

## EFFECT OF YOGIC PRACTICE ON PULMONARY FUNCTIONS IN YOUNG FEMALES

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**Abstract :** During recent years, a lot of research work has been done to show the beneficial effects of yoga training. The present study was undertaken to assess the effects of yogic practice on some pulmonary functions. Sixty healthy young female subjects (age group 17-28 yrs.) were selected. They had to do the yogic practices daily for about one hour. The observations were recorded by MEDSPIROR, in the form of FVC, FEV-1 and PEFR on day-1, after 6 weeks and 12 weeks of their yogic practice. There was significant increase in FVC, FEV-1 and PEFR at the end of 12 weeks.

**Key words :** Yogic exercises      FVC      FEV-1      PEFR

### INTRODUCTION

Medical science tries to achieve an optimum physical and mental health of the individual through preventive, curative and promotive means. However, for a long time medical professionals have laid much emphasis on the curative aspect and only relatively recently the preventive aspect is also being emphasized whereas in yogic practice the stress is mainly on the promotive aspect, although some yogic methods are prescribed for curative purposes as well.

A number of studies have been done to assess the effect of yogic practice on

pulmonary functions. Udupa et al studied the effects of some breathing exercises (Pranayam) in normal persons (1). Nayar et al documented the effects of yogic exercises on human physical efficiency (2). In another study, oxygen consumption during three yoga-breathing patterns was shown by Miles Wales (3). In a related work, Makwana et al studied the effects of short-term yoga practice on ventilatory function tests (4). The present study has been done exclusively on young healthy females to add more data in the field of yoga and pulmonary functions. This study has been designed to explain and ascertain the promotive aspects of health and yoga.

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## METHODS

The study was carried out at the Institute of Yogic Therapy and Culture, Lucknow, Department of Physiology - King George's Medical College, Lucknow and Lady Hardinge Medical College, New Delhi.

Total 60 healthy young females volunteered as subjects and their physical characteristics like height, weight and age, which have a role to play in determining the lung volumes, have been given in Table I.

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 viz :

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.

All the subjects had to do pranayam essentially for about 10 to 15 minutes. Pranayam schedule included the deep breathing, inhalation-retention-exhalation at fixed intervals, abdominal (diaphragmatic) breathing and alternate nostril breathing.

The subjects who became pregnant during the study were excluded. The

subjects with diabetes, hypertension and chronic respiratory problems like asthma, tuberculosis were also excluded. The subjects performing yoga less than 5 days a week were also not included in the study.

*Pulmonary Function Tests (PFT)* were recorded by MEDSPIROR - made in India (Chandigarh)-a computerized dry type spirometer. The parameters of PFT included in the study were - FVC (Forced vital capacity), FEV1 (Forced expiratory volume in 1st second) and PEFr (Peak expiratory flow rate). Recordings were done on day-1, after 6 weeks and after 12 weeks of yogic practice.

Day-1 means the very first day the subjects started yogic practice. For PFT - the subjects were first explained the whole procedure and were demonstrated the same after obtaining their consent. The subjects performed the test in sitting position.

*Statistical analysis* - The results of PFT are presented as mean  $\pm$  S.D. The data were analyzed using student's 't' test. P values  $<0.05$  were considered significant.

## RESULTS

The results have been summarized in Table-II. The FVC, FEV-1 and PEFr of all the subjects on day-1, weeks-6 and weeks-12 has been given. It is evident that the PFT parameters have higher values at weeks-6 and weeks-12 in comparison to day-1 values. The p value has been calculated at weeks-6 and weeks-12 in comparison to values on day-1.

TABLE I: Physical characteristics of subjects.

	Mean	Median	S.D.
Age Group (yrs)	22.7	22.5	3.61
Height (cms)	155.3	156.0	4.9156
Weight (kgs)	55.9	56.0	7.485

TABLE II: Comparison of pulmonary function tests.

Time Interval/ Parameter	FVC (lit) Mean $\pm$ S.D.	FEV-1 (lit) Mean $\pm$ S.D.	PEFR (lit/sec) Mean $\pm$ S.D.
Day-1	2.019 $\pm$ 0.289	1.989 $\pm$ 0.289	5.10 $\pm$ 1.12
Weeks-6	2.272 $\pm$ 0.276*	2.244 $\pm$ 0.278*	5.34 $\pm$ 1.10**
Weeks-12	2.541 $\pm$ 0.269*	2.504 $\pm$ 0.268*	5.59 $\pm$ 1.09***

\*P<0.001    \*\*P = N.S.    \*\*\*P<0.05

## DISCUSSION

In our study, FVC and FEV-1 were significantly higher at weeks-6 and weeks-12 from day-1 (P<0.001). However, PEFR is not statistically significant at weeks-6 but value of PEFR is higher at weeks-6 in comparison to day-1. At weeks-12, PEFR is significantly higher than day-1 (P<0.05).

Makwana et al reported significant increase in FVC following 10 weeks of yoga training (4). Others have recorded similar observations (2, 5). The improvement in vital capacity is due in part to increased development of respiratory musculature incidental to regular practice of yogic exercise (6). 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

(age 60 to 75 yrs) has been shown to improve lung volumes and capacities (7). Makwana et al also showed increased FEV-1 after 10 weeks of yogic practice. The increase in FEV-1 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 (8).

Lung inflation near to total lung capacity is a major physiological stimulus for the release of lung surfactant (9) and prostaglandins into alveolar spaces (10), which increase lung compliance and decreases bronchial smooth muscle tone respectively. The other possible mechanism for improved PFT may be :-

1. Increased power of respiratory muscles that is due to the work hypertrophy of the muscles during pranayam and other exercises.
2. Cleansing procedures cleans the infective nasal secretions.
3. 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).
4. Yoga, with its calming effect on the mind can reduce and release emotional stresses, thereby withdrawing the broncho-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 (11, 12). In recent studies, effect of yoga on ventilatory responses, respiratory endurance and muscle strength have been well documented (13, 14). Bera et al have studied 'recovery from stress by yogic relaxation posture' in their recent work (15).

In conclusion, it can be stated that yogic exercises are beneficial for the better maintenance of body functions, particularly pulmonary functions, even in normal healthy subjects. In our study, there was

significant increase in FVC, FEV-1 and PEFr at the end of 12 weeks of yogic practice in young healthy females.

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