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Some Physical Fitness Values of Physical Education Department Students Engaged In Different Team Sport Branches

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Abstract**—**The purpose of this study was to examine and compare physical fitness values of students engaged in different team sport branches Totally 60 female, and 60 male athletes, that 20 athletes in each branch which are volleyball, basketball and football participated the study as a volunteer. The mean ages of female and male athletes were 21.20 ±1.87 and 21.61 ± 1.61 respectively. Age, height, body weight, body mass index, flexibility, body fat percentage, 30m sprint, maximum oxygen consumption capacity (Max$VO_{2)}$ and drop jump values were measured. As a result of measurements, significant differences were found in height, weight, MaxVO_2, shuttle run speed between different sports branches in female athletes. In male athletes, height, body weight, flexibility, 30m split speed and drop jump values were found significantly different between sports branches.

As a conclusion and as a literature, it can be said that structure of body has to be appropriate with the engaged sports branch. Physical fitness values that required the sports branches can be expressed clearly by increasing the number of subjects.

Keywords**—**Volleyball, basketball, football, athletes, physical fitness.

I. Introduction

PHYSICAL fitness is a set of attributes that are either health- or skill-related. The degree to which people have these attributes can be measured with specific tests [1]. Physical fitness means that heart, blood vessels, lungs, and muscles work with the most productive capacity. Physical fitness involves both healthy and skill related components. These are heart-circulatory system durability, strength, endurance, agility, balance, coordination, flexibility, and body composition, strength, and speed [2].

Contemporary thinking in public health holds that physical activity and physical fitness may influence health during childhood and adolescence, as well as throughout life [3]. For most individuals, increases in physical activity produce increases in physical fitness, although the amount of adaptation in fitness to a standard exercise dose varies widely and is under genetic control [4].

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Being healthy is a prerequisite to reach the physical capacity beyond the basic standards and to be able to achieve a high level of athletic performance [5]. Anthropometric and physiological profiles of successful athletes has been evaluated in studies, as the evaluation of elite-level athletes, the parameters such as experience, body composition, strength, aerobic and anaerobic power and balance evaluated priority than the other factors [6].

The purpose of this study was to examine and compare physical fitness values of students engaged in different team sport branches that attending Physical Education and Sports High School.

II. Methodology

Total 60 female, and 60 male athletes, those 20 athletes in each branch which are volleyball, basketball and football participated the study as a volunteer (V: Volleyball, B: Basketball, F: Football)

The athletes were attending Physical Education and Sports High School. This study was made by the consent document according to the Research Ethics of Ondokuz Mayıs University.

Body Height and Weight: Measured with electronic scale (Seca brand) by naked feet and by wearing t-shirts and tights.

Body Mass Index (BMI): BMI =Weight/Height^2

Skinfold Thickness: Body fat percentage was estimated using Lange skinfold calipers and by Yuhasz formula four-site method.

Fat% = 5.783 + 0.153 (Triceps + Subscapula + Abdominal + Suprailiac) formula.

Flexibility Test: Athletes sit on the ground barefoot with Standing Trunk Flexion Meter and leaned their soles to the test stand. Without bending the legs, two hands started to push the digital indicator placed on the stand towards forward. Waiting for a few seconds at the lastest extend they could reach, indicated values were read. Subjects repeated this thrice. Best score of each was taken into evaluation.

Maximal oxygen uptake: Maximal oxygen uptake (VO2 max) was determined by 20 m Multistage-Fitness Test. For this aim, Powertimer PC 1.9.5 Version Newtest device was used. This consisted of shuttle running between two met alers placed 20m apart at increasing fast speeds. Two photocells has been placed on the starting and ending at the 20 meters running distance. The speed at the start is quite slow; test has an initial running velocity of 8.5 km/hr, which increases by 0.5 km/hr each minute. The subject continues running between the two lines, turning when signaled by the recorded beeps. After about one minute, a sound indicates an increase in speed, and the beeps will be closer together. This continues each minute (level). If the line is not reached in time for each beep, the subject must run to the line turn and try to catch up with the pace within 2 more 'beeps'. The test stopped if the subject fails to reach the line (within 2 m) for two consecutive ends.

