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A COMPARATIVE STUDY OF PULMONARY FUNCTION TESTS IN FREESTYLE WRESTLERS AND AGE MATCHED SEDENTARY INDIVIDUALS

Physiology

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ABSTRACT

Objective of the current study was to determine the differences in Pulmonary function tests in Freestyle wrestlers and sedentary individuals.

Materials and Methods:

Study included 40 male Freestyle wrestlers and 40 male sedentary individuals who are not interested in any sport branches actively. Forced Vital Capacity (FVC), Forced Expiratory Volume in 1st second (FEV1), FEV1 % and Peak Expiratory Flow Rate (PEFR) are the Lung function parameters considered in this study and recorded using HELIOS 401 MEDSPIROR.

Results:

The arithmetic mean and standard deviations of the data were obtained for statistical evaluation. Results were analysed statistically using unpaired 't' test. Male wrestlers showed statistically significant higher values of FEV1 4.09 ± 0.109, FVC of 4.96 ± 0.45, PEFR of 4.570 ± 0.119 and FEV1 % of 82.48 ± 0.602 when compared to sedentary group.

Conclusion:

In Freestyle wrestlers higher values of Lung function tests were obtained when compared to sedentary individuals suggest that regular exercise has a significant role in improving lung functions.

KEYWORDS

Freestyle Wrestling, Pulmonary Function Test, Sedentary individuals

INTRODUCTION:

Physical inactivity is currently identified as the fourth leading risk factor for global mortality (6% of deaths globally). Physical inactivity together with a sedentary lifestyle has become a global "non-communicable" disease. In 2010, WHO Global recommendations on physical activity suggested that adults aged 18-64 years should do atleast 150 minutes of moderate-intensity aerobic physical activity throughout the week.1 Exercise is a subcategory of physical activity that is planned, structured, repetitive and purposeful. Physical activity includes exercise and other activities involving bodily movement such as playing, working, active transportation, house chores and recreational activities. Physical exercise done regularly and systematically is vital for healthy development.2 Physical activity improves cardiorespiratory fitness in children and adults, and with exercise preadolescents and adolescents can improve cardiorespiratory fitness.[3]

Wrestling is one of the oldest combat sports, disputed since the ancient Greek Olympic Games. This sport has caught the attention of the scientists since 1943, the year of appearance of first scientific research in wrestling.4 Wrestler's competition includes a challenging environment with repetitive sessions of high intensity attacks and counter-attacks alternated by sub-maximal low intensity activity and/or pause.5,6 An optimum level of cardiorespiratory fitness is needed in wrestling (irrespective of gender and wrestling styles) to sustain effort during the period of the match and also for faster recovery process between the periods.

Hutchinson is the London surgeon who introduced the spirometry concept in 1846. Primary instrument used to assess lung function tests is the spirometer. Lung function tests are used as health evaluation tool. They form the non-invasive diagnostic tests that provide measurable feedback about the function of lung volumes, capacities, rate of flow and gas exchange. Pulmonary function tests (PFT) are determined by compliance of the thoracic cavity, elastic recoil of the lungs, airway resistance and strength of the respiratory muscles.7 Type of exercise, duration and intensity has effects on PFT.3,8 It has been proved that aerobic workout and other traditional physical activity (Yoga and Tai Chi Chaun) improves PFT.9,10 Lung function tests in normal sedentary individuals have been studied widely in India.11,12,13,14 But no studies have compared the PFT in Freestyle wrestlers with sedentary individuals. Indian data on this subject is very limited. Hence, present study was designed to examine and compare the pulmonary function tests in freestyle wrestlers and age matched sedentary individuals.

Materials and Methods:

This comparative study included 40 male freestyle wrestlers in the age group of 18-30 years and 40 age matched male sedentary individuals. Freestyle wrestlers were selected from Kere Garadi Mane and Hanuman Garadi Mane, Davanagere and sedentary individuals were selected randomly from urban areas.

