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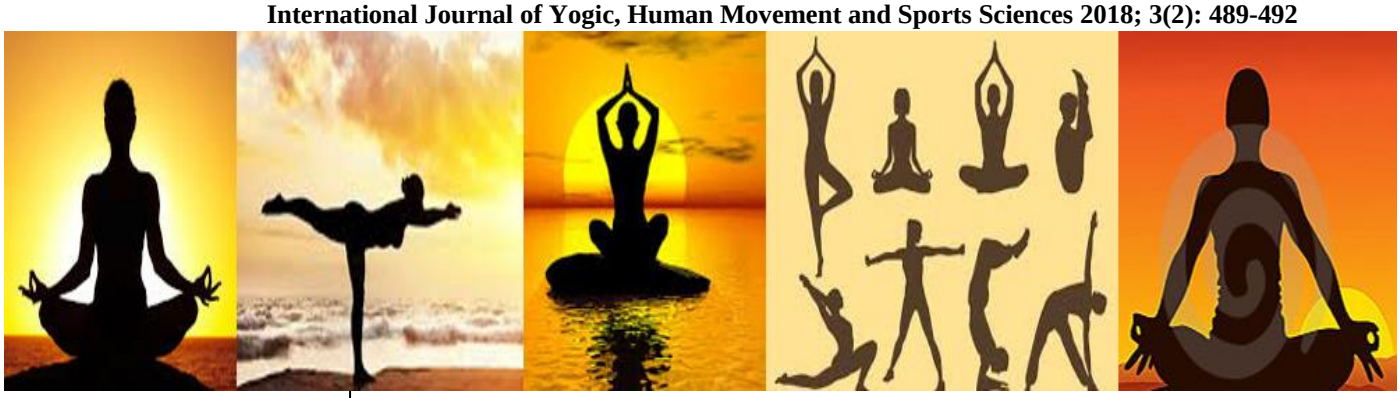

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Dr. Anil Mishra
Professor, Shrimad Rajchandra College of Physiotherapy, Bardoli, Gujarat, India

Dr. Mansi Bidija
Assistant Professor, Shrimad Rajchandra College of Physiotherapy, Bardoli, Gujarat, India

Dr. Neeti Mishra
Associate Professor, Spbphysiotherapy College, Surat, Gujarat, India

Correspondence
Dr. Anil Mishra
Professor, Shrimad Rajchandra College of Physiotherapy, Bardoli, Gujarat, India

A comparative study of the pulmonary functions between actively working and sedentary young female individuals

Dr. Anil Mishra, Dr. Mansi Bidija and Dr. Neeti Mishra

Abstract
Background: Pulmonary function tests (PFT) serve as a tool of health assessment and also to some extent as a predictor of survival rate. PFT tend to have a relationship with life-style such as regular exercise and non-exercise. To be physically active is the body's most common physiological stress, and it places major demands on the cardiopulmonary system. Spirometry is pivotal to the screening, diagnosis and monitoring of respiratory diseases and is increasingly advocated in primary care practice. Spirometry is considered the most practical test of assessing the respiratory function. So the present study was carried out to evaluate the lung function between physically active and sedentary females using pulmonary function test.
Methods: The sample consisted of 62 female individuals of age between 25 years to 35 years. In group A Actively working female subjects were included and in group B sedentary females were included. Before 6 min walk test, all subjects of both the groups were asked for Pre PFT readings. After completion of 6 min walk test, all subjects of both the groups were again asked for Post PFT readings. Lung function parameters like Forced Expiratory Volume in 1 second (FEV1), Forced Vital Capacity (FVC), FEV1 / FVC Ratio and Peak Expiratory Flow Rate (PEFR) were recorded. Pulmonary function were recorded in the same time of the day in sitting position at rest and immediately after 6min walk test.
Results: The data was analysed by SPSS VERSION 20. Pre and post PFT readings within group was done using paired t test which shows highly significant difference in both groups. Comparison between groups was done using independent t test which shows significant differences in both groups for all variables.
Conclusions: The results of this study shows significant difference within and between the groups. However Group 2 with sedentary females is found to have lower values compared to the group 1 for all variables.

