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Comparative Study of Pulmonary Function Tests in Sedentary Individuals and Dynamic Exercising People

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Abstract: *The field of exercise physiology is at the dawn of a new era. Exercise can play a role in shaping one's life style.Jogging, and walking are dynamic exercises, play a dominant role in individual's total health. The pulmonary physicians admit the dynamic exercise is beneficial to prevent respiratory diseases . The dynamic exercise's positive impact includes pulmonary physioloy. The pulmonary function tests evaluate the respiratory system. They are ventilatory function tests. The oxygen consumption and carbon dioxide production may go up to 25 times depending on severity of the exercise and the alveolar and arterial PO2 and PCO2 are maintained normal during the strenuous exercise, by increase in pulmonary ventilation and changes at the tissues level.*

Materials and Methods: *study was conducted on subjects ranging from 24-26 years, 44-46 years and 64-66 years male in good health and their hemoglobin is more than 10gms/ 100ml. Different parameters (FVC, FEV1, FEV1/FVC %, PEF 50%, RR) of the study are recorded on the computerized Spirometer.*

Results and Conclusion: *The results showed significantly increased (p<0.001) mean FVC, mean FEV1, mean FEV% and mean PEF in male atheletes practicing regular dynamic exercise and more so in young persons. This suggests that regular dynamic exercise has improved lung function.*

Keywords: *Jogging, spirometry, pulmonary function tests, ventilatory function tests*

I. Introduction

Public's interest about the role of exercise in shaping one's life style is increasing day by day. Jogging, running and walking are considered as dynamic exercises plays a dominant role in modifying individual's total health in general and in particular the cardiac and respiratory systems. Pulmonary physicians admit that dynamic exercise is beneficial to prevent respiratory diseases like chronic bronchitis etc. one should maintain health throughout the life. To achieve this best method is to undertake dynamic exercise so that clinically desirable and beneficial physiological changes occur in the body, to lead a healthier life.

The dynamic exercise produces a positive impact on the pulmonary physiology. So the health of the body is reflected by the tests involving the pulmonary function. The pulmonary function tests are:

1. Ventilatory function tests
2. Tests of diffusion
3. Tests of ultimate purpose of respiration.

In our present study we considered the ventilatory function tests only. These tests can be measured by spirometry. Forced vital capacity, forced expiratory volume in 1 sec, forced expiratory volume % and peak expiratory flow 50% serve as the lung volumes for assessing the pulmonary functions. During the exercise the oxygen consumption and carbon dioxide production may go up to 25 times depending on severity of the exercise. Alveolar and arterial PO2 and PCO2 are maintained normal by increase in pulmonary ventilation and the changes at the tissues level.

The increase in O2 uptake in the lungs occurs to about 4 L per minute during exercise. This is made possible by increased pulmonary perfusion, increased alveolar pulmonary capillary PO2 gradient and increased pulmonary diffusing capacity of the respiratory membrane in the lungs. The ultimate goal of all these changes in respiratory system is to meet the metabolic O2 demands.

Spirometry

Hutchinson, a London Surgeon in 1846 introduced the concept of spirometry. The primary instrument used in the pulmonary function testing is the spirometer. Spirometry is a measure of Forced Expiratory Volume in 1 sec, Forced Vital Capacity and ratio of FEV1 / FVC and peak expiratory flow.

1. Forced Vital Capacity (FCV):

After the subject has taken in the deepest possible breath the volume of air, which can be forcibly and maximally exhaled out of the lungs until no more can be expired.

2. FEV1

This is the volume of air which can be forcefully exhaled from the lungs in the first second and it is the best characterized test of respiratory function.

3. PEFR

This PEFR is defined as the maximum flow, which can be sustained for a period of 10ms during a forced expiration starting from the total lung capacity.

