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Differences in Anthropometric Characteristics and Motor Abilities between Volleyball Players and Untrained Boys 17 Years Old

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Abstract

The aim of the research was to measure and assess general motor skills and anthropometric characteristics of untrained boys and volleyball players 17 years old and to present the results of a comparative statistical analysis. The results show that there are no statistically significant differences in body height, mass and body-mass index, at the same time statistically significant differences were observed in tests: 30 m sprint, medicine ball throw, standing long jump and bench bend, between volleyball players and untrained boys. Results in "flamingo" test did not show a statistically significant difference. In conclusion, volleyball training, with physical education classes, helps further improvement of certain motor abilities.

Key Words: Volleyball, anthropometric characteristics motor abilities, boys

1. Introduction

Physical education, sport and recreation are integral and inseparable parts of physical culture. Various technical elements training and the development of skills is one of the tasks of physical education. Later, one need's to apply these adopted skills in their free time to meet their needs for exercise and that is where the field of recreation begins. From these two broad fields we choose the most talented ones that will develop their abilities to the upmost limits in order to achieve maximum athletic performance.

In order to better analyze the anthropometric characteristics and motor abilities, knowledge of the activities that we study is required. Volleyball is a team sport and belongs to a group of sports games. It represents a dynamic sport activity that requires players to developed motor, technical and tactical abilities and skills with individual, group and collective aspects. Besides that it requires players with appropriate anthropometric characteristics, which largely determine the position of the player on the team. Requires players who have developed certainmotors skills, such as: coordination, accuracy, balance, joint flexibility, movement speed, agility and strength (Katic et al., 2007).

On the other hand, physical education in schools also requires the development of motor skills and training of technical elements, except that the training is more general than those in specific sports branches.

Volleyball activity requires optimum levels of all of these capabilities because these basic motor abilities manifest themselves in different forms which are necessary in a volleyball game. These include: jumping, acceleration, deceleration, fast changes in direction, movement speed and rhythm, situational dexterity and more.

Given all that volleyball game tends to the maximum development of the mentioned motor skills and movement, while physical education goals are aimed at moderate and general development.

The object of this study were anthropometric characteristics and motor abilities of boys who are actively engaged in volleyball training and untrained boys aged 17 years, who were in the current school year in classes involved in physical education courses related to volleyball.

From the space of motor skills, the study covered locomotion speed, explosive power of knee extensor muscles of legs, thigh hamstring flexibility and mobility in the hip joint, explosive muscle strength of arm and shoulder belt and static balance.

The aim of the research was to measure and assess general motor abilities of children aged 17 years and to show the results of a comparative analysis of volleyball players and the boys who do not pursue sports actively.

Based upon the object and the aim of this study following hypothesis was given: There are statistically significant differences between volleyball players and untrained boys aged 17 years in all of the purposed variables.

2. Materials and Methods

The paper applied non-experimental research method based on the transversal study principle. It has a quantitative and qualitative approach. The quantitative approach involves description and observation, and qualitative approach involves testing and measurement method.

Sample of subjects consisted of 31 boys aged 17± 0.5 years. Sample was divided into two subsamples: 16 boys who were members of Volleyball Club "Sterija" Belgrade, and have been practicing volleyball for at least a year (3 times a week), and 15 boys from "XVBelgrade High School" who weren't engaged in any physical activity outside their school. They were all regular students, and didn't have more than 30% absence from physical education classes

Sample of variables consisted of 8 variables; three of them were for measuring anthropometric characteristics:

- body height (TV)
- body weight (TM)
- a body mass index (BMI)

and five variables for assessing motor abilities:

- 30m sprint (T30M)
- standing long jump (SUD)
- bench bend (PRE)
- „flamingo" balance test (FLA)
- medicine throw (BM3)

Anthropometric characteristics were measured by standard protocols and standard equipment. Body height was measured by Martin anthropometry. The result is read with an accuracy of 0.1cm. Body mass was measured with medical scales (Tanita Inner Scan Body, BC - 601). The result is read with an accuracy of 0.1 kg. The body mass index was determined according to the formula tm / tv2.

