THE ASSOCIATION OF ANTHROPOMETRIC PARAMETERS WITH STRENGTH AND EXPLOSIVE POWER OF LOWER EXTREMITIES

Nurja, A[1], Caushi. A[2]

[1]Sports University of Tirana, Albania, Institute of Scientific Research and Sports, [2] Sports University of Tirana, Albania, Faculty of Movement Sciences

Correspondence: Anisa Nurja, e-mail: anurja@ust.edu.al

(Accepted 15 March 2019)

Abstract

The aim of this study was to determine if there is any association between anthropometric parameters and strength, explosive power of lower extremities**.** Forty-seven volleyball players aged 16.23 ± 1.35 years performed lower body strength (standing long jump test), upper body strength (push-ups test- 30sec), core body strength (curls up test 30sec) and measured anthropometric parameters (body weight, body height, waist circumference). Analysis of correlation were performed to find out if there was any correlation between anthropometric parameters and the power of lower limbs. Descriptive statistics revealed body weight mean 66.84 ± 10.74 SD, body height mean 171.34±7.51 SD, waist circumference mean 77.25±7.51 SD. Boys performed better than girls on lower body strength (standing long jump test) mean 221.94 ±28.64 SD, upper body strength (push-ups test 30sec) mean 23 ±7.83 SD, core body strength- curls up test 30sec (mean 25.41±3.69 SD). Results showed that there was significant correlation between core body- curls up 30sec (Sig. 2-tailed = 0,355), lower body- standing long jump test (Sig. 2-tailed=0.565) and body height. Significant correlation was found between body weight and lower body standing long jump (Sig.2-tailed=0,335). Between waist circumference and lower body standing long jump was also correlation (Sig.2-tailed=0.291). In conclusion, according to the results there was significant correlation between strength, explosive power and anthropometric parameters.

Keywords; lower body, standing long jump, body weight, body height, correlation,

Introduction

Sports have different demands on anthropometric attributes, which are specific to each professional player (Miftari. F, (2017). Volleyball is a team sport and a complex game involving aerobic and anaerobic activity which includes good level on flexibility, force, power, agility and vertical jump (De almeida&Soarres, 2003). As a sport with technical and physical characteristics, the power and precision are important factors to achieve a winning action (D'Isanto et al, 2017). Another important element in predicting a successful future for athletes are anthropometric parameters because they affect athlete's performance and they are very significant on perfection of sports skills (Bayois et al., 2006; Duncan et al., 2006; Gualdi-Rosso & Zaccogni, 2001; Ibrahim, 2010). Success in many elite sports is

directly dependent on anthropometric parameters but in many research sciences, volleyball is considered as a sport that requires power because all sports performance is related to the number of jumps and their height (Ciccarone et al., 2007; Gualdi-Rosso & Zaccogni, 2001; Ibrahim, 2010; Malousarisa et al., 2008; Stamm et al., 2003; Strangelli et al., 2008; Voigt & Vetter, 2003; Xing et al., 2006). Modern volleyball needs high speed and jumps, thus it is a clear sign of demand physical strength (Raiola et al, 2016). In fact, an important key of selecting the young talents is the explosive dynamic strength (Ashley, & Weiss, 1994). Results from the study of Nurja (2018) that the selected physical exercises are appropriate to increase the explosive power and the vertical jump of volleyball players. Despite the muscular strength, power, the technical skills of the players, the anthropometric parameters are effective in the success of elite volleyball players. One of the main objectives in volleyball is to triumph and being superior on the net against the opponent with higher jump ability which comes from the explosive power of lower extremities. Very important process in volleyball is developing vertical jump because it has been estimated that the elite volleyball athletes may perform between 30,000 and 40,000 spiking movements in a single year (Bredeweg S, 2003). So the level of vertical jump and the explosive power of lower extremities are important elements in the career of a volleyball players (Stec & Smulsky, 2007). The most important key in physical fitness on volleyball players in the performance of vertical jump (Ziv and Lidor, 2010). In Albania there are few research studies for the importance of vertical jump and how anthropometric parameters effect on it. The purpose of the present study was to determine their ole of anthropometric parameter on the height jump and explosive power of lower extremities in volleyball players of Partizani team and Tirana volley association aged 16-18 years.

