001$; 95% $CI = 2.383, 0.851$; Cohen's $d = 0.35$) and (iv) high frequency yoga breathing ($P = 0.034$; 95% $CI = 1.087, 0.078$; Cohen's $d = 0.27$).

The group mean values ± *SD* for (i) P300 peak amplitudes and peak latencies and (ii) HRV time domain and frequency domain variables before and after the six sessions are presented in Tables 4 and 5. The grand averaged P300 ERP traces before and after (i) alternate nostril yoga breathing and bellows yoga breathing (ii) bumblebee yoga breathing and high frequency yoga breathing and (iii) breath awareness and quiet seated rest are presented in Figures 2 to 4 respectively.

Pearson Correlation

There was no significant correlation between yoga experience and the percentage of change in the P300 peak amplitude at the Pz electrode site following the yoga breathing sessions.

Discussion

Following four yoga breathing practices *viz.* high frequency yoga breathing, bellows yoga breathing, bumblebee yoga breathing and alternate nostril yoga breathing, the P300 peak amplitude increased significantly at the parietal midline scalp recording site with no changes in the P300 after the two control interventions. There were no significant changes in the heart rate variability (HRV) after the four yoga breathing practices or the two control sessions.

A two stimulus oddball task was used to elicit a target stimulus processing event related potential, the P300. An increase in the P300 amplitude is associated with directing attention to the target stimuli with increased engagement of attentional resources for the task.[20] Hence following all four yoga breathing practices the increase in resources recruited for the oddball task could reflect an increase in targeted phasic attention.[23] Previously, a decreased P300 amplitude was described as indicative of decreased openness to deviant stimuli.[24] Hence

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Table 5. HRV and Respiration Rate Before and After Four Yoga Breathing Practices, Breath Awareness and Quiet Seated Rest. Values are Group Mean ± *SD*.

Variables		Alternate nostril yoga breathing	Bellows yoga breathing	Bumblebee yoga breathing	High frequency yoga breathing	Breath awareness	Quiet seated rest
Mean RR intervals (s)	Pre	0.84 ± 0.13	0.82 ± 0.13	0.82 ± 0.12	0.84 ± 0.1	0.83 ± 0.13	0.84 ± 0.15
	Post	0.85 ± 0.12	0.85 ± 0.12	0.85 ± 0.13	0.84 ± 0.09	0.83 ± 0.11	0.85 ± 0.14
	Cohen's d	0.07	0.2	0.25	0.05	<0.01	0.05
HR (bpm)	Pre	74.43 ± 12.14	75.38 ± 11.62	75.57 ± 10.16	73.59 ± 8.86	74.44 ± 11.66	74.87 ± 12.86
	Post	73.62 ± 9.89	72.84 ± 10.61	73.17 ± 10.04	71.79 ± 7.78	74.33 ± 10.64	74.1 ± 13.16
	Cohen's d	0.07	0.23	0.24	0.4	<0.01	0.06
RMSSD (ms)	Pre	68.59 ± 32.75	70.26 ± 116.78	101.9 ± 129.2	73.36 ± 69.97	61.63 ± 20.99	95.71 ± 185.57
	Post	92.09 ± 73.45	78.02 ± 28.87	121.92 ± 131.68	84.63 ± 70.69	78.11 ± 38.36	96.88 ± 155.39
	Cohen's d	0.44	0.11	0.15	0.16	0.56	0.01
NN50 (count)	Pre	101.2 ± 55.85	81.45 ± 59.67	94.6 ± 52.35	95.01 ± 60	100.29 ± 51.61	87.24 ± 58.87
	Post	106.1 ± 48.01	98.95 ± 54.27	106.77 ± 59.51	102.75 ± 56.04	105.29 ± 56.97	95.76 ± 55.06
	Cohen's d	0.09	0.31	0.22	0.13	0.09	0.15
pNN50 (%)	Pre	29.02 ± 16.83	24.07 ± 17.39	26.96 ± 14.93	27.45 ± 18.82	28.21 ± 15.06	26.72 ± 19.62
	Post	30.64 ± 14.42	28.94 ± 16.32	32.15 ± 18.62	31.16 ± 17.99	29.52 ± 16.78	28.04 ± 17.53
	Cohen's d	0.1	0.29	0.31	0.2	0.08	0.07
LF power (n.u.)	Pre	44.96 ± 14.89	52.05 ± 17.69	49.95 ± 16.34	47.15 ± 15.71	46.48 ± 14.8	51.24 ± 19.34
	Post	47.07 ± 14.35	48.32 ± 14.25	49.32 ± 13.4	51.91 ± 20.7	51.05 ± 18.31	48.75 ± 17.71
	Cohen's d	0.14	0.23	0.04	0.26	0.28	0.13
HF power (n.u.)	Pre	55.04 ± 14.89	47.93 ± 17.66	50.05 ± 16.34	52.94 ± 15.78	53.52 ± 14.8	48.04 ± 20.48
	Post	52.93 ± 14.35	51.68 ± 14.25	50.68 ± 13.4	48.09 ± 20.7	48.95 ± 18.31	51.25 ± 17.71
	Cohen's d	0.14	0.23	0.04	0.27	0.3	0.17
VLF peak (Hz)	Pre	0.03 ± 0.03	0.03 ± 0.03	0.02 ± 0.01	0.03 ± 0.05	0.03 ± 0.01	0.04 ± 0.07
	Post	0.03 ± 0.04	0.03 ± 0.01	0.03 ± 0.01	0.03 ± 0.02	0.02 ± 0.01	0.03 ± 0.03
	Cohen's d	0.04	0.18	0.61	0.14	0.3	0.36
LF to HF ratio	Pre	1.04 ± 0.73	1.51 ± 1.27	2.04 ± 4	1.11 ± 0.8	1.06 ± 0.75	2.16 ± 3.51
	Post	1.22 ± 1.15	1.12 ± 0.69	1.4 ± 1.51	1.75 ± 2.01	1.45 ± 1.28	1.39 ± 1.53
	Cohen's d	0.19	0.4	0.23	0.46	0.38	0.3
Respiration rate (cpm)	Pre	16.24 ± 1.85	16.08 ± 2.47	16.22 ± 2.66	16.27 ± 2.06	16.25 ± 2.3	15.51 ± 2.98
	Post	16.68 ± 1.97	15.66 ± 2.5	16.42 ± 2.54	15.87 ± 2.51	15.56 ± 2.49	15.81 ± 2.71
	Cohen's d	0.23	0.17	0.08	0.17	0.29	0.11

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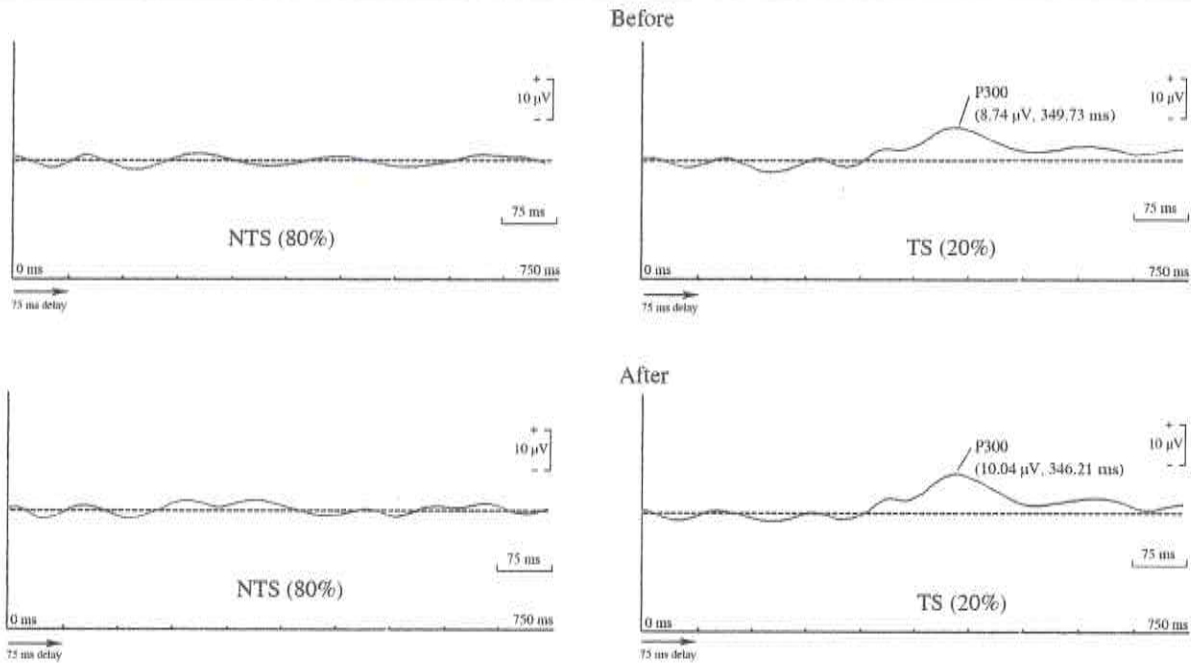
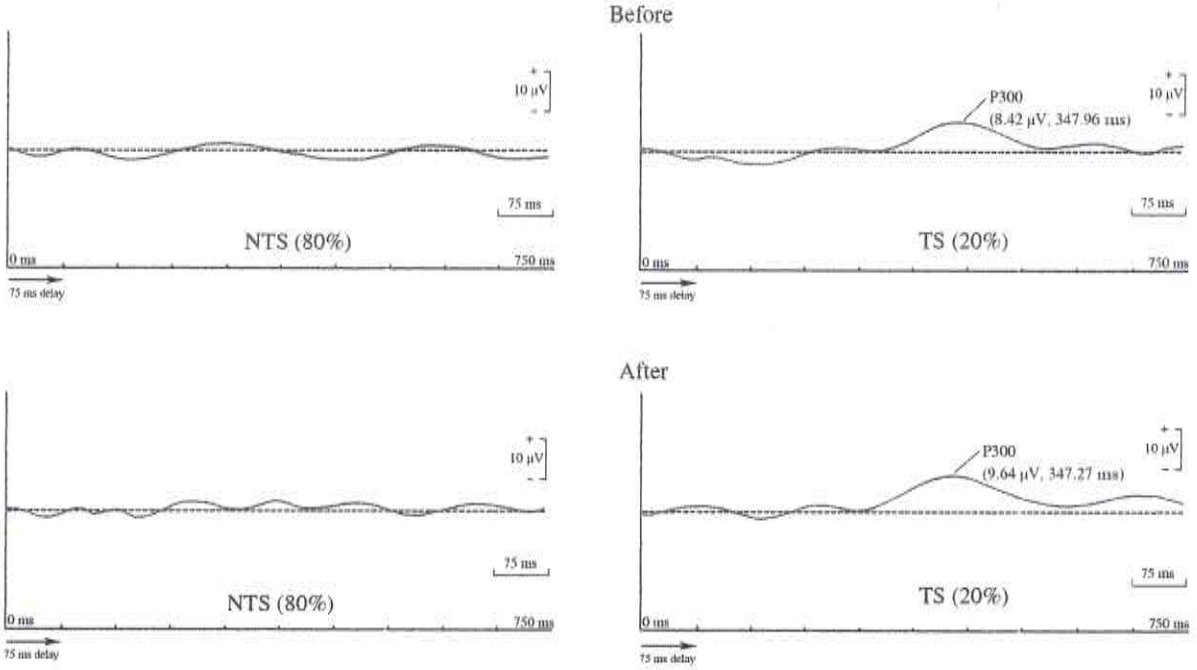


Averaged P300 waveform (n=38) before and after alternate nostril yoga breathing at Pz (referenced at linked earlobes)



Averaged P300 waveform (n=38) before and after bellows yoga breathing at Pz (referenced at linked earlobes)

Figure 2. Grand average traces of P300 before and after alternate nostril yoga breathing and bellows yoga breathing. NTS = non-target stimuli, TS = target stimuli.

