MORPHOLOGICAL CHARACTERISTICS OF BOSNIAN FIRST LEAGUE FEMALE BASKETBALL PLAYERS

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Abstract

The aim of the research was estimation of anthropometric characteristics of female basketball players from six Bosnian first league teams and also identification of possible differences between the players that play at different positions in the teams. Forty three, actually health, players participated in this research. They were between nineteen and twenty four years old. For all eleven anthropometric characteristics, descriptive parameters have been calculated. For the identification of possible differences between the players that play at different positions in the teams multiple analysis of variance have been used. The obtained results show that there are not important differences between the players from different teams, but there are statistical significant differences between players that play at different team positions. They are expressed with all variables except one; lower leg length. Centers (big players) are dominantly with longer and wider skeleton dimensionality, as well as body mass. Values of these variables are bigger from players' position one to position five. Further researches should include more anthropometric variables especially those for body voluminosity and body fat estimation that will help coaches to indirectly evaluate fitness level of tested players.

Key words: morphology, team position

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INTRODUCTION

Morphological characteristics are very important aspect of athlete's anthropological status. Some of them are very high genetically conditioned and consequently, they can not be affected by any sport activity or programmed exercise, but others are not so hereditary and it could be changed. This fact is can be essential in athlete's selection for specific sport. It can be said that every sport request specifically determined status of athlete's morphological profile, which is directly connected with success in specific sport activity. Big number of researchers dealt with anthropometric characteristics of high level sportsmen, trying to reveal optimal morphological profile for specific sport activity. Fleck S.J. (1983)[2] conducted his study on 525 male athletes participating in 26 Olympic events and 298 female athletes participating in 15 Olympic events. Obtained results showed that all athletes have lower percentage of body fat mass than student age population. The smallest body fat values have athletes involved in strictly aerobic activities, such as marathon running, while athletes involved in sports where body size is a definite advantage, such as basketball and volleyball tended to have a larger LBM (lean body mass).

Other researchers compared anthropometric characteristics of same age female and male athletes that were involved in same physical activity. Green J.J. at al. (1998)[3] conducted his research on sample of fifty-four female and sixty-one male subjects, from varsity basketball teams at high schools in order to reveal differences in their anthropometric characteristics and motor abilities. The male subjects were significantly taller and heavier, while the females had a significantly higher percentage of body fat. Performance testing revealed that the males were able to jump significantly higher and run the sprint significantly faster than the female subjects.

The aim of this research was to determine morphological profile of elite female basketball players that played in I Bosnian Basketball League, as well, to determine differences between the players that play at different team position. Similar studies conducted, but there are few in Bosnia and Herzegovina, what was the reason for this study. Ackland at al. (1997)[1] measured 168 players from 14 national teams using 38 anthropometric dimensions before the Women's World Basketball Championships held in Australia in 1994. Clear differences in

absolute size were found between guards, forwards and centers. La Monte M.J at al. (1999)[6] on sample of 46 female university basketball players got similar results. The centers were significantly taller and greater in mass than were the guards and forwards. The centers had significantly lower body density yet displayed higher fat-free mass than did the guards. Also, Jeličić M. at al. (2002)[5] confirmed differences of anthropometric characteristics of elite junior basketball that play at different team position. Centers were characterised by bigger transversal and longitudinal skeleton dimensionality, but they didn't have bigger body fat percentage than guards and forwards.

Also, previous studies confirmed correlation between anthropometric characteristics and motor and functional abilities. Only optimal athlete's morphometric status can provide optimal exposure of motor and fitness potential. Hoare D.G. (2000)[4] measured anthropometric and physiological attributes of 125 male and 123 female junior basketball players competing at the Australian Under 16 championships in 1998. Best players differed to rest players on a number of anthropometric and physiological variables for both males and females. Riezebos M.L. at al. (1983)[7] measured twenty women on physiological, anthropometric, motor fitness and skill related variables in order to provide a current profile of elite female basketball players. The factors which best discriminated between high and low performers were accuracy shooting, percent fat and VO2max.