Freestyle wrestlers were selected based on following inclusion criteria: Should be practicing Freestyle wrestling for at least 5 hours per week and should be practicing Freestyle wrestling for at least 1 year regularly. Individuals with less than 20 minutes of activities per week or less than 3 times per week were considered as sedentary individuals. Subjects were selected randomly from urban population in the age group of 18-30 years. All the study subjects were non-smoker, non-obese, and free from respiratory diseases.

Ethical clearance for the study protocol was obtained from institutional ethical committee and informed consent obtained from each subject prior to inclusion in the study. Personal history and medical history of both groups was collected in pre-designed proforma. Personal history was obtained about history of smoking, recent respiratory illness and medications used. Medical history was taken to rule out any medical or surgical disease which would affect pulmonary function test of the individual. Family history of bronchial asthma was also obtained. The subjects were explained about the importance and procedure of the study. The study involved non-invasive procedures with no financial burden on the subjects. Sufficient time was given for the subjects to mentally & physically relax before recording the parameters.

Anthropometric measurements like height and weight of the subjects were measured before the start of the study procedure. Pulmonary function tests were carried out using computerized spirometry (HELIOS 401 MEDSPIROR -SPIROLYSER) after reinforcing the method of test to each subject. To avoid diurnal variations in pulmonary function tests, measurements were taken between 8 AM to 12 PM. The subject was made to loosen the tight clothing and parameters were recorded in sitting position. The subject was instructed to take maximum inspiration through the nose, then close the nose using nose clip and blow into the mouthpiece as rapidly, forcefully and completely as possible. A minimum exhalation of 6 seconds time was applied to get maximum FVC results. It was ensured that tight seal maintained between the lips and mouthpiece of the spirometer. A minimum of three acceptable FVC manoeuvres were obtained and highest of the three values were used for statistical analysis.

Statistical Analysis:

The Statistical software namely SPSS 20th version were used for the

analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables etc. PFT parameters were reported as mean ± Standard Deviation (SD). Results were analysed statistically using unpaired 't' test. Minimum level of significance was fixed at $p<0.05$

RESULTS:

Table 1: General characteristics of Freestyle wrestlers & sedentary individuals (values are in Mean ± SD).

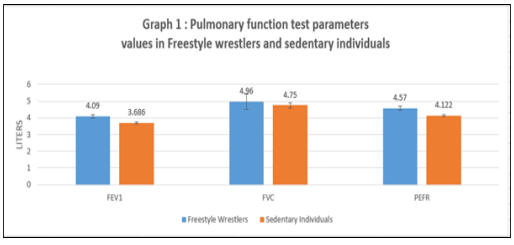
Study group	Age (Years)	Height (cm)	Weight (kg)	BMI
Freestyle wrestlers (n=40)	23.82 ± 2.06	166.57 ± 4.46	65.49 ± 5.02	23.6
Sedentary individuals (n=40)	24.21 ± 2.12	167.06 ± 4.34	64.77± 6.49	24.2

Both the groups were age matched without any significant variation in height, weight & BMI.

The parameters of PFT considered in the study:

- Forced Vital Capacity (FVC) in Litres
- Forced Expiratory Volume in 1st second (FEV1) in Litres
- FEV1 %
- Peak Expiratory Flow Rate (PEFR) in Litres/min

The predicted values were calculated by the standard formulae which were programmed in the spirometer.



Graph 1 shows the FEV1 values in Freestyle wrestlers (4.09 ± 0.109) compared with sedentary individuals (3.686 ± 0.071). FEV1 was significantly higher in Freestyle wrestlers compared with sedentary individuals ($p<0.001$). The mean value of FVC was 4.96 ± 0.45 in Freestyle wrestlers and 4.75 ± 0.16 in sedentary individuals and the difference was statistically significant ($p<0.01$). Similarly it was found that mean values of PEFR was higher in Freestyle wrestlers (4.570 ± 0.119) than sedentary individuals (4.122 ± 0.069) and the différence was statistically significant ($p<0.001$). Also, statistically significant difference in the mean values of FEV1% in Freestyle wrestlers and sedentary individuals were observed in the study.

