GENDER COMPARISON STUDY OF ANTHROPOMETRIC PARAMETER IN YOUNG VOLLEYBALL PLAYERS

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Abstract
An important role in whole performance of volleyballers plays the anthropometric parameters. Anthropometric differences mostly define the position and the role of the players in the court.
The aim of this study was to determine the difference in some anthropometric parameters of young female volleyball players and young male volleyball players. This study assess 22 young boys volleyballer (17.1± 1.8 SD) and 25 young girls volleyballer (16.9 ± 1.9 SD) located in Tirana. Anthropometric measures assessed were: body-height, body-weight, body-waist circumference. Equipment used for measuring were digital scale with height rod (Health O meter professional scales) and flexible metric tape. Independent samples test and t-test were used to analyze quantitative data. Boys had the mean and SD of body-height (177.95 ± 8.351) while girls showed the mean and SD (165.52 ± 6.593). In terms of body-weight, boys were presented with mean and SD (71.9 ± 8.608) while the girls had the mean and SD (62.39 ± 10.597). Boys displayed a mean value in waist-circumference (81.18 ± 5.413) while girls showed the mean and SD of (73.79 ± 7.475).
This research provided an original comparison of anthropometric measurement between boys and girls on young volleyball players where boys had larger mean of body-weight, body-height and body – waist circumference.

Keywords: volleyball players, anthropometric parameters, boys, girls, difference

Introduction

Anthropometric parameters effect in a successful performance and in the movement structure (Thissen. M et al., 1991). Moreover, anthropometric variables and many others factors such body composition and physical fitness are the significant tools to structure the development of performance and monitoring it. Data of anthropometric parameters help coaches to evaluate their program training and decision-making processes (Bourdon et al., 2017).

It is very important to focus on anthropometric variables because by this way is possible the selection process for certain positions in volleyball (CEV., 2005). According to FIVB., 2005 the perfect age to start selection process is 13-15 years old but the anthropometric parameters can change during growth thus the position can be change also. Anthropometric variables most used to evaluate the players level in specific position or to differentiate the playing position, are height, weight and mass indexes (Gualdi-Russo. E et al., 2001). The weight can be an important component that effect the performance because being heavy (include huge muscles mass) impair the repeated jumping performance (Sheppard. JM et al., 2009). According to Malousaris. GG et al., 2008 the typical volleyball player somatotype is mesomorph-ectomorph. Eventuality this mean that volleyball require from their players tall limbs, lower BMI, high reach from middle-block, opposite and outside hitter while medium length of limbs from liberos and setters.

In volleyball players handl the ball above their heads especially hitters (Gaurav et al., 2010), therefore tallness is great advantage in these sports. Thus, this

is another prove on the importance of anthropometric parameters in volleyball discipline.

The first aim of the present research was therefore to analyze anthropometric measures (height, weight, waist circumference) of young volleyballers. The second aim was to compare anthropometric parameters in young volleyball player between boys and girls.

Materials and Methods

Participants

Twenty-two female volleyball players (16.9 ± 1.9 SD) and twenty-five male volleyball players (17.1± 1.8 SD) took part in this study. All subjects participated voluntarily and their parents gave their informed written consent to participate in this study, which was conducted with the full accordance of the volleyball club. Measurement were conducted in indoor volleyball gyms. All subjects practice volleyball 3-5 times per week (lasting 60-90 min).

Anthropometric Measures

Three anthropometric parameters were measured in the study: body-height, body-weight and body-waist circumference. Body-height and Body-weight measurements are conducted with digital scale with height rod (Health O meter professional scales). A metric tape was used to measure waist circumference. All anthropometric measurements were taken by the same responsible investigator. The right time to measure anthropometric parameters is about 2-4 times in a year. It is needed more measurement when athletes are younger (our research case) because their body experiences more changes (Field testing kit, 2016)

Anthropometric (height and weight) Protocol

It is recommended to test the athletes in the morning because it gets more accurate results. Athletes should be barefoot and light clothes during the test. They position their feet in the center of the equipment with the weight distributed on both feet during weight measuring. The feet of the athletes are together, arms hanging by their side, back straight and the sight forward. The height rob was placed on the top of athlete's head. In both measuring athletes reduced movements. (Field testing kit, 2016)

Anthropometric (waist circumference) Procedures

During waist circumference athletes stood with their legs open as his shoulders' width. Athletes shouldn't hold their breath. The waist circumference was measured by staring with a flexible tape at the midpoint between the lower border of the rib cage and the iliac crest and brought all around the athlete's body. The tape was not too tight or too loose while measuring.

