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Research Article

STUDY OF EFFECT OF YOGA ON BREATH HOLDING TIME IN MEDICAL STUDENTS

R. Aravind Kumar^{1*}, T.T. Ganesan², Sheela Ravindar. S³, Subhashini. A⁴¹Lecture, Department of Physiology, Melmaruvathur Adiparasakthi Institute of Medical Sciences, Melmaruvathur, India²Associate professor, Department of Physiology, Sri Ramachandra Institute of Medical Sciences, Porur, Chennai, India³Assistant professor, Department of Physiology, Sri Ramachandra Institute of Medical Sciences, Porur, Chennai, India⁴Professor and head, Department of Physiology, Sri Ramachandra Institute of Medical Sciences, Porur, Chennai, India

*Correspondence

R. Aravind Kumar
Lecture, Department of physiology,
Melmaruvathur Adiparasakthi Institute of
Medical Sciences, Melmaruvathur, India

DOI: 10.7897/2321-6328.01204

Article Received on: 07/06/13

Accepted on: 10/08/13

Abstract

Yoga is the science of right living which includes postures, breathing exercises and cleansing practices. Yoga consists of five principles which include proper exercise, proper relaxation, proper breathing, proper diet, positive thinking and meditation. Pranayama is a controlled breathing exercise improves lung functions. This study was conducted to show the positive effect of pranayama on lung functions. Sixty first year M.B.B.S students of Sri Ramachandra University served as subjects. Age group of subjects was around 17-20 years of both genders participated in our study. Of these 60 subjects, 30 motivated students were selected to receive yoga training pranayama group I and remaining 30 students will serve as controls group II. Breath holding time was analyzed before and after pranayama around the time of ten weeks. Results were analyzed accordingly. There is significant difference in breath holding time in normal inspiration, maximum voluntary inspiration and after forceful expiration between group I and group II with $p < 0.001$ statically significant. Our results showed significant increase in breath holding time after regular practice of pranayama the significance is more in breath holding time after normal inspiration.

Keywords: Paranayma, Pulmonary Function, Breath Holding Time.

INTRODUCTION

Yoga originated in India is the science. The word yoga means unity or oneness and is derived from the Sanskrit word 'yuj' which means "to join"^{6, 1}. Breathing is an automatic process that occurs throughout life. Automatic breathing is produced by rhythmic discharge of motor neurons that innervate and drive the muscles of respiration. Breathing can be voluntarily inhibited for some time, but eventually the voluntary control is overridden. The point at which breathing can no longer be voluntarily inhibited is called the breaking point.⁴ A number of studies have been done to assess the effect of yoga on pulmonary functions. Breath-holding time has been used in respiratory physiology as a measure of ventilatory response¹². The postures of Yoga are designed to put pressure on the glandular systems of the body, thereby increasing its efficiency and total health. Yoga gently increases breath control to improve the health and function of both body and mind. Regular daily practice of Yoga produces a clear bright mind and a strong, healthy body^{3, 8}. Types of Yoga - There are over a hundred different types Yoga. Some of the most well known are described below. Hatha Yoga - The physical movement's postures and breathing techniques. Raja Yoga incorporates exercise and breathing practice with meditation. Janna Yoga - The path of wisdom considered the most difficult path. Bhakti Yoga - The practice of extreme devotion in one-pointed concentration upon one's concept of God Karma Yoga all movement, all works of any kind is done with the mind centered on a personal concept of God.

Yogic postures Asanas and breathing pranayama have some features unique enough to deserve a special mention.⁵

Pranayama

Pranayama means control of breathing. As a technique pranayama can assume rather complex forms of breathing. But the essence of the practice is slow and deep breathing. Such breathing is economical because it reduces dead space ventilation. It also renews air throughout the lungs in contrast with shallow breath filling which renews air only at the base of the lungs. Slow and deep breathing is a part of shavasana. It may also be practiced sitting in the cross legged posture; placing hand on the abdomen and the other on the chest. Breathing in slowly by diaphragm makes the feeling the abdomen moving out; then taking in some more air using the intercostals. Finally taking in some more air this would enter the uppermost part of the lungs. During this final effort at inspiration taking care that the abdomen does not move inwards and retain the breath for a while. Then breathing out slowly, first emptying the lowest part of the lungs, then the middle, and finally the uppermost part of the lungs. Complex forms of pranayama require prior prolonged practice and proper instruction from a competent teacher.⁵ A few varieties of pranayama are Ujjayi pranayama - Maximal inspiration making a sibilant sound followed by slow expiration. Suryabhedana pranayama - It is inspiration through the right nostril, retention of breath and then expiration through the left nostril. Nadisodhana pranayama - Alternate nostril breathing the nostril is changed after each inspiration.

