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ASSESSMENT OF PULMONARY FUNCTION TEST IN ATHLETIC AND NON ATHLETIC INDIVIDUALS

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ABSTRACT

Introduction: Pulmonary function is governed by genetic, environmental and nutritional factors and confirms that physical training during growth help in developing a greater endurance in respiratory muscles.

Objectives: to study pulmonary functions of the athletic and non athletic individuals at department of physiology at tertiary health care centre.

Materials and Methods: This was a cross-sectional study carried out in the department of physiology during the one year period i.e. March 2018 to March 19. During the one year period there were 100 volunteers participated into study out of which 50 were doing the athletic exercise like marathon running, swimming etc. since six months were considered as athletic and those individual not doing any active exercise or activity were considered as sedentary were selected randomly . 50 sedentary were selected randomly. All details of the patients like age, sex BMI was recorded. All the patients with written and explained consent were undergone pulmonary function test by under all standard protocols. The statistical analysis was done by unpaired t-test and chi-square test.

Result : In our study we have seen that The average age was comparable i.e. 37.98±3.42 and 38.29± 2.75 (t=0.78,df=48,p>0.05);and the proportion of Male : Female was also comparable i.e. 1.5 as to 1.6 (X^2=2.34,df=1,p>0.05) . The FVC was 90.12 and 79.80 (t=3.45,p< 0.01); FEV1- 88.15 and 72.01 (t=4.19,p)< 0.01; FEV3 was 87.34 and 75.30 (t=5.13,p< 0.01); PEFR- 94.45 and 87.16 (t=3.87,p< 0.01); FEV1/FVC was 92.1 and 83.28 (t=10.76 ,p< 0.001) was significantly higher in Athletic group as compared to Sedentary group.

Conclusion : It can be concluded from our study that Athletic group were superior in terms of Pulmonary functions i.e. FVC, FEV1, FEV3 , PEFR, FEV1/FVC as compared to sedentary volunteers .

KEYWORDS : athletic individuals, PFT (Pulmonary function Test)

INTRODUCTION:

Pulmonary function is governed by genetic, environmental and nutritional factors and confirms that physical training during growth help in developing a greater endurance in respiratory muscles. Lung size may increase by a strenuous and prolonged strength training regimen during adolescence.[1,2,3] significant difference in pulmonary functions is found among types of athletic training. Swimmers have better pulmonary functions because in swimming the load of water pressure against the chest wall and elevated airway resistance as the result of immersion causes increase in the exercise of respiratory muscles.[4,5]

MATERIALS AND METHODS:

The study protocol approved by Institutional Ethics committee of S.N. Medical College, Bagalkot before the study being started. This was a cross-sectional study carried out in the department of physiology during the one year period i.e. March 2018 to March 2019. During the one year period there were 100 volunteers who want to participate into study out of which 50 were doing the athletic exercise like marathon running, swimming etc. since six months were considered as athletic and those individual who were not doing any active exercise or activity were considered as sedentary. 50 sedentary and 50 athletic were selected randomly. All details of the patients like age, sex, BMI was recorded. All the patients with written and explained consent were undergone pulmonary function test by under all standard protocols. The statistical analysis was done by unpaired t-test and chi-square test.

RESULT:

Table 1: Distribution of the patients as per the age and sex

	Athletes (n=50)	Sedentary (n=50)	P-value
Age	37.98±3.42	38.29± 2.75	t=0.78,df=98, p>0.05
Sex			
Male	30	32	X2=1.78,df=1, p>0.05
Female	20	18	
Average BMI	23.41± 1.98	24.38± 2.15	t=0.27,df=98, p>0.05

The average age was comparable i.e. 37.98±3.42 and 38.29± 2.75 (t=0.78,df=48,p>0.05);and the proportion of Male : Female was also comparable i.e. 1.5 as to 1.6 (X2=2.34,df=1,p>0.05) , Average BMI In both the groups were comparable i.e. 23.41± 1.98 and 24.38± 2.15 (t=0.27,df=98,p>0.05)