METHODS

Participants

Forty three actually health (without any injury report) female basketball players from six Bosnian first league clubs, participated in this research. They were between nineteen and twenty four years old.

Instruments

For estimation of the players anthropometric characteristics, following variables were selected: Body height - height, body weight - weight, leg length – leg l. , upper leg length – upper leg l., lower leg length – lower leg l. , arm length – arm l. , upper arm length – upper arm l. , forearm length – fore arm l. , hand breadth - hand b. , biacromial breadth – biacromial b. , bicristal breadth – bicristal b.

RESULTS

Table 1 shows descriptive statistics of all eleven anthropometric characteristics of the forty three players. Comparing the results with data obtained by Fleck S.J. 1983.(basketball players: males, 84.1 ± 6.2 kg; females, 55.3 ± 4.9 kg) it is obvious that Bosnian players are heavier than female players in the Fleck's study.

Table 1. Descriptive statistics of the players' morfometric parameters

VARIABLES	Mean	Std Dev	Min	Max	N
Height	1776.19	89.23	1571	1950	43
Weight	698.42	93.82	502	881	43
Leg l.	1011.79	74.42	897	1170	43
Upper leg l.	476.95	54.78	370	580	43
Lower leg l.	534.84	46.19	447	697	43
Arm l.	798.05	56.05	676	912	43
Upper arm l.	342.26	23.26	296	387	43
Fore arm l.	258.81	21.91	214	308	43
Hand b.	196.98	14.68	166	221	43
Biacromial l.	365.91	21.72	315	410	43
Bicristal b.	294.44	24.34	254	360	43

Using MANOVA we try to determine if there are any significant differences in assessed morphological variables between the players that play in different teams (table 2). As it showed in table 3, there are differences between players from different teams, but statistically significant differences have only three variables: leg length, lower leg length and biacromial breadth.

Table 2. Multiple analysis of variance of the basketball players according to club affiliation

Test Name	Value	Aprox.F	Hypoth.DF	Error DF	Sig. of F
Pillais	2.42831	2.66105	55.00	155.00	.000
Hotellings	6.84490	3.16110	55.00	127.00	.000
Wilks	.02207	2.99039	55.00	128.56	.000
Roys	.74504				

Table 3. Univariate Tests of Significance

VARIABLES	Hypoth SS	Error SS	Hypoth.MS	Error MS	F	Sig. of F
Height	69615.98	264814.52	13923.19	7157.14	1.94536	.110
Weight	64930.41	304780.05	12986.08	8237.29	1.57650	.191
Leg l.	79144.38	153440.73	15828.87	4147.04	**3.81690**	**.007**
Upper leg l.	31040.95	95012.95	6208.19	2567.91	2.41760	.054
Lower leg l.	22572.74	67023.11	4514.54	1811.43	**2.49225**	**.048**
Arm l.	15366.30	116603.60	3073.26	3151.44	.97519	.446
Upper arm l.	3588.28	19137.89	717.65	517.24	1.38747	.251
Fore arm l.	3289.69	16870.81	657.93	455.96	1.44295	.232
Hand b.	1517.71	7527.26	303.54	203.43	1.49206	.216
Biacromial l.	4957.53	14856.09	991.50	401.51	**2.46941**	**.050**
Bicristal b.	4004.43	20884.17	800.88	564.43	1.41891	.240