4. $FEF_{25\%-75\%}$:-

Flow is often measured over the middle half of the FVC (i.e., between 25% and 75% of the expired volume).
Using computerized spirometer (Spiro lab) different age groups subjects with physical activity like dynamic exercise people and sedentary subjects are inducted into the present study.

II. Materials And Methods

Study was conducted on subjects ranging from 24-26 years, 44-46 years and 64-66 years male clinically in good health i.e, no clinical abnormalities and their hemoglobin is more than 10gms/ 100ml in all the subjects. Each group consisted of 25 subjects.

Group IA: Males sedentary from age 24-26 years
Group IB: Male athletes from age 24-26 years
Group IIA: Males sedentary from 44-46 years
Group IIB: Male athletes from 44-46 years
Group IIIA: Males sedentary from 64-66 years
Group IIIB: Male athletes from 64-66 years

All the subjects are well informed of the experimental protocol and also their consent was obtained.

Different parameters (FVC, FEV1, FEV1/FVC %, PEF 50%,) of the study are recorded on the computerized Spirometer. The heights and weights of all the subjects and also the pulse & blood pressures were recorded. The subjects were asked to sit in front of the computerized spirometer with mouth piece held firmly between the lips and the nose clip is applied, the subject is asked to inhale and exhale into the spirometer and such three readings are taken, out of which the average (mean) is taken as a standard reading for the study.

III. Analysis Of Results

Table 1: Mean Pulmonary Function Test Values In Male Sedentary And Athletes Of 24-26 Years Age Group

PFT	SEDENTARY		ATHLETES		T VALUE	P VALUE	CRUDE VALUE	%↑↓
	MEAN	SD	MEAN	SD				
FVC	4.67	.074	4.98	0.15	15.342	<0.001	0.10	11%↑
FEV1	3.585	0.051	4.077	0.115	19.563	<0.001	0.119	13%↑
FEV1%	80.4	0.68	82.48	0.441	12.832	<0.001	3.91	2% ↑
PEF50%	4.104	0.0789	4.462	0.108	13.391	<0.001	0.472	8%↑

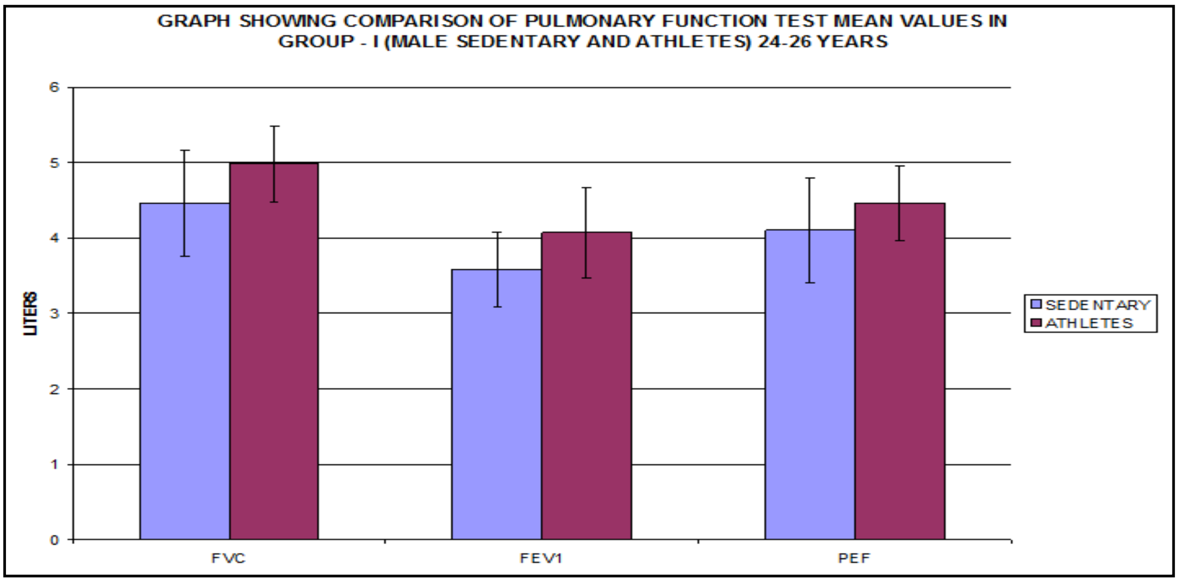


Table 2: Comparision Of Mean Pulmonary Function Test Values In Male Sedentary And Athletes Of 44-46 Years Age Group

