

RESEARCH ARTICLE

Effect of pranayama on respiratory muscle strength in chronic asthmatics

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ABSTRACT

Background: Pranayama is a breathing technique that produces many systemic and psychological effects in the body, specifically on the respiratory system. It is also an art which controls the life force of breath. **Aims and Objectives:** The current study is designed to assess the effect of pranayama on respiratory muscle strength of chronic asthmatics. **Materials and Methods:** This study is designed to observe the measurement of maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) in asthma patients before and after Pranayama practice. Maximum respiratory pressure is one of the important methods of diagnosing respiratory muscle dysfunction. The study group consisted of 100 asthmatics. The participants were asked to undergo Pranayama training for 30 min daily, for 12 weeks. In the beginning of the course, the first phase of the recording was done and the second phase was done after 12 weeks of the regular pranayama practice. **Result:** The results showed statistically significant improvement in MIP from 64.08 ± 8.162 to 70.38 ± 6.169 and MEP from 107.92 ± 9.897 to 113.68 ± 8.767 in asthma patients after pranayama. **Conclusion:** The current study shows that pranayama has a positive effect on respiratory system with evidence of improvement in respiratory muscle strength.


KEY WORDS: Pranayama; Chronic Asthmatics; Maximum Inspiratory Pressure; Maximum Expiratory Pressure

INTRODUCTION

“Pranayama” is a Sanskrit word, meaning development of control on breathing, it also said as the different forms of energy in the universe.^[1] Breath is the symbol of life force in all individuals which also form a bridge between the body and mind.^[2] This breathing technique can produce various physiological responses in healthy individuals.^[3] Breathing improves the efficiency of respiratory muscle and lung

compliance during inspiration by reducing the elastic and viscous resistance of lung.

Bronchial asthma is an airway disease with chronic inflammation of the airways with psychosomatic imbalance and an increased vagal tone.^[4,5] Many antiasthmatic drugs (inhaled or oral medicine) are available in the market, but these drugs are expensive and may have adverse effects. These days, complementary medicine therapy which is a non-pharmacological enhances the probability of health consciousness with a positive outcome. In earlier days, humans were treated with rituals, folk medicines, and various techniques performed by many traditional healers of their cultures to potentiate their abilities to survive. Practice of yoga even for a short span of 6 weeks can make significant improvements in respiratory muscle strength and endurance.^[6] Researchers have observed that the significant change in the lung functions can be brought about even with short-term

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yoga training.^[7,8] Effect of pranayama in improving various diseases of asthmatics has done by various researchers such as Murthy *et al.*,^[9] Kumar *et al.*,^[10] Singh *et al.*,^[11] and Jain *et al.*^[12]

Various types of yoga asanas combined with breathing exercise can benefit with different physiological changes in young adults. Studies reported that the short duration of pranayama can benefit cardiorespiratory and autonomic functions.^[13]

In the past few years, there are many studies done on the effect of yoga, meditation, and pranayama. However, there are only very few number of studies done on the effects of Bhastrika Pranayama. Therefore, this study was taken up to evaluate the effects of Bhastrika pranayama on respiratory muscle strength in chronic asthmatics.

MATERIALS AND METHODS

The present study was done in 100 chronic asthmatics in the age group of 30–50 years who are under treatment for the same. It was done in the Department of Medicine, Government Hospital, Bhavani, Erode district. Ethical clearance was taken from the Ethics Committee of Annapoorana Medical College, Salem, India (Protocol number - AMC/Ethics/Proc. No. 9). The participants who had a long-term medication with bronchodilators, severe asthma, malignancy, and congenital disorders with forced expiratory volume in the first second <60%, diabetes mellitus, and hypertension were excluded from the study. We included the adult participants with asthma aging around 30–50 years who take the medication during attack.

Study Design

Pre- and post-assessment was done in 100 participants before and after intervention. Baseline assessment was done at the start of the study which was considered as control. After this Pranayama, training was given daily for 30 min in the morning for 12 weeks and again assessment was done.

