Tamara Karalić[1], Nijaz Skender[2] and Miloš Jelčić[3]

INFLUENCE OF BODY PARAMETERS ON THE PERFORMANCE OF SPECIFIC MOTOR TESTS IN VOLLEYBALL

[1]Faculty of Physical Education and Sports; University of Banja Luka
[2]Faculty of Pedagogy; University of Bihac
[3]OŠ "Lipanjske zore" Višići

Original research:

Abstract
The study was conducted on a sample of 32 volleyball players who participated in the cadet volleyball camp. Five (5) tests will be performed from the space of body parameters, namely: Body height (ATV), Body weight (ATT), Arm span (RAR), Maximum one-hand reach from the place (MD1RM), Maximum two-hand reach from the place (MD2RM) and they will be treated as dependent variables. The following will be reported in the area of specific motor abilities (4): Maximum reach in spike (MDSM), Maximum reach in the block from place (MDBLM), Maximum reach in the block from run up (MDBLZ), and Forward bend on the bench (PRKL) will be treated as sample predictor variables. The research technique, observation with recording was used to collect data. The obtained data it was processed using descriptive statistics procedures. ANOVA revealed differences between samples using a univariate approach. The effects of body parameters on the performance of specific motor tests were calculated using regression analysis at the significance level of p=.05. Three (3) of the total (5) five characteristic body parameters were found to have a significant impact on the performance of specific motor tests in volleyball.

Keywords: motor skills, physical characteristics, volleyball.

Introduction

Volleyball practice frequently includes exploration of morphological and motor space. The reason for this is that the technical-tactical performance of volleyball elements in the training process and during the game is highly dependent on body dimension parameters (Marelić, Đurković & Rešetar, 2008). Control of a complex dynamic system such human being, is possible only if the structure of individual subsystems within the system and their interrelationships is known. (Skender, 2004; 2008).

No technical element in volleyball can be performed without adequate motor skills and fully manifested without a rational technique of performing movement (Smajić, Kuljanin, Korać, Tomić, Savić, & Vasić, 2015). Because of the increased attractiveness, but also the necessity of modern volleyball, the future quality player must be both motorically capable and extremely tall. The boundaries that must be crossed in order to achieve a top result are expanding, and they are becoming increasingly difficult to comprehend. Body height and weight are two of the most commonly observed morphological measures in volleyball. The main reason for this is that in all major competitions, clubs and national teams are required to send data on each player. As a result, a large database is created that is open to all and allows you to compare your own players to those of the best teams (Marinović, 2020).

Exploring the connection and influence of the dimensions pertaining to the overall anthropological status of volleyball players is a continuous procedure which is regulated according to certain principles, but above all, according to the exercise system affecting the body of a young volleyball player (Karalić, Skender, Selimović & Šabić, 2020). The physical and motor parameters of cadet volleyball players are the focus of this study. The research investigates the effect of specific body parameters on the level of realization of specific motor abilities. The goal is to see if certain body parameters influence the performance of specific motor tests in young male volleyball players.

Methods

The study was conducted on a sample of 32 male volleyball players who participated in the cadet volleyball camp "Trebinje" in 2016. The study was conducted on a sample of 32 volleyball players who participated the cadet volleyball camp "Trebinje" in 2016. The following criteria were used to select participants: (1) the sample's age range is 14 to 16 years (6 months); (2) they must be active members of volleyball clubs in the Republika Srpska; and (3) they must have been actively training volleyball for at least 2 to 4 years. Five (5) tests will be performed from the space of body parameters, namely: Body height (ATV), Body weight (ATT), Arm span (RAR), Maximum one-hand reach from the place (MD1RM), Maximum two-hand reach from the place (MD2RM) and they will be treated as dependent variables. The following will be reported in the area of specific motor abilities (4): Maximum reach in spike (MDSM), Maximum reach in the block from place (MDBLM), Maximum reach in the block from run up (MDBLZ), and Forward bend on the bench (PRKL) will be treated as sample predictor variables. The research technique, observation with recording was used to collect data. The obtained data will be processed using descriptive statistics procedures. ANOVA revealed differences between samples using a univariate approach. The effects of body parameters on the performance of specific motor tests were calculated using regression analysis at the significance level of p =.05. Three (3) of the total (5) five characteristic body parameters were found to have a significant impact on the performance of specific motor tests in volleyball.