PFT	SEDENTARY		ATHLETES		T VALUE	P VALUE	CRUDE VALUE	%↑↓
	MEAN	SD	MEAN	SD				
FVC	3.98	0.04	4.15	0.09	8.634	<0.001	0.17	4%↑
FEV1	2.934	0.02	3.254	0.063	24.222	<0.001	0.320	10%↑
FEV1%	73.79	0.974	78.6	2.2	9.996	<0.001	4.81	6% ↑
PEF50%	3.239	0.013	3.914	0.043	1.683	<0.001	0.675	21%↑

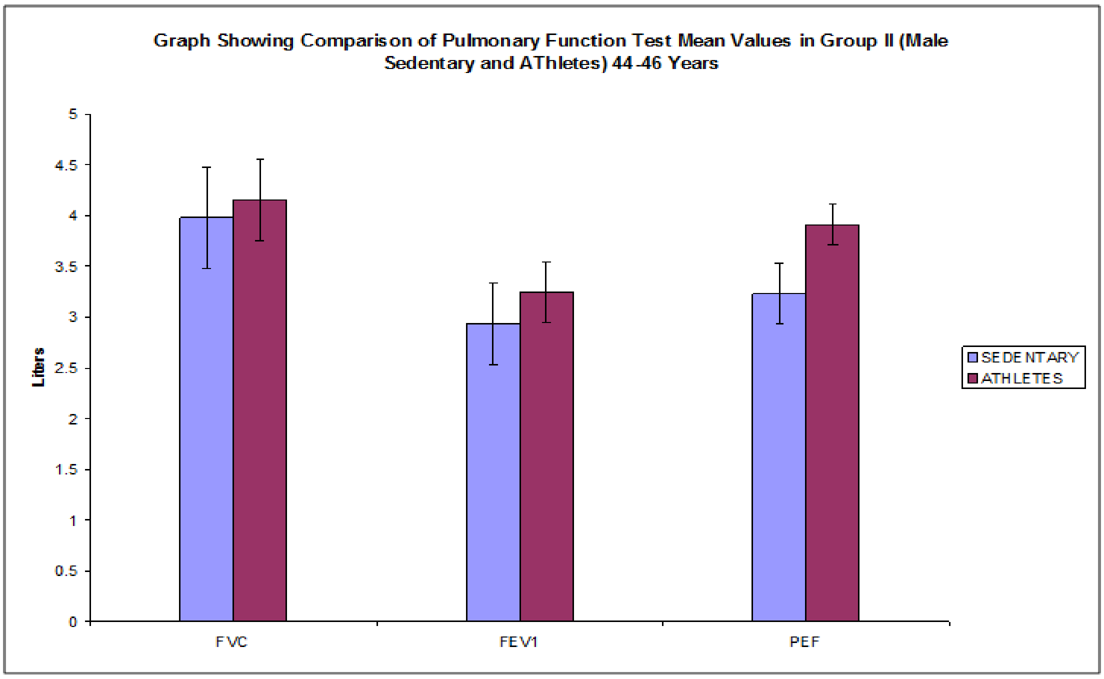
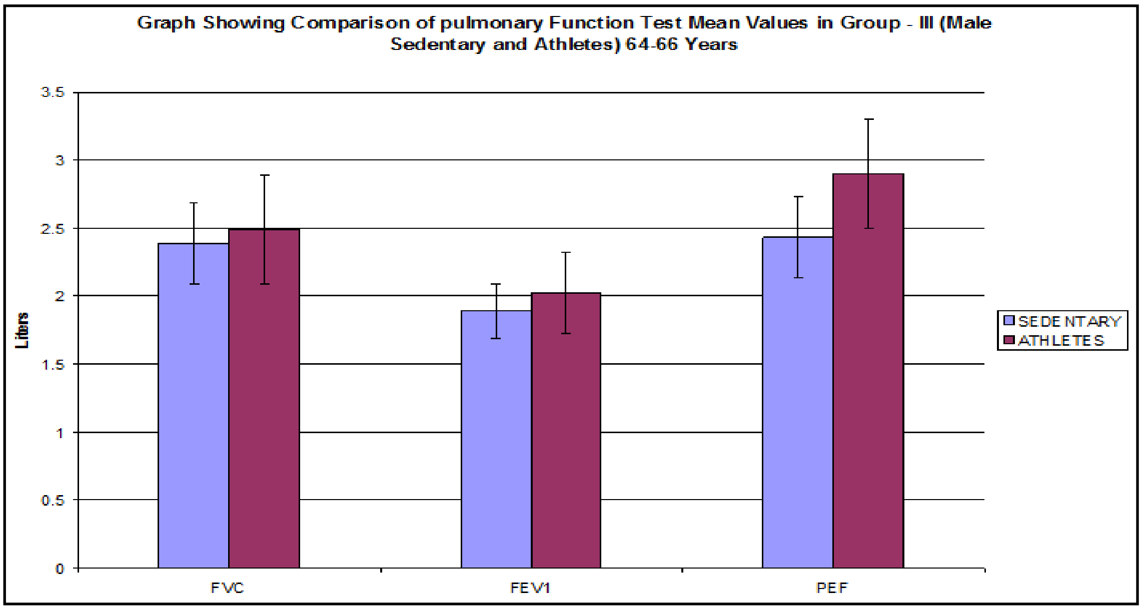


