

Effect of Yoga Training on Breathing Rate and Lung Functions in Patients of Bronchial Asthma

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Research Article

Abstract: Objective: The concept of yoga is helpful for the treatment of Bronchial Asthma has created a great interest in the medical research fields. The present study was designed in order to investigate whether yoga has a positive impact on PFT in asthma. **Background:** Though the modern medical/pharmacological therapy has replaced the traditional system of ailments, increasing incidence of stress is posing a challenge. Here comes the role of yoga which not only improves the physical but the mental stress as well by establishing equilibrium between the sympathetic and para sympathetic components. Medicine affects the physical health whereas yoga stabilizes the mental health. Therefore this combination of yoga and medicine may have a stronger impact on health and would help healthy mind to reside the healthy body. **Method:** In this context, the present study was conducted on forty diagnosed bronchial asthma patients. Yogic session was carried for 12 weeks. Respiratory rate (RR), Breath holding time (BHT) & PFT (FVC, FEV₁%, PEFR) were carried out before and after yoga training. **Result:** There was statistically significant improvement in respiratory variables ($p < 0.001$) after yoga session. The study indicates that there is beneficial effect in pulmonary ventilation by way of relaxation of voluntary inspiratory and expiratory muscles. **Conclusion:** Thus, yogic breathing exercises used adjunctively with standard pharmacological treatment significantly improve pulmonary function in patients with bronchial asthma.

Keywords: Yoga, Asthma, BHT, RR, PFT.

1. Introduction

Bronchial Asthma is a well known disease since ancient India and was quoted in charak samhita as Tamasa Swasa meaning difficulty in breathing. It is associated with increase in airway resistance, hyperinflation of lungs, decrease flow per unit time and increase work of breathing, [1-2]. Though the modern pharmacological system has replaced traditional system of ailments, but increasing incidence of stress is posing a great challenge. It is here that yoga makes a vital contribution to modern medical system. The word yoga means union of mind, body and spirit. The union between us and the intelligent cosmic spirit of creating "The oneness of all things". Bronchial Asthma is known to be functional disorder having a psychosomatic component where in autonomic imbalance may contribute to possible increase in airway reactivity.

Yoga stabilizes this autonomic equilibrium with a tendency towards parasympathetic dominance [3-4]. Studies done by Nararathana Nagendra murthy et al [5] have reported improvement of the various disease parameters in asthmatics with the use of pranayama and controlled ventilation exercises. Studies on the ancient Hindu practice of yoga have also demonstrated an improvement in respiratory function [6]. A study by Joshi et al [7] 1992, also demonstrated improved ventilation function in the form of lowered respiratory rate, increase FVC, increase FEV₁% following six weeks of yoga instruction. In the light of these variable findings the present study was conducted to assess the outcome of yoga training on pulmonary function in patients with bronchial asthma.

2. Materials and Methods

The present study involved a total of 40 Males patients of Bronchial Asthma, having duration of disease within 2-5 years. The study was carried out in the department of Physiology, Government Medical College, Nagpur. The patients were enrolled from chest and T.B OPD. The research proposal was reviewed and approved by Institutional Ethical Committee. Non smokers in the age group of 30-45 with mild to moderate grades of Bronchial Asthma as per National Asthma Education and Prevention Programme (NAEPP) were included [1]. All patients remained on their prescribed treatment during the study. The study was a preliminary attempt to know the efficacy of yoga; therefore a control group was not taken. Patients with a history of TB, Chronic obstructive pulmonary disease (COPD), Diabetes, Renal failure, Coronary artery disease, musculoskeletal chest deformities, respiratory tract infection within previous six weeks and engagement in any regular exercise/physical training were excluded. Yogic session included: pranayamas (deep breathing exercises), Kapalabhati (cleaning breath), bhastrika (rapid and deep respiratory movements like that of bellows) ujjayi (loud sound producing pranayama). Various asana like vajrasana, padmasana, bhujangasana, gomukhasana,

dhanurasana followed by mediation and relaxation techniques. The study group began a daily one hour yoga regime for a total 12 weeks led by a certified yoga instructor. Respiratory Rate, Breath Holding Time and Pulmonary Function tests were performed on patients at baseline and again after 12 weeks. The PFT were done on computerized spirometer (SPIROLAB-2). The following PFT parameters were recorded, Forced Vital Capacity in Liters (FVC), Percentage of Forced expiratory volume in first second (FEV1%) and Peak expiratory flow rate in liters /sec (PEFR). Spirometric test were done 4 hours after the last dose of short acting bronchodilator and 12 hours after the last dose of long acting bronchodilator. The readings were taken thrice and the best of three readings were noted.

Statistical Analysis: Data was collected and tabulated. Mean and Standard deviation were calculated. Significance of difference was tested statistically by applying unpaired T test, $p \leq 0.05$ was taken to be significant.