Methods

Participants

Forty-seven youth volleyball players aged (16.23 ± 1.35) years took part in this study. Twenty-eight volleyball athletes were females part of Partizani team and Tirane volley association, while nineteen of them were male from both team. Their coach signed an informed consent form allowing their participation in the research. Athletes were certificated by Albanian Volleyball Federation as elite youth volleyball players. Volleyball athletes participated this sport from 0.5 years to 10 years and trained for two and a half hours a day, on average 5 weekly training sessions.

Anthropometric assessment

Total body mass and stature were assessed in this research as part of anthropometric assessment. To measure total body mass and stature is used digital height weight scale. Athletes were in barefoot and with as little clothes as possible. Measuring tape is

used to measure waist circumference. The time of anthropometric measurement was march 2019.

Protocol

Volleyball athletes performed standing long jump test, Upper Body (push-ups 30s test) and core Body (curl up 30s test). The standing long jump was asses by standing long jump tester carpet. Athletes were asked to jump as high as possible with their arm maintain the same body position during the take-off and landing while performing standing long jump. Before performing the tests, the process was following by fifteen minutes' warm-up. Two jumps were performed and the best result was score and used for further analyses. Five minutes' rest between each tests. The time of test measurement was march 2019.

Statistical analysis

Data on the standing long jump, upper body strength (push-ups 30sec test) and core body strength (curls up 30 sec test), anthropometric characteristics and results are presented as mean and standard deviation (SD). To determine if there is any correlation between anthropometric parameters and lower body strength (standing long jump test), upper body strength (push-ups 30 sec test) and core body strength (curls up 30 sec test) is used correlation analysis (excel) and the Pearson correlation coefficient. A p-value <0.05 was considered significant for all the performed analyses. Descriptive statistic (excel) is also used to find out the mean, SD, minimum and maximum of the data available.

Results

Table 1 show the mean and standard deviation (SD) of anthropometric parameters and standing long jump, upper body push-ups (30 sec test) and core body (curls up30 sec test) parameters of all the volleyball players considered. The result revealed body weight mean 66.84 ± 10.74 SD, body height mean 171.34±7.51 SD, waist circumference mean 77.25±7.51 SD. (Table 1). The mean and SD of anthropometric parameter and the tests.

The analysis of correlation between anthropometric parameters and tests are instead show in table 2. Result showed that there was significant correlation between core body (curls up 30 sec) (Sig. 2-tailed = 0,355), lower body (standing long jump) (Sig.2-tailed =0.565) and body height. Significant correlation was found between body weight and lower body strength (standing long jump) (Sig. 2-tailed=0,335).

Between waist circumference and lower body strength (standing long jump test) were also correlation (Sig. 2-tailed=0.291).

According to Tables 1 and 2 there are significant correlation between anthropometric parameters and lower body strength (standing long jump test), upper body strength (push-ups), core body (curl ups).

Discussion

Similar finding was found in study of Philipines which reported that the best standing long jump performance, had the players with longer lower limbs. The taller an athletes is the longer is the standing long jump (Aouadi R, et al 2012). Is has been revealed significant relationship between standing long jumps and anthropometric measurement (shank length, calf circumference, foot and weight) (Fattihi A, et al 2012). According to

Table 1 Descriptive statistics for volleyball measurement

	Descriptive Statistics			
Sport_Dicipline		Mean	Std. Deviation	N
Volleyball	Body_Height	171.34	9.685	47
	Body_Weight	66.84	10.744	47
	Waist_Circumference	77.25	7.513	47
	Upper_Body_Push_ups_30s	15.196	10.1114	51
	Core_Body_Curl_up_30s	22.196	5.4882	51
	Lower_Body_Standing_Long_Jump	192.7	36.9897	50