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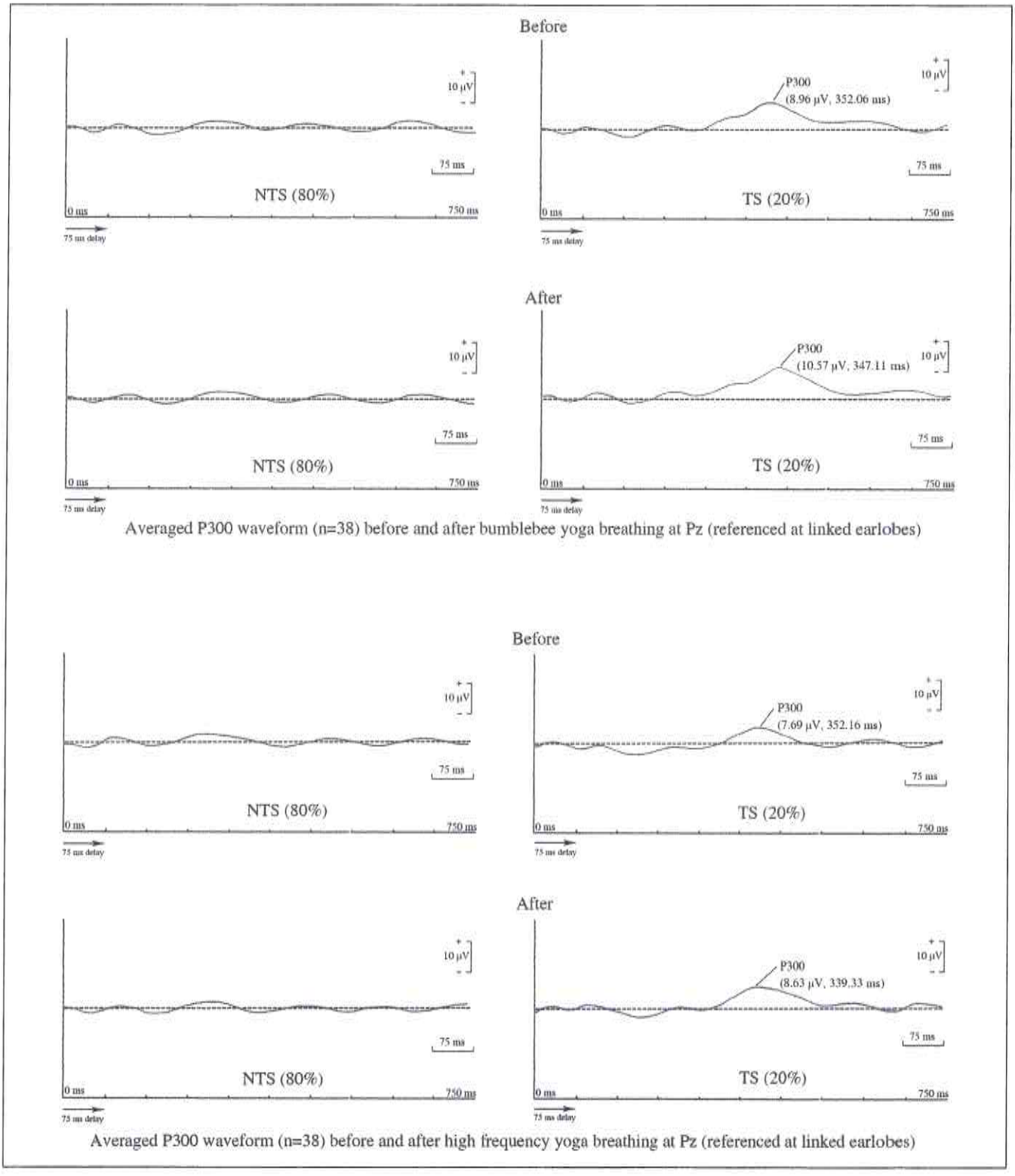

Figure 3. Grand average traces of P300 before and after bumblebee yoga breathing and high frequency yoga breathing. NTS = non-target stimuli, TS = target stimuli.

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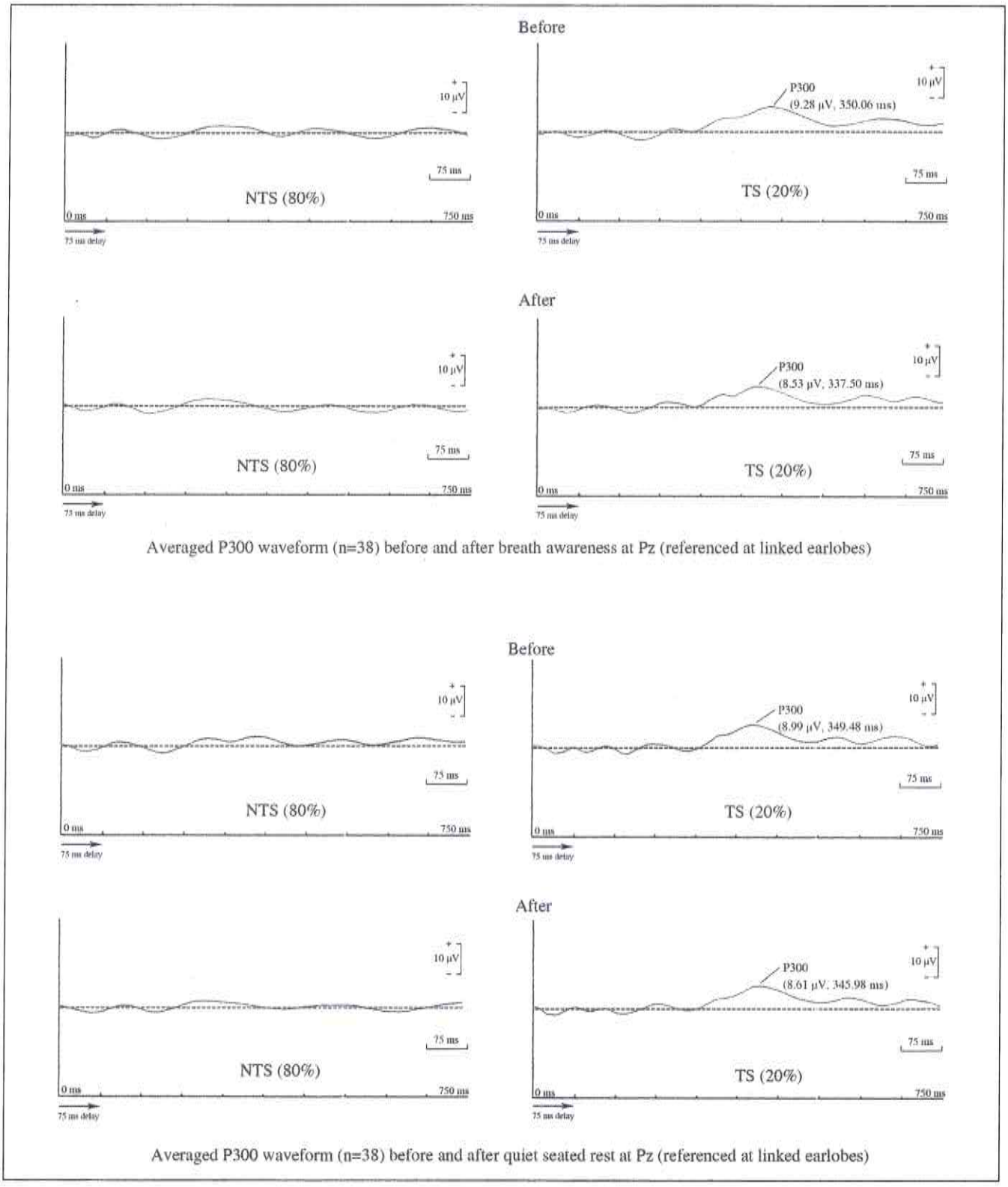

Figure 4. Grand average traces of P300 before and after breath awareness and quiet seated rest. NTS = non-target stimuli, TS = target stimuli.

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conversely, the increase in P300 amplitude after the yoga breathing practices may reflect greater attention towards the task involving mental counting of the target stimuli, reflecting increased phasic arousal.[20,24] The increase in P300 peak amplitude occurred after the four yoga breathing practices but not after breath awareness or quiet seated rest. This suggests that the effect may be related to features specific to the yoga breathing practices.[2]

All yoga breathing practices include volitional breath regulation while directing the awareness to the breath.[2] The brain activity during both volitional and attentional breathing were assessed in eight adults with focal pharmacoresistant epilepsy chronically monitored with intracranial stereoencephalographic depth arrays.[25] Intracranial EEG with concurrent monitoring of the respiration was recorded while participants alternated between blocks of spontaneous breathing and volitionally regulated breathing with an increase in respiratory frequency.[25] Similarly participants were directed to turn their attention to the breath and count the breaths during repeated blocks of attentional breathing.[25] The areas involved in volitional breathing were the caudal-medial frontal, orbitofrontal, premotor, and motor cortex, insula, superior temporal gyrus and amygdala. During attentive breathing which resembles breath awareness in the present study, the anterior cingulum, premotor, insula and hippocampus showed activity.[25] Hence the networks involved in volitional breathing and in attentional breathing are distinct though with areas of overlap. Several areas in both networks are involved in cognition, particularly in attention.[26-28] As mentioned above, the four yoga breathing practices studied here include volitional breathing and attentive breathing,[2] hence these practices can be expected to facilitate attention.

In addition to effects common to the yoga breathing practices, each practice could be assumed to have specific effects related to the dimension of respiration which is regulated volitionally.[2] However, the present results did not demonstrate any difference in the response to the auditory oddball task following the four yoga breathing practices.

The absence of change in the peak latency of the P300 after the four yoga breathing practices compared to earlier reported decreases in P300 peak latency following high frequency yoga breathing[3] and alternate nostril yoga breathing[4] could be due to differences in the duration of the intervention among other factors.

The present study also compared the HRV recorded simultaneously with the oddball task following the four yoga breathing practices and two control sessions. There were no changes in the HRV following the yoga breathing practices or control sessions. This suggests that increased P300 peak amplitudes recorded after the four yoga breathing practices indicating increased engagement of neural resources for attention, was not associated with a change in cardiac autonomic activity. Previously, in separate studies changes were reported in the HRV in high frequency yoga breathing,[12] alternate nostril yoga breathing[14] and bumblebee yoga breathing.[15]

The absence of change in HRV in the present study may be related to the timing of HRV recordings after the yoga breathing practices and simultaneous with the two stimulus oddball task.

Most changes were recorded at the parietal site. When intracranial recordings, lesion studies and event-related functional imaging with source analysis were used to determine the generators of the P300 elicited by an oddball paradigm, a consistent pattern of generators emerged, with target related responses associated with the parietal cortex and the cingulate, along with novelty related activations in the inferior parietal and prefrontal regions.[29] Similarly, the odd ball paradigm used to elicit the P300 in the present study involved detection of the unpredictable target stimulus, which could be expected to lead to activation best picked up from the parietal midline site (ie, Pz).[24]

Hence the present results suggest that the four yoga breathing practices increase attentional resources for an oddball task which requires two stimulus discrimination and counting target stimuli. All four yoga breathing practices showed the same change irrespective of the characteristic of respiration modified volitionally. The results hence suggest that yoga volitional breathing may be practiced with benefits for sustained attention.