Table 4. Descriptive statistics according to team affiliation

	Height		Weight		Leg l.		N
	SV	SD	SV	SD	SV	SD	
CLUB 1	1803	107	714	83	1049	81	9
CLUB 2	1845	61	757	40	1072	35	7
CLUB 3	1742	73	629	56	1013	96	6
CLUB 4	1753	47	719	103	945	26	7
CLUB 5	1720	107	669	92	973	70	6
CLUB 6	1774	87	685	130	1004	52	8
Average	*1776*	*89*	*698*	*94*	*1012*	*74*	*43*
	Upper leg l.		Lower leg l.		Arm l.		N
	SV	SD	SV	SD	SV	SD	
CLUB 1	485	52	565	33	809	72	9
CLUB 2	531	49	541	27	829	34	7
CLUB 3	463	49	549	81	780	49	6
CLUB 4	443	17	502	14	790	30	7
CLUB 5	468	70	505	35	769	73	6
CLUB 6	468	55	536	45	802	58	8
Average	477	55	535	46	798	56	*43*
	Upper arm l.		Fore arm l.		Hand b.		N
	SV	SD	SV	SD	SV	SD	
CLUB 1	351	30	270	27	189	18	9
CLUB 2	354	13	267	19	208	8	7
CLUB 3	330	21	250	20	199	12	6
CLUB 4	335	14	256	10	199	7	7
CLUB 5	332	27	244	28	193	19	6
CLUB 6	345	24	259	20	197	15	8
Average	342	23	*259*	*22*	*197*	*15*	*43*

Also, using multiple analysis of variance we tried to determine if there were any morphological differences between the players that play at different position in the teams. As it obvious, there are differences in anthropometric features between players that play at different

position in the teams (table 5). Table 6 shows that there are differences in all assessed variables except in one variable; lower leg length. Table 7 shows descriptive statistics of morphological characteristics for all five position in the teams: position 1- play maker, position 2 – guard shooter, position 3 –forward, position 4 – power forward, position 5 – centre.

Table 5. Multiple analysis of variance of the basketball players' morphological characteristics according to the position they play in their clubs.

Test Name	Value	Aprox.F	Hypoth.DF	Error DF	Sig. Of F
Pillais	1.41423	1.54134	44.00	124.00	.033
Hotellings	5.72436	3.44762	44.00	106.00	.000
Wilks	.08504	2.24221	44.00	109.08	.000
Roys	.8302				

Table 6. Univariate Tests of Significance

Variables	Hypoth SS	Error SS	Hypoth.MS	Error MS	F	Sig. of F
Height	206758.616	127671.896	51689.6539	3359.78674	**15.38480**	**.000**
Weight	125289.801	244420.664	31322.4503	6432.12273	**4.86969**	**.003**
Leg l.	106608.236	125976.880	26652.0590	3315.18106	**8.03940**	**.000**
Upper leg l.	60999.0643	65054.8427	15249.7661	1711.96955	**8.90773**	**.000**
Lower leg l.	7615.29192	81980.5685	1903.82298	2157.38338	.88247	.484
Arm l.	91050.1609	40919.7460	22762.5402	1076.83542	**21.13837**	**.000**
Upper arm l.	13160.8152	9565.37085	3290.20380	251.72029	**13.07087**	**.000**
Fore arm l.	13881.7584	6278.75325	3470.43960	165.23035	**21.00365**	**.000**
Hand b.	5342.12249	3702.85426	1335.53062	97.44353	**13.70569**	**.000**
Biacromial l.	8675.97711	11137.6508	2168.99428	293.09607	**7.40028**	**.000**
Bicristal b.	6443.36078	18445.2439	1610.84020	485.40115	**3.31858**	**.020**

Table 7. Descriptive statistics of morphological characteristics for every position in the teams

	Height		Weight		Leg l.	
	SV	SD	SV	SD	SV	SD
POSITION 1	1676	58	632	49	951	39
POSITION 2	1725	53	648	67	971	39
POSITION 3	1777	67	708	81	1004	67
POSITION 4	1810	59	712	102	1037	71
POSITION 5	1897	45	797	86	1104	56
Average	*1776*	*89*	*698*	*94*	*1012*	*74*

	Upper leg l.		Lower leg l.		Arm l.		Upper arm l.	
	SV	SD	SV	SD	SV	SD	SV	SD
POSITION 1	423	30	529	28	735	36	318	17
POSITION 2	452	40	519	22	764	30	331	11
POSITION 3	474	44	530	47	796	38	340	21
POSITION 4	496	50	540	74	819	31	350	14
POSITION 5	544	34	561	36	881	25	374	11
Average	*477*	*55*	*535*	*46*	*798*	*56*	*342*	*23*

