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Variations in PEFR among Sports Persons of Different Types of Sports Activities and their Relationship with BMI

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Abstract

Background: Physical activity is known to improve physical fitness and to reduce the incidence of Hypertension, Diabetes, Obesity etc. Regular exercise as in athletes produces a positive effect on the lung function by increasing vital capacity and make them more fit. The Pulmonary Function Capacities of sedentary individuals have been studied extensively in India but less in the context of an athletic population.

Objectives:

1. To study the variations in PEFR among sports persons and sedentary persons.
2. To study the variations in BMI of persons of different sports activities.
3. To study the variations in PEFR among persons of different sports activities.

Materials and Method: Sixty subjects comprising of 30 Male and 30 Female sports person were taken as the study group and 60 sedentary persons were taken as the control group. PEFR was measured using Mini Wright's peak flow meter. The height, weight and BMI of all subjects were recorded.

Results: Unpaired t test is used to find out the differences between sports persons and sedentary persons and male and female sports persons. Our study shows that height($p<0.0130$) and PEFR($p<0.0001$) was found to be significantly higher and BMI($p<0.0399$) was significantly lower among sports persons when compared with the sedentary persons. Height ($p < 0.0084$), weight($p<0.0248$) and PEFR ($p< 0.0078$) were significantly higher in male sports person when compared with the females. ANOVA test was used to find out the difference in height, weight, BMI and PEFR between different sports activities. Height and PEFR were found to be higher among football players and athletes and BMI was found to be lower in football players when compared to the other sports persons.

Conclusion : The results indicate that all the sportspersons had a higher value of lung function compared to the controls. PEFR was found to be high among persons with increased height. Among the various groups of players chosen for this study, the athletes and football players showed the maximum increase in their lung functions and BMI was found to be lower in football players when compared to the other sports persons. The fact that footballers and athletes had higher lung functions could be attributed to the fact that these games involves a lot of power in running at great speed. Compared to the other games included in this study more force has to be generated while running at great speed.

Keywords: *athletes, PEFR, sports person, sedentary person, Pulmonary Function Capacities, BMI.*

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Introduction

Every year about 2 million deaths are attributed to physical inactivity, prompting WHO to issue a forewarning that a sedentary lifestyle could be one among the leading causes of death and disability in the

world. Exercise has shown to increase the strength of the muscle, reduce body fat, decrease resting systolic and diastolic blood pressure, improve the function of heart and lungs, increase the cardiac output and blood volume, increase blood supply to muscles and their oxygen consumption.

Regular physical activity can prevent the disease or can be prescribed as an adjuvant to a patient during convalescence and rehabilitation. Lack of physical activity is linked to the increased incidence of cancer, diabetes and cardiovascular diseases thus increasing the rate of morbidity and mortality in these population. [1,2,3]

Impaired pulmonary functions are associated with increased mortality and morbidity. Physical activity is known to improve physical fitness and to reduce morbidity and mortality from numerous chronic ailments. In athletes, regular exercise tends to have an increase in the pulmonary capacity when compared to non-exercising individuals.[4,5]

The peak expiratory flow rate (PEFR) is a person's maximum speed of expiration. It measures the airflow through the bronchi and thus the degree of obstruction in the airways. Peak expiratory flow rate gives a reasonably accurate measurement of lung function.[6,7,8] The present study was undertaken to assess the variations in PEFR among sports persons and sedentary persons, to study the variations in BMI of persons of different sports activities and to study the variations in PEFR among sports persons of different sports activities.

Materials and Method

The study population comprised of 60 subjects comprising of 30 Male and 30 Female sports persons and 60 sedentary persons were taken as the control group. The subjects were carefully selected between the age group of 18-25 years who are willing to participate in the study. Study group includes person who takes part in competitive track and field events for 2-4 hours per day. The study population was selected randomly from Sri Ventakeshwara medical College campus with the help of Physical Education department. Control group comprised of subjects with leisure-time physical activity or activities done for less than 20 minutes or fewer than 3 times per week. Smokers (Cigarettes, Beedies etc), persons with acute respiratory disorders & chronic respiratory disorders like Bronchial Asthma and Obese persons were excluded from the study.

The study was conducted after obtaining the Institutional Ethical Committee Clearance. The experimental procedures were performed after receiving the informed written consent from the study population. Anthropometric measurements like height, weight and BMI of each subject was measured before the test procedure. Information regarding the personal history, family history of any bronchial asthma, about smoking, recent respiratory illness, medications used was obtained. After detailed explanation regarding the working of the instrument, Mini Wright's Peak Flow Meter and after proper demonstration PEFR was recorded. Measurements were taken with the patient sitting upright, and the value of three peak expiratory flow rate manoeuvres were recorded. Best of the three readings was taken for statistical analysis. The instrument was sterilized between uses by each subject using a dilute (10%) solution of Potassium Permanganate & Cotton Wool. Measurements were taken between 8 AM and 12 noon to avoid diurnal variations in lung functions.

