Study of pulmonary functions in Yoga performing group and non-Yogics

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Abstract:

INTRODUCTION: Yoga means "the unity of body and mind." Yoga has a great value of as a method of preservation of health and treatment of various diseases. Practicing yoga contributes in the improvement of pulmonary ventilation and gas exchange. MATERIALS & METHODS: This study consists of two groups- yoga practitioners (study group) and sedentary subjects (control group). Different pulmonary function tests (FVC, $FEV_{1,}$PEFR,FEV_1/FVC Ratio) were done in both the groups to determine lung functions.
RESULTS: The study revealed that the sedentary subject's performance on PFT was poorer when compared with yoga practitioners and this difference was statistically highly significant.
CONCLUSION: There is the need for sedentary subjects to change their life-style and adopt measures like yoga regularly to be healthy.

Introduction

Yoga, 3000 years old tradition, is a Sanskrit word which means "the unity of body and mind". It is the science of simple living that balances all aspects of life – the physical, mental, emotional, psychic and spiritual.Classical literature on yoga indicates that it is of great value as a method of preservation of health and treatment of various diseases.Yoga practice consists of the five-principle

I. proper relaxation
II. proper exercise
III. proper breathing
IV. proper diet
V. positive thinking and meditation.

Yoga respiration consists of very slow, deep breaths with sustained breath hold after each inspiration. Practicing yoga contributes in the improvement of pulmonary ventilation and gas exchange. It also helps in the prevention, cure and rehabilitation of patients with respiratory illnesses by improving ventilatory functions.Pulmonary function tests (PFT) serve as a tool of health assessment and also to some extent as a predictor of survival rate[I].PFT provide

qualitative and quantitative assessment of pulmonary function in patients with obstructive and restrictive lung diseases[II].Pulmonary functions are generally determined by the strength of respiratory muscles, compliance of the thoracic cavity, airway resistance and elastic recoil of the lungs.The tests used to describe pulmonary function are the lung volumes and lung capacities.The pulmonary function capacities of normal sedentary individuals have been studied extensively in India, but less in the context of comparison with yogic population practicing yoga[V].Hence the present comparative study was undertaken on a large randomly selected sample of yoga practitioners and compared with matched control of sedentary group.This study tested the hypothesis that yoga training improved chest wall expansion and lung volumes in young healthy adults when compared to sedentary adults without yoga training.

Materials And Methods

The study population comprised

I. yoga practitioners as the study group

II. sedentary subjects as the control group selected randomly.

The study group consisted of those practicing pranayama, yogasana and other yogic techniques for at least 1 h/day, 5 days a week for more than 1 year are selected randomly from list of yoga practioners from two different yoga centers in Ahmadabad city.

The sedentary group comprised subjects not practicing yoga and a leisure-time physical activity or activities done for less than 20 min or fewer than 3 times/week.

Study population : Study group – 25

Control group – 25

For each subject in the study group, a similar subject matched for age and gender was identified from urban population aged between 30 and 70 years, non-obese and willing to participate in the study. Informed written consent was taken from the subjects that met the inclusion criteria of the study. Inclusion criteria:- Aged between 30 and 70 years, non-obese, willing to participate, non-smokers and free from active respiratory diseases. Exclusion criteria:- Smokers (cigarettes, beedies, chutta and tobacco chewing), subjects with active respiratory disorders, epileptic disorders and those not willing to participate. The PFT were carried on all these subjects as per the procedure and guidelines mentioned by Twisk *et al*[IV], after explaining the procedure in local language to each subject. The test was carried out in a well-ventilated spacious room with ambient temperature ranging from 28°C to 35°C respectively. Measurements of PFT were taken between 8 am and 12 noon to avoid diurnal variations in lung functions. The tests were carried by a well-trained doctor familiar with SPIROLAB 111 (computerized spirometry) after reinforcing the method of a test to each subject. The five tests of pulmonary function were taken into consideration

and the values obtained were recorded. The best value from three measurements was considered after recording by a spirometer. The tests chosen were:

I. Percentage of forced vital capacity (%FVC)

II. Percentage of forced expiratory volume in 1st second (%FEV1)

III. Percentage of peak of expiratory flow rate (%PEFR)

IV. Percentage of FEV1/FVC ratio.

Anthropometric measurements like height and weight of each subject was measured before the test procedure.