	Fore arm l.		Hand l.		Biacromial b.		Bicristal l.	
	SV	SD	SV	SD	SV	SD	SV	SD
POSITION 1	237	13	179	1	343	18	278	18
POSITION 2	243	10	189	12	354	15	283	19
POSITION 3	259	14	198	10	369	22	295	24
POSITION 4	264	15	205	9	377	14	301	21
POSITION 5	293	12	214	5	384	13	316	28
Average	*259*	*22*	*197*	*15*	*366*	*22*	*294*	*24*

These results confirmed previous researches conducted by Ackland at al. (1997)[1], La Monte M.J at al. (1999)[6], Jeličić M. at al. (2002)[5]. There are statistically significant differences in

morphological characteristics between players that play at different position in a team. Looking the data from table 7 it is obvious that values of all variables increase from team position 1 to team position 5. Centres tend to have the highest values of longitudinal and transversal skeleton dimensionality, as well as a body mass that closely correlates with body height. This kind of anthropometric profile provides them to efficiently play close to a basket, respectively to score from shorter distance and gives them more opportunities to make a lot of rebounds. Also, the profile helps them to set more efficiently screens, stopping defenders from catching up offensive players. Having bigger team is very often a big advantage, especially if you have players with good quickness and agility. Players on position 1, play makers, have the lowest values of all variables. They are the smallest and the lightest players in the teams. This fact gives them the best conditions to control the ball and consequently to organise their teams' offence. They are usually the quickest and fastest team players, what is directly connected with their lower body mass.

CONCLUSION

Conducting this research we determined morfometric profile of Bosnian elite female basketball players and we confirmed previous research about morphological differences between players that play at different team position. Centres tended to have the biggest values of all measured variables, while playmakers tended to have the lowest values.

This is one of the first studies carried out in Bosnia on elite female basketball players and this is a good base for further estimation of their anthropometric profile. This kind of studies can be a fine indicator for basketball selection and also indirect sign of players' fitness level. Also, knowing the morphological profile of players can explain good or bad competitive performance.

LITERATURE

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MORFOMETRIJSKE KARAKTERISTIKE KOŠARKAŠICA PRVE LIGE BOSNE I HERCEGOVINE

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Sažetak

Cilj rada je estimacija morfološkog statusa košarkašica koje igraju u prvoj ligi Bosne i Hercegovine te utvrđivanje razlika u morfometrijskim karakteristikama igračica koje igraju na različitim pozicijama u timu. Istraživanje je obuhvatilo 43 košarkašice uzrasta 19-24 godine. Za svih jedanaest mjernih instrumenata za procjenu morfološkog statusa ispitanica izračunati su deskriptivni parametri. Za utvrđivanje razlika među ispitanicama iz različitih klubova, kao i razlika među igračicama koje igraju na različitim pozicijama u timu, korištena je višestruka analiza varijanse. Dobijeni rezultati pokazuju da postoje zanemarljive razlike između igračica koje igraju u različitim klubovima, tj. da su njihove morfometrijske karakteristike približno jednake. Statistički značajne razlike postoje među igračicama koje igraju na različitim pozicijama u timu. One su izražene u svim, osim u jednoj, mjerenoj varijabli (dužina potkoljenice). Centri pokazuju najizraženiju longitudinalnu i transverzalnu dimenzionalnost skeletal, kao i masu tijela. Primjetno je da vrijednosti mjerenih karakteristika rastu od pozicije 1 (playmaker) pa do pozicije 5 (centar). Daljnja istraživanja bi trebala uključiti mjerenja voluminoznosti tijela i količine potkožnog masnog tkiva koje je indirektni pokazatelj fizičke pripremljenosti sportista.

Ključne riječi: antropometrija, razlike, pozicija u igri.

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