Statistical Analysis

SPSS (version 22) was used for statistical analysis. Statistical Analysis by gender were performed using an independent t-test. Descriptive statistic (mean ± SD) were calculated for anthropometric data. The level of significant was set at $p<0.05$.

Results

The maximum body height of 22 boys (16-18 years) was 193 cm while the minimum is 158 cm. The mean and the standard deviation of body height in young boys volleyballers was 177.95 cm (SD 8.351). Body weight of boys had the maximum 87 kg, minimum 55 and mean (SD) 71.9 kg (SD 8.608). Moreover, the waist circumference of the boys were presented with the minimum of 73 cm, maximum of 93 cm and the mean (SD) of 81.18 cm (SD 5.413). 25 young girls volleyballers had the mean (SD) of body height 165.52 cm (SD 6.593), the maximum value of 181 cm and the minimum of 151 cm. Body weight of girls were presented with the maximum of 85 kg, minimum of 41 kg and mean (SD) of 73.79 kg (SD 10.597). Waist circumference of the girls showed the minimum

64 cm, maximum 94 cm and mean (SD) 73.79 cm (SD 7.475).

The mean of body height in boys was 177.95 cm (SD 8.351) while the standard error mean was 1.78. Girls had the mean of body height 165.52 cm (SD 6.593) and the standard error was 1.319. Boys show the body weight mean 71.9 kg (DS 8.608) and the standard error 1.835. The mean of body weight in girls was 62.39 kg (SD 10.597) while the standard error was 2.119. Waist circumference was another anthropometric component measured in the study where the mean for boys was 81.18 cm (SD 5.413) and standard error mean 1.154. The girls had the mean of waist circumference 73.79 cm (SD 7.475) and the standard error mean 1.495.

Data comparison by gender showed significant difference for body-weight, body-height and body-waist circumference. Boys were heavier compared to girls (p=0.002; F=0.918). For body-height boys showed to be taller compare to girls (p=0.000; F=1.482). A significant difference is found in body-waist circumference where boys had a wider waist compare to girls (p=0.000; F=1.404)

Table 1. *Describe the minimum, maximum and mean (SD) of anthropometric parameters in boys and girl in volleyball discipline.*

Sport-Discipline	Gender		N	Minimum	Maximum	Mean	Standard Deviation (SD)
Volleyball	Boy	Body Height	22	158	193	177.95	8.351
		Body weight	22	55	87	71.9	8.608
Aged-Category		Waist Circumference	22	73	92	81.18	5.413
Junior (16-18 years)		Valid N (listwise)	22				
	Girl	Body Height	25	151	181	165.52	6.593
		Body weight	25	41	85	62.39	10.597
		Waist Circumference	25	64	94	73.79	7.475
		Valid N (listwise)	25				

Table 2. *Display the mean, the standard deviation and standard error mean of body height, body weight and waist circumference in boys and girls (junior in volleyball discipline)*

Group Statistics							
Sport Discipline	Age Category		Gender	N	Mean	Std. Deviation	Std. Error Mean
Volleyball	Junior (16-18 yrs)	Body Height	Boy	22	177.95	8.351	1.78
			Girl	25	165.52	6.593	1.319
		Body weight	Boy	22	71.9	8.608	1.835
			Girl	25	62.39	10.597	2.119
		Waist Circumference	Boy	22	81.18	5.413	1.154
			Girl	25	73.79	7.475	1.495

Table 3. *Display statistical significant difference for body-weight, body-height and body-waist circumference.*