Generalizability of the present results is limited by selecting participants who were trained in yoga for a minimum of 6 months, excluding those with shorter training and yoga naïve participants. Also, male participants alone were included in the study. Females were excluded to prevent a possible source of variation due to changes of the variables (ie, the ERP and HRV) with phases of the menstrual cycle.[17,18]

Author Contributions

AQ1

ST designed the study, interpreted the results and compiled the manuscript. NK & SKS collected and analyzed the data and assisted in compiling the manuscript. AB contributed in designing the study and fund collection. All authors read and approved the manuscript

Declaration of Conflicting Interests

GQ3

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AQ2

Ethical Approval

~~Not applicable, because this article does not contain any studies with human or animal subjects.~~

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Short Communication

Perceptions about the Benefits and Negative Outcomes of Yoga Practice by Yoga-Naïve Persons: A Cross-sectional Survey

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Abstract

Background and Objective: Understanding the way nonexercisers view the benefits and barriers to physical exercise helps promote physical exercise. This study reports perceived benefits and negative outcomes of yoga perceived by yoga-naïve persons. **Methods:** The 2550 yoga-naïve respondents of both sexes (m:f = 2162:388; group mean age ± SD 23.5 ± 12.6 years) participated in a convenience sampling in-person survey conducted to determine the perceived benefits and negative outcomes of yoga. **Results:** Among 2550 respondents, 97.4% believed yoga practice had benefits. The three most common perceived benefits of yoga were improvement in (i) physical health (39.8%), (ii) cognitive functions (32.8%), and (iii) mental health (20.4%). Among the respondents, 1.4% believed that yoga had negative outcomes. The three most common perceived negative outcomes were (i) apprehension that wrong methods may be harmful (0.24%), (ii) apprehension that excessive practice may harm (0.24%), and (iii) laziness (0.12%). **Conclusion:** The most common perceived benefit of yoga practice was "improvement in physical health," with "apprehension that wrong or excessive practice could be harmful" as the most common perceived negative outcomes of yoga.

Keywords: *Naïve to yoga persons, perceived benefits, perceived negative outcomes, yoga*

Introduction

Understanding the way nonexercisers perceive the benefits and barriers to physical activity has mediated change promoting physical activity.[1] While the practice of yoga includes an increase in physical activity and calmness of the mind, there are also several similarities between the factors associated with regular physical activity or yoga practice as a lifestyle choice.[2,3]

Several surveys have reported yoga practitioners' benefits from yoga practice.[4-6] A survey on 3135 yoga practitioners in India reported that the most common benefits were improvement in (i) physical fitness, (ii) mental state, and (iii) cognitive functions.[6] The most common negative outcomes reported were (i) soreness and pain, (ii) muscle injuries, and (iii) fatigue.[6] These findings were comparable to previously reported benefits and negative outcomes of yoga from the US, UK, Japan, and Germany.[4,5,7,8] These results suggest that yoga practitioners with varying experience of yoga practice experience and report improved physical health as well as benefits to mental health.

Reports about the benefits and negative effects of yoga as perceived by yoga-naïve persons are scarce. An understanding of the perceptions of yoga naïve persons about the benefits and negative outcomes of yoga is essential to promoting yoga practice. With this background, the present survey was conducted to determine perceived benefits and negative outcomes of yoga in yoga-naïve persons.

Materials and Methods

Respondents

Convenience in person sampling was used to distribute the survey sheets to persons at a public event on yoga.[9] The inclusion criteria were (i) participation in the event and (ii) having completed 10 years of age, as the minimum age required for children to respond to questions accurately.[10] The exclusion criterion was prior experience of yoga practice. Of the 8600 respondents who returned the survey sheet, 5441 had practiced yoga before and their responses

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have been published elsewhere.[6] Incomplete or incorrectly filled surveys were also excluded. The signed informed consent of each respondent was obtained.

Study design

Prior clearance from the institutional ethical committee was obtained to conduct the survey (approval number YRD-018/002). The study is reported according to the recommendations of "The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies."

The survey

The survey was originally developed in English and was translated into Hindi (i.e., local language). The method of translating the survey from English to Hindi has been described elsewhere.[6]

The survey was developed to understand the perceived benefits and negative outcomes of yoga by yoga-naïve persons. The survey had three questions. The first question was to identify yoga-naïve persons from those who had prior yoga experience (i.e., question 1(a) "have you practiced yoga before?" respond "yes" or "no"). Those who had prior experience of yoga were excluded.

The second and third questions of the survey had one parent question and one follow-up question. The follow-up questions were for those who responded "yes" to parent questions. The second question was question 2(a) (i.e., question 2(a) "'Do you think that there is any benefit of practicing yoga?" respond "'Yes" or "No"; question 2(b) "If your response to question 2(a) was "Yes," mention the most definitive benefit of yoga you think can occur)." The third question was question 3(a) "'Do you think that there can be any negative outcome of practicing yoga?" respond "'Yes" or "No"; question 3(b) "'If your response to question 3(a) was "Yes," mention the most definite negative outcome of yoga you think can arise by practicing yoga." Responses to questions 1 were mandatory for all the participants, whereas the responses to questions 2(b) and 3(b) were mandatory for those who responded "Yes" to questions 2(a) and 3(a).

The characteristics of the respondents such as age and gender were obtained separately.

Data cleaning

Nine thousand and one hundred survey sheets were distributed. Of these, 8600 respondents returned the survey, of which 5441 had prior experience of yoga and were excluded from the present analysis. From the remaining 3159 respondents, 609 were excluded due to the following reasons: (i) 280 did not mention clearly whether they had prior experience of yoga or not and (ii) 329 were excluded as their responses to either question 2(b) or question 3(b) were unclear. Hence, data of 2550 (29.7% of the total respondents who returned the survey) respondents were used for analyses.

Data analysis

The percentages of respondents who reported perceived benefits and perceived negative outcomes of yoga were calculated.

Results

Two thousand five hundred and fifty respondents completed the survey satisfactorily and their responses were analyzed. The number of respondents at different stages of the trial is provided in Figure 1. The baseline characteristics of the respondents are provided in Table 1.

Perceived benefits of yoga

Two thousand four hundred eighty-four respondents (97.4% of the total respondents who completed the survey satisfactorily) reported perceived benefits of yoga [Table 2]. The three most common perceived benefits were improvement in (i) physical health (n = 988; 39.8% of the total respondents), (ii) cognitive health (n = 814; 32.8% of the total respondents), and (iii) mental health (n = 504; 20.4% of the total respondents).

Perceived negative outcomes of yoga

Thirty-five respondents (1.4% of the total number of respondents) reported perceived negative outcomes

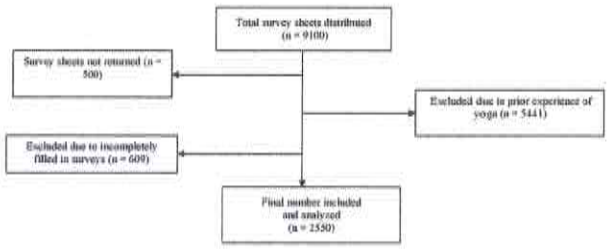

Figure 1: Trial profile

Table 1: Baseline characteristics of the respondents

Characteristics	n=2550
Age (years)	
Age range	10-77
Group mean age±SD	23.5±12.6
Gender (male: female)	
Actual values	2162:388
Percentage values	84.78:15.22
Years of education (%)	
10 and less	629
11-12	1117
13-15	395
16 and above	215
Not mentioned	194

SD: Standard deviation

University of Patanjali Haridwar

Table 2: Gender- and age-wise details of the respondents who reported perceived benefits and perceived negative outcomes of yoga

Characteristics	Subcharacteristics	*n* (%)	Perceived benefits		Perceived negative outcomes	
			Yes, *n* (%)	No, *n* (%)	Yes, *n* (%)	No, *n* (%)
Gender	Male	2162 (84.78)	2110 (97.59)	52 (2.41)	30 (1.39)	2132 (98.61)
	Female	388 (15.22)	374 (96.39)	14 (3.61)	7 (1.80)	381 (98.20)
Age (years)	10-12	31 (1.22)	31 (100)	0	1 (3.23)	30 (96.77)
	13-20	1728 (67.77)	1688 (97.69)	40 (2.32)	25 (1.45)	1703 (98.55)
	21-44	542 (21.26)	525 (96.86)	17 (3.14)	6 (1.11)	536 (98.89)
	45-59	178 (6.98)	171 (96.07)	7 (3.93)	3 (1.69)	175 (98.32)
	60 and above	71 (2.78)	68 (95.78)	3 (4.23)	1 (1.41)	70 (98.59)

of yoga [Table 2]. The three most common negative outcomes reported were (i) apprehension that wrong methods may cause negative outcomes (0.24% of the total respondents), (ii) apprehension that excessive practice may cause negative outcomes (0.24% of the total respondents), and (iii) lethargy (0.12% of the total respondents).

Discussion

97.4% of the yoga-naïve respondents reported perceived benefits of yoga and 1.4% reported perceived negative outcomes.

The three most common perceived benefits of yoga were of three categories, namely (i) physical health which includes improved physical fitness, better physical strength, balance, flexibility, body weight regulation, and ability to carry out physical activity (reported by 39.8%), (ii) cognitive health indicates an improvement in attention, concentration, learning, and memory (32.8%), and (iii) mental health functions included positive affect, increased satisfaction with life, and reduced depression (20.4%). The three categories of perceived benefits reported were the same as the categories of benefits experienced by yoga-experienced population.[6]

Most yoga-naïve persons perceived better physical health as the most likely outcome of yoga practice. These findings are supported by the results of a pre–post survey on yoga-naïve adults assessed at baseline before a 4-week yoga program for which they had enrolled (n = 604 at baseline, response rate = 16%–47%).[11] Participants were asked whether they perceived yoga as an exercise activity, a spiritual activity, or as a means to treat a health condition. Ninety-two percent of the respondents who were naïve to yoga at baseline considered yoga as an exercise activity, which was more than those who perceived yoga as a spiritual activity (73%) or as a means to treat a health condition (50%). Furthermore, earlier surveys on the benefits of yoga in yoga-experienced persons showed similar results.[4-6] Hence, yoga practice is often perceived as an exercise activity, perhaps because the perceived and experienced benefits to physical fitness are the most common.

In the present study, cognitive benefits were reported as the second most common perceived benefit (32.8%). In a comparable population who were yoga experienced, cognitive benefits were cited as a common experienced benefit, though by fewer persons (13.2%).[6] Comparably, 20.4% of yoga-naïve persons in the present study believed that yoga would lead to a positive mental state, while a positive mental state was reported as an experienced benefit by 28.5% of yoga-experienced persons in an earlier report.[6]

Previously, 94.5% (n = 2963 out of 3135) of yoga-experienced persons from the same background as the present respondents reported benefits of yoga which they had experienced.[6] This indicates that the perceived benefits of yoga reported by the respondents of the present study are well supported by the experienced benefits by the yoga practitioners.[6]

The three most common negative perceptions reported in the present study were (i) practicing yoga wrongly could be harmful (0.24%), (ii) yoga practice could be strenuous (0.24%), and (iii) practicing yoga could increase lethargy (0.12%). The perceived negative outcomes of yoga here differ from the experienced negative outcomes reported previously (i.e., (i) soreness and pain, (ii) muscle injuries, and (iii) fatigue).[6] These differences in the experienced versus perceived negative outcomes of yoga indicate that there should be more information regarding the safety of yoga practice.

In summary, while the perceived benefits reported here are supported by reported benefits experienced, the perceived negative outcomes are not similarly supported.

The main limitations of the study are (i) the respondents had an interest in yoga as they had chosen to be part of a public event on yoga, (ii) respondents were recruited by convenience sampling, and (iii) a large number of responses were incomplete and had to be excluded.

Future directions

In future research, yoga-naive persons with no specific inclination toward yoga could be examined to determine their perceptions about the benefits and negative outcomes of yoga. These perceptions could be correlated with the persons' likelihood of starting and subsequently adhering

University of Patanjali Haridwar

to practicing yoga to better understand factors promoting yoga practice.

Financial support and sponsorship

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Conflicts of interest

There are no conflicts of interest.

