

Original Research Article

## Effect of yoga and pranayama on physiological parameters in Medical students

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**Abstract:** The yogic practice synchronizes physiological activities through controlled postures, breathing, meditation, relaxation and few physical exercises. Stress and mental strain are leading suffering factors in medical students by over academic burden which affects cognitive and deterioration functions. The present study conducted to see the effects of yogic practices on physiological parameters in medical students. Study contains 56 participants (34 male and 22 female) within the age group of 18 to 23 years. Physiological parameters i.e. height, weight, surface area, blood pressure, heart rate, respiratory rate and haematological parameters were measured and 10 asana, 5 mudras, 5 pranayama's, and 5 bandhas regularly for one and half hour daily in the evening for a period of 3 months given by yoga experts. There is a significant fall in SBP, DBP, and ESRAfter first month, second month and third month of yogic practice and significant raise in haemoglobin percentage, total red blood cell count, total leucocytes and platelets count, vital capacity, FEV1 and PEFr after yogic practices. Yogic practice, pranayama and physical exercises are beneficial to improve haematological parameters and respiratory functions.

**Keywords:** Yoga, Pranayama, Vital capacity, Hear rate, Blood pressure

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### INTRODUCTION

Yoga practice has multiple physiological credits including decrease of blood pressure, increase in respiratory rate and increase of heart rate and improve autonomic nervous system by modulating parasympathetic and sympathetic activities, cardiovascular functions, respiratory functions, decreases the effect of stress and strain of body and improves physical and mental health [1,6]. So it is believed that the practice of yoga can also result in changes in perception, attention and cognition such as increased performance of verbal memory and memory scores [7]. Practice of short kumbhak pranayama at slow rate increases oxygen consumption and metabolic rate [8]. Practice of pranayama also been referred treatment for anxiety disorders as it attenuates cardiac autonomic responses [9].

Therefore the objective of this study is to investigate the effect of yoga practice on the physiological parameters of medical students.

The present study was carried out in Department of physiology, Alluri sitaramaraju Academy of Medical Sciences, Eluru, Andhra Pradesh during June 2015 to September 2016. The study contains 56 participants (34 male and 22 female) within the age group of 18 to 23 years. Physiological parameters i.e. height, weight, surface area, blood pressure, heart rate, respiratory rate and haematological parameters were measured initially. The yogic training was given under the supervision of a yogic expert. These volunteers were subjected to practice 10 asana, 5 mudras, 5 pranayama's, and 5 bandhas regularly for one and half hour daily in the evening for a period of 3 months. The observations were recorded after 1 month, 2 months and 3 month periods.

Following yogic exercises were performed in each case i.e. Mukthasana, Bhujangasana, Naukasana, Makarasana, virasana, Uthit Padmasana, Gomukhasana, Pachimothasana, Matsayasana, shavasana. Pranayams i.e. kapalbhathi, ujjavi, Bhastrika, suryabhedhi. Mudras like maha mudra, singh mudra, Shaktishalni mudra, Vairoli mudra. Bandhas i.e. uddiyan bandha, jalandhara

### MATERIALS AND METHODS

bandha, mul bandha, maha bandha, mahavedha was performed under the supervision of Yoga expertly.

The present study was carried out on 56 participants, out of which 34 were male and 22 were female. The age of male cases ranged from 18-23 years.

**RESULTS:**

**Table 1. Effects of yogic practice on cardiovascular system.**

Groups	Blood pressure (mm hg)		Heart rate Per minute (Mean±S.E.)
	Systolic(Mean±S.E.)	Diastolic(Mean±S.E.)	
Control	120.3±4.47	88.01±4.12	84.34±1.76
1 month yoga practice	117.81±4.76	78.44±1.34	76.63±1.54
2 months yoga practice	116.24±1.92	77.68±0.05	76.18±1.38
3 months yoga practice	112.62±0.98	69.28±0.81	73.58±1.04

**Table 2c. Effects of yogic practice on respiratory functions.**

Groups	Vital capacity in ml. (MEAN±S.E.)	F E V <sub>1</sub> (MEAN±S.E.)	Maximum breathing capacity in lt. Per minute (MEAN±S.E.)
Control	2810 ± 120	65.89 ± 2.47	53.11 ± 2.35
1 month yoga practice	2989 ± 134	81.90 ± 1.89	68.24 ± 2.78
2 months yoga practice	3121 ± 113	89.96 ± 1.57	75.45 ± 2.32
3 months yoga practice	3376 ± 132	94.67 ± 1.72	87.53 ± 2.89