Table 2 : Distribution of the study groups as per the Spirometric variables

Variables	Groups		t- value	p –value
	Athletes (n=50)	Sedentary (n=50)		
FVC	90.12	79.80	3.45	< 0.01
FEV1	88.15	72.01	4.19	< 0.01
FEV3	87.34	75.30	5.13	< 0.01
PEFR	94.45	87.16	3.87	< 0.01
FEV1/FVC	92.1	83.28	10.76	< 0.001

The FVC was 90.12 and 79.80 (t=3.45,p< 0.01); FEV1- 88.15 and 72.01 (t=4.19,p)< 0.01;

FEV3 was 87.34 and 75.30 (t=5.13,p< 0.01); PEFR- 94.45 and 87.16 (t=3.87,p< 0.01);

FEV1/FVC was 92.1 and 83.28 (t=10.76, p< 0.001) was significantly higher in Athletic group as compared to Sedentary group.

DISCUSSION:

Impaired cardiovascular and respiratory functions are associated with increased mortality and morbidity.[6, 7] Physical activities is known to improve physical fitness and to reduce morbidity and mortality from numerous chronic conditions.[8] Treadmill tests and spirometric tests are important measurements for evaluating cardiovascular and respiratory functions. The positive relation between physical activity and a treadmill test is much more consistent than that between physical activity and pulmonary function parameters.[9 10] There are few longitudinal studies on physical activity and respiratory function in the general population.[5] Most studies on the effects of physical activity on respiratory function are cross sectional ones on special populations such as athletes or patients with chronic obstructive pulmonary disease.[11–14,15]

Lung function parameters tend to have a relationship with lifestyle such as regular exercise and no exercise. Hence, the present study was undertaken to assess the effects of exercise in athletes on respiratory system. It has been studied that regular exercise has got impact on the lung function.[16] There are certain lifestyle parameters such as smoking behavior, habitual physical activity, physical fitness, dietary intake, and consumption of alcohol which can alter the lung function.[17] Smoking tends to have deleterious effect on lung function.

Alternately having a physical fitness and good physical activity are said to have positive effect on lung function.[18] The parameters of lung functions are considered important indicator of health in clinical research.[19] Athletes tend to have good physical fitness and muscular activity due to regular exercise when compared to non-exercising Research Article Sedentary lifestyles could be associated with less efficient pulmonary function.[20] Pulmonary function test (PFT) is considered one of the important tools for the assessment of respiratory function.[21] PFTs determine the objective, quantifiable measures of lung function. They are used to evaluate and diagnose diseases that affect lung function and heart function, to determine the effects of environmental, occupational, and drug exposures.[22] PFT aids in information about the small and large airways, the lung parenchyma the integrity, and size of the pulmonary capillaries.[23]

In our study we have seen that The average age was comparable i.e. 37.98±3.42 and 38.29± 2.75 (t=0.78,df=48,p>0.05);and the proportion of Male : Female was also comparable i.e. 1.5 as to 1.6 (X^2=2.34,df=1,p>0.05)

The FVC was 90.12 and 79.80 (t=3.45,p< 0.01); FEV1- 88.15 and 72.01 (t=4.19,p)< 0.01;

FEV3 was 87.34 and 75.30 (t=5.13, p< 0.01); PEFR- 94.45 and 87.16 (t=3.87,p< 0.01);

FEV1/FVC was 92.1 and 83.28 (t=10.76, p< 0.001) was significantly higher in Athletic group as compared to Sedentary group.

This was similar to ShobhaRani Vedala they found that pulmonary function profile was analyzed and compared between the study groups.[15] In our study the athletic group were having higher mean of percentage value of FVC 88.0 ± 12.8%, FEV1 of 86.8 ± 22.0%, FEV3 of 86.5 ± 13.7 %, PEFR of 93.0 ± 12.8% and FEV1/ FVC ratio of 92.1 ± 4.4% as compared to sedentary group.

CONCLUSION :

It can be concluded from our study that Athletic group were superior in terms of Pulmonary functions i.e. FVC, FEV1, FEV3 , PEFR, FEV1/FVC as compared to sedentary volunteers . Our study suggests that regular exercise has an important role in determining and improving lung functions.

