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Pulmonary Function Parameters of Football Players and Age Matched Controls

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Abstract

*The purpose of this study was to compare the pulmonary function parameters between football players and age matched control. A sample of forty (N=40) school going boys (football: **N_1**=20, mean ± SD: age 16.75± 0.72 years, height 161.50 ± 1.50 cm, weight 55.62 ± 1.36kg, BMI 21.33± 0.53) and Controls: **N_2**=20, mean ± SD: age 16.95±0.89 years, height 157.95 ± 1.67cm, weight 50.62±1.36 kg, BMI 20.29±0.30) were selected from different schools of Punjab, India. All participants were informed about aim and methodology of the study and they volunteered to participate in this study. The age of each subject was calculated from the date of birth as recorded in his school. Height measurements were taken by using the standard anthropometric rod to the nearest 0.5 cm. The subject's weight was measured with portable weighing machine to the nearest 0.5 kg. Pulmonary functions were measured with a computerized spirometer. The independent samples t-test was applied to assess the differences between football players and controls. The results of present study indicated 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 compare to controls. It is concluded that the exercise has clear impact on pulmonary function variables.*

Keywords: *Football, players, controls, pulmonary.*

Introduction

Exercise has shown to increase maximal oxygen consumption, improve in cardio-respiratory function and ability to carry oxygen, increase blood supply to muscles and ability to use oxygen (Doyle *et al*., 1997). Some studies showed that intense physical training made on impact for increasing the respiratory parameters (Acıkada, 1982; Gelecek *et al*., 2000; Tulin *et al*., 2012; Shivesh *et al*., 2007). Many researchers stated that the respiratory system can impact the strength and exercise performance in trained athletes (Boutellier *et al*., 1992; Harms *et al*., 2000). Previous studies in this field have shown that athletes have higher values of pulmonary functions comparison to their control counterparts who are not engaged in any kind of regular physical exercise (Mehrotra *et al*., 1997; Singh *et al*., 2012). Moreover, pulmonary function values are influenced by genetic factors, ethnic characteristics, environmental pollution, physical activity, altitude and to a minor extent by nutritional and socio-economical factors (American Thoracic Society, 1991; Hankinson *et al*., 1999; Forastiere *et al*., 1994; MacAuley *et al*., 1999; Fiori *et al*., 2000; Havryk *et al*., 2002; Harik-Khan *et al*., 2004; Raju *et al*., 2005). Generally physically fit athletes showed better pulmonary functions relative to less fit subjects (Johnson *et al*., 1981; Johnson *et al*., 1991). Therefore, the purpose of this study was to compare the pulmonary function variable between football players and age matched controls.

Materials & Methods

Subjects: A sample of forty (N=40) school going boys (Football: **N_1**=20, mean ± SD: age 16.75 ± 0.72 years, height 161.50 ± 1.50 cm, weight 55.62 ± 1.36kg, BMI 21.33 ± 0.53 and Controls**: N_2**=20, mean ± SD: age 16.95 ± 0.89 years, height 157.95 ± 1.67cm, weight 50.62 ± 1.36 kg, BMI 20.29 ± 0.30) were selected from different schools of Punjab, India. The purposive sampling method was used to select the subjects for the present study. All the participants were informed about aim and methodology of the study and they volunteered to participate in this study. The age of each subject was calculated from the date of birth as recorded in his school.

Methodology

Height measurements were taken by using the standard anthropometric rod to the nearest 0.5 cm. Full attention was given to make sure that players' body was fully upright and their mandible was parallel to the ground. Taken values recorded in 'cm'. The subject's weight was measured with portable weighing machine to the nearest 0.5 kg. During measurements players were on bare feet and wearing underwear only. Measurements recorded in 'kg'. BMI was calculated by the formula of; Body Mass Index = Weight/Height^2.

Measurements of Pulmonary Functions

Pulmonary functions were measured with a computerized spirometer following the procedures and predicted values recommended by the American Thoracic Society. Before recording the respiratory function tests, subjects were shown a demonstration of the tests. Consequently, a minimum of three readings were recorded of each test for every subject and the best of the three was considered. The pulmonary variables like, Forced vital capacity (FVC), Maximum voluntary ventilation (MVV) and Peak expiratory flow rate (PEFR) were taken into consideration for this study.