**Table 3a. Effects of yogic practice on hemopoietic functions.**

Groups	ESR In first hour (MEAN±S.E.)	Packed Cell Volume (%) (MEAN±S.E.)	Hb in gm (%) (MEAN±S.E.)	RBC count in millions per cu.mm. Of blood (MEAN±S.E.)	Platelet count in lacs per cu.mm. Of blood (MEAN±S.E.)	Total leucocyte count per cu.mm. Of blood (MEAN±S.E.)
Control	13.18 ± 1.43	45.25 ± 1.6	14.64 ± 0.43	4.47 ± 0.08	2.48± 0.08	6788 ± 436
1 month yoga practice	10.98 ± 1.56	45.98 ± 1.34	13.25 ± 0.4	4.96 ± 0.17	2.53 ± 0.12	7362 ± 278
2 months yoga practice	9.10 ± 1.14	45.66 ± 1.73	13.94 ± 0.18	4.84 ± 0.15	2.78± 0.09	7690 ± 189
3 months yoga practice	8.35 ± 0.95	45.32 ± 0.46	14.89 ± 0.36	5.22 ± 0.08	2.98 ± 0.4	7913 ± 370

**DISCUSSION**

The practice of yoga in contrast physical exercise exerts minimum physical efforts but influences vital organs and neuroendocrine system to induce the variety of physiological changes [10,12]. Yogic asana are a preliminary stage in the comprehensive classical practice of yoga although each and every yogic asana produces specific physiological effect[12] but considerable improvement in cardio respiratory, metabolic and adrenocortical functions [10,11].

The mean systolic and diastolic blood pressure of the volunteers before starting yogic practice were 120.3±4.47 and 88.01±4.12 mm Hg respectively. Yogic practices produced a gradual lowering of both systolic and diastolic blood pressure. The fall in systolic blood pressure after 1 month, 2 months and 3 months of yogic practices were statistically significant. Although decreases in diastolic blood pressure was consistent but is only significant after 3 months. In Addition yogic practices produced a time dependent negative chronotropic effects on heart. The heart rate was decreased for a mean control figure of 84.34±1.76 per

minute to  $76.63 \pm 1.54$  after 1 month,  $76.18 \pm 1.38$  after 2 months and  $73.58 \pm 1.04$  after 3 months of yogic practices, although the decrease in heart rate was small but statistically significant.

The significant increase of Vital capacity, FEV1 and PEFr after yoga and pranayama training, which may attributed to increase in the strength and endurance of respiratory muscles and weight loss. Yogic exercises are unique in contrast to other form of exercises which improves the lung function by increasing the power and endurance of respiratory muscles [13,14]. Short term yoga and pranayama training in particular in various age groups produced significant improvement in lung ventilator functions in the form of lowered respiration rate, increased forced vital capacity, FEV1, PEFr, maximum breathing capacity, and breath holding time [15,17]. Yoga with its calming effect on the mind can reduce and release emotional stresses, hereby withdrawing the broncho constrictor effect [18,20].

In present study a gradual decrease in erythrocyte sedimentation rate and packed cell volume was observed due to yoga practice. The rate of ESR is influenced by a number of inter reacting factors, so it is difficult to explain how yogic practice bring about lowering ESR. But ratio of RBC to plasma is one of the factors which effects ESR. Decrease in erythrocyte sedimentation rate and packed cell volume may possibly explain the lowering of ESR. The haemoglobin levels were increased significantly in first (13.25), second (13.94) and end of third month (14.89) of yogic practice. The red blood cell count gradually increased at the end of first (4.96), third months (5.22) and slight significant reduction at end of second month (4.84). Platelet count and total leucocyte count shows significant increase at the end of all the months of yogic practices.

#### **CONCLUSION**

Yogic practices are usually leads to vagal tone stimulation, resulting decrease in sympathetic tone, thus they induce decrease in systolic and diastolic blood pressure and in heart rate as well. The results of present study showing significant fall in SBP, DBP after first month, second month and third month of yogic practice. The effects of yoga practice on hemopoietic parameters, shows a decrease in erythrocyte sedimentation rate, increase in haemoglobin percentage, total red blood cell count, total leucocytes and platelets count. There was no significant change in packed cell volume. The significant increase of Vital capacity, FEV1 and PEFr after yoga and pranayama training, which may

attributed to increase in the strength and endurance of respiratory muscles and weight loss

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