Drop Jump: Jump tests were done with the Powertimer PC 1.9.5 Version Newtest device. Athletes dropped down with both feet from a stair at 30 cm height onto the mat on the ground with their arms akimbo and as soon as their feet touched the mat, they jumped as high as they can with a half squat. Athletes jumped three times. Best score of each was used in the evaluation.

Speed: Speed and Acceleration test was done by Powertimer PC 1.9.5 Version Newtest device. Three photocells has been placed; on the starting, 10th meter and ending at the 30th meter. 0-10m (output), 10-30m (acceleration) ve 0-30m (total) speed values were recorded.

Statistical Analysis: The SPSS 19 package software was used in the statistical analyses of our study's data. Whether or not the data managed a normal distribution was scanned with the Kolmogorov-Smirnov test and then the data hadn't managed a normal distribution was confirmed. The values among three groups were compared by Kruskall Vallis Test. For the pairwise comparison Mann Whitney-U test was used.

TABLE I
COMPARISON OF THE PHYSICAL CHARACTERISTICS AND FLEXIBILITY VALUE OF ATHLETES

Variables	Sports Branch	Male Athletes Mean±SD	Male Athletes Sig.	Female Athletes Mean±SD	Female Athletes Sig.
Age (years)	V(1)	21.10±1.83	-	21.15±1.63	-
	B(2)	22.00±1.52		21.45±1.70	
	F(3)	21.75±1.40		21.00±2.29	
Height (cm)	V(1)	179.4±6.22	2>1, 3** 1>3**	174.05±6.58	1,2>3**
	B(2)	188.1±6.63		178.15±6.89	
	F(3)	174.4±4.89		163.90±5.23	
Body Mass (kg)	V(1)	74.50±5.96	2>1* 2>3**	62.25±6.54	1,2>3*
	B(2)	83.95±14.3		60.20±7.57	
	F(3)	71.30±7.13		55.05±6.57	
BMI (kg/m^2)	V(1)	23.14±1.63	-	20.55±1.54	-
	B(2)	23.44±3.06		20.74±1.82	
	F(3)	23.47±2.06		20.55±2.36	
Flexibility	V(1)	16.35±5.40	2<1* 2<3**	16.55±6.25	-
	B(2)	11.85±5.66		16.49±3.82	
	F(3)	19.42±3.68		16.09±5.03	
Body Fat Percentage (%)	V(1)	11.40±1.09	-	12.55±1.27	-
	B(2)	12.35±2.83		13.15±2.00	
	F(3)	12.21±2.09		13.20±1.73	

** p<0.01 *p<0.05

III. RESULTS AND DISCUSSION

In our study, male athletes according to branches there was no significant difference in age and body mass index. Basketball players were found to be taller than volleyball players and football players; volleyball players were found to be taller than football players ($p<0.05$). Looking at the values of flexibility between sports branches, basketball players were found to be the lowest value of flexibility. Percentage of body fat calculated according to the formula Yuhasz not differ significantly between the three branches ($p> 0.05$) (Table I).

According to the study, female athletes sports branches, there was no significant difference in age ($p>0.05$), significant differences were found in height and weight ($p<0.05$ and $p<0.01$). Football player's height and body mass were found to be lower than volleyball players and basketball players ($p<0.01$ and $p<0.05$). Calculated fat % values, body mass index, flexibility was not found significantly different between sports branch ($p>0.05$).

TABLE II
COMPARISON OF THE 10M AND 30M SPEED VALUES OF ATHLETES

Variables	Sports Branch	Male Athletes Mean±SD	Male Athletes Sig.	Female Athletes Mean±SD	Female Athletes Sig.
Split time 0-10m (sec)	V(1)	1.97±0.10	2>1*	2.33±0.21	-
	B(2)	2.02±0.10		2.29±0.17	
	F (3)	2.00±0.93		2.27±0.16	
Split Speed 0-10m (m/sec)	V(1)	5.07±0.25	-	4.31±0.37	-
	B(2)	4.94±0.25		4.37±0.33	
	F(3)	5.14±0.79		4.39±0.30	
Split time 10-30m (sec)	V(1)	4.40±0.21	2>3*	5.23±0.36	-
	B(2)	4.50±0.19		5.29±0.39	
	F(3)	4.37±0.10		5.13±0.21	
Split Speed 10-30m (m/sec)	V(1)	8.25±0.44	3>2**	6.94±0.44	3>2*
	B(2)	7.97±0.44		6.67±0.67	
	F(3)	8.36±0.38		7.05±0.70	
Total Speed 0-30m (m/sec)	V(1)	6.83±0.30	-	5.76±0.37	-
	B(2)	6.66±0.28		5.69±0.42	
	F(3)	6.99±0.24		5.85±0.24	

