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"Effect of Pranayama and Meditation on Pulmonary Functions in Healthy Individuals

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ABSTRACT *Yoga is a science practiced in India over the thousands of years. In recent times, medical fraternity is much attracted towards beneficial effects of Yoga.The present study was designed to explain and ascertain the promotive aspects of pranayama and meditation in influencing respiratory status in healthy individuals. In conclusion, the Yoga practice can be advocated to improve pulmonary function tests in healthy individuals and hence to prevent respiratory diseases in future.*

KEYWORDS : Meditation, Pranayama and Pulmonary Functions.

Introduction:

The term "yoga" and the English word "yoke" are derived from Samskrit root "yuj" which means union. Yoga is a psycho-somatic-spiritual discipline for achieving union & harmony between our mind, body and soul and the ultimate union of our individual consciousness with the Universal consciousness.[1] Yoga is a science practiced in India over the thousands of years. Yoga practice mainly consists of Asana (posture- a particular position of the body which contributes to steadiness of body and mind), Pranayama (to control the breathing in a superior and extra-ordinary way to get maximum benefits.) and meditation. It produces consistent physiological changes and have sound scientific basis.[2] In recent times, medical fraternity is much attracted towards beneficial effects of Yoga.

We are well aware of the fact that any sort of exercise done regulary, is beneficial to the body. Yoga is considered to be a very good exercise for maintaining proper health and also has a profound effect on the lung functions of an individual. It is claimed that yogic practices help in prevention, control and rehabilitation of many respiratory diseases. The present study was designed to explain and ascertain the promotive aspects of pranayama and meditation in influencing respiratory status in healthy individuals.

Material and methods:

This present study was conducted in the Department of Physiology, Hi-tech Medical College and Hospital, Rourkela, Odisha during the period from October, 2012 to January, 2013. A total of 45 healthy subjects, an age match group 18-60 years were selected randomly from a group of participants visiting the yoga center who had not yet started practicing yoga but were keen on learning. The same subjects were chosen as both study as well as control group. All the data was collected from 5am to 6am. Data on physical characteristics such as age, height, weight and body mass index (BMI) was obtained. BMI was calculated as weight (kg) / height (m)^2. Pranayam schedule included the deep breathing, inhalation-retention-exhalation at fixed intervals, abdominal (diaphragmatic) breathing and alternate nostril breathing. All the subjects used to do yoga practice daily for about one hour. The yogic schedule consisted of a prayer, asanas, pranayam and meditation. The exercise regimen included different yogic asanas like, Padmasana, Yoga Mudra, Matsyasana, Kukkudasan, Uthana Padhasana, Pavanmuktasana, Paschimotasana; Dhanurasana, Supta Vajrasana, Gomukhasana, Viparita Karani, Sarvangasana, Halasan, Karna Peedasana, Bhujangasana, Bakasana, Mandukasana, Parvathasana, Nauli and Shavasana. Optionally the subjects could do cleansing procedures (kriya) also.

Fig No.-1 RMS Computerised (Helios 401) Spiro-meter.

Subjects who were trained in yoga before, subjects with history of respiratory diseases, cardiovascular diseases and diabetes were excluded from the study. We also excluded subjects with neurological disorders and those who were not able to perform respiratory function tests. Subjects who smoked, consumed alcohol, or any drugs were excluded after taking their history. Pulmonary Function Tests (PFT) were recorded by using RMS Computerised (Helios 401) Spirometer. The parameters of PFT included in the study were - FVC (Forced vital capacity), FEVI Forced expiratory volume in 1st second) and PEFR (Peak expiratory flow rate). Recordings were done on day-1, after 6 weeks, after 12 weeks and after 18 weeks of yogic practice. Data were analyzed by SPSS student t-test and one way ANOVA. A P-value <0.05 was considered statistically significant.