Independent Samples Test		*Levene's Test for Equality of Variances*		*t-test for Equality of Means*						
Sport-Discipline **Volleyball**		*F*	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean difference*	*SED*	*95% Confidence Interval of the Difference*	
Junior (16-18 year)									*Lower*	*Upper*
Body Height	Equal variances assumed	**1.482**	**0.23**	**5.694**	**45**	**0.000**	**12.4**	**2.182**	**8.03**	**16.821**
	Equal variances not assumed			**5.608**	**39.862**	**0.000**	**12.4**	**2.216**	**7.947**	**16.904**
Body weight	Equal variances assumed	**0.918**	**0.343**	**3.348**	**45**	**0.002**	**9.5**	**2.814**	**3.79**	**15.235**
	Equal variances not assumed			**3.393**	**44.738**	**0.001**	**9.5**	**2.804**	**3.865**	**15.16**
Waist Circumference	Equal variances assumed	**1.404**	**0.242**	**3.836**	**45**	**0.000**	**7.4**	**1.928**	**3.512**	**11.276**
	Equal variances not assumed			**3.915**	**43.479**	**0.000**	**7.4**	**1.889**	**3.586**	**11.201**

Discussion

The main goal of the study was to determine differences in anthropometric parameters between boys and girls in young volleyball players. Usually the selection of young people for volleyball discipline is done according by their body shape. This way because height (for example) cannot be effect by training (Vando. S et al., 2013). But somehow it can be substitute with jump height. Although height is a parameter, which depends on genetics and can't not be altered, weight and waist circumference are factors which can be controlled (Mielgo-Ayuso, J et al., 2015). The weight also plays an important role in volleyball discipline. Volleyball is a sport that contains many directions change as fast as possible thus athletes with huge body mass index are more slowly in the court. Newton's second low support this thesis by proving that it is harder to put into motion, stop or change the direction of bodies with great mass. Moreover, the data results of Bilali. A & Jarani. J, 2016 in basketball young players showed the importance of maintaining a balance body weight and the crucial role of anthropometric parameters in performance. Thus body-weight plays an important role not only in volleyball but also in many others sports discipline. The result of present study demonstrates significant difference among boys and girls in variables of body-height, body-weight and

waist-circumference. The same results were found in Jarani. J et al., 2012 boys show significant differences among girls not only in anthropometric parameters but also in coordination abilities. Similar results are found in (Muca. F et al., 2012) study, boys have higher BMI compare to girls and they were more active in aerobic fitness test. The crucial role of anthropometric study presented in this research it is also found in (Nurja. A & Caushi. A., 2019). According to their study the selection of young athletes is directly link to their anthropometric profiles. The importance of the anthropometric parameters is reported in many others researchers. The anthropometric variables are very important factors related with speed, strength, agility and endurance for both males and females (Ozkan. A et al., 2012; Bilsborough. JC et al., 2015; Spiteri T et al., 2015; Haakonssen. EC et al., 2016). Additionally, anthropometric parameters can be used to predict the effect of age, the impact of biological aspects of young athlete growth on performance and maturity (Torres-Unda. J et al., 2016)

Limitations

The main limitation of our study was small sample size of young volleyball boys and girls. Further studies should analyze these
parameters with large sample size and different ages of athletes.

Conclusion

This study provides an original comparison of anthropometric measurement between boys and girls on young volleyball players. The obtained result provides a clearer insight into young boys (volleyball player) and young girls (volleyball players) differences at the age 16-18 years old. We found that anthropometric profiles are important factors in volleyball and determine playing position of the court.

References

Ayuso JM, González JC, Suárezy VC, Zourdos MC. Influence of anthropometric profile on physical performance in elite female volleyballers in relation to playing position. Nutr Hosp. 2015;31(2):849-857

Bilali. A & Jarani. J. (2016). The role of anthropometric parameters on sprint and agility in youth basketball players. Second International Scientific Conference.