Keywords: PFT, physical active, pulmonary function, Spirometry, 6 min walk test

Introduction
Public's interest about the role of keeping themselves physically active in shaping one's life style is increasing day by day. Jogging, running and walking are considered as dynamic exercises which plays a dominant role in modifying individual's total health in general and in particular the cardiac and respiratory systems[1]. But now a days working actively at their workplaces is also one of the dynamic exercise according to the pulmonary physicians and it is beneficial to prevent respiratory diseases like chronic bronchitis etc. One should maintain health throughout the life [1]. To achieve this, best method is to remain physically active in their workplace so that clinically desirable and beneficial physiological changes occur in the body, to lead a healthier life.
Pulmonary function tests (PFT) serve as a tool of health assessment and also to some extent as a predictor of survival rate. PFT tend to have a relationship with life-style such as regular exercise and non-exercise [2, 3]. Spirometry is pivotal to the screening, diagnosis and monitoring of respiratory diseases and is increasingly advocated in primary care practice [4]. PFT provide qualitative and quantitative assessment of pulmonary function in patients with obstructive and restrictive lung diseases. The tests used to describe pulmonary function are the lung volumes and lung capacities.

It is well-known that pulmonary functions may vary according to the physical characteristics including age, height, body weight and altitude [4].

Due to regularly active in jobs, all individuals tend to have an increase in pulmonary capacity when compared with sedentary females. Pulmonary functions are generally determined by the strength of respiratory muscles, compliance of the thoracic cavity, airway resistance and elastic recoil of the lungs. Remaining activity is accompanied by a number of beneficial physiological effects in the body. Regularly physically active is known to improve overall performance and working capacity [5]. Current evidence suggests that regular practice of yoga also shows an improvement in cardiovascular and pulmonary functions [6].

The object of our study is to determine the differences between the pulmonary functions of actively working female individuals, and sedentary female individuals in accordance with new literature data.

Methodology

Study design: Pre and post test experimental study

Population: Female individual of 25 to 35 years of age

Sampling technique: Purposive sampling

Study duration: 6 months

Sample size: 62

For the study the sample size was calculated in G Power 3.1.9.2 with effect size 0.80 and α =0.05. Sample size calculated was 52, with a drop out chances of 20% the total sample size was 62 samples and 31 subjects in each group.

Study Setting: UKA Tarsadiya University Campus.
Women organization committee, Surat.

The study population comprised of actively working female individuals as the group 1 and sedentary female subjects as the group 2 were selected randomly from the UKA Tarsadiya University Campus and Women organization committee, Surat. Present study was reviewed and approved by the Institutional Ethics Committee. Informed written consent was taken from the subjects that met the inclusion criteria of the study. Female Participants aged between 25-35 years age, Active females who were doing job at least > 5 hours, 6 days per week more than 5 years, sedentary individuals who were not engaged with any physical activities, No history of medical illness, No history of lower extremities injury in past 1 year were included in the study. Male subjects, Smokers (cigarettes, beedies, chutta and tobacco chewing),Subjects with active respiratory disorders, epileptic disorders, Those not willing to participate in the study, Recent lower extremities injury or diseases, Subject having Heart rate(HR) <50 BPM or >100 BPM at rest, Subject having Blood Pressure (BP) >140/90 mm hg were excluded from the study.

Procedure

Before 6 min walk test, all subjects of both the groups were asked for Pre PFT readings. After completion of 6 min walk test, all subjects of both the groups were again asked for Post PFT readings.

The PFT were carried on all these subjects as per the procedure and guidelines mentioned by Miller *et al*. [14] 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. The tests were carried by a well-trained doctor familiar with Medspiror (computerized spirometry) after reinforcing the method of a test to each subject. Further, study subjects undergoing the tests were well-informed about the instrument and the technique of test by demonstrating the procedure. 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. Predicted values were calculated by the standard formulae originally programmed in the spirometer.

Lung function parameters like Forced Expiratory Volume in 1 second (FEV1), Forced Vital Capacity (FVC), FEV1 / FVC Ratio and Peak Expiratory Flow Rate (PEFR) were recorded. Pulmonary function were recorded in the same time of the day in sitting position at rest and immediately after 6min walk test.