Forced Vital Capacity (FVC): It is maximum air volume that discarded by tough, fast and deep expiration after deep inspiration (Tamer, 2002).
Voluntary Ventilation (MVV): It is maximum breathable volume that occurs with voluntary effect in one minute (Tamer, 2002).
Peak Expiratory Flow Rate(PEFR): It is maximum speed of expiration. It measures the airflow through the bronchi and thus the degree of obstruction in the airways. The peak expiratory flow rate is a test that measures how fast a person can exhale (Phillips, 2012).

Statistical analyses

Values are presented as mean values and SD. Independent samples t tests were used to test if population means estimated by two independent samples differed significantly. Data was analyzed using SPSS Version 16.0.

Results

Table-1 Demographic Characteristics of football players and controls

Variables	Football (N_1 = 20)		Controls (N_2 = 20)		Mean Difference	SEDM	t-value
	Mean	*SD*	*Mean*	*SD*			
Age (yrs)	16.75	0.72	16.95	0.89	0.20	0.25	0.784
Height (cm)	161.50	1.50	157.95	1.67	3.55	0.50	**7.065***
Weight(kg)	55.62	1.36	50.62	1.36	5.00	0.43	**11.638***
BMI	21.33	0.53	20.29	0.30	1.05	0.14	**7.706***

*Significant at 0.05 level

Table-2 Comparison of Forced Vital Capacity, Maximum Voluntary Ventilation and Peak Expiratory Flow Rate between Football Players and Controls

Variables	Football (N_1 = 20)		Controls (N_2 = 20)		Mean Difference	SEDM	t-value
	Mean	*SD*	*Mean*	*SD*			
Forced VitalCapacity	3.91	0.04	3.13	0.11	0.78	0.03	**30.176***
Maximum Voluntary Ventilation	99.19	2.56	96.19	2.56	3.00	0.81	**3.705***
Peak Expiratory Flow Rate	331.97	8.25	301.97	8.25	30.00	2.61	**11.498***

*Significant at 0.05 level

Table-1: depicts the demographic characteristics of football and controls.The mean age of football players was 16.75 years and controls subjects were 16.95 years. The mean height of football players was 161.50 cm and controls subjects were 157.95 cm. The mean weight of football players was 55.62 kg and controls subjects were 50.62 kg. The mean value of body mass index of football players was 21.33 and controls subjects were 20.29. Results of the present study revealed that football players had significantly higher height ($p<0.05$), weight ($p<0.05$) and body mass index ($p<0.05$) than controls subjects.
Table-2 depicts the comparison of forced vital capacity, maximum voluntary ventilation and peak expiratory flow rate between football players and controls. Results of the study showed that football players had significantly greater forced vital capacity ($p<0.05$), maximum voluntary ventilation ($p<0.05$) and peak expiratory flow rate ($p<0.05$) as compare to controls.

Discussion

In the present study the selected respiratory variables between football players and age matched control subjects have been evaluated. This study indicates the significant differences between football players and controls. The overall results showed that football players were taller and heavier as compared to control subjects. The results of this study clearly indicated that football players had higher values of pulmonary functions as compared to the controls, it was confirmed from this study that playing sports or exercise has a significant effect on the pulmonary functions variables. These findings are in line with the study conducted by Adegoke and Arogundade (2002), they reported greater pulmonary functions in players when compared to controls. Similar results have been obtained from others reports (Mehrotra *et al*., 1997; Singh *et al*., 2012).The findings of the present study are not in line with the findings of Hagberg (1988), who observed no significant differences between players and controls. Previous studies showed that pulmonary function can be improved by bodily exercise (Suryawanshi *et al*., 2012), as well as the fact that it is influenced by the type of the sport (Doherty & Dimitriou, 1997; Mehrotra*et al*., 1998).

Conclusion

In conclusion, pulmonary functions in players who play football have been found to be higher than controls that do not play any sports. Pulmonary functions parameters of the players found to be higher than controls and this indicated that playing football has a positive impact on the pulmonary functions.

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