

RESEARCH ARTICLE

Effect of yoga on peak expiratory flow rate

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ABSTRACT

Background: The 21st century has witnessed a landmark of science and technology. Due to this advanced scientific-technological invention, the body movements of human beings have been restricted. Man has been felt the prey of stress, hypokinetic, and psychosomatic diseases. Every one desires good health and it is the ultimate objective of all those who want happiness in life. Hence, man should not ignore the importance of any physical activities. Yoga strengthens the respiratory musculature due to which chest and lungs inflate and deflate to fullest possible extent, and muscles are made to work to the maximal extent. Yoga includes many specific postures (asanas) and breath control (pranayama). Peak expiratory flow rate (PEFR) is one of the lung function tests. Hence, the present study is undertaken to know the effect of pranayama on PEFR.


Aims and Objectives: The objectives of this study were to compare of PEFR values between pranayama practitioner and sedentary lifestyle individual. **Materials and Methods:** This cross-sectional comparative study was conducted in the Department of Physiology, Bidar Institute of Medical Sciences, Bidar, Karnataka. The study comprises healthy subjects of both sexes in the age group of 20–40 years. The subjects will be divided into two groups. Group A consisting of 30 healthy subjects, selected randomly from a group of regular yoga practitioners practicing pranayama for 20–30 min a day, 6 days/week, for a minimum period of 5 years. Group B consists of 30 sedentary lifestyle individuals. PEFR is assessed among both groups using computerized spirometer RMS Helios 702. Statistics was done using independent Student's *t*-test. **Results:** The study showed a significant increase in PEFR values in yoga practitioners compared to sedentary individuals. **Conclusion:** Regular performance of yoga helps in improving respiratory muscle strength and enhances the pulmonary functions.

KEY WORDS: Yoga; Sedentary; Peak Expiratory Flow Rate

INTRODUCTION

The 21st century has witnessed a landmark of science and technology. Due to this advanced scientific-technological invention, the body movements of human beings have been

restricted. Man has been felt the prey of stress, hypokinetic, and psychosomatic diseases. Every one desires good health and it is the ultimate objective of all those who want happiness in life. Hence, man should not ignore the importance of any physical activities. Breathing is very much essential to life, without breathing and a fresh supply of oxygen, the cells in the body will die in approximately 5 min. As oxygen gets supplied throughout the body, the cells utilize it for their needs and eliminate carbon dioxide as the main product of metabolism.^[1] Yoga is an ancient Indian philosophical and religious tradition discipline designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual. The benefits of yoga are innumerable and, at the same time, indispensable for

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a harmonial life.^[2] Yoga offers many health benefits such as improving flexibility, reducing stress, and improving overall wellness and physical fitness. It is a wonderful mind-body activity that promotes relaxation as you practice linking breath work to physical posture. Yoga strengthens the respiratory musculature due to which chest and lungs inflate and deflate to fullest possible extent, and muscles are made to work to the maximal extent.^[3] Pulmonary function testing is a major step in assessing the functional status of the respiratory system. It provides guidance for clinical recognition and monitoring of certain obstructive airway disease and restrictive diseases of the respiratory system. Spirometry is useful in assessing the pattern of disease, severity, and the progression of respiratory disease and as a tool in assessing the respiratory well-being of an individual.^[4] Peak expiratory flow rate (PEFR) is objectively measurable quantitative parameters of respiratory health. It is an early indicator of respiratory and systemic inflammation and associated with cardiorespiratory morbidity and mortality. It is very easy, reliable, and also reproducible.^[5] The PEFR is defined as the maximal flow which is achieved during the expiration which is delivered with maximal force, starting from the level of maximal lung inflation, following the maximal inspiration which was expressed in liters/min. The normal range for males and females is 450–550 L/min and 320–470 L/min, respectively.^[6,7] According to the World Health Organization, 60–85% of the population worldwide does not engage in enough activity. Physical inactivity is the fourth leading risk factor for global morbidity and mortality. Traditional thought suggests that having a healthy diet and getting exercise will offset the effects of time spent being sedentary. The literature on yoga shows that it helps in preserving the health and helps in the treatment and prevention of various diseases. The aim of this study was to provide the calculated and measured values of PEFR which helps to assess the benefit of yoga on respiratory health.

MATERIALS AND METHODS

This observational study was conducted in the Department of Physiology, Bidar Institute of Medical Sciences, Bidar, Karnataka, for 12 months. The study was conducted after obtaining ethical clearance from the Institutional Ethical Committee. The study comprises healthy subjects of both sexes in the age group of 20–40 years. The subjects will be divided into two groups. Group A consisting of 30 healthy subjects, selected randomly from a group of regular yoga practitioners practicing different yoga poses for 1 h and pranayama for 20–30 min a day, 6 days/week, for a minimum period of 5 years. Group B consists of 30 sedentary lifestyle individuals.