Bhastrika pranayama – It is forceful breathing simulating bellows. Kapalabhati pranayama - Resembles bhastrika but the inspiration is gentle, only the expiration is vigorous. Bhramari pranayama - Resembles ujjayi but a sound resembling the buzzing of a bee is produced during expiration. Sitali pranayama - The tongue is curled up and protruded, and characteristic sounds are produced during inspiration and expiration. Sitkari pranayama – It is a simpler version of sitali. Murchhana pranayama - Here there is a characteristic modification of the expiratory phase the neck remains bent while the glottis is opened.³

MATERIALS AND METHODS

60 healthy medical student volunteers between 17-20 years of both genders studying in the first year MBBS at Sri Ramachandra University, Porur, Chennai, India were recruited for the present study. 30 motivated students were selected to receive yoga training group I and remaining 30 students were controls group II. Exclusion criteria - Athletes, Previous experience of yoga training, History of major medical illness, History of major surgery in the recent days are excluded. Study Protocol - General characteristics age and body mass index were collected from all students and

matched between the groups. All students were assigned to learn the whole protocol and explained in detail by the investigators. Informed written consent was obtained by explaining the study protocol. Ethical committee approval was obtained. The yoga practice sessions were conducted by a qualified yoga teacher. Breathe holding time after normal inspiration, after normal expiration, after maximum inspiration, and after forceful expiration were measured initially at the time of recruitment in both group I and group II as pre-test data. And then the students in group I were subjected to comprehensive yoga and breathing exercises for one hour daily for 10 weeks six days in a week. The comprehensive program included prayer, asana and pranayama. The protocol of the yoga session includes - Asanas such as Padmasana, Vajrasana, Tad asana, Trikonasana, and Sasankasana; Pranayamas such as Nadi shuddi, Sitali Sitkari, Ujjayi and Bhramari. Participants were instructed to follow a specific breathing pattern during each asana and asked to hold each posture in final position for up to 30 seconds without holding their breath. Each posture was followed by an appropriate relaxation technique for a short period. At the end of 10 weeks period all studied parameters were measured as post-test data with the same method.

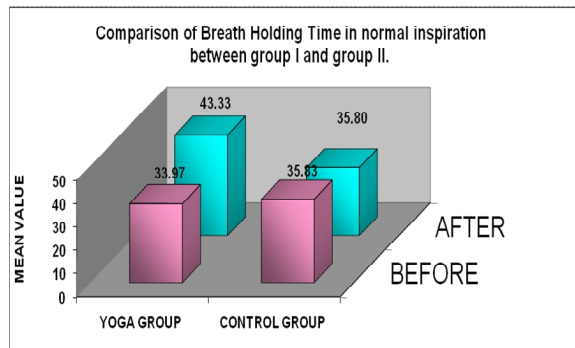


Figure 1

There is Significant Difference in Breath Holding Time in Normal Inspiration between Group I and Group II at P value < 0.001.

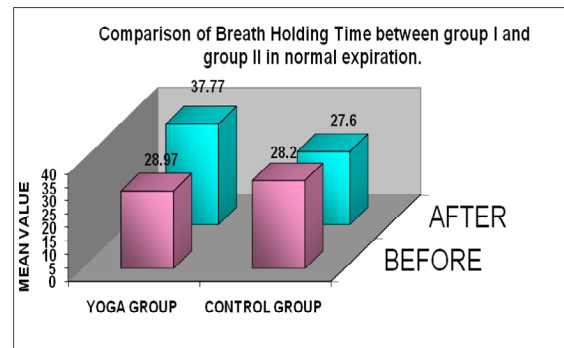


Figure 2

There is Significant Difference in Breath Holding Time between Group I and Group II In Normal Expiration at P < 0.001

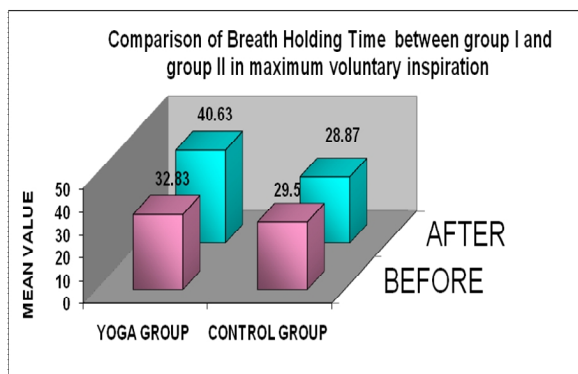


Figure 3

There is Significant Difference in Breath Holding Time between Group I and Group II in Maximum Voluntary Inspiration at P < 0.001