Assessment Procedure

The measurement of maximal respiratory pressures was done using digital peak respiratory pressure monitor which consists of a mouthpiece, pressure transducer, digital converter, and display monitor. The pressure transducer converts the pressure into electrical signal, and the signals are amplified and converted to digital form and displayed in mmHG. The participant is instructed to take a deep breath and blow back into the mouthpiece and sustain the pressure for at least 2 s. This measures the maximum expiratory pressure (MEP). Similarly, the subject is asked to take a deep breath through the mouthpiece and sustain for at least 2 s. This measures the maximum inspiratory

pressure (MIP). This measurement is helpful to find the respiratory muscles weakness and also identify and quantify any auxiliary possible respiratory diseases.^[14,15] The body position should be considered to measure the variations in maximal respiratory pressures, endurance of the inspiratory, and expiratory muscles. Hence, the participant was made to be in sitting position, with the hip at 90° angle and feet flat on the floor.

Intervention

Yogic exercises used by the participants with the duration are given in Table 1. A certified yoga trainer trained the participants for 30 min duration for 12 weeks. The participants were asked to practice at home and maintain a record of each day yoga practice.

Statistical Analysis

Mean \pm SD is the values obtained before and after Pranayama. Statistical analysis was performed using paired *t*-test to compare pre- and post-training values. $P < 0.05$ is considered as statistically significant.

RESULT

On statistical analysis, there was a significant change in maximum respiratory pressures. The mean of MIP increased from 64.08 ± 8.162 to 70.38 ± 6.169 and the mean of MEP increased from 107.92 ± 9.897 to 113.68 ± 8.767 [Figure 1].

Table 1: Yogic exercises used by the participants

Name	Duration
Prayer and Omkar recitation	5 min
Breathing exercises (Kapalbhati)	5 min
Pranayama (Bhastrika, Ujjayi, and Shavasana)	20 min
Total	30 min

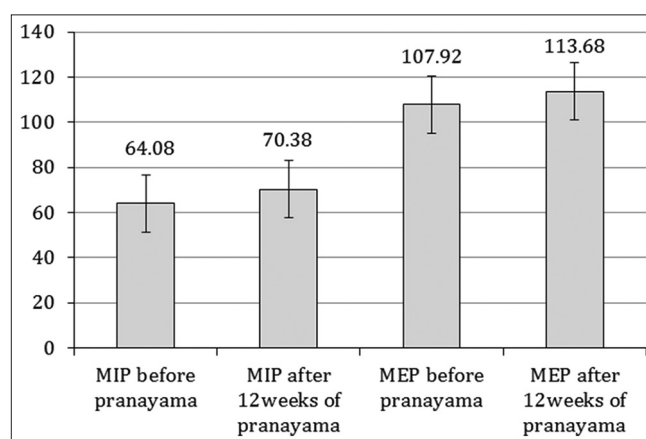


Figure 1: Maximum inspiratory pressure and maximum expiratory pressure before and after Pranayama

DISCUSSION

This study was designed to observe the MIP and MEP in asthma patients after 12 weeks of Pranayama practice. Asthma is a condition with an increase in airway resistance, increased work of breathing, and decrease in respiratory volumes, flow rates, and lung hyperinflation.^[16,17] Stress is an important precipitating factor of asthma,^[18] and mind can be calmed by slow and deep breathing, which not only helps to destress^[19] but also improves the individuals antioxidant status.^[20] Our study result has shown a significant improvement in the MIP and MEP. The changes in the inspiratory and expiratory pressure with pranayama may be due to the alterations in the lung functions.

In normal shallow breathing, lung spaces are not used, whereas Pranayama helps in using lung spaces with the help of respiratory muscle. Therefore, the peak expiratory flow rate is increased which might be an important reason for opening small airway in the lungs.^[1] Pranayama creates negative and positive pressures in thoracic compartment to improve its capacity and also increases the expiratory and inspiratory muscle performance.^[21] During Pranayamic breathing, the lungs and chest get inflated and deflated to the fullest possible; this extent leads the muscles to work maximally which causes strengthening of respiratory muscles.^[22] It is proved from different studies that breathing exercise helps in cleansing the secretions of air pipes and increases lung compliance.^[23] When the lung compliances increased, breathing becomes comfortable and respiratory muscle strength is improved. Yoga asanas and Pranayama improve the various lung volumes, lung capacities, and pressures in young adult.^[24]

With the support of various studies, we took up this study on chronic asthmatics and achieved the improvement in the strength of respiratory muscle due to which the MIP and MEP significantly improved.

CONCLUSION

The study is concluded with the evidence that Pranayama can significantly improve the maximum inspiratory and expiratory pressures with altering the respiratory muscle strength in chronic asthmatic.

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