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Short Communication

Smartphone Excessive Use, Sleep, and Beliefs about Well-being in University Students who Practice Yoga Compared with Those with No Experience of Yoga

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Abstract

Background: Addictive behavior can be effectively managed with yoga. This study compared smartphone use, self-rated sleep, and beliefs about well-being in university students who practiced yoga regularly with those who did not. **Materials and Methods:** One hundred and forty-two university students (average age ± standard deviation: 20.2 ± 2.2; male: female = 1:1) who practiced yoga (90 min a day, 6 days a week, and 29.7 months) were compared for smartphone excessive use, self-rated sleep, and beliefs about well-being, with an equal number of comparable age- and gender-distributed university students who did not practice yoga. **Results:** The yoga group had lower scores on the short version of the Smartphone Addiction Scale with fewer nocturnal episodes of checking their smartphone. The nonyoga group reported longer nocturnal sleep time compared to the yoga group, whereas there was no significant difference in the beliefs about well-being scores between the two groups. **Conclusions:** University students who practice yoga may be less likely to use a smartphone excessively as well as have uninterrupted sleep than students who do not practice yoga.

Keywords: Beliefs about well-being, excessive smartphone use, self-rated sleep, university students, yoga

Introduction

Excessive use of a smartphone has detrimental effects on health and overall functioning[1] with features in common with addictive behaviors.[2] In university students, high levels of smartphone use and poor sleep quality correlated positively with levels of depression.[3]

University students who practiced 1 h of mindfulness-based cognitive-behavioral intervention (MBCBI) for 8 weeks showed less desire to use a smartphone, compared to a control group.[4] Yoga practice like MBCBI also includes suggestions for awareness.[5] Yoga was an effective strategy to manage chemical addictive behavior and substance abuse.[6] In addition, yoga practice influenced well-being[7] and the perceptions about well-being,[8] which can influence the recovery from addiction.[9]

The present study compared two groups of university students, of whom one group practiced yoga regularly whereas the other group did not practice yoga and continued their routine activities. The yoga practices included asana (*posture*), yoga breathing (*pranayama*), meditation (*dhyana*), and guided relaxation. The two groups were compared for (i) smartphone excessive use, (ii) beliefs about well-being, and (iii) self-rated quality of sleep.

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Materials and Methods

A cross-sectional study design was used to administer questionnaires to two groups of students. The study was approved by the institutional ethics committee (approval number: YRD-018/02). One hundred and forty-two university students from North India formed the yoga group. Students practiced yoga between 05:30 and 07:00 h in the morning. An

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University of Patanjali Haridwar

equal number of students from a nearby university formed the nonyoga group. The groups had comparable socioeconomic backgrounds and leisure interests. All students used a smartphone to communicate but not for studies. Students were included in the research if they (i) used a smartphone and (ii) had at least 3 months of yoga practice (yoga group) and no prior experience of yoga (nonyoga group). Students were excluded from the study if they did not complete the questionnaires. Both groups of students were informed about the study and its aims. The students were asked to fill in their details in a sociodemographic form to indicate individual consent, and permission to conduct the study was obtained from registrars of the universities.

Yoga practice

The yoga group had an average of 29.7 months of experience of yoga. Students practiced yoga in group classes on 6 successive days in a week for 90 min per day between 05:30 and 07:00 h in the morning. The yoga practice included loosening exercises,[10] yoga postures (*asanas*), yoga breathing (*pranayamas*), and guided relaxation. The session was conducted by a yoga teacher with a minimum of 5 years of experience of teaching yoga.

Assessments

Demographic information

Students were asked the following: (i) their name, date of birth, gender, and number of years of education completed and (ii) duration of yoga practice in months (yoga group alone).

Smartphone use

Smartphone addiction scale-short version

The Smartphone Addiction Scale–Short Version (SAS-SV) assesses levels of smartphone use.[11] This scale consists of ten items with six possible response options to each item which are strongly disagree, disagree, weakly disagree, weakly agree, agree, and strongly agree. The scale has been used in an Indian population.[12] The total scores of SAS-SV lie between 10 and 60, with 10 being "low", and 60 being "high" level of smartphone addiction. According to Kwon *et al.*,[11] high level of addiction was defined by a score between 34 and 60 in females and 32 and 60 in males.[12]

Self-rating about smartphone

(i) Use of a smartphone or not, (ii) the chief purposes of smartphone use, and (iii) whether they woke up at night to check their smartphone.

Sleep rating questionnaire

The sleep rating questionnaire (SRQ) assessed the quality of sleep of preceding week. The questionnaire has been used in an Indian population.[13] It has seven questions, of which the response to four questions was given as quantitative data (i.e., how long does it take you to fall asleep (in minutes)?, how many hours do you sleep each night?, how many times do you wake up during the night?, and how long do your day time naps last (in minutes)?). The responses to the remaining two questions (i.e., do you feel rested in the morning? and do you sleep in day time?) provided nominal data, whereas one provided qualitative data as it was an open-ended question (i.e., the usual reasons for waking up if you do so?).

The beliefs about well-being scale 16 (BWBS)

The Beliefs about Well-Being Scale consists of 16 items measured on a seven-point Likert scale in which three points are described as 1 = "strongly disagree", 4 = "neutral", and 7 = "strongly agree."[14] BWBS assesses four domains of mental well-being. These four domains are (i) the experience of pleasure, (ii) avoidance of negative experience, (iii) self-development, and (iv) contribution to others. All four are positively correlated with well-being and higher scores indicate better well-being.[14]

Data analysis

Two statistical tests were performed using SPSS (Version 24.0) (IBM SPSS statistics City: Armonk State: New York Country: United States), i.e., independent *t*-test and Chi-square test. The two groups were compared with multiple independent *t*-tests which were Bonferroni corrected. The following four items were compared with Chi-square test, (i) from SRQ (a) a feeling of being refreshed in the morning and (b) daytime sleep, (ii) number of addicted students in yoga and nonyoga group based on SAS scores which were categorized as high and low scores to classify excessive smartphone users,[8] and (iii) self-reported checking of smartphone at night.

Results

Results are presented under the three categories, i.e., smartphone excessive use, self-rated sleep, and beliefs about-wellbeing with details about the participants and group average values ± standard deviation values which are presented in Table 1.

SAS scores and self-rated smartphone use

A whole group comparison: SAS-SV scores were higher in the nonyoga group compared to the yoga group ($P < 0.001$). (ii) A gender-wise comparison: the difference of SAS-SV scores was higher among males ($P < 0.001$) compared to females. The mean scores of SAS-SV are presented in Table 2.

The number of students with high SAS scores was significantly different between the yoga (i.e., 34 out of 142) and

Table 1: Baseline characteristics of the students

Baseline characteristics	Yoga (n=142)	Nonyoga (n=142)
Average age (years)	20.2±2.2	19.7±1.5
Gender ratio (female:male)	1:1	1:1
Education range (years)	12-17	12-17
Yoga experience (months)		
Mean±SD	29.7±27.3	NA
Yoga practice per day (min)	140.0±55.8	NA
Experience of physical activity (months)	40.1±34.5	52.6±44.4
Time spent in physical activity in a day (min)	107.6±81.6	90.47±60.8
Physical activity per week (days)	5.8±1.2	5.4±1.8

SD: Standard deviation, NA: Not available

University of Patanjali Haridwar

nonyoga (i.e., 61 out of 142) groups ($\chi^2 = 11.53$, $P = 0.001$, Cramer's $V = 0.201$). The details of the scores are provided in the following Table 3.

Fewer students of the yoga group (37 out of 142) woke up at night one or more times to check their smartphone for messages compared to the nonyoga group (48 out of 142) ($\chi^2 = 5.66$, $P = 0.0173$, Cramer's V = 0.15).

Self-rated sleep

The duration of nocturnal sleep in minutes was significantly higher in the nonyoga group compared to the yoga group ($P < 0.001$).

A greater number of students of the yoga group (105 out of 142) reported daytime sleep compared with the nonyoga group (87 out of 142; $\chi^2 = 5.209$, $P = 0.022$, Cramer's $V = 0.134$).

The beliefs about well-being

There was no significant difference between yoga and nonyoga groups for components of the beliefs about well-being.

Discussion

One hundred forty-two yoga practitioners (age range 16–28 years; average age 20.2 ± 2.2 years; M:F = 1:1) had lower smartphone addiction than yoga naïve (age range 18–25 years; average age: 19.7 ± 1.5 years, M: F = 1:1). The differences between groups were considered to be an effect of yoga practice since the groups were of comparable ages, gender ratio, years of formal education, social support (most students of both groups stayed in a student hostel), and leisure interests (both groups were from the same town). Yoga practice includes several dimensions considered relevant in managing substance abuse and chemical addictions.[6] These include: (i) stress reduction, (ii) positive affect, (iii) improved self-awareness, (iv) improved self-esteem, and (iv) a chance to experience feelings of transcendence through yoga. Similar factors may help students regulate smartphone use.

In the present cross-sectional study, the two groups were not recruited from the same university. Students who practiced yoga regularly were enrolled for a course in yoga. All students of the course were required to join yoga practice sessions. The

Table 2: Unpaired *t*-test for smart phone addiction, beliefs about well-being, and sleep quality in yoga and yoga naïve students

Variables	Mean±SD		*T*	*P*#
	Yoga	Nonyoga		
Smartphone addiction scale				
Group as whole	25.8±10.2	30.3±11.0	3.7	<0.001
Males	26.1±10.4	33.4±10.8	4.2	<0.001
Females	25.4±10.0	27.0±10.2	1.0	0.34
Sleep rating questionnaire				
Time taken to fall asleep (min)	22.8±25.4	26.3±27.4	1.1	0.26
Duration of sleep in each night (min)	375.5±61.5	411.1±71.0	4.5	<0.001
Times wakes up during the night	0.9±1.0	1.0±1.1	0.4	0.69
Time taken for naps in daytime (min)	78.3±41.7	85.9±52.5	1.3	0.18
The beliefs about well-being scale 16				
Sub component				
Total well-being	80.5±12.1	82.9±10.8	1.7	0.08
Components				
Experience of pleasure	20.1±4.5	21.1±4.0	2.0	0.05
Avoidance of negative experience	15.9±4.7	15.9±4.9	0.0	0.97
Self development	21.5±3.9	22.5±3.9	2.2	0.03
Contributions to others	23.0±4.3	23.4±3.7	0.8	0.43
Derived components				
Eudaimonic	44.5±7.3	45.9±6.8	1.7	0.10
Hedonic	36.0±7.6	37.0±6.6	1.2	0.24

#Bonferroni adjusted statistical significance level for different variables: Smartphone addiction (α=0.05); the seven subdomains of the beliefs about well-being (α=0.007); four subdomains of quality of sleep (α=0.0125). SD: Standard deviation

Table 3: Details of Chi-square for level of addiction

Groups	Level of addiction		χ^2	*P*	Cramer's V
	Low addiction	High addiction			
Yoga (*n*=142)	108	34	11.53	0.001	0.201
Nonyoga (*n*=142)	81	61			

University of Patanjali Haridwar

students who had no experience of yoga were recruited from a university in the same locality as the students of the yoga group. While the two groups had comparable ages, gender ratios, hours of study, social support in student hostels, and possibilities for leisure activities in the area, there were other factors which could have influenced the students' smartphone addictive behavior. These include personality-related factors and levels of physical activity. Personality-related factors associated with predicted smartphone addiction.[15]

Yoga practice increases the level of physical activity while modifying the breath and the mental state.[16] Increased physical activity can serve as a rehabilitation for Internet addiction by improving physical health and increasing confidence, satisfaction, and well-being.[17] Hence, yoga practice may have reduced students' smartphone use by increasing their feelings of confidence and self-esteem which were not assessed in this study. However, even though perceptions about gratification, reward, and factors contributing to well-being influences susceptibility to addictive behavior,[18] the two groups did not differ in their beliefs about well-being.

The university students of the yoga group spent significantly less time asleep in the night than the group who did not practice yoga (with average values of 375 and 411 min, respectively), with fewer nocturnal awakenings to check their smartphone. Previously, yoga practice was associated with better quality of self-reported sleep, especially in the elderly.[19] The yoga group in the present study may have experienced better quality of nocturnal sleep hence reducing their nocturnal sleep requirement, while they did have more daytime sleep.