Table 3: Comparision Of Mean Pulmonary Function Test Values In Male Sedentary And Athletes Of 64-66 Years Age Group

PFT	SEDENTARY		ATHLETES		T VALUE	P VALUE	CRUDE VALUE	%↑↓
	MEAN	SD	MEAN	SD				
FVC	2.39	2.49	0.03	0.012	16.06	<0.001	0.10	4%↑
FEV1	1.892	2.021	0.024	0.032	16.170	<0.001	0.119	6%↑
FEV1%	74.7	78.61	1.801	0.65	10.215	<0.001	3.91	5% ↑
PEF50%	2.436	2.908	0.081	0.097	18.684	<0.001	0.472	19%↑



The tables and graphs support the study. The mean FVC, mean FEV1, mean FEV%, and mean PEFare significantly increased i.e p valve (<0.001).

IV. Discussion

The study conducted shows that the individuals who have sedentary lifestyle have lung function values significantly lesser than the dynamic exercising people. The results of study show that there is significant improvement in mean FVC, mean FEV1, mean FEV% and mean PEF. The results are supported by the study of A K Ghosh et al, C Kesav Chandran et al who reported significant increase in the above said values.

Pulmonary function tests by spirometry permit early identification of abnormalities associated with many respiratory diseases. These tests would also provide valuable information in monitoring disease progression, response to treatment and rating disability due to occupational hazards. These tests are user friendly, non-invasive.

As per the study, dynamic exercise can improve lung function and delay in age related changes in respiratory system and thus the respiratory diseases as well as cardiovascular diseases also.

Summary

The chosen parameters reflect that the pulmonary functions were best among dynamic exercising people and their performance was better than when compared with sedentary subjects. The study shows that the pulmonary function tests can be screening method to identify the subjects who may be prone for respiratory disorders. The vast improvement in sophisticated technology helps in solving the problems of diagnosis of obstructive and restrictive diseases which can be interpreted clinically and physiologically.

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