** p<0.01 *p<0.05

In this study, the athletes' output capabilities were measured between 0-10 m and acceleration capabilities were measured between 10-30m.

Male athletes' 30 m running values were examined and their running speed was 6.83m/sec in volleyball players, 6.66 m/sec in basketball players and 6.99 m/sec in football players. Between volleyball and basketball players, 0-10 m split running time was found significantly different ($p<0.05$) but there was no significant difference in 0-10 m split running speed ($p>0.05$). However, analysis of 10-30 m split values showed that football players were found to be faster than basketball players ($p<0.05$ and $p<0.01$). While no significant differences were found between the values of 0-30 m speed ($p>0.05$), a significant difference between 10-30m shows acceleration capabilities of football players were found to be better than basketball players (Table II).

Female athletes' 30m running values were examined and their running speed was 5.76 m/sec in volleyball players, 5.69 m/sec in basketball players and 5.85 m/sec in football players' speed. 0-10 m and 0-30 m running speed and time values were not found significantly different between 3 sports branch ($p>0.05$). 10-30 m speed values showed that acceleration capabilities of the football players were found to be a better than the basketball players ($p<0.05$).

TABLE III
COMPARISON OF THE SHUTTLE RUN TEST VALUES OF ATHLETES

Variables	Sports Branch	Male Athletes		Female Athletes	
		Mean±SD	Sig.	Mean±SD	Sig.
Test Duration (sn)	V(1)	298.33±60.52	-	176.33±29.71	-
	B(2)	291.30±91.96		238.42±88.07	
	F(3)	347.50±87.52		199.16±42.66	
Stage	V(1)	5.00±1.12	-	3.50±1.39	-
	B(2)	4.75±1.48		4.00±1.45	
	F(3)	5.70±1.45		3.40±0.68	
Velocity (km/h)	V(1)	11.89±1.66	-	9.89±0.68	2>1,3*
	B(2)	11.24±1.35		11.24±1.59	
	F(3)	12.06±1.34		10.64±1.09	
VO_2 max (ml-kg/min)	V(1)	43.67±9.31	-	32.45±3.55	2>1*
	B(2)	41.57±8.05		41.33±9.48	
	F(3)	46.03±8.46		37.16±6.98	

*p<0.05

In our study, VO_2 max values were 43.67±9.31 ml/kg/min in volleyball male athletes 41.57±8.05 ml/kg/min in basketball players and 46.03±8.46 ml/kg/min in football players (Table III). Albay et al. [7] have indicated aerobic capacity value 45.72±2.21 ml/kg/min in volleyball players and 49.91±3.33 ml/kg/min in football players; and they found significant differences. In our study, similar result was found that football players have higher VO_2 max value than the other sports branch but this difference was not statistically significant. Hazar and İbiş [8] have studied with 15 male amateur football players and after 12 weeks training program they found the aerobic capacity value 48, 63±3, 80 ml/kg/min. In accordance with our data, males' 20 m shuttle run variables did not significantly differ between the branches ($p>0.05$).