Limitation

Ideally all students should have been recruited from the same university, with random assignment of one group to yoga and other students to an observation control group. In the present study, the cross-sectional assessment of two student groups from different universities makes it difficult to rule out confounding factors, especially since students who practiced yoga were enrolled in a study program on yoga. A longitudinal, interventional study would address these concerns.

Conclusions

The present study suggests that university students who practice yoga have lower SAS-SV as well as have uninterrupted nocturnal sleep, compared to university students from the same geographical region, age, and gender distribution who did not practice yoga. However, the perception of well-being did not differ between the two groups.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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University of Patanjali Haridwar

Use of Yoga in India During the COVID-19 Pandemic: Results of a Patient Based Survey

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Various prophylactic and treatment strategies have been tried during the COVID-19 pandemic. In India there are several traditional systems of medicine, including Ayurveda, Yoga, Unani, Siddha, and Homeopathy (currently regulated through the Ministry of Ayush in India), which are effectively utilized in delivering a holistic type of health care. The Ministry of Health and Family Welfare (MoHFW) has issued proactive guidelines from time to time in line with the global approaches and national protocol to tackle this unprecedented pandemic, and the Ministry of Ayush (MoA) has issued guidelines for the prevention and management of COVID-19. The possibilities of using yoga and Ayurveda to prevent infection and as adjuvant to therapy have been reported.[1] In addition to prophylaxis and therapy, yoga and Ayurveda have been used successfully in the management of co-morbidities such as type 2 diabetes mellitus,[2] which were shown to negatively impact the outcome in COVID-19.[3] During the pandemic there was also a need to help patients recover from post-COVID symptoms ~~COVID~~).[4]

In order to determine whether yoga practice was used chiefly for prophylaxis, as adjuvant therapy, to manage co-morbid conditions, to facilitate recovery post-COVID or as a combination of these possibilities a survey was carried out in a yoga therapy outpatient department between December 2021 and April, 2022.

Four hundred and eleven patients were recruited. The survey required patients to state if they had practiced yoga during the COVID-19 pandemic (Yes/No). Patients who responded 'yes' were asked if they intended yoga practice to help in prophylaxis, as adjuvant therapy, to manage co-morbid conditions, to facilitate recovery post-COVID or as a combination of these possibilities. There were 366 complete responses. Hence the response rate for the present survey was 89.05 percent. Patients were also asked to mention their age, gender and illness. The percentages were determined.

Of the total respondents, (1) 68.0 percent respondents used yoga for prevention from COVID 19, (2) 1.37 percent used yoga for recovery from COVID 19 and (3) 5.19 percent for the management of other co-morbidities (e.g., type-2 diabetes, hypertension) during COVID 19 pandemic. The remaining 24.86 percent of the respondents used yoga for more than one reasons. The three most common combinations mentioned were: (1) prevention from COVID 19 along with management of other co-morbidities (11.0 percent; n= 40), (2) prevention from COVID 19, treatment of COVID 19 and recovery from COVID 19 (5.2 percent ~~of~~ n =19) and (3) Prevention and treatment of COVID 19 (2.5 percent ~~of~~ n = 9).

Yoga practice was most often used as a prophylactic during the COVID 19 pandemic. This usage is in keeping with known benefits of yoga practice to ameliorate mental stress[5] and optimize immune functioning.[5]

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University of Patanjali Haridwar

Original Article

Yoga Practice and Choices of Foods, Physical Activity, and Leisure: A Convenience Sampling Survey from India

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Abstract

Background: Previous surveys from countries other than India reported positive health behaviors in yoga practitioners. The present study aimed to determine with respect to yoga practitioners in India: (i) percentages of yoga practitioners who consumed specific foods, had additional physical activity and leisure activity, (ii) the association between these choices and their yoga practice, and (iii) the association of yoga with adding or avoiding specific foods and with meal timings in a day. **Materials and Methods:** This convenience hybrid-mode sampling survey was conducted on 551 yoga-experienced persons. **Results:** (1) Yoga practitioner respondents ate fruits and vegetables regularly (62.1%), did not consume animal source products (69.2%), alcohol (98.0%), or tobacco (98.4%), had a regular physical activity other than yoga (77.5%) and leisure activities (92.2%). (2) More than 150 min/week of yoga practice and experience of yoga exceeding 60 months was (a) significantly associated with (i) regular consumption of fruits and vegetables, (ii) lower consumption of sugar-sweetened beverages, animal source foods, tobacco, and alcohol ($P < 0.05$, Chi-square test) and (b) not associated with physical activity or leisure activities ($P > 0.05$, Chi-square test). (3) Yoga practitioners excluded sugar-sweetened beverages, animal-source foods and fast foods from their diet, whereas they added fruits, vegetables, and plant-based juices to their diet, with earlier first and last meals for the day. **Conclusion:** In India, yoga practitioner respondents' choices for foods, physical activity, and leisure conform to accepted positive health behaviors. The exclusion of animal-source foods emphasizes the need for well-planned and fortified diets among vegan yoga practitioners.

Keywords: *Food choices, leisure, meal timings, physical activity, yoga practice*

Introduction

Yoga includes specified postures, volitional breathing techniques, meditation, and suggestions for nutrition, physical activity, and leisure which are not obligatory.[1,2] In India, yoga practice has gained in popularity to promote fitness and relieve stress.[3]

Previously, in a US-based survey, the association of yoga with nutrition choices and physical activity was examined in 46 yoga practitioners.[4] A positive association was found between yoga and healthy eating, along with the motivation to eat healthily. Furthermore, in a study on yoga practitioners sourced as a subset of the Australian Longitudinal Study on Women's Health, yoga practice was associated with a higher likelihood of a vegetarian or vegan diet.[5] In the U.K., from a survey of yoga practitioners, yoga was found to positively impact health due to positive health behaviors.[6]

However, there has been no study from India on the association between yoga practice and foods consumed, physical activity, and leisure choices.

Hence, the present study aimed to determine with respect to yoga practitioners in India: (i) percentages of yoga practitioners who consumed specific foods, had additional physical activity and leisure activity, (ii) the association between these choices and their yoga practice, and (iii) the association of yoga with adding or avoiding specific foods and meal timings in a day.

Materials and Methods

Respondents

The respondents to the survey were yoga practitioners whose practice was based on traditional yoga texts.[7] Yoga practitioners of both sexes were sourced from different

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University of Patanjali Haridwar

regions in India who (i) completed a training program from a yoga institution or (ii) were studying yoga at a state private university, both in north India. A hybrid of online and offline methods was used to recruit respondents. Respondents were recruited online from addresses of 500 yoga practitioners provided by the yoga institution on request, whereas the offline recruitment of 168 yoga practitioner students was by verbal announcements and flyers in the university. Participation in the survey was voluntary. Respondents were included if they were: (i) at least 15 years of age, (ii) practicing yoga for at least 3 months, and (iii) willing to participate. Respondents were excluded if they filled in the survey incompletely or incorrectly. A total of 585 responses were received; of these, 34 responses were excluded. Hence, the responses of 551 respondents (Male:female = 314:237) were analyzed. Informed consent was obtained from each respondent.

Study design

The study was carried out between December 2020 and March 2022. This cross-sectional, anonymous convenience sampling survey was administered using a hybrid of online and offline methods. Online survey administration was conducted as follows: (i) Yoga practitioners were telephonically invited to participate in the survey, followed by an E-mail invitation with a link to the survey prepared on Google Forms. (ii) Two telephone reminder calls (after 15 and 30 days of the E-mail invitation) were made to each yoga practitioner to collect the maximum possible responses. The survey was administered offline by distributing printed surveys in lecture halls of the university when students did not have lectures. Prior clearance from the institutional ethical committee was obtained to conduct the survey (approval number PRF/YRD/020/005).

Survey

Survey questions were drafted in English. However, it was expected that most respondents would prefer to communicate in Hindi. Hence, the questions were translated to Hindi with the assistance of two bilingual experts using standard procedure.[8]

The survey had three parts. The first part of the survey determined respondents': (a) sociodemographic characteristics (i.e., age, gender, and education) and (b) yoga practice-related characteristics (i.e., [i] minutes of yoga/week [based on yoga practice minutes/day X number of days/week a respondent practiced yoga], and [ii] experience of yoga practice [in months]). The second part of the survey was designed to determine the choices of foods, physical activity, and leisure activities of yoga practitioners. The third part of the survey determined the association of yoga with foods participants added to/removed from their diet and with their meal timings in a day. The second and third parts of the survey are depicted in Figure 1. The survey questions were selected by the corresponding author, who has over 30 years of experience of practicing and researching yoga.

Data cleaning

Two researchers independently scrutinized the completed surveys to determine whether a respondent fulfilled the criteria for inclusion (i.e., at least 15 years of age and practicing yoga for a minimum of 3 months before the survey) and exclusion (i.e., whether a respondent filled the survey incompletely or incorrectly). A total of 585 responses were received. Of these, 34 responses were excluded as the surveys were filled incompletely or incorrectly. Hence the responses from 551 respondents were analyzed.

Data analysis

The data analysis was carried out in three parts. (A) Percentages of respondents were obtained for those who (1) consumed fruits, vegetables, eggs, fish/seafood, meat, alcohol, and tobacco, (2) had a regular physical activity other than yoga, and (3) had a leisure activity. (B) The association was calculated (Chi-square test, SPSS Version 24.0) between (1) yoga practice-related factors, i.e., (a) minutes of yoga practice in a week or (b) experience of yoga in months and (2) percentages of respondents who (a) consumed fruits, vegetables, eggs, fish and seafood, meat, alcohol and tobacco, (b) had a regular physical activity other than yoga, and (c) had a leisure activity. (C) The association of yoga with (1) foods included in the diet and foods excluded from the diet) and (2) meal timings (i.e., specifically, the timings of the first and last meals of the days) was obtained from the responses to direct questions and converted to percentages.

For Chi-square tests, Cramer's V was determined if there was a significant association between percentages of respondents obtained for (A) those who (1) consumed fruits, vegetables, eggs, fish and seafood, meat, alcohol, and tobacco, (2) had a regular physical activity other than yoga and (3) had a leisure activity and (B) their yoga practice based on the Chi-square test. Cramer's V >0.10 was considered the critical value to report a moderate association between variables.

Results

Five hundred and fifty-one respondents completed the survey satisfactorily and their responses were analyzed. The baseline characteristics of the respondents are given in Table 1. The sample size was not calculated *a priori*. However, the *post hoc* analysis was carried out to determine the power of the study. The present study (with n = 551, level of significance [α] = 0.05, and Cohen's w = 0.25 [determined from the association of time spent practicing yoga/week associated with consumption of fruits]) had power equal to 0.9986.

University of Patanjali Haridwar

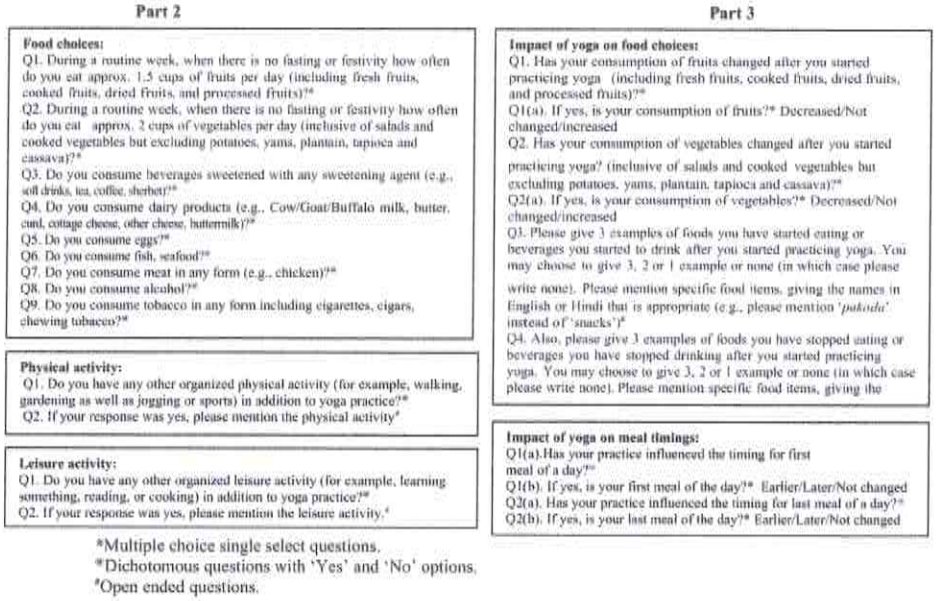

Figure 1: Part two and three of the survey questions

Sociodemographic characteristics

The respondents were of both genders comparably (males = 57.0%), more frequently between the ages of 15 and 30 years (44.3%), educated up to graduation (i.e., 15 years of education, 49.5%) and those with both (i) less than or (ii) greater than 60 months of experience in yoga were comparable in number (i.e., 50.8% had over 60 months experience of yoga).