Table 1. Basic statistical parameters of physical parameters and motor abilities of cadets volleyball players

	Variable	N	Mean	Min.	Max.	Var.	SD	SE	Skew.	Kurt.
Volleyball players' body parameters	Body height (ATV)	32	186.62	176	202	0.035	6.67	1.20	0.275	-0.200
	Arm span (RAR)	32	187.79	176	209	0.431	8.10	1.45	0.796	0.624
	Body weight (ATT)	32	69.48	59	101	0.121	8.46	1.81	1.900	5.430
	M. one-hand reach (MD1RM)	32	245	228	272	0.041	10.09	1.28	0.948	1.255
	M. two-hand rech (MD2RM)	32	241.68	226	267	0.039	9.50	1.71	0.928	1.349
Motor skills of volleyball players	M. reach in spike(MDSM)	32	298.71	280	330	0.043	12.88	2.21	0.503	-0.229
	M. reach in block (p) (MDBLM)	32	281.18	361	304	0.039	11.13	1.91	0.213	-0.140
	M. reach in block (r) (MDBLZ)	32	286.85	271	320	0.041	11.96	2.05	0.687	0.161
	Forward bend on the bench (PRKL)	32	22.18	3	35	0.374	8.30	1.42	-0.790	0.712

Table 2. Univariate analysis ANOVA: Body height (ATV)

Model		SS	df	MS	F	Sig.
1	Regression	2752606.25	4	688151.563	1.170	.345[b]
	Residual	17059063.86	29	588243.582		
	Total	19811670.11	33			

a. Dependent Variable: ATV
b. Predictors: PRKL, MDBLZ, MDBLM, MDSM
$df_1=4$ i $df_2=29$; F=2.69; Sig.= 0.05

In Table 2, the value of the F test is F=1.170, which is lower than the limit value. Confirmation of this is the significance of P=0.345, at the level of *0.05*. Based on that, it is concluded that the body height (ATV) of cadet male volleyball players doesn't have a significant impact on the performance of specific motor tests of this research.

Table 3. Regression analysis - Body height (ATV)

Coefficients[a]

		UC		SC	t	Sig.	95% CI for B	
Model		B	SE	Beta			LB	UP
1	(Constant)	2280.33	3607.1		.632	.532	-5097.0	9657.7
	MDSM	30.21	32.022	.502	.944	.353	-35.27	95.712
	MDBLM	4.628	35.172	.066	.132	.896	-67.307	76.564
	MDBLZ	-43.80	41.205	-.677	-1.063	.297	-128.0	40.469
	PRKL	28.696	18.452	.308	1.555	.131	-9.042	66.435

a. Dependent Variable: ATV

Table 3 shows the results of regression analysis of motor tests and it can be seen that predictor factors have no statistically significant inpact on the criterion (P = 0.345). Body height (ATV) has no significant effect on the performance of motor tests, according to regression coefficients (Beta).

Results

The deviation of the body weight (ATV) result from the normal distribution of data is shown in Table 1, however the numerical values preview is a zone with a smaller number of results, which does not disrupt the sample's general homogeneity. The distribution of the other results is normal.

Table 4. Univariate analysis ANOVA: Arm span (RAR)

ANOVA[a]

Model		SS	df	MS	F	Sig.
1	Regression	473001.74	4	118250.43	.696	.601[b]
	Residual	4929132.75	29	169970.09		
	Total	5402134.50	33			

a. Dependent Variable: RAR

b. Predictors: PRKL, MDBLZ, MDBLM, MDSM

In Table 4, the value of the F test is F=0.696, which is a value lower than the limit value. Confirmation of this is the significance of P=0.601, at the level of *0.05*. Based on that, it is concluded that the Arm span (RAR) of cadet male volleyball players doesn't have a significant impact on the performance of specific motor tests of this research.