Results and Discussion:

Present study consists of total 45 healthy subjects, an age match group 18-60 yrs, the mean age being 37.01±4.21 years. On analysis of the physical characters of the 45 subjects, the mean age (years) was 37.01±4.21, the mean height (cm) was 159.31±12.01, the mean weight (kg) was 56.21±5.01 and the mean BMI (kg/m2) was 25.03±2.07. The results have been summarized in Table-II. The FVC, FEV-I and PEFR of all the subjects on day-1, weeks-6, weeks-12 and weeks-18 has been given. It is evident that the PFT parameters have higher values at weeks-6, weeks-12 and weeks-18 in comparison to day-I values. The p value has been calculated at weeks-6, weeks-12 and weeks-18 in comparison to values on day-I.

Table 1: Shows the Comparison of pulmonary function tests:

Parameter	FVC(lit.)	FEV-1(lit.)	PEFR (lit/sec)
time interval	mean±sd	mean±sd	mean±sd
Day-1	2.62 ± 1.2	1.99±0.27	4.35 ± 1.4
Weeks-6	2.91 ± 1.26	2.41 ± 0.8	5.12±1.12*
Weeks-12	3.22 ± 1.04	2.62 ± 1.2	5.35± 1.13*
Weeks-18	3.46 ± 1.52	2.91 ± 1.8	5.6±1.0

(Statistically significant at (p<0.05) and * Statistically not significant)

In this study, FVC and FEV-1 were significantly higher at weeks-6, weeks-12 and weeks-18 from day-I (P<0.001). However, PEFR is not statistically significant at weeks-6 and weeks-12 but value of PEFR is higher at weeks-6 and weeks-12 in coparison to day-I. At weeks-18, PEFR is significantly higher than day-I (P<0.01). On analyzing the effect of regular practice of pranayama and meditation in the present study, it was found that there was a highly significant increase in chest expansion, breath holding time and PEFR after yoga practice. Other studies have also reported significant increase in chest expansion[5,6] and PEFR after yoga practice.[7,8,9] The increased chest expansion and PEFR due to regular practice of pranayama and meditation.

Makwana et al reported significant increase in FVC following 10 weeks of yoga training.[4] Others have recorded similar observations.[3,10] The improvement in vital capacity is due in part to increased development of respiratory musculature incidental to regular practice of yogic exercise.[11] By the practice the respiratory apparatus is emptied and filled more completely and efficiently which is recorded in terms of increased FVC. Similar ventilatory training even in elderly subjects

has been shown to improve lung volumes and capacities.[12] Makwana et al also showed increased FEV-l after 10 weeks of yogic practice. The increase in FEV-l might be due to significant increase in vital capacity. Joshi et al reported significant increase in FVC and PEFR following 6 weeks of pranayam practice.[13]

Lung inflation near to total lung capacity is a major physiological stimulus for the release of lung surfactant[14] and prostaglandins into alveolar spaces[15], which increase lung compliance and decreases bronchial smooth muscle tone respectively. The other possible mechanism for improved PFT may be :Increased power of respiratory muscles that is due to the work hypertrophy of the muscles during pranayam and other exercises, Cleansing procedures cleans the infective nasal secretions, Yogic breathing exercises train practitioners to use the diaphragmatic and abdominal muscles more efficiently thereby emptying and filling the respiratory apparatus more efficiently and completely.[4] ,Yoga, with its calming effect on the mind can reduce and release emotional stresses, thereby withdrawing the brancho-constrictor effect. Thus, practice of yogic exercises seems to be beneficial for respiratory efficiency. A number of studies have been done to show the beneficial effects of yoga on asthmatic patients.[16,17] In recent studies, effect of yoga on ventilatory responses, respiratory endurance and muscle strength have been well documented.[18,19] Bera et al have studied 'recovery from stress by yogic relaxation posture' in their recent work.[20]

Thus our study suggests that regular yoga practice improves various pulmonary function tests and is beneficial to improve respiratory efficiency for both males and females. Research on particular set of Yogic exercises like only selected asanas or pranayama is required and also further research with large sample size and for varied age groups is required for applying these results to population in general.

Conclusion:

In conclusion, the Yoga practice can be advocated to improve pulmonary function tests in healthy individuals and hence to prevent respiratory diseases in future. The results of this study and their explanations would justify the incorporation of Yoga as part of our lifestyle and as a part of course in the medical field in promoting health and thereby preventing age related respiratory diseases as well as other systemic disorders.

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