Inclusion Criteria

The following criteria were included in the study:

- Study Group A consists of 30 yoga practitioners, practicing different yoga poses for 1 h and pranayama for a minimum period of 1 year, in the age group of 20–40 years

- Study Group B consists of 30 sedentary lifestyle individuals who spend moderate time in sitting posture for their professional work and for relaxation such as watching TV, using a mobile, reading, and playing computer games.

Exclusion Criteria

The subjects with a history of major respiratory, cardiac illness, or neurological disorders or with a history of major surgery or injury in the recent past, smoking, alcohol consumption, obesity, and pregnant females were excluded from the study.

The procedure and benefit of the study was informed and taken written consent from all the participants. All the data were collected at a fixed time of the day to minimize any diurnal variation. Data on physical characteristics such as age, height, weight, and body mass index (BMI) were obtained. Vital parameters are checked. Systemic clinical examination was done. PEFR was assessed among both groups using computerized spirometer RMS Helios 702. For recording PEFR, the subjects were asked to begin relaxed tidal breathing through the mouth piece fixed over the transducer and then to take a deep breath in and to blow out as hard and fast as possible and continue blowing until no more air can be exhaled, then to take another deep breath back in, with mouth piece still in the mouth until lungs are full. The best of three readings was considered.

Statistical Methods

Mean and standard deviation of all parameters was calculated in the two groups under the study. A comparison of the variable was done using independent *t*-test. $P < 0.05$ was considered as statistically significant.

RESULTS

Table 1 shows BMI in yoga and sedentary individuals. The study showed a significant increase in PEFR values in yoga practitioners compared to sedentary individuals, as shown in Table 2.

DISCUSSION

The origin of yoga dates back to the Indus Valley Civilization (3300–1900 BC) as well as the Eastern states of India. There is also the prediction in our indispensable history of an early

Table 1: BMI in yoga and sedentary individuals

Group	<i>n</i>	Mean	Standard deviation
Yoga practitioners	30	20.13	1.30
Sedentary adults	30	20.88	2.32

BMI: Body mass index

Table 2: PEFR among two groups

Group	n	Mean	Standard deviation	P-value
PEFR				
Yoga practitioners	30	97.7850	1.76256	P=0.00 Significant
Sedentary adults	30	4.8967	2.81954	

PEFR: Peak expiratory flow rate

form of yoga known as Nirodha yoga (yoga of cessation) at the time of Mahabharata.^[8] Among all the benefits, a few of them include an increase in agility and strength of the body, enhancement of memory and the cognitive functioning of the brain, an increase in efficiency of the respiration and cardiac activity, prevention of degenerative disease, and the increase in parasympathetic dominance.^[9] In India, Patanjali, the first exponent of yoga, described pranayama as the gradual unforced cessation of breathing. In yoga, breathing is voluntarily regulated to make respiration rhythmic and simultaneously to calm the mind. Pranayama is an art of controlling the breath.^[10] Our study showed a significant improvement in PEFR values in individuals performing pranayama ($P = 0.00$). Several similar studies were conducted on pulmonary function tests which showed similar results. A study conducted by Ambareesh *et al.* also showed that there is a highly significant increase in PEFR in the pranayama group than the Surya Namaskar group due to increase compliance of lungs and decreased resistance.^[11] A study on the effect of alternate nostril breathing exercise on cardiorespiratory functions by Dhungel *et al.* showed a significant increase in PEFR values (507.50 ± 44.29).^[12] A study conducted by Prakash *et al.* on pulmonary function tests in athletes, yogic, and sedentary subjects showed a similar lung function tests in athletes and yogis, except for PEFR which was significantly higher in yogis ($P = 0.019$). Pranayama trains the respiratory system to get emptied and filled completely and raises the diaphragm at a higher level. A study on the effect of yogic practice in 60 young females on pulmonary functions by Yadav and Das showed a significant increase in PEFR values (5.59 ± 1.09) in yoga practitioners after 12 weeks of yoga, and they also attributed the increase in PEFR.^[13] Joshi reported a significant increase in forced vital capacity and PEFR following 6 weeks of pranayama practice.^[14] We can appreciate a hike in the values of pulmonary function parameters in an individual with regular yoga in all the studies.

In our study, the numbers of subjects are less and also other lung functions could have been taken to assess the lung functions in yoga practitioners.

CONCLUSION

Practicing regular yoga helps in enhancing the pulmonary functions so practicing yoga as a daily physical activity

improves the health of an individual. We suggest all age group individuals to practice yoga and pranayama for an hour daily for 5 days a week. As PEFR is an easy and cheap method to assess respiratory function, it can be used as a routine pulmonary function test to assess the respiratory functions so that we can prevent from respiratory diseases in future.

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