Results

Unpaired t test is used to find out the differences between sports persons and sedentary persons and male and female sports persons. Table 1 shows that height($p<0.0130$) and PEFR($p<0.0001$) was found to be significantly higher and BMI($p<0.0399$) was significantly lower among sports persons when compared with the sedentary persons. Table 2 shows that height ($p < 0.0084$), weight($p<0.0248$) and PEFR ($p< 0.0078$) were significantly higher in male sports person when compared with the females.

Table 1: Height, Weight, BMI and PEFR between sports person and sedentary persons

Parameters	Sports Persons (N=60) mean± SD	Sedentary Persons(N=60) mean± SD	P value
Height(cm)	168.24±8.96	164.35±7.88	0.0130*
Weight (kg)	61.1±12.09	59.88±11.18	0.5658
BMI	21.51±3.41	22.70±2.80	0.0399*
PEFR(L/min)	459.83±83.797	340.33±85.38	0.0001 ***

Table 2: BMI and PEFR among male and female sports persons

Parameters	Male sports persons N=30 mean± SD	Female sports persons N=30 mean± SD	P value
Height(cm)	173.93±7.06	168.24±8.96	0.0084**
Weight(kg)	68.16±11.62	61.10±12.09	0.0248*
BMI	22.51±3.43	21.518±3.41	0.2631
PEFR(L/min)	517.33±77.59	459.83±83.79	0.0078**

Table 3: BMI & PEFR among persons of different sports activities.

Parameters	Type of sports	No of players (N)	Mean	Standard deviation	P value
Height (cm)	Badminton	8	159.90	6.54	
	Athlete	15	171.03	9.82	
	Football	11	173.59	4.97	0.001**
	Basket ball	13	170.15	6.55	
	Volley ball	13	163.72	9.24	
Weight(kg)	Badminton	8	54.12	6.44	
	Athlete	15	65.00	15.10	0.367
	Football	11	61.27	8.12	
	Basket ball	13	60.07	12.40	
	Volley ball	13	61.80	12.90	
BMI	Badminton	8	21.18	2.27	
	Athlete	15	22.11	4.21	
	Football	11	20.43	3.51	0.344
	Basket ball	13	20.61	3.37	
	Volley ball	13	22.85	2.73	
PEFR(L/min)	Badminton	8	383.75	41.03	
	Athlete	15	503.33	109.58	
	Football	11	505.45	53.91	0.001**
	Basket ball	13	459.23	60.34	
	Volley ball	13	418.46	58.99	

ANOVA test was used to find out the difference in Height, Weight, BMI and PEFR between different sports activities. Table 3 shows that height and PEFR was found to be significantly higher among football players and athletes and BMI was found to be lower in football players when compared to the other sports persons.

Discussion

Our study shows that height($p<0.0130$) and PEFR($p<0.0001$) was found to be significantly higher and BMI($p<0.0399$) was significantly lower among sports persons when compared with the sedentary persons. Height ($p < 0.0084$), weight($p<0.0248$) and PEFR ($p< 0.0078$) were significantly higher in male sports person when compared with the females. Height

and PEFR was found to be higher among football players and athletes and BMI was found to be lower in football players when compared to the other sports persons. The fact that footballers and athletes had higher lung functions could be attributed to the fact that these games involve a lot of power in running at great speed. Compared to the other games included in this study more force has to be generated while running at great speed. In a similar study conducted by PRATEEK et al. all the sportspersons had a higher values of lung functions compared to the controls. Among the various groups of players chosen, the swimmers showed the maximum increase in their lung functions. The respiratory muscles and the diaphragm of the swimmers are required to develop greater pressure as a consequence of immersion in water during the respiratory cycle, thus leading to functionally better respiratory muscles.[9]

A study done on the assessment of Pulmonary Function Parameters of Football Players and Age Matched Controls showed that football players had significantly greater height ($p<0.05$), body weight ($p<0.05$), body mass index ($p<0.05$), forced vital capacity ($p<0.05$), maximum voluntary ventilation ($p<0.05$) and peak expiratory flow rate ($p<0.05$) as compared to controls. It is concluded that the exercise has clear impact on pulmonary function variables.[10] A similar study conducted among the Athletic and Sedentary Population showed that FVC, FEV1, FEV3, PEFR and FEV1/FVC ratio were higher in athletes than in the normal sedentary control individuals.[11] This study suggests that regular exercise has an important role in determining and improving lung functions

Conclusion

The results indicate that all the sportspersons had a higher value of lung function compared to the controls. PEFR was found to be higher among persons with increased height. Among the various groups of players chosen for this study, the athletes and football players showed the maximum increase in their lung functions and BMI was found to be lower in football players when compared to the other sports persons. To explain the difference in the lung volumes in various categories of players, more extensive and detailed research with each group of players is required.

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