The motor abilities were estimated according to standard protocols and with help of standard tests, hence: 30 meter sprint - test for the evaluation of the speed of movement. Measurements were performed according to the protocol described by Bjelica and Fratrić, 2011 The result is given with an accuracy of 0.1 seconds.Standing long jump – is a test for explosiveness of lower limbs assessment. The measuring was conducted according to the protocol at Nešić et al., 2013; Milić, Nejić&Kostić, 2008. The result is red with an accuracy of 0.5 cm. Bench bend - test for assessment of flexibility in the hip and lumbar region of the spinal column. Measurements were performed according to the protocol described in Martin, SB et al., 1998 The result is read with an accuracy of 0.1 cm. „Flamingo" balance test, conducted according to the described protocol at Reza Abbasi Bakhtiari, 2012. Medicine ball throw - is a test for assessment of explosiveness of shoulder area. The measuring was conducted according to the described protocol at Nešić et al., 2013. The results were obtained with an accuracy of 1.0 cm.

Untrained boys were tested on 10.3.2014., and volleyball players did their tests a day later. After a short warm-up subjects performed tests all in the same order (1.TM, 2. TV, 3. SUD, 4. T30M, 5. BM3, 6. FLA., 7. PRE.).All measurements were taken by the same physical education proffesors, and in the same gym.

Descriptive and comparative analysis (t-test for small dependent samples) were performed by statistical analysis softver SPSS 19.0.

3. Findings

Table 1 presents the results of the basic descriptive indicators of anthropometric characteristics and motor abilities for volleyball players, whereas Table 2 shows the results of basic descriptive indicators of anthropometric characteristics and motor abilities of untrained boys. Descriptive indicators presented in Tables 1 and 2 are: number of subjects, average, standard deviation, minimum, maximum, and coefficient of variation.

Table 1. Results of basic descriptive indicators of anthropometric characteristics and motor abilities of volleyball players

Variables	N	Mean (St. Dev.)	Range	Cv%
TM_o	16	75.3 ± (18.87)	56.5 ÷ 120.5	25.06
TV_o	16	182.6 ± (9.14)	171 ÷ 205	5
BMI_o	16	22.5 ± (5.21)	18 ÷ 35.7	23.19
T30_o	16	4.6 ± (0.29)	4.2 ÷ 5.31	6.33
SUD_o	16	2.2 ± (0.16)	1.9 ÷ 2.5	7.17
BM3_o	16	8.5 ± (1.61)	4.8 ÷ 11	18.93
FLA_o	16	9.3 ± (5.76)	1.8 ÷ 22	61.93
PRE_o	16	25.9 ± (8.21)	2 ÷ 35	31.74

Table 2. Results of basic descriptive indicators of anthropometric characteristics and motor abilities of untrained boys

Variables	N	Mean (St. Dev.)	Range	Cv%
TM_n	16	78.2 ± (14.03)	49.6 ÷ 104.8	17.94
TV_n	16	181 ± (8.58)	168 ÷ 195	4.74
BMI_n	16	23.8 ± (3.63)	16.6 ÷ 32.1	15.25
T30_n	16	5.1 ± (0.48)	4.6 ÷ 6.5	9.32
SUD_n	16	2 ± (0.19)	1.6 ÷ 2.25	9.6
BM3_n	16	7.4 ± (1.26)	5.7 ÷ 9.6	17.18
FLA_n	16	8.7 ± (4.52)	2 ÷ 17	51.87
PRE_n	16	19.1 ± (6.73)	7 ÷ 32	35.16

Table 3. Results of comparative statistical analysis of anthropometriccharacteristics and motor abilities

Variables	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
TV_o - TV_n	2.4	6.78	1.75	1.37	14	.19
TM_o - TM_n	-2	20.31	5.25	-0.38	14	.71
BMI_o - BMI_n	-1.23	6.51	1.68	-0.73	14	.48
T30_o - T30_n	-0.5	0.64	0.17	-3.02	14	**.01**
SUD_o - SUD_n	0.25	0.22	0.06	4.4	14	**.00**
BM3_o - BM3_n	1.23	1.58	0.41	3	14	**.01**
FLA_o - FLA_n	0.77	6.42	1.66	0.46	14	.65
PRE_o– PRE_n	6.6	11.6	2.99	2.2	14	**.04**