Bilsborough JC, Greenway KG, Opar DA, Livingstone SG, Cordy JT, Bird SR, et al. Comparison of anthropometry, upper-body strength, and lower-body power characteristics in different levels of Australian football players. *J Strength Cond Res*. 2015;**29**(3):826-34. doi: 10.1519/JSC.0000000000000682. [PubMed: 25226309]

Bourdon, P. C., Cardinale, M., Murray, A., Gastin, P., Kellmann, M., Varley, M. C., et al. (2017). Monitoring athlete training loads: consensus statement. *Int. J. Sports Physiol. Perform.* 12(Suppl. 2), S2161–S2170. doi: 10.1123/IJSPP.2017-0208

Canadian Sport Institute. Field test kit Protocols 3. 2016;8.

CEV - Confédération Européenne de Volleyball [Internet]. [cited 2015 September 18]. Available from: http:// www.cev.lu/default.aspx

FIVB - Volleyball [Internet]. [cited 2015 September 18]. Available from: http:// www.fivb.org/en/volleyball/Rankings.asp

Gaurav, V., Singh, M., & Singh, S. (2010). Anthropometric characteristics, so- matotyping and body composition of volleyball and basketball players. *Journal of Physical Education and Sports Management*, *1*(3), 28-32.

Gualdi-Russo E, Zaccagni R. Somatotype, role and performance in elite volleyball players. J Sports Med Phys Fitness 2001;41(2):256-262.

Haakonssen EC, Barras M, Burke LM, Jenkins DG, Martin DT. Body composition of female road and track endurance cyclists: Normative values and typical changes. *Eur J Sport Sci*. 2016;**16**(6):645-53. doi: 10.1080/17461391.2015.1084538. [PubMed: 26366462]

Jarani. J, Muca. F, Kasa. A, Caporissi. D, Gallota. MC (2012). Gender differences and the relationship between coordination abilities and body composition indicators in first and fourth elementary school children in Tirana. 4th World conference on the International Society for the Social Sciences of Sport, 21

Malousaris GG, Bergeles NK, Barzouka KG, Bayios IA, Nassis GP, Koskolou MD. Somatotype, size and body composition of competitive female volleyball players. J Sci Med Sport. 2008; 11:337–344.

Muca. F, Jarani. J, Karsten. F (2012). Correlates of aerobic fitness and physical activity with BMI and waist circumference in children 9-10 years old in Tirana. 4th World conference of the International Society for the Social Sciences of Sport. 30

Nurja. A & Caushi. A (2019). The association of anthropometric parameters with strength and explosive power of

lower extremities. European Journal of Health & Science in Sports, 6(1), 7-11.

Ozkan A, Kayihan G, Koklu Y, Ergun N, Koz M, Ersoz G, et al. The relationship between body composition, anaerobic performance and sprint ability of amputee soccer players. *J Hum Kinet*. 2012;**35**:141-6. doi: 10.2478/v10078-012-0088-3. [PubMed: 23486067]. [PubMed Central: PMC3588686].

Sheppard JM, Gabbett TJ, Stanganelli LC. An analysis of playing positions in elite men's volleyball: considerations for competition demands and physiologic qualities. J Strength Cond Res 2009;23(6):1858-1866.

Spiteri T, Newton RU, Binetti M, Hart NH, Sheppard JM, Nimphius S. Mechanical determinants of faster change of direction and agility performance in female basketball athletes. *J Strength Cond Res*. 2015;**29**(8):2205-14. doi: 10.1519/JSC.0000000000000876. [PubMed: 25734779]

Thissen-Milder M, Mayhew JL. Selection and classification of high school volleyball players from performance tests. J Sports Med Phys Fitness. 1991;31(3):380-384.

Torres-Unda J, Zarrazquin I, Gravina L, Zubero J, Seco J, Gil SM, et al. Basketball performance is related to maturity and relative age in elite adolescent players. *J Strength Cond Res*. 2016;**30**(5):1325-32. doi: 10.1519/JSC.0000000000001224. [PubMed: 26439783].

Vando S, Filingeri D, Maurino L, Chaabène H, Bianco A, Salernitano G, Foti C, Padulo J. Postural adaptations in preadolescent karate athletes due to a oneweekkaratetrainingcAMP.JHum Kinet 2013;38:45-52.