3. Results

The Age & Anthropometric parameters of subject are depicted in Table 1 as mean \pm standard deviation (SD).

Table 1: Age & Anthropometric parameters of subject.

Parameters	Mean \pm SD
Age (years)	37.55 \pm 5.84
Body weight (kg)	56.30 \pm 4.30
BMI (kg/m ²)	20.05 \pm 1.79

Table 2: BHT & Respiratory rate for Pre & post yoga session.

Parameters	Pre		Post		P value
	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD	
Breath Holding Time (sec)	33.10 \pm 4.62	45.95 \pm 5.37			<0.001***
Respiratory Rate (per min)	17.25 \pm 2.00	12.58 \pm 2.51			<0.001***
Pulmonary function test parameters	FEC (lit)	2.92 \pm 0.52	3.64 \pm 0.52		<0.001***
	FEV ₁ (%)	61.90 \pm 4.84	70.88 \pm 3.55		<0.001***
	PEFR (L/s)	4.71 \pm 1.03	7.06 \pm 0.88		<0.001***

There was a significant increase in FVC, FEV1% and PEFR [$p < 0.001$] in the study group after yoga. Respiratory rate was significantly decreased ($p < 0.001$), and Breath holding time was significantly increased ($p < 0.001$) after yoga session.

4. Discussion

Bronchial Asthma a chronic inflammatory disease of the airways which is having psychosomatic imbalance and increased vagal tone as its etiopathogenesis. [8-9]. Yoga therapy readjusts the autonomic imbalance, controls the rate of breathing and thus alters various physiological variables [3-4]. After a continuous 12 weeks yoga program pulmonary function results showed

significant improvement with decreased in RR & increase in Breath Holding Time. The possible cause of improvement in lung functions could be the following: By consistently performing a variety of asana muscles of the thoracic cavity are constantly being recruited. This recruitment may lead to greater muscular and thereby result in improved lung function [7]. There occurs strengthening of respiratory musculature incidental to regular practice of pranayamic breathing during which the lungs and chest inflate and deflate to possible extent and muscles are made to work to maximal extent.

Secondly lung inflation near to total lung capacity is a major physiological stimulus for release of lung surfactant and Prostaglandins to alveolar spaces which increases the lung compliance, decrease bronchiolar smooth muscular tone [7]. Significant improvement in BHT could be attributed to the control of neural respiratory centers during pranayama. While performing pranayama, yoga participants were instructed to consciously be in control of their breathing, which may indicate that the autonomic breathing stimulus was overridden result in increased breath holding time [10]. An alternate explanation involves that practice of yoga including pranayam, produces a wakeful hypo metabolic state of the body characterized by decreased CO₂ production and decreased O₂ consumption thus allowing breath holding for a longer time. Thus decrease responsiveness of Respiratory centre to CO₂, increase development of respiratory musculature, incidental to regular practice of pranayamic breathing causes increase muscle endurance and delays the most of their fatigue, then allowing breath holding for longer time. Yoga practice involves control of posture and respiration. Authors say that respiratory exercises cause vagal blockage which is responsible for decreased respiratory rate. Rate of breathing in eucapnic is determined by bulbopontine pacemaker's mechanisms [11]. During daily practice of pranayamic breathing, the basic activity of bulbopontine complex is modified in such a way so as to slow down its rhythm, by voluntary prolonging the phase of inspiration with expiration by stretching to their fullest extent, thus making respiratory apparatus to work to maximal extent. Thus we may hypothesize that by voluntarily practicing pranayamic breathing for few weeks, the bulbopontine complex is adjusted to a new breathing pattern which is slower than its basal rhythm.

In addition the relaxation technique and meditation produce state of restful alertness. It decreases the anxiety state and help to reduce Respiratory rate. Decrease the anxiety state and helps to reduce respiratory rate decrease sympathetic activity [12]

5. Conclusion

Thus the present study suggest that regular practice of yoga improves ventilatory function of the lungs as shown

by increase FVC, FEV₁%, PEF_R and increase tolerance to CO₂ as shown by prolonged BHT and decrease respiratory rate of respiration. Patients had reduced symptoms, became more actively involved in their own health care. Yoga breathing is non competitive, personal, inexpensive and enjoyable activity which can produce truly amazing results. Therefore we conclude that yogic breathing exercises when used adjunctively with standard pharmacologic T/t can significantly improve pulmonary function in non smokers with mild to moderate grades of bronchial asthma. However the duration for which the effects of yoga session program are retained is not studied. In the present study the total duration of daily practice of yoga is about 60min. In today's busy life the duration should be less as possible if one wants to practice such programs for long period. Therefore an effective regime requiring minimum daily time should be decided.

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