Results of comparative statistical analysis (Table 3.)of anthropometric characteristics and motor abilities between volleyball players and untrained boys show that statistically significant differences were found in 4 out of 8 variables measured. Those variables are: 30m sprint (T30) with p=.01, standing long jump (SUD) with p=.00, medicine ball throw (BM3) with p=.01, and bench bend (PRE) with p=.04. Differences between volleyball player and untrained boys in other 4 variables measured were not significant.

4. Discussions

Fact that there were no statisticaly significant differences in body height (p=.19) and mass (p=.71) between volleyball players and untrained boys is the effect of apparently not so good selection, given the fact that the game of volleyball ismainly determined by longitudinal measurements. Although these results are not as expected, they improve internal validity of the study, because greater differences in hight would have impact on results in other tests (standing long jump, 30m sprint...). Comparative analysisresults of body-mass index (BMI) show that there were no statistically significant difference between the two groups of subjects, which is expected because both body height and mass were similarand the values of these variables in both subsamples are within normal limits. Significant difference was found in the variable 30m sprint, which estimates acceleration ability (Grbovic, 2013.), and speed in general. These results can be explained by the basic volleyball time structure in which most points last 4-6 secounds (Nesic, 2006), and that is the kind of game format that demands swift reactions and the ability of fast movement in court. Volleyball players during their games and training improve those characteristics, and thus have better results in tests estimating speed and acceleration. Standing long jump is another variable showing statistically significant difference in favor of volleyball players (p=.00).This fact fits into one of the basic principles of training, that the locomotor apparatus of athletes is best expressed in those conditions in which they are trained (Jankovic et al., 1995; Nesic et al., 2013). The movement and locomotion manifested hereby are in a horizontal plane, that is, they require sudden shifts of running direction and course (running forward-backward, sideways...). This is in line with the expression of agility, and certainly contributed to the development of leg extensor explosiveness – in terms of horizontal component, which is important for the result on standing long jump test in this case (Dopsaj, 1994). Medicine ball throw (MB3) estimates the

explosiveness of body flexors, and it showed significant difference in favor of volleyball players. Nature of this test, which resembles the movement of body when performing a spike in volleyball, may explain the given results. While jumping and spiking volleyball players improve abdominal and shoulder muscles which enables them to perform better on this test. "Flamingo" balance test didn't show any statistically significant difference between these two groups (p=.65). By observing these results we can conclude that both volleyball training and physical education classes evenly impact the development of balance ability. Bench bend results show difference in favor of volleyball players (p=.04).These results can be explained by the fact that volleyball training has a positive impact on the development of flexibility (Dopsaj, 1994; Ljubojevic et al., 2012.), also some studies indicate that volleyball players spend more time stretching in relation to a large number of other related sports (Levine et al. 1987).

5. Conclusions

Based on the results of this research we can conclude that our hypotesis is partialy accepted: there was a statistically sifnificant difference between volleyball players and untrained boys 17 years old, but not in all of the variables chosen for this study. Volleyball players had better statistically better results then untrained boys in four out of eight variables measured in this study. This shows that volleyball training positively affects motor abilities, and further improves them upon classes of physical education. Specific types of movement and game structure of volleyball dictates certain pattern of motor ability needed for better efficiency (Grgantov et al., 2007). Trainings of volleyball players are directed towards improving those abilities, and therefore they perform better in tests for assesing those specific abilities. Untrained boys who only participated in physical education classes had only basic training, and their improvement was not that significant (Aleksandrovic et al., 2007). Future studies should include pretest-posttest design of research in order to determine actual training impact of both types. Also different categories should be included (girls, younger subjects, cities, villages...), because it is indicated in the previous researches (Shegregur et al., 2010) that all those variables might influence the results in different ways.

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