Table 2 Correlation and Sig.(2-tailed)

Correlations					
Sport_Dicipline			Upper_Body_Push_ups_30s	Core_Body_Curl_up_30s	Lower_Body_Stand
Volleyball	Body_Height	Pearson Correlation	0.224	.355*	.565**
		Sig. (2-tailed)	0.129	0.014	0
		N	47	47	46
	Body_Weight	Pearson Correlation	0.055	0.282	.335*
		Sig. (2-tailed)	0.713	0.055	0.023
		N	47	47	46
	Waist_Circumference	Pearson Correlation	0.255	0.084	.291*
		Sig. (2-tailed)	0.084	0.573	0.049
		N	47	47	46

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

a Cannot be computed because at least one of the variables is constant.

(Gjinovski. B, et al 2014) in their research the results show that between teams ranked third and fourth there was no differences on anthropometric parameters of volleyball players, the distinguish were only in some motor variables of explosive force and standing long jump. Also another study of (Miftari. F, (2014) result that important statistical changes between two teams, were in motoric tests (such as standing long jump, height of the jumps etc) and not on anthropometric parameters.

Conclusion

In conclusion, according to the results there was significant correlation between strength explosive power and anthropometric parameters. The selection of young athletes is directly linked to their anthropometric profile. Coaches and trainers are in need of fast and powerful athletes because modern volleyball reduced duration of play and increasing intensity of rhythm.

References

De almeida ta, soares ea. Nutritional and anthropometric profile of adolescent volleyball athletes. Revistabrasileira de medicinadoesporte. 2003; 9:198-203.

Bayios ia, bergeles nk, apostolidis ng, noutsos ks, koskolou md. Anthropometric, body composition and somatotype differences of greek elite female basketball, volleyball and handball players.j sports med & physical fitness. 2006; 46(2):271-280.

Ciccarone g, croisier jl, fontani g, martelli g, albert a, zhang l, et al. Comparison between player specialization, anthropometric characteristics and jumping ability in top-level volleyball players. J sport med & physical fitness. 2007; 61(1):29-43.

Bredeweg s. The elite volleyball athlete.in:volleyball: handbook of sports medicineand science. Reeser jc and bahr r, eds.malden, ma: blackwell science ltd, 2003.pp. 183–191.

Stec m, smulsky v. The estimation criteria of jump actions of high performance female volleyball players.research yearbook. 2007; 13:77-8

Lidor r, ziv g. Physical and physiological attributes of female volleyball players-a review.
J strength cond res, 2010a; 24(7): 1963–197

D'isanto, t., altavilla, g., raiola, g. (2017). Teaching method in volleyball service: intensive and extensive tools in cognitive and ecological approach, journal of physical education and sport, 17(suppl 4)

Raiola, g., altavilla, g., de luca, c., di tore, p.a. (2016). Analysis on some aspects of the service in volleyball, sport science, 9(1):74-77

Ashley, c.d., & weiss, l.w. (1994). Vertical jump performance and selected physiological characteristics of women. J strength cond res; 8: 5-11.

Gjinovski. B, nikqi. V and miftari. F, (2014), the distinction between teams ranked third and fourth in the super league vollyeball of kosovo, sport mont journal 12(40-41-42):64-69

Nurja. A (2016). The impact of physical exercises in increasing the explosive power on volleyball players (aged 16-18 years). European Journal of Health & Science in Sports. Vol 4 Issue 1 page 18-21 http://ejhss.com/index.php/SportsScience/article/view/16/pdf_11

Miftari. F,(2014), the difference between two volleyball teams in some anthropometeric and motor abilities, conference: sport mont.

Miftari. F, (2017), a comparison of the anthropometric parameters between basketball players, handball players and volleyball players,