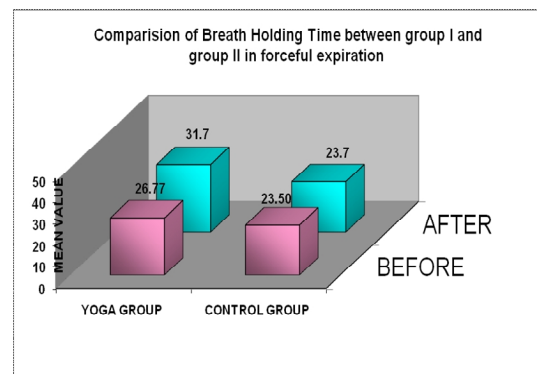


Figure 4

There is Significant Difference in Breath Holding Time between Group I and Group II after Forceful Expiration at P < 0.001.

DISCUSSION

The results of our study indicate that yoga training improves the breath holding times significantly in the maneuver of normal inspiration. In the yoga group, there was a steady and progressive improvement in breath holding time after 10 weeks of yoga training. The change is being statistically significant in case of breath holding time after normal inspiration as compared to corresponding baseline values. Breath holding maneuvers induce hypoxia, hyper apnea and various cardiovascular responses typically including increases in total peripheral resistance, mean arterial pressure (MAP) and decreases in heart rate⁷ Wallace RK *et al.* In 1988 showed that there was decrease in heart and increase in breath holding time after yoga may be due to decreased oxygen consumption¹³. In our study we found that the breath holding time after normal inspiration was more significant. This may due to the effort stress which makes the students in group I to be embarrassed to prolong their breath holding time to the maximum. The favorable effect of yoga on breath holding time observed by us in some out-come measures is consistent with similar results in several previous studies. Makwana *et al.* In 1988 conducted a study on short term Yoga practice on ventilatory function tests of 25 male volunteers show; there was an improvement in respiratory functions in the form of lowered respiratory rate, increased breath holding time, increased forced vital capacity and improvement in tidal volume¹⁴ Madan Mohan *et al* 1992 conducted a study on effect of yoga training on Breath holding time after inspiration and after expiration in 27 student volunteers. They were given yoga training for 12 weeks. Results showed that yoga practice for 12 weeks resulted in significant increase in breath holding time.¹¹ S. Telles *et al* 2007, conducted a study of the effect of 3 months of yoga practice and found an increase in breath holding time, a decrease in blood pressure and rapid decrease in blood glucose, plasma cholesterol, and increased urinary levels of 17-keto steroids.¹⁵ Practice of forced breathing involving only a phase of deep inhalation and forceful exhalation without a phase of breath holding as practiced in 'pranayama' also prolongs breath holding time and improves ventilatory functions of the lung⁹. Joshi *et al.* 1992 conducted study on seven male and seven female participants underwent a one hour daily yoga program for a total of 12 days taught by certified instructor and they studied the effect of two weeks yoga program on pulmonary function and have shown increased in breath holding time.⁸ Austin Dainel Mauch *et al.* In 2008 conducted a simple breathing exercises in which 4 weeks of nadi shodhana pranayama on 20 healthy young men proved there was an increase in breath holding time and decrease in both systolic and diastolic BP. This shows that there was a decrease in autonomic performance those who are practicing regular pranayama¹. Bhargava R *et al.* in 1998; in their study conducted on the persons who are undergoing regular practice of raja yoga. They have shown there was an increase in breath holding time, increase in cardiovascular parameters and decrease in lipid profile². Vyas r *et al* in 2002 in their study Short term practice of pranayama breathing improves the ventilatory functions of the lungs and also

prolongs the breath holding time^{16,18}. Sonya AO *et al.* In 1998 conducted a study on breath holding time among obese and non obese subjects from their study they concluded there was an inverse relationship was found between body fat and breath holding time¹⁷.

CONCLUSION

Our results showed that significant increase in breath holding time after regular practice of yoga and pranayama. The significance is more in breath holding time after normal inspiration. The present study has shown that adding comprehensive yoga-based breathing exercises pranayama to the daily life improve the Lung function. Subjectively the participant gained much enjoyment and relaxation from the yoga classes. This study justifies the need for further studies using a larger sample size.

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Cite this article as:

R. Aravind Kumar, T.T. Ganesan, Sheela Ravindar. S, Subhashini. A. Study of effect of yoga on breath holding time in medical students. J Biol Sci Opin 2013; 1(2): 56-58 <http://dx.doi.org/10.7897/2321-6328.01204>

Source of support: Nil; Conflict of interest: None Declared