Respondents' food choices, physical activity, and leisure

A total of 72.1% of respondents reported regular consumption of vegetables, whereas 52.1% reported regular consumption of fruits. Of the total respondents, 60.0% consumed sugar-sweetened beverages, while 85.5% used dairy products. The majority of respondents did not consume eggs (79.5%), fish or seafood (90.9%), meat (91.8%), alcohol (98.0%), or tobacco in any form (98.7%).

Among 551 respondents, 77.5% had a physical activity in addition to yoga practice. The three most common physical activities reported were: (i) walking (35.4%), (ii) playing games (7.7%), and (iii) jogging (6.3%).

A total of 92.2% of respondents reported having leisure activities. The most common leisure activities were: (i) listening to music (48.3%), (ii) gardening (10.2%), and (iii) reading (9.8%).

Association of yoga practice-related factors with respondents' (1) food choices, (2) physical activity, and (3) leisure

The following associations between time spent practicing yoga and specific responses about foods chosen were

Table 1: Sociodemographic characteristics of the respondents (n=551)

Characteristics	Percentage
Age group (years), mean±SD	36.7±15.3
Age (range)	15–77
Gender (male: female)	
Actual values	314:237
Percentage values	57:43
Education	
High school	17.8
Graduate	49.5
Postgraduate and above	32.7
Type of diet	
Vegan	11.4
Lacto-vegetarian	65.5
Ovo-vegetarian	2.0
Lacto-ovo-vegetarian	9.2
Nonvegetarian	11.9
Yoga experience (months)	
4–12	12.5
13–60	36.7
Above 60	50.8

SD: Standard deviation

significant ($P < 0.05$ for all comparisons, Chi-square tests). Respondents with over 300 min/week of yoga practice were (a) more likely to consume fruits regularly (Cramer's V = 0.12) and (b) less likely to consume eggs (Cramer's V = 0.15) or tobacco (Cramer's V = 0.12; also likely for practice levels <150 min/week) compared with other yoga practice levels. Respondents with 150–300 min/week of yoga practice were less likely to consume (i) fish/seafood (Cramer's V = 0.16), (ii) meat (Cramer's V = 0.25),

University of Patanjali Haridwar

and (iii) alcohol (Cramer's V = 0.11) than other yoga practice levels.

There were also significant associations between the experience of yoga in months and specific responses about foods chosen ($P < 0.05$ for all comparisons, Chi-square tests). Respondents with 60 or more months of experience in yoga were (a) more likely to consume (i) fruits regularly (Cramer's V = 0.11) and (ii) vegetables regularly (Cramer's V = 0.12), (b) less likely to consume (i) sugar-sweetened beverages (Cramer's V = 0.16), (ii) eggs (Cramer's V = 0.16) and (iii) meat (Cramer's V = 0.10). The association of respondent's food choices with yoga practice-related factors is given in Table 2.

There was no significant association between whether a respondent had (i) physical activity in addition to yoga and (ii) a leisure activity with yoga practice-related factors (i.e., time spent practicing yoga/week and) experience of yoga [in months]; $P > 0.05$, Chi-square test for all comparisons).

The association of yoga with adding or avoiding specific foods and meal timings in a day

There was an increase in consumption of fruits in 59.0% and of vegetables in 54.5% of respondents after they started practicing yoga (this was based on the question, i.e., "Has your consumption of fruits/vegetables changed after you started practicing yoga").

Of the total respondents, 65.7% reported that they had introduced specific foods or beverages to their diet after starting to practice yoga. Of these, the three most common foods or beverages were: (i) fruits (19.2%), (ii) vegetables (14.7%), and (iii) plant-based juices (12.2%).

A total of 65.3% of respondents reported having stopped eating specific foods and beverages after starting to practice yoga. Of these, the three most common foods and beverages which respondents stopped eating were: (i) sugar-sweetened beverages (26.0%), (ii) fast foods (22.7%), and (iii) animal-source foods (19.6%).

Of the total respondents, 72.4% reported that yoga had influenced the timing for the first meal of the day. Of these respondents, 63.7% reported that they had started having the first meal of the day earlier than before. Furthermore, 72.4% of the respondents reported that yoga had influenced the timing for their last meal of the day. Of these respondents, 67.9% of the respondents reported that they had started having the last meal of the day earlier than before.

The impact of yoga on food choices and timing of the first and last meals is shown in Table 3.

Discussion

Among 551 yoga practitioners in India, 69.2% did not consume animal source products, while 62.1% consumed

Table 2: Food choices of the yoga practitioner respondent's in relation to yoga practice-related factors

Characteristics	Categories	*n*	Food choices																			
			Fruits/week[$,&]			Vegetables/week[&]			Sweetened beverages[&]		Dairy products		Eggs[$,&]		Fish/ seafood[$]		Meat[$,&]		Alcohol[$]		Tobacco[$]	
			Rarely	Often	Always	Rarely	Often	Always	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Time spent practicing yoga/week (min)	<150	22	59.1	36.4	4.6	27.3	40.9	31.8	63.6	36.4	81.8	18.2	40.9	59.1	22.7	77.3	31.8	68.2	5.8	94.2	5.8	94.2
	160–300	52	55.8	32.7	11.5	32.7	28.9	38.5	67.3	32.7	80.8	19.2	30.8	69.2	5.8	94.2	3.9	96.2	1.7	98.3	0.8	99.2
	above 300	477	45.5	30.2	24.3	27.5	30.2	42.4	58.9	41.1	86.0	14.1	18.5	81.6	8.8	91.2	7.6	92.5	0.0	100.0	1.5	98.6
Yoga experience (months)	4–12	69	63.8	23.2	13.0	43.5	31.9	24.6	65.2	34.8	84.1	15.9	31.9	68.1	15.9	84.1	14.5	85.5	3.5	96.5	2.0	98.0
	13–60	202	49.5	34.7	15.8	31.2	34.2	34.7	74.8	25.3	89.6	10.4	29.7	70.3	10.4	89.6	11.9	88.1	1.4	98.6	0.7	99.3
	above 60	280	41.1	29.6	29.3	21.8	27.5	50.7	47.9	52.1	82.5	17.5	11.1	88.9	6.4	93.6	3.9	96.1	2.5	97.5	1.2	98.8

[$]$P<0.05$: Chi-square test for association between time spent in practicing yoga and related food choices, [&]$P<0.05$: Chi-square test for association between overall yoga experience in months and related food choices

University of Patanjali Haridwar

Table 3: Impact of yoga on fruits and vegetables consumptions according to yoga practice-related factors

Characteristics	Categories	*n*	Fruits consumption[$&]			Vegetables consumption[$]			Change in the timings for meal							
			Decreased	Increased	NC	Decreased	Increased	NC	First meal of the day				Last meal of the day			
									1	2	3	4	1	2	3	4
Time spent practicing yoga/week (min)	<150	22	18.2	45.5	36.4	9.1	45.5	45.5	40.9	27.3	4.5	27.3	27.3	18.2	4.6	50.0
	160–300	52	5.8	73.1	21.2	3.9	71.2	25.0	15.4	36.5	5.8	42.3	5.8	40.4	11.5	42.3
	above 300	477	8.2	58.1	33.8	5.2	53.0	41.7	19.7	48.0	4.0	28.3	12.0	51.6	9.9	26.6
Yoga experience (months)	4–12	69	17.4	46.4	36.2	8.7	46.4	44.9	26.1	39.1	4.3	30.4	18.8	47.8	8.7	24.6
	13–60	202	8.9	64.4	26.7	5.9	52.5	41.6	18.8	45.5	4.0	31.7	11.9	47.0	8.9	32.2
	above 60	280	5.7	58.2	36.1	3.9	57.9	38.2	19.6	48.2	4.3	27.9	10.4	51.1	10.7	27.9

[$]$p<0.05$: Chi-square test for association between time spent in practicing yoga and related food choices and timings for meals, [&]$P<0.05$: Chi-square test for association between overall yoga experience in months and related food choices and timings for meals. 1: Later than before you have started practicing yoga, 2: Earlier than before you have started practicing yoga, 3: Omitting the meal, 4: No change in the timing of the meal. NC: Not changed

fruits and vegetables most days of a week. The percentages of respondents consuming animal-source foods, alcohol, or tobacco were lower than the national statistics in India,[9] with higher percentages of respondents consuming fruits and vegetables.[9]

While greater consumption of fruits and vegetables and lower consumption of alcohol and tobacco is considered likely to promote health and prevent certain diseases, a diet devoid of animal source products should be well-planned with a wide variety of plant foods and a reliable source of Vitamin B12 (vitamin fortified foods or supplements) to ensure adequate nutrient intake and prevent vitamin deficiencies.[10]

Longer time spent practicing yoga in a week and longer experience of yoga in months were significantly associated with regular consumption of fruits and vegetables and lower consumption of animal-source foods, alcohol, and tobacco. This may suggest that respondents with a longer duration of yoga experience were established in healthy lifestyle choices.

The impact of yoga on eating behavior was based on respondents' replies to direct questions about whether yoga had influenced their food choices and meal timings. When asked if they had added any foods or beverages to their diet after they started practicing yoga, respondents most often specifically added both fruits and vegetables to their diet, which is considered beneficial to health.[11] This response was especially reported in respondents with between 150 and 300 min of yoga practice in a week. Parallel to their yoga practice, respondents also added plant-based juices (e.g., the juice of *Aloe vera L.* and of *Emblica officinalis*) to their diet, which are known to have antioxidant and anti-inflammatory activities.[12,13] Respondents also reported that they had stopped eating certain foods once they practiced yoga, especially sugar-sweetened beverages, animal-based foods (e.g., meat, fish, eggs, and dairy products), and fast foods (including deep-fried foods). In 73.48% of respondents who had more than 300 min of yoga practice in a week, respondents reported that they had both their first and their last meal of the day earlier than before they practiced yoga. While the impact of meal timings on health is complex and determined by multiple factors, including circadian rhythms, there are reports that among those who have a late last meal of the day during the 2 h before sleep, the probability of being obese increases five times, while in those who consume their first meal of the day 2 h after wake time the probability of developing obesity decreases by 50%.[14] Hence, on the whole respondents' reported impact of yoga practice on eating behavior as changes which promote positive health.

These findings are similar to those of a previous study which used mixed methods (i.e., a survey and semi-structured interviews) to determine the association

University of Patanjali Haridwar

between yoga practice and dietary behaviors in 46 young adult yoga practitioners in the US.[4] In the U.S. based study also, regular yoga practice was associated with more servings of fruits and vegetables and lower consumption of snacks and fast foods. Unlike the present study conducted in India, there was no clear association between yoga practice and reduced consumption of animal-source foods. However, in yoga practitioners sourced as a subset of the Australian Longitudinal Study on Women's Health, yoga/meditation practice was more often associated with a vegetarian or vegan diet and with marihuana and drug use.[5] Furthermore, in the UK, from a survey of 2434 yoga practitioners, yoga was perceived to have a positive impact on physical and mental health conditions and was linked to positive health behaviors.[6] The similarities and differences between the impact of yoga on food choices in the present study conducted in India, compared to previous studies in the US,[4] Australia,[5] and the UK[6] highlight the common features and differences in yoga practitioners across different regions globally.