Statistical analysis

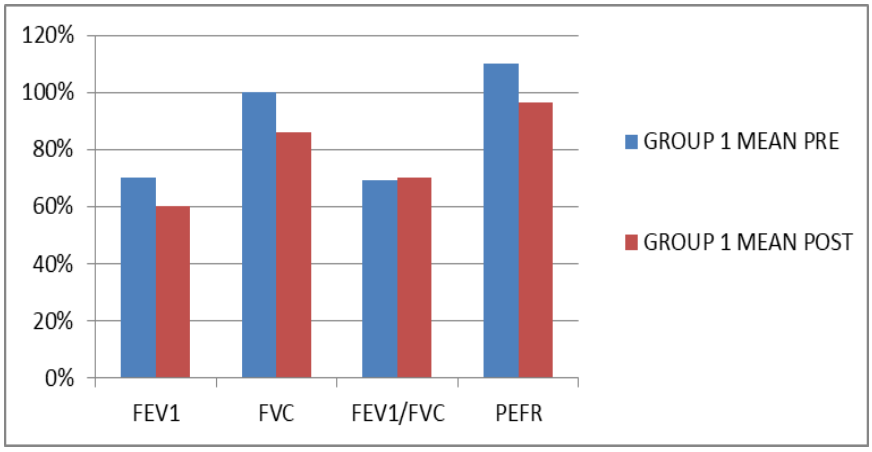
Analysis were done using SPSS-20. Descriptive analysis was used to calculate mean and standard deviation. Paired t test was used for inter group analysis. Independent t test was used for intra group analysis for all the three dependent variables. The level of significance was set at 95%.

Results

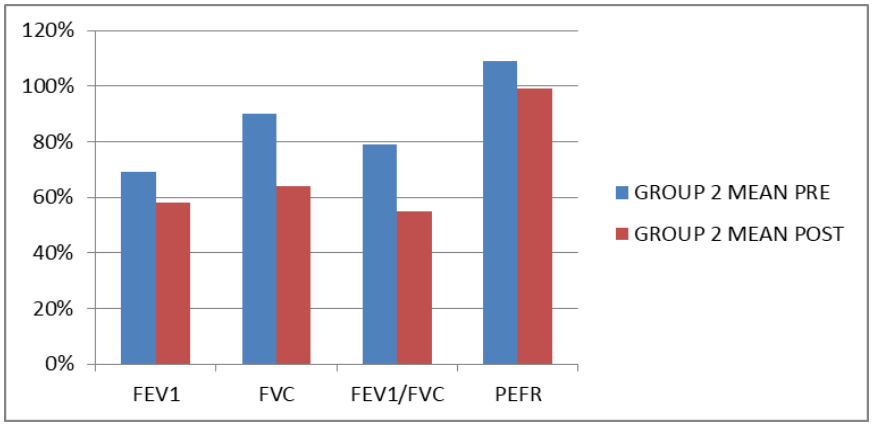
Pre and post readings within group was done using paired t test which shows highly significant difference in both groups in all the outcome scores. Comparison between groups was done using independent t test which shows significant differences in both groups for all variables.

Table 1: Shows mean values of all variables of group 1 and group 2

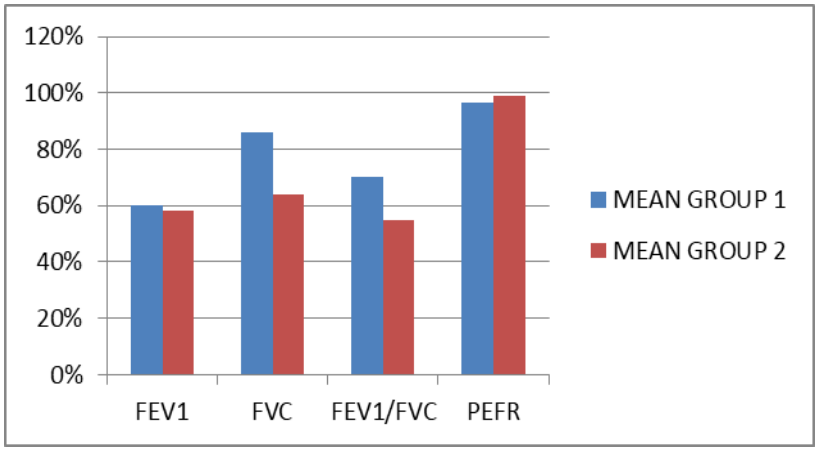
Variables	Group 1 Mean	Group 2 Mean	Group 1 Sd	Group 2 Sd	T Value	P Value
FEV1	60%	58%	15.9	14.5	9.91	<0.01
FVC	86%	64%	17.04	15.4	4.76	<0.01
FEV1/FVC	70%	55%	7.5	8.23	2.35	<0.05
PEFR	96.40%	99%	20.65	18.09	4.03	<0.01