In our study, female volleyball athletes VO_2 max values were 32.45±3.55 ml/kg/min in volleyball players, 41.33±9.48 ml/kg/min in basketball players and 37.16±6.98 ml/kg/min in football players. Tsunawake et al. [9] have found the volleyball and basketball players, VO_2 max value 46.6 ml/kg/min and 56.7 ml/ kg/min respectively. They compared the values of women's basketball and volleyball players VO_2 max, and they found basketball players' VO_2 max values higher than the volleyball. In our study, the similar finding with Tsunawake et al. (9) was found that basketball players VO_2 max values were higher than volleyball players. Sugahara et al. [10] was identified VO_2 max value 52.2 ml/kg/min in 22-year-old Japanese female basketball players. In the literature, female football players has been identified that VO_2 max values were 47 to 58 ml/ kg/min in Bangsbo's [11] study, 49.64 ± 5.26 ml/kg/min in Ricardo's [12] study. In our study VO_2 max value of female football players is lower than the value of the above-mentioned studies. The reason for this may be due to low physical condition of Turkish female football players. In our study 20 m shuttle test duration values and shuttle stage values did not show significant differences between three sports branch ($p>0.05$), significant difference was found in velocity and capacity of maximum oxygen consumption ($p<0.05$). Basketball players carried on the test in a higher speed than the football players and volleyball players ($p<0.05$).

In our study, the VO_2 max values were lower than the previous studies, the reason for this may be all subjects in our study take place only in the school teams but most of the athletes were not playing in the sports club. In addition, measuring the different methods in order to find VO_2 max values may be another reason.

TABLE IV
COMPARISON OF THE DROP JUMPING VALUES OF ATHLETES

Variables	Sports Branch	Male Athletes		Female Athletes	
		Mean±SD	Sig.	Mean±SD	Sig.
Jump Power (W)	V(1)	3721.0±1003.5	1>3**	2431.8±1134.97	-
	B(2)	3331.8±985.1		2557.3±958.81	
	F(3)	2833.1±880.8		2236.4±887.58	
Jump Height (cm)	V(1)	41.84±7.49	1>3** 2>3*	28.99±7.688	-
	B(2)	39.22±6.83		30.47±7.270	
	F(3)	34.62±6.17		29.41±8.462	
Relative Power (W/kg)	V(1)	50.39±13.09	1>3 *	37.72±19.39	-
	B(2)	41.89±13.97		41.98±13.66	
	F(3)	39.60±12.75		42.93±17.35	

**** p<0.01 *p<0.05**

The male athletes' jumping heights were 41.84±7.49 cm for volleyball players, 39.22± 6.83 cm for basketball players and 34.62 ±6.17 cm for football players (Table IV).

Male athletes' drop jumping values were significantly different. Jumping power and relative jumping power values of volleyball players' was significantly higher than football players ($p<0.05$ and $p<0.01$). Volleyball players reached the best jumping height scores between the 3 sports branch. Jumping height values were significantly higher in volleyball and basketball players than football players ($p<0.05$ and $p<0.01$). This finding coincides with the results of a previous study [13]. In the study of Kollias et al. [13], counter movement and drop jumping values of volleyball players were found higher than basketball, handball and football players.

The reason of higher jumping values of male volleyball and basketball players than thefootball players thought to be the feature of the branches. Volleyball and basketball players frequently use jumping movements during the game. So in their trainings, they do jumping exercises frequently. Basketball players make many times tourniquet and rebound movements during matches and training applications. Volleyball players use a lot of standing vertical jump in volleyball game (especially blocks). There is no statistically significant difference between the jumping values of basketball and volleyball players.

In our study, no significant differences were found between female athletes jumping values ($p>0.05$). Even there is no statistically significant difference in jumping height values between branches, volleyball and basketball players' have higher jumping powers than the football players. A lower relative jump value of basketball players and volleyball players than football players is due to the lowest body weight of football players.

IV. Conclusion

In male athletes, no significant differences were found between the values of 0-30 m speed ($p>0.05$) of three branches. A significant difference between 10-30m shows acceleration capabilities of football players were found to be better than basketball players. Football players have higher VO_2 max value than the other sports branch but this difference was not statistically significant. Volleyball players reached the best jumping height scores between the 3 sports branch.

In female athletes, 0-10 m and 0-30 m running speed and time values were not found significantly different between 3 sports branch. 10-30 m speed values showed that acceleration capabilities of the football players were found to be a better than the basketball players. Basketball players VO_2 max values were higher than volleyball players. Even there is no statistically significant difference in jumping height values between branches, volleyball and basketball players' have higher jumping powers than the football players.

As a result of this research finding and as a literature, it can be said that structure of body has to be appropriate with the engaged sports branch. Physical fitness values that required the sports branches can be expressed clearly by increasing the number of subjects.

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