The high percentage of lacto-vegetarian respondents can be connected with the origins and beliefs of yoga philosophy. Yoga is documented as a philosophical system including both orthodox and heterodox Indic traditions.[7,15] Vegetarianism is encouraged in yoga texts to enhance equipoise which is an aim of yoga.[2] Furthermore, the principle of nonviolence (*ahimsa*) forms the first ethical restraint (*yama*) in Patañjali's Yoga Sutras, a seminal text on yoga.[7]

Among the present yoga practitioner respondents, 77.5% had some physical activity in addition to yoga every day. There was no association between adopting such a physical activity and respondents' duration of yoga practice per week or experience of yoga in months. Most often, respondents included any of the following: walking (35.4%), group sports (7.7%), and jogging (6.3%) as their choices of additional physical activity. Previously similar to the present results, yoga practice was associated with moderate-to-vigorous physical activity in a US-based survey[4] and with at least moderate physical activity in a survey from Australia.[5] Both brisk walking and jogging positively influence physical health; hence, in the present study, these activities can be expected to benefit health.[16]

Ninety-two percent of respondents had a regular leisure activity such as (i) listening to music (48.3%), (ii) gardening (10.2%), and (iii) and reading (9.8%). Gardening has multiple benefits associated with being in nature and physically active,[17] while music activities offer a rich and underutilized resource for health.[18] Hence, these leisure activities could be beneficial to health.

Before summarizing the findings, the study limitations are mentioned here. The present survey results were based on respondents' self-reports. It would have been ideal to use more objective methods, such as respondents' use of wearable cameras;[19] though this would be difficult to implement in the present sample who had varying levels of literacy and familiarity with such techniques. Similarly, the use of observation (e.g., by a member of the family or close associate) could have been tried with training the observer.[20] It is worth noting that the self-report method used in this survey was the basis of associations between yoga and foods consumed in previous surveys conducted in the US,[4] UK,[6] and Australia.[5] Hence, the percentages obtained in these surveys may also be expected to reflect errors in reporting.

Apart from respondents' self-reports as a limitation of the study, in any attempt to establish an association, such as the association between yoga practice and lifestyle choices, there may be various additional factors that influence the association. These confounding variables cannot be ruled out and is also a limitation of the present study. Finally, these findings are limited by the absence of a comparative group of respondents who did not practice yoga for comparison.

Conclusion

1. In this survey from India, yoga practitioner respondents ate vegetables and fruits regularly (62.1%), did not consume animal source products (69.2%), alcohol (98.0%), or tobacco (98.4%), had a regular physical activity other than yoga (77.5%) and leisure activities (92.2%). This is comparable to other countries though consumption of animal-source foods is lower
2. More than 150 min/week of yoga practice and 60 months experience of yoga was (a) positively associated with (i) regular consumption of fruits and vegetables, (ii) lower consumption of sugar-sweetened beverages, animal source foods, tobacco, and alcohol and (b) not associated with physical activity or leisure activities
3. Yoga practitioner respondents excluded sugar-sweetened beverages, animal-source foods, and fast foods from their diet, whereas they added fruits, vegetables, and plant-based juices to their diet along with earlier first and last meals for the day
4. The exclusion of animal-source foods emphasizes the need for well-planned and fortified diets among vegan yoga practitioners in India.

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Conflicts of interest

There are no conflicts of interest.

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Performance in the Trail making Test following High Frequency Yoga Breathing and Breath Awareness

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Abstract

Background: A combination of yoga breathing techniques including high frequency yoga breathing practiced over 12 weeks resulted in improved performance in trail making test (TMT). However it is not studied whether a brief session of yoga breathing techniques will cause similar results in TMT performance.

Aims: This study intended to assess the effect of a brief session of high frequency yoga breathing or breath awareness separately on the TMT performance.

Settings and Design: Self as control study.

Methods and Material: Fifty three participants (aged between 18 and 46 years; group average 26.0 (SD = 7.3) years; all males were recruited in north India. They were randomly assigned to three sessions on three separate days at the same time of the day. These were HFYB or BAW or Quiet sitting (QS). Both parts, A and B of the TMT, with the STAI-S were determined before and after each session.

Statistical Analysis used: Analyses were repeated measures ANOVA, with post-hoc multiple comparisons carried out using SPSS Version 18. There were 2 within-subject factors: (i) Sessions (HFYB, BAW and QS) and (ii) States (before and after).

Results: Following the HFYB session TMT-A time reduced (P = 0.001). After BAW TMT-B time reduced (P = 0.01), and the STAI-S scores also decreased (P = 0.01). Both voluntarily regulated yoga breathing techniques, i.e., HFYB and BAW improved the performance in the TMT. HFYB improved psychomotor speed and ability to keep attention sustained while visually scanning the worksheet.

Conclusions: BAW improved flexibility in thinking, working memory and shifting strategies, while reducing state anxiety.

Keywords: Breath awareness; High frequency yoga breathing; Trail making test (TMT); Cognitive flexibility; State anxiety.

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INTRODUCTION

A comprehensive review of yoga breathing practices which included 68 studies after screening 1400 references from 3 databases described neurocognitive benefits of these practices including improved attention.[1] The trail making test reflects a wide variety of executive functions

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including shifting attention.[2] Performance in the trail making test (TMT) improved after practicing a combination of yoga voluntarily regulated breathing techniques (*pranayamas*), when 67 healthy medical students showed a reduction in total time taken to complete both parts of the TMT (A and B), related to the practice of *pranayamas* [i.e., bumblebee breath (*bhramari*), alternate nostril breathing (*anulom vilom*), high frequency yoga breathing (*kapalabhati*) and bellows breath (*bhastrika*)] for 4 weeks.[3] There was a reduction in the total time taken to complete both parts of the TMT in 84 healthy participants who practiced both fast and slow pranayamas for 12 weeks.[4] Fast pranayamas included high frequency yoga breathing (*kapalabhati*), bellows breath (*bhastrika*) and dog-panting breath (*kukkuriya*). Slow pranayamas included a cleansing breath (*nadishodhana*), exhalation with a sound (*pranav*) and breathing with short periods of breath-holding (*savitri*).

These studies mentioned,[3,4] determined the longitudinal effect of a combination of voluntarily breath regulation techniques including high frequency yoga breathing on executive functions using TMT (A and B). This approach to study the effect of breathing practices on TMT (A and B) has limitation that the effect of an individual breath regulation technique cannot be determined. Apart from this the studies did not use self as control study design which is useful to reduce variations caused by inter-individual factors between the experimental, active control and control sessions.

A specific high frequency, yoga based, regulated breathing, i.e., *kapalabhati* (*kapala* = forehead; *bhati* = shining in *Sanskrit*); respiratory rate 1.0 Hz to 2.0 Hz when assessed for immediate effect has consistently improved the performance in attention tasks.[5,6] One minute of HFYB at the rate of 2.0 Hz reduced the time required to complete a cancellation task in medical students, middle aged adults and people aged over the age of 60 years.[7] This task tests abilities to direct the attention selectively and to maintain sustained attention. Also, HFYB practiced at 2.0 Hz showed a reduction in the peak latency of the P300 ERP potential elicited by the auditory oddball paradigm.[5] The results suggested a decrease in the time needed to distinguish the auditory tones following HFYB suggesting that HFYB reduced the time needed for this selective attention task. HFYB was compared with (i) breath awareness (BAW), which is an inherent part of all *pranayamas* and also with a control session. (ii) In the same study, BAW resulted in an increase in the peak amplitude of the P300 wave, a result which implies an increase in the neurons recruited to complete the P300 attention task. In another study following HFYB at 1.0 Hz and BAW for 10 minutes, there was better performance in a task which assesses the dexterity of the fingers and a reduction in errors and time to complete a task which assesses shape and size discrimination.[6] The results were speculated to be due to the beneficial effects on attention of these practices.

With this background the present study was planned to determine the immediate effects of HFYB and BAW separately on the TMT performance.

MATERIAL AND METHODS

Study design

For all participants there were three separate assessment days maintaining the time of day constant for each person. The three assessment sessions were (i) quiet sitting (control session), (ii) breath awareness (intervention session) and (iii) high frequency yoga breathing (HFYB). The session sequence was in random order (www.randomizer.org), so that the order of the sessions was not same for the 53 participants. The sequence of sessions for the first two participants is provided below as an example. For the first participant, the sessions sequence was as follows: (i) high frequency yoga breathing (HFYB), (ii) breath awareness followed by (iii) quiet sitting. While for the next participant the sequence of the sessions was as follows: (i) quiet sitting, (ii) breath awareness and (iii) high frequency yoga breathing. Hence the sequence differed for the participants. For all the three sessions the total duration was 18 minutes, with 3 epochs of 5 minutes practice and 1 minute of rest in between. Participants were assessed at the beginning and end of the sessions. The study was carried out between July 2016 and October 2016. This study design is depicted in schematic form in Fig.1.

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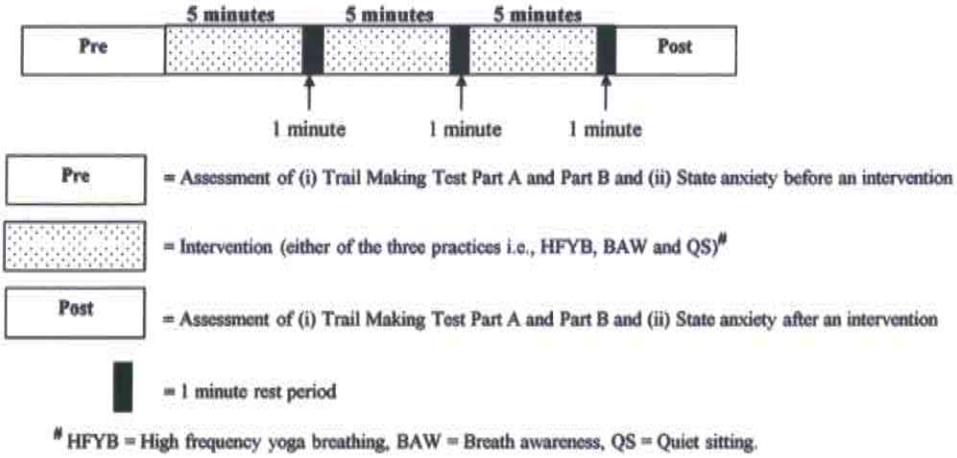

Fig. 1: Schematic Presentation of A Study Session

Participants

Fifty three male participants with ages ranging between 18 to 46 years (group average age 26.0 (SD = 7.3) years were recruited. The criteria for inclusion in the study were: (i) healthy males, (ii) experience of at least three months practice of voluntarily regulated yoga breathing techniques and (iii) being able to practice HFYB at the rate of 60 breaths per minute (50-70 breaths per minute) for 20 minutes. The criteria set to exclude participants from the trial were: (i) a past history of seizures or diagnosed epilepsy, (ii) any surgery of the abdomen or chest in the year prior to assessment, and (iii) the intake of any medication, or substances which alter the mental state. No participant was excluded for these criteria. The sample size had not been determined before beginning the experiment. However, post-hoc calculations, based on changes in time taken to complete TMT part A after HFYB; with effect size = 0.52 showed the Power was 1.000 (G Power Software, Version 3).[8] The signed consent which was voluntary and informed consent was taken from each of the participants. The study had been approved by the ethics committee of the institution which was formed based on recommendations of Indian Council of Medical Research and adheres to Helsinki's declaration involving human subjects.