Table 5. Regression analysis - Arm span (RAR)

Coefficients[a]

Model		UC		SC	t	Sig.	95% CI for B	
		B	SE	Beta			LB	UB
1	(Constant)	141.79	1938.96		.073	.942	-3823.83	4107.43
	MDSM	-10.94	17.213	-.348	-.636	.530	-46.147	24.263
	MDBLM	-10.55	18.906	-.290	-.558	.581	-49.225	28.111
	MDBLZ	21.154	22.149	.626	.955	.347	-24.146	66.454
	PRKL	14.126	9.919	.290	1.424	.165	-6.159	34.412

a. Dependent Variable: RAR

From Table 5, where the results of regression analysis of motor tests are shown, it can be seen that there is no statistically significant influence of predictor variables on the criterion (P=0.601). Regression coefficients (Beta) read values that confirm that the range of arms (RAR) of volleyball male players also doesn't have a significant impact on the performance of motor tests.

Table 6. Univariate analysis ANOVA: Body weight (ATT)

ANOVA[a]

Model		SS	df	MS	F	Sig.
1	Regression	768.157	4	192.039	3.457	.020[b]
	Residual	1610.902	29	55.548		
	Total	2379.059	33			

a. Dependent Variable: ATT

b. Predictors: PRKL, MDBLZ, MDBLM, MDSM

In Table 6, the value of the F test is F=3.457, which is a value higher than the limit value. Confirmation of this is the significance of P=0.020, at the level of 0.05. Based on that, it is concluded that the body weight (ATT) of cadet volleyball players has a significant impact on the performance of specific motor tests of this research.

Table 7. Regression analysis - Body weight (ATT)

Coefficients[a]

Model		UC		SC	t	Sig.	95% CI for B	
		B	SE	Beta			LB	UB
1	(Constant)	-49.0	35.0		-1.40	.172	-120.7	22.60
	MDSM	.105	.311	.159	.337	.738	-.531	.741
	MDBLM	.614	.342	.805	1.797	.083	-.085	1.313
	MDBLZ	-.301	.400	-.424	-.751	.459	-1.120	.518
	PRKL	.001	.179	.001	.005	.996	-.366	.368

a. Dependent Variable: ATT

Table 7, where the results of regression analysis of motor tests are presented, shows that there is no statistically significant impact of predictor variables on the criterion (P=0.020). Regression coefficients (Beta) read values that confirm that the body weight (ATT) of volleyball players has a significant impact when performing motor tests.

Table 8. Univariate analysis ANOVA: Maximum one-hand reach from the place (MD1RM)

ANOVA[a]

Model		SS	df	MS	F	Sig.
1	Regression	2508.945	4	627.236	16.641	.000[b]
	Residual	1093.055	29	37.692		
	Total	3602.000	33			

a. Dependent Variable: MD1RM

b. Predictors: PRKL, MDBLZ, MDBLM, MDSM

In Table 8, the value of the F test is F=16.641, which is significantly higher than the limit value. Confirmation of this is the significance of P=0.000, at the level of *0.05*. Based on that, it is concluded that the Maximum one-hand reach from the place (MD1RM) of cadet volleyball players has a significant impact on the performance of specific motor tests of this research.

Table 9. Regression analysis - Maximum one-hand reach from the place (MD1RM)

Coefficients[a]

Model		UC		SC	t	Sig.	95% CI	
		B	SE	Beta			LB	UB
1	(Constant)	19.849	28.874		.687	.497	-39.205	78.903
	MDSM	-.310	.256	-.382	-1.208	.237	-.834	.215
	MDBLM	.642	.282	.684	2.281	.030	.066	1.218
	MDBLZ	.485	.330	.555	1.469	.153	-.190	1.159
	PRKL	-.131	.148	-.104	-.890	.381	-.434	.171

a. Dependent Variable: MD1RM

From Table 9, where the results of regression analysis of motor tests are shown, it can be seen that there is a statistically significant influence of predictor variables on

the criterion (P=0.000). Regression coefficients (Beta) read values that confirm that the Maximum one-hand reach from the place (MD1RM) has a significant impact when performing motor tests.