I. Weight was recorded in kilograms (kg)

II. Height was measured in centimeters (cm)

III. Information was collected regarding the socio-demographic data, smoking history, recent respiratory illness, medications used and about the family history of any bronchial asthma. A detailed clinical examination was done to exclude any cases with respiratory and systemic disorders.

IV. Data after collection was entered on Microsoft Excel spread sheet and analyzed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA) statistical software. The data was checked for normal distribution. Mean and standard deviation (SD) were calculated for quantitative data. All values are presented as mean ± SD. Comparison of mean values between the two groups was done using unpaired *t*-test for significance. All statistical tests were two-tailed and $P < 0.05$ was considered to be significant

Results

VARIABLES	GROUP	MEAN (SD)	T VALUE	P VALUE
AGE (Years)	YOGA SEDENTARY	45.3 (9.3) 47.1 (8.5)	1.82	>0.05*
WEIGHT(Kg)	YOGA SEDENTARY	57.2 (8.6) 59.5 (9.3)	1.37	>0.05*
HEIGHT(Cm)	YOGA SEDENTARY	160.5 (8.0) 158.2 (9.3)	1.12	>0.05*
BODY MASS INDEX	YOGA SEDENTARY	22.6 (2.8) 24.4 (4.6)	1.92	>0.05* (*= Not significant)

VARIABLES	GROUP	MEAN (SD)	T VALUE	P VALUE
FVC	YOGA SEDENTARY	109.1±18.2 86.8±16.9	8.03	<0.001** (**= Highly significant)
FEV_1	YOGA SEDENTARY	116.3±15.9 85.8±14.8	9.91	<0.01**
PEFR	YOGA SEDENTARY	109.2±21.3 90.5±14.4	4.58	<0.01**
FEV_1 / FVC RATIO	YOGA SEDENTARY	111.3±6.9 102.0±11.8	2.86	<0.05* (*=Significant)

Pulmonary function test variables between the two groups

Discussion:

In the present study, significantly higher values of pulmonary functions were observed among subjects practicing yoga as compared to sedentary subjects who did not practice yoga. It was observed subjects who were practicing yoga since last 1 year had better FVC values than the sedentary subjects. Similarly Prakash *et al*[III]. have reported that the mean FVC value for yoga practitioners was 98 whereas in sedentary subjects the values were lower and they are in agreement with the present study. Yadav and Das[VI] in their study also observed that there was a significant increase in FVC among the subjects exposed to yogic exercises for 12 weeks. The changes in the FVC values depend upon the duration of yoga training.In the present study observations revealed PEFR values in yoga practitioners were much higher than the sedentary subjects. In a study of yoga for asthmatics found improvement in the peak flow rate after yoga training for 2 weeks. Yadav and Das[VI] also observed a significantly higher PEFR value after 12 weeks of yoga training, but not statistically significant values after 6 weeks of training indicating that the duration of yoga training plays a role in PEFR. In contrast, Joshi et al.[II] observed a significant increase in PEFR even at 6 weeks of pranayam training with only pranayamic practice lasting for 20 min twice a day. Improvement in vital capacity among yoga practitioners in the present study may be due to increase in the development of respiratory musculature incidental to regular practice of yoga. The findings of the present study can also be explained on the basis of better functions of respiratory muscle strength, improved thoracic mobility and the balance between lung and chest elasticity which the yoga practitioners may have gained from regular yoga. The other possible mechanism for improved PFT in yoga practitioners as mentioned by Yadav and Das[VI] are:

I. Increased power of respiratory muscles that is due to the work hypertrophy of the muscles during yoga and other exercises

II. 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.

The present study also showed that the sedentary group had lowest values of pulmonary function compared to yoga practitioners. Sedentary life-style is associated with development of restrictive lung function. We recommend that sedentary people should adopt yogic exercises for improving their health. Hence regular practice of yoga should be promoted among the sedentary subjects that may bring desirable physiological, psychological and physical changes in the individual.

Conclusion

This study agrees with previous reports and supports the health benefits of yoga.The study revealed that the sedentary subject's performance on PFT was poorer when compared with yoga practitioners. This emphasizes the need to change their life-style and adopt measures like yoga regularly to be healthy.

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