ASSESSMENTS

Trail making test (TMT)

The trail making test, was administered before and after the three sessions (HFYB, BAW and QS) for each participant. The test was conducted individually. First the procedure to perform TMT Part A was detailed to each participant individually and a sample part of TMT A was used to see how much they understood. After this the subject performed the actual TMT Part A test. This procedure was repeated for Part B. Whenever the participant made an error, it was pointed out straight away and the participant was instructed to correct the mistake and continue. The time taken to complete the test was noted separately for Part A and Part B using a stopwatch which had the accuracy of 10 milliseconds.

Derived TMT scores

Two derived TMT scores were determined.[9] These were (i) trail cost (i.e., the difference between the time taken to complete TMT Part B and Part A) and (ii) trail ratio (i.e., ratio of time required to complete TMT Part B and Part A).

Spielberger's State trait anxiety inventory State (STAI-S)

State anxiety was measured with Spielberger's State Trait Anxiety Inventory (State) which has 20 items to determine state anxiety or anxiety at the moment.[10] The participants were asked to select the number which most closely corresponded to the intensity of what felt when being tests on the scale: 1 = not at all, 2 = somewhat, 3 = moderately, or 4 = very much so. State anxiety was assessed at the beginning and at the end of all three sessions.

INTERVENTION

Assessments of all participants were recorded at the beginning and the end of three intervention sessions. The sessions were (i) quiet sitting (QS,

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control), (ii) breath awareness (intervention) and (iii) high frequency yoga breathing (HFYB). Each session was for 18 minutes. The method of practice of each session is presented below.

High frequency yoga breathing

High frequency yoga breathing (HFYB) Participants were requested to sit cross legged (sukhasana = comfortable posture) keeping their spine straight and with closed eyes. During HFYB the participant actively exhaled while contracting the muscles of the anterior abdomen, followed by inhalation which was passive. The participants maintained their breath rate between 50 and 70 breaths per minute (0.8-1.2 Hz).

Breath awareness (BAW)

Participants were in the same posture as for HFYB. They were seated in sukhasana (easy, cross legged pose), keeping their spine straight and their eyes closed. In this pose participants were asked to be aware of the movement of their breath in the nasal passage, during both phases of respiration, without attempting to regulate or modify the airflow.

Quiet sitting (QS)

The participants were asked to sit in *sukhasana* (at ease, cross-legged pose). During this control practice participants were asked to keep their back straight and close their eyes. Participants were not given instructions about their thoughts or directing their attention. During quiet sitting, participants were permitted to pass thoughts through their mind without modifying their thoughts. They were asked to avoid modifying their breath or being aware to their breathing.

Data analysis

Multiple repeated measures analyses of variance (RM-ANOVA) followed by post-hoc tests with Bonferroni adjustment were performed to compare values before and after the 3 sessions, using SPSS Version 18.0. There were 2 within subject factors: (i) Sessions with three levels (i.e., HFYB, BAW and QS) and (ii) States with two levels (i.e., before and after).

RESULTS

Repeated measures analyses of variance (RM ANOVA)

In the RM ANOVA, a significant difference between the two States (Pre, Post) was obtained for time taken to complete (i) trail making test (TMT) Part A and (ii) trail making test (TMT) Part B.

There was also a significant Sessions by States interaction for time taken to complete TMT Part B, suggesting the interdependence of States and Sessions.

The F, df, Eta squared, Huynh-Feldt epsilon and P values are provided in (Table 1).

Table 1: ANOVA values for the variables studied.

Sl. No.	Variables	Factor	F	df	Partial Eta Squared	Huynh-Feldt epsilon	p value
1	TMT Part A (in seconds)	States	20.013	1,52	0.278	1	<0.001
		Sessions	0.915	1.775,92.310	0.017	0.888	0.394
		Sessions x States	2.108	1.497,77.832	0.039	0.748	0.14
2	TMT Part B (in seconds)	States	6.401	1,52	0.11	1	0.014
		Sessions	0.502	1.826,91.935	0.01	0.913	0.59
		Sessions x States	1.678	1.962,102.000	0.031	0.981	0.192
3	Trail cost (in seconds)	States	1.104	1,52	0.021	1	0.298
		Sessions	0.144	1.883,97.937	0.003	0.942	0.854
		Sessions x States	1.062	1.980,102.956	0.02	0.99	0.349
4	Trail ratio	States	0.851	1,52	0.016	1	0.36
		Sessions	0.68	2,104	0.001	1	0.934
		Sessions x States	0.473	2,104	0.009	1	0.625
5	State anxiety (scores)	States	7.28	1.000,52	0.123	1	0.009
		Sessions	0.439	1.688,87.755	0.008	0.844	0.612
		Sessions x States	0.66	1.680,87.336	0.013	0.84	0.494

University of Patanjali Haridwar

Post-hoc analyses

The TMT-A time decreased (P = 0.001) significantly after HFYB compared to before with 95% confidence intervals (CI) of [9.515, 3.881]. While, after BAW there was a significant decrease in TMT-B time (P = 0.01) with 95% CI of [16.290, -1.535]) and trail cost (P = 0.01) with 95% CI of [10.610, -9.252]). Also after BAW, there was a significant decrease (P = 0.01) in the state trait anxiety inventory-state (STAI-S) scores with 95% CI of [5.007, -856]).

The group mean values (Standard deviation SD) for (i) time taken to complete the trail making test (TMT) Part A, (ii) time taken to complete the trail making test (TMT) Part B, (iii) trail cost (i.e., time taken to complete the TMT Part B minus time taken to complete the TMT Part A), (iv) trail ratio (i.e., time taken to complete TMT Part B/time taken to complete TMT Part A) and (v) Spielberger's state trait anxiety inventory state (STAI-S) scores before and after the three sessions (i.e., high frequency yoga breathing, breath awareness and quiet sitting) are given in (Table 2).

Table 2: Changes in the time taken to complete trail making test (TMT) Part A, TMT Part B, trail cost, trail ratio and state anxiety before and after the three sessions.

Variables	Sessions								
	HFYB (n = 53)			BAW (n = 53)			QS (n = 53)		
	Before	After	Cohen's d	Before	After	Cohen's d	Before	After	Cohen's d
TMT Part A (seconds)	32.6±16.6	25.9±9.4***	0.52	31.8±14.1	28.6±15.7	0.21	29.1±9.4	27.3±9.4	0.24
TMT Part B (seconds)	72.8±31.3	65.4±29.2	0.24	76.7±32.3	66.7±29.9**	0.32	69.1±26.4	67.6±29.4	0.06
Trail cost (seconds)	40.25±29.92	39.57±23.97	0.03	44.91±23.83	38.13±24.88*	0.28	40.06±20.53	40.32±23.98	0.01
Trail ratio	2.49±0.87	2.57±0.74	0.1	2.51±0.75	2.47±0.75	0.05	2.40±0.55	2.52±0.80	0.15
State anxiety (scores)	30.6±8.9	28.5±10.7	0.21	30.8±8.6	28.0±6.6**	0.37	29.3±7.2	28.2±8.2	0.17

DISCUSSION

The time taken to complete Part A of the trail making test (TMT) reduced following high frequency yoga breathing whereas the time taken to complete Part B, and the trail cost (Time B-Time A) reduced following breath awareness (BAW). Also, following BAW there was a reduction in state anxiety.

The trail making test is a reliable neuropsychological test of visual attention and the ability to switch tasks.[11] The goal of the test for the subject is to finish the test as quickly as possible. The primary assessment of performance is based on the time taken to complete the test. Part A examines cognitive processing speed, while part B examines the executive functioning.

The trail making test (part A) examines cognitive processing speed.[11] TMT-A represents a perceptual speed construct, which involves perception of the stimuli, a simple motor response and in addition the ability to judge the physical identity of the letters or digits.[12] Part B of the trail making test examines executive functioning, as does the trail cost[11,13] and the trail ratio.[11] Trail B requires instant recognition and understanding the significance of the numbers and letters, the ability to scan the page continuously so as to identify the next number or letter in sequence, ability to be flexible in integrating the numeric and letter series correctly, and completing these tasks keeping time in mind.[12]

In the present study 18 minutes of high frequency breathing practice reduced the time taken to complete TMT-A. TMT-A is understood to reflect processing speed.[11] This finding of the present study can be compared with results of an earlier study which reported improved performance in a letter cancellation task in pre teen children following high frequency yoga breathing practice for 18 minutes at 1.0 Hz which was comparable to the present study.[14] Similar to TMT-A and six letter cancellation task requires visual selectivity and motor skill. Hence reduction in time taken to complete TMT-A could be result of beneficial effects of high frequency yoga breathing on visual selectivity and motor skills.

After 18 minutes of breath awareness there was a significant decrease in TMT-B time and in trail cost

University of Patanjali Haridwar

(Time B minus Time A), both variables indicate better executive functions.[12] Breath awareness, mentioned here is not the same as mindfulness meditation or mindful-breath awareness. All yoga breathing practices include being aware of the breath. In yoga-based breath awareness, unlike mindful breath awareness there are no specific instructions. However as in mindful breath awareness, during the breath awareness session participants directed their attention to their experiences as they occurred while simultaneously keeping their mental state non-judgmental and accepting.[15] This mental state is known to lead to improved attention[16,17] and better associated cognitive processes.[18]

In the present study reduction in TMT-B time and in trail cost (Time B minus Time A) following breath awareness could be explained from the finding of an earlier study.[19] The earlier study investigated the effect of mindful breathing exercise compared to control condition on neural activity associated with self-monitoring processes. In the study 44 participants were either assigned to mindful breathing exercise or control condition. The participants were assessed for EEG during mindful breathing or control condition and subsequently during a stroop test. The study reported an increased alpha activity during mindful breathing exercise and enhanced error related alpha suppression during stroop test following mindful breathing. Based on this finding the authors concluded that mindful intervention may enhances attention control and self monitoring process.

Similar to performance in stroop test, TMT B requires inhibition control and shifting attention. Hence a possible way in which it may be speculated that the way in which attention was engaged resembled that of mindful breath awareness. This could explain the improvement in TMT-B performance, suggestive of better executive functions. Ideally, the participants should have been asked to describe in detail what their thoughts were during breath awareness. Not having these details limits the interpretation of the present findings about the effects of breath awareness. However breath awareness is used as a method to engage the attention and has improved the performance in tasks such as letter cancellation test[20] and the P300 task.[21] Breath awareness could also influence executive functions by down-regulating the stress response through the influence on the autonomic nervous system and on levels of epinephrine, nor-epinephrine which influence attention and recall.[22] This effect is supported by the decrease in state anxiety following breath awareness.

The main limitations of the present study are related to explaining the changes in the TMT test performance after HFYB or BAW. A detailed interaction with each participant would be useful to understand their exact mental processes during breath awareness, especially as breath awareness is also a part of HFYB. If there had been simultaneous recordings of neuro-physiological variables during the completion of the TMT it would have helped to understand the neuro-physiological processes underlying the effects.

Both HFYB and BAW practice improved the performance in the TMT; HFYB reduced the time required for TMT-A, suggestive of better cognitive processing, while BAW reduced the time required for TMT-B and decreased state anxiety, which is suggestive of better executive functions. Hence the practices complement each other and maintaining awareness on the breath during HFYB would give the best possible results.

LIMITATIONS

The findings of the study will be of maximum interest to practitioners of yoga and yoga therapists who are interested in mental health issues related to details about yoga practice. The main reason for this is the study lacks novelty. Previous longitudinal studies have shown an improvement in the Trail Making Test (TMT) performance following practice of yoga breathing, including high frequency yoga breathing (HFYB), after several weeks of practice. This study adds the detail that 18 min of HFYB improves TMT performance.

CONCLUSIONS

The immediate effect of both yoga breathing practices (i.e., HFYB and BAW), was an improvement in TMT performance. HFYB improved psychomotor speed, sustained attention and visual scanning. BAW improved flexibility in thinking, working memory and shifting strategies, while reducing state anxiety. Hence a combination of the two practices, with awareness on the breath maintained during HFYB could be expected to give the best possible results.

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Conflicts of interest:

There are no conflicts of interest.

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