Table 2: Pulmonary function test parameters values in Freestyle wrestlers and sedentary individuals

Variables	Study group		p value
	Freestyle wrestlers (n=40)	Sedentary individuals (n=40)	
FEV1	4.09 ± 0.109	3.686 ± 0.071	$p<0.001$
FVC	4.96 ± 0.45	4.75 ± 0.16	$p<0.01$
FEV1 %	82.48 ± 0.600	78.90 ± 0.47	$p<0.001$
PEFR	4.570 ± 0.119	4.122 ± 0.069	$p<0.001$

Discussion:

In this study pulmonary function tests in freestyle wrestlers were compared with age matched normal sedentary individuals. Lung function tests parameters measured were FVC, FEV1, PEFR and FEV1 % and all the four parameters showed statistically significant higher values in Freestyle wrestlers when compared to sedentary individuals. This confirms that regular exercise has a facilitatory effect on the lungs. Similar result was obtained by Malik A et al who recorded significant increase in the FVC in different type of sports including wrestlers compared with non-sports individuals.15 Study done on Korean wrestling athletes comparing with non-athletes showed significantly higher spirometry parameters including FVC in wrestlers.16 Study conducted PFT in sedentary individuals compared with dynamic exercising group showed significant increase in lung function values in dynamic exercisers.17 Similar results were observed by Vedala S et al18 and Prakash S et al.19 Some studies showed that physical exercise has no improvement in pulmonary parameters20 and whereas other studies showed positive effect on the pulmonary parameters.21,22

Beneficial effects of physical exercise on the circulatory and respiratory system are well accepted. As stated earlier, wrestling competition includes repetitive sessions of high intensity attacks alternated by low intensity activity and/or pause. The pulmonary capacity depends on the body structure and also the oxygen need of the sports branch performed by an individual. The respiratory system of the adequately trained sportsmen adapt rapidly to the increasing oxygen during the exercise.23 The possible explanation for improved PFT observed in this study could be that regular forceful inspiration and expiration occurring for a prolonged period during playing leads to strengthening of both voluntary and involuntary muscles. This assists the lungs to inflate and deflate maximally.24 This is an important stimulus for the release of prostaglandin25 and lung surfactant26 into the alveolar spaces which causes decrease in bronchial smooth muscle tone and increases the lung compliance, respectively.

Limitations of our study:

In this study, gender related differences in pulmonary function tests of Freestyle wrestlers and sedentary individuals are not done.

CONCLUSION:

Higher values of Pulmonary function tests in Freestyle wrestlers when compared to sedentary individuals support the view that regular exercise has a significant role in improving lung functions. Pursuing a physical activity or sport which could help in achieving efficient lung function is an essential preventive strategy when the lifestyle disorders as well as prevalence of sedentary life style is increasing. Incorporating physical activity regimen in daily schedule lowers the mortality, improves pulmonary functions and hence should be encouraged.

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Conflict of Interest:

The author declares that she has no conflict of interests.

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REFERENCES:

1. Global recommendations on Physical activity for health. Geneva. World Health Organization. 2010
2. Kurkcu R, Gokhan I. The effects of Handball training on the some respiration and circulatory parameters of school boys aged 10-13 years. Int J Hum Sci. 2011;8:135-143
3. Losengard T, Hallen J. Elite cross-country skiers do not reach their running VO2 max during roller ski skating. J Sports Med Phys Fitness. 2014;54(4):389-93
4. Chaabene H, Negra Y, Bouguezzi R et al. Physical and Physiological profile of wrestler athletes: a short review. J Strength Cond res. 2017;31(5):1411-1442
5. Horswill CA. Applied physiology of amateur wrestling. Sports Med (Auckland NZ). 1992;2:114-43.
6. Yoon J. Physiological profiles of elite senior wrestlers. Sports Med (Auckland NZ). 2002;32(4):225-33
7. Cotes JE. Lung Function: Assessment and Applications in Medicine. 4th ed. Oxford: Blackwell Scientific Publications; 1979
8. Galy O, Ben Zoubir S, Hambli M et al. Relationship between heart rate and physiological parameters of performance in top-level water polo players. Biol Sport. 2014;31(1):33-8
9. Channavirut R, Khaidjapho K, Jaree P et al. Yoga exercise increases chest wall expansion and lung volumes in young healthy Thais. THAI J PHYSIO SCIENCES. 2006;19(1):1-7
10. Chang YF, yang YH, Chen CC et al. Tai Chi Chauntraining improves pulmonary function of asthmatic children. J Microbiol Immunol Infect. 2008;41(1):88-95
11. Singh HD. Ventilatory Function tests, Normal Standards in Male Adults. Ind J Med Prof 1959;5:2483-2486.
12. Jain SK, Ramaiah TJ. Normal Standard of Pulmonary Function Tests for healthy Indians 15-40 years old, comparison of different prediction equations. Ind J Med Res 1969;57:1433-1466.
13. Aggarwal AN, Gupta D, Chaganti S et al. Diurnal variation in peak expiratory flow in healthy young adults. The Indian J Chest Dis & Allied Sci 2000;42:15-19.
14. Gupta P, Gupta L, Ajmer RL. Lung Functions in Rajasthan Subjects. Ind J Physiol Pharmacol 1979;23(1):9-14.
15. Malik A, Malik S, Kumar S. Sports specific influence on Force Vital capacity in university players. Journal of Sports and Physical Education. 2017;4(2):06-09
16. Shin YS, Yang SM, Kim MY. Analysis of respirogram phase of Korean wrestling athletes compared with nonathletes for sports physiotherapy research. J Phys Ther Sci. 2016;28(2):392-398
17. Devi I, Maruthi W. Comparative study of Pulmonary Function Tests in sedentary Individuals and Dynamic exercising people. Journal of Pharmacy and Biological Sciences. 2015;10(3):73-77.
18. Vedala S, Paul N, Mane AB. Differences in Pulmonary function test among the Athletic and Sedantary population. National Journal of Physiology, Pharmacy & Pharmacology. 2013;3(2):118-123
19. Prakash S, Meshram S, Ramlekkar U. Athletes, Yogis and individuals with sedantary life styles, Do their lung function differ? Indian J Physiol Pharmacol 2007;51(1):76-80
20. Fisekcioglu IB, Sahin M, Erkek MB. Examining physical and physiological parameters

of kids who are attended the city sport centre summer period training programme. Selcuk Uni J Phy Edu Sport Sci 2008;10:10-22
21. Sable M, Vaidya SM, Sable SS. Comparative study of lung functions in swimmers and runners. Indian J Physiol Pharmacol 2012;56:100-104
22. Armour J, Donnelly Pm, Bye PT. The large lungs of elite swimmers: An increased alveolar number? Eur Respir J 1993;6:237-247).
23. Tasgin E, Donmez N. Effect on respiratory parameters of exercise programmers which are applied children between 10 to 16. Selcuk Uni J Phy Edu Sport Sci 2009;11:13-16
24. Mehrotra PK, Varma M, Tiwari S et al. Pulmonary functions in Indian Sportsmen playing different sports. Indian J Physiol Pharmacol 1998;42(3):412-416
25. Smith AP. Prostaglandin and respiratory system – Prostaglandin Physiological Pharmacological and Pathological aspects. Edited by SMM Karim 1976:83-102
26. Hildebran JN, Georke J, Clements JA. Surfactant release in exercised rat lung stimulated by air inflation. J Applied Physiol 1981;51:905-910