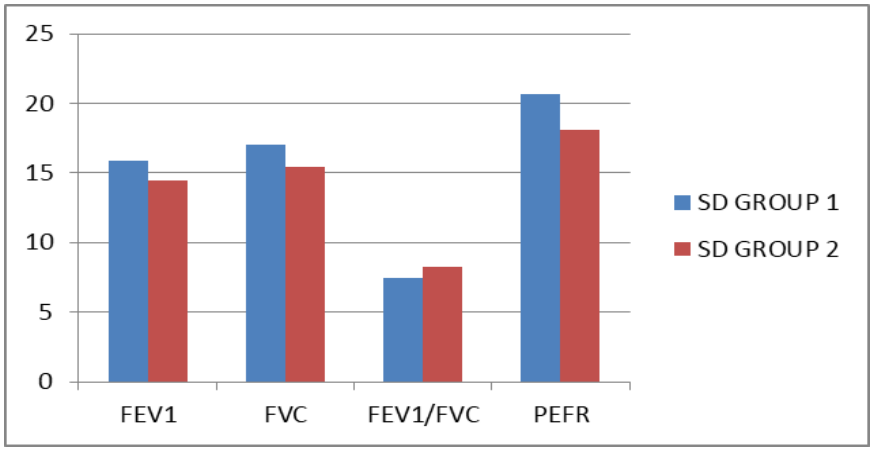
Graph 1.a: Per and post comparision variables for group 1



Graph 1.b: Per and post comparision of all variables variables for group 2



Graph 1.c: Post Mean comparision of all variables between both groups



Graph 1.d: Post SD Comparision of all variables between both groups

Discussion

In the present study, significantly higher values of pulmonary functions were observed among subjects practicing actively in their work as compared to sedentary subjects who did not work. The group 1 exhibited better pulmonary function status when compared with group 2. It was observed that the mean of %FVC for group 1 was 86% and for group 2 were 64%. This clearly showed that the subjects who were working actively had better FVC values than the sedentary subjects. Similarly praksh *et al*. [15] 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. Joshi *et al* in their study also observed a significant increase in FVC after pranayam practice [7]. Yadav and Das 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 [8].

With reference to % FEV1 the second test studied, the values in Group 1 were much better when compared with sedentary subjects. When both groups are compared, results showed higher FEV1 inactive group as reported by other studies. Many authors emphasized the importance of PEFR as one of the important indicators of pulmonary function. In the present study, the mean %PEFR among group 1 was 60% compared to sedentary group which was 58%. The above observations revealed PEFR values in group 1 were much higher than the sedentary subjects. The FEV1/FVC ratio when coupled with other test could be used as a predictor of obstructive and restrictive patterns of lung disorders. In the present study, the mean %FEV1/FVC among actively working females was higher 70.6% than sedentary 55%. While khanam *et al* did not observe any significant change in FEV1 and PEFR [9]. Yadav and Das in their study observed that FEV1 was significantly higher at 6 weeks and 12 weeks of yoga training [8].

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

Conclusion

The study revealed that the sedentary subject's performance on PFT was poorer when compared with actively working female individuals. This emphasizes the need to change their life-style and adopt measures like exercise regularly to be healthy. Engaging in any work actively produces a positive effect on the lung that is reflected in improvement of pulmonary capacities. The present study suggests that active participation in their work improves respiratory breathing capacity by increasing chest wall expansion and forced expiratory lung volumes. The data from the study provide more scientific evidence to support the beneficial effect of working actively on respiration and muscle strength. This resultant effect of this on lung functions can be used as lung strengthening tool to treat many lung diseases such as asthma, allergic bronchitis, post-pneumonia recoveries, tuberculosis and many occupational diseases.

Limitation

The study has certain limitations too. As it was done only on small sample size, the results could not be generalized to the entire young population. There was also practical difficulty while performing test to all subjects which may not be feasible in a non-research set- up.

Future Research

Future study could be conducted on large population. Study can also be conducted on other age groups. Further comparative study of changes in PFT could also be studied in various chronic obstructive pulmonary diseases.

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