Table 10. Univariate Analysis ANOVA: Maximum two-hands reach from the place (MD2RM)

ANOVA[a]

Model		SS	df	MS	F	Sig.
1	Regression	2243.936	4	560.984	17.52	.000[b]
	Residual	928.181	29	32.006		
	Total	3172.118	33			

a. Dependent Variable: MD2RM

b. Predictors: PRKL, MDBLZ, MDBLM, MDSM

In Table 10, the value of the F test is F=17.527, which is also significantly higher than the limit value. Confirmation of this is the significance of P =0.000, at the level of *0.05*. Based on that, it is concluded that the Maximum two-hands reach from the place (MD2RM) of cadet male volleyball players has a significant impact on performing specific motor tests of this research.

Table 11. Regression analysis - Maximum two-hands reach from the place (MD2RM)

Coefficients[a]

Model		UC		SC	t	Sig.	95% CI	
		B	SE	Beta			LB	UB
1	(Constant)	26.63	26.67		1.003	.324	-27.73	81.10
	MDSM	-.319	.236	-.419	-1.349	.188	-.802	.164
	MDBLM	.767	.259	.870	2.954	.006	.236	1.297
	MDBLZ	.340	.304	.415	1.118	.273	-.282	.962
	PRKL	-.170	.136	-.144	-1.246	.223	-.448	.109

a. Dependent Variable: MD2RM

From Table 11, where the results of regression analysis of motor tests are shown, it can be seen that there is a statistically significant influence of predictor variables on the criterion (P=**0.000**). Regression coefficients (Beta) read values that confirm that Maximum two-hands reach from the place (MD2RM) of cadet male volleyball players has a significant impact when they performing motor tests.

Discussion

There are clear scientific evidence of a strong association between morphological characteristics and the chosen sport (Eston & Reilly, 2009). Depending on the sports branch of athletes, their physical condition, body structure and technical tactical capacities affect their performance (Aytek, 2007; Acar & Eler, 2019). Every sport, including volleyball, has its own set of requirements, and each athlete should have certain anthropometric and body composition features for their sport (Massuça & Fragoso, 2011; Acar & Eler, 2019). Volleyball players generally have above-average body height, athletic constitution type, endurance, strength, and jumping skills (Malousaris et al., 2008; Carvajal et al., 2012). Anthropometric characteristics and jumping skills of volleyball players are the most important factors of their team's performance in terms of performance (Clarke, 1975). In the context of the discussion, the results of this study also confirm that body parameters, especially body weight, really affect on the test specific motor results in volleyball. Given that it was stated significant influence of the reach height of volleyball players with one and two hands on the test results of a group of predictor variables, it can be said that motor skills such as flexibility contributed significantly to this (Lee, Etnyre, Poindexter, Sokol & Toon, 1989; Palaniappan & Deivendran, 2013; Aslam, 2016; Gulati, Lehri, Kumar & Jain, 2021), then agility (Young & Behm, 2003; Kruse, Barr, Gilders, Kushnick & Rana, 2015; Taleb-beydokhti & Haghshenas, 2015) and explosive power of the jump type (Cronin, McNair & Marshall, 2001; Grgantov, Milić & Katić, 2013; Mannan & Johnson, 2015; Hiskya & Wasa, 2019). Given that explosive power is complex, but motor ability wich is important in volleyball, and that it manifests itself in conditions of different motor ability participation and movement, it is, in a way, a representative indicator of individual motor characteristics of volleyball players. Therefore, volleyball players, with combined motor characteristics (flexibility, strength, speed, agility, etc.), have different, more or less successful performance of some of the tests. It is this type of strength that is one of the key factors that probably made a significant difference, that is, the impact on the performance of tests in the spike and block. So, explosive power is an important factor in those activities in which it is necessary to give great acceleration to the mass of the body, the mass of individual parts of the body. Well, that is probably one of the possible reasons for the appearance of a significant influence on the performance of given motor tests.

Conclusion

Based on the findings, the general conclusion is that some physical parameters have a positive influence on the performance of specific motor tests in a sample of

young volleyball players. It should be noted that the obtained results are only valid for the selected sample, and given that scientific research is based on assumptions, this study undoubtedly leaves space for further verification of the facts established so far.

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Corresponding author:
Nijaz Skender
Faculty of Pedagogy
University of Bihać
E-mail: nijazs@yahoo.com

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