REFERENCES:

1. Prakash S., Meshram S. and Ramtekkar U. Athletes, Yogis and Individuals with sedentary life styles; Do their lung functions differ? ; Indian Journal of Physiology and Pharmacology, 2007, 51 (1): 76-80.
2. Kippelen P, Caillaud C, Robert E, Connes P et al. Effects of endurance training on lung function: a one year study; British Journal of Sports Medicine, 2005, 39: 617-621.
3. Doherty M, Dimitriou L. Comparison of Lung volume in Greek Swimmers, Land Based Athletes and sedentary controls using allometric scaling, British Journal of Sports Medicine, 1997, 31, 337- 341.
4. Lakhera SC ,Kain TC. Comparison of pulmonary function amongst Ladakhi Delhi ,Vanvasi and Siddi boy athletes , Indian J Physiol. Pharmacol. 1995 Jul. 39 (3): 255-8.
5. Lakhera SC, Kain TC, Bandopadhyay P. Changes in lung function during adolescence in athletes and non athletes, J Sports Med Phys Fitness, 1994, Sep 34 (3): 258-262.
6. Blair SN, Kampert JB, Kohl HW III, et al. Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women. JAMA 1996; 276:205–10.
7. Schunemann HJ, Dorn J, Grant BJ, et al. Pulmonary function is a long-term predictor of mortality in the general population: 29-year follow-up of the Buffalo Health Study. Chest 2000;118:656–64.
8. U.S. Department of Health and Human Services. Physical activity and health: a report of the Surgeon General. Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.
9. Dunn AL, Marcus BH, Kampert JB, et al. Comparison of lifestyle and structured interventions to increase physical activity and cardiorespiratory fitness: a randomized trial. JAMA 1999;281:327–34.
10. Twisk JW, Staal BJ, Brinkman MN, et al. Tracking of lung function parameters and the longitudinal relationship with lifestyle. Eur Respir J 1998;12:627–34.
11. Burchfiel CM, Enright PL, Sharp DS, et al. Factors associated with variations in pulmonary function among elderly Japanese-American men. Chest 1997;112:87–97.
12. Doherty M, Dimitriou L. Comparison of lung volume in Greek swimmers, land based athletes, and sedentary controls using allometric scaling. Br J Sports Med 1997;31:337–41.
13. Malkia E, Impivaara O. Intensity of physical activity and respiratory function in subjects with and without bronchial asthma. Scand J Med Sci Sports 1998;8:27–32. 9 Tiep BL. Disease management of COPD with pulmonary rehabilitation. Chest 1997; 112:1630–56.
14. Tiep BL. Disease management of COPD with pulmonary rehabilitation. Chest 1997;112:1630–56
15. ShobhaRani Vedala et al. Differences in Pulmonary Function Test among the Athletic and Sedentary Population. National Journal of Physiology, Pharmacy & Pharmacology; 2013 : 3(2) : 118 – 123
16. Boutellier U, Büchel R, Kundert A, Spengler C. The respiratory system as an exercise limiting factor in normal trained subjects. Eur J Appl Physiol Occup Physiol 1992;65:347-53.
17. Twisk JW, Staal BJ, Brinkman MN, Kemper HC, van Mechelen W. Trascking of lung function parameters and the longitudinal relationship with lifestyle. Eur Respir J 1998;12:627-34.
18. Miller GJ, Saunders MJ, Gilson RJ, Ashcroft MT. Lung function of healthy boys and girls in Jamaica in relation to ethnic composition, test exercise performance, and habitual physical activity. Thorax 1977;32:486-96.
19. Tager IB, Muñoz A, Rosner B, Weiss ST, Carey V, Speizer FE, et al. Effect of cigarette smoking on the pulmonary function of children and adolescents. Am Rev Respir Dis 1985;131:752-9.
20. Prakash S, Meshram S, Ramtekkar U. Athletes, yogis and individuals with sedentary lifestyles; Do their lung functions differ? Indian J Physiol Pharm 2007;51:76-80.
21. Ranu H, Wilde M, Madden B. Pulmonary function tests. Ulster Med J 2011;80:84-90.
22. Crapo RO. Pulmonary-function testing. N Engl J Med 1994;331:25-30.
23. Vedala SR, Paul N, ManeAB. Differences in pulmonary function test among the athletic and sedentary population. Nat J Physiol Pharm Pharm 2013;3:118-23.