Research in Physical Education, Sport and Health
2022, Vol. 11, No. 2, pp.9-14
ISSN(Print):1857-8152; ISSN(Online):1857-8160

DIFFERENCES IN SOME MORPHOLOGICAL CHARACTERISTICS, FOR 14, 15 AND 16 YEAR OLD FEMALE BASKETBALL PLAYERS

DOI:
(Original scientific paper)

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Abstract

The research was conducted on a sample of 60 respondents, female basketball players aged 14, 15 and 16. The total sample is divided into three subsamples that count 20 basketball players each. The first subsample includes 14-year-old female basketball players, the second subsample includes 15-year-old female basketball players, and the third subsample includes 16-year-old female basketball players. The subject of the study in this research are some morphological characteristics in female basketball players aged 14, 15 and 16 years. The aim is focused on determining intergroup differences in the studied variables. A total of 6 variables were used in the research to assess the morphological characteristics. Based on the obtained results, their interpretation and discussion, significant differences were determined among the studied variables.

Keywords: */female basketball players/, /specific/, /motor/, /variables*

Introduction

Basketball is one of the most dynamic sport games in terms of complexity, intensity, fast and explosive movements and lightning-fast decisions of the players. Basketball is a synthesis of morphological characteristics, mental and physical courage, physical strength and aggressiveness, absolute authority and safety in the contact game, prediction - anticipation of the intention (next movement or action) of the opponent, decision-making and solving situations in the game, individual and collective competitions, congruence of spatial and temporal parameters, etc. Basketball is the queen of sports games and it is played with equal interest by young and old individuals of both sexes.

Basketball requires extremely pronounced body height and some other longitudinal measures. They primarily influence the performance of certain specific basketball movements with a pronounced vertical component (rebounds, different shots, blocking of shots, jumping at the jump ball etc.). In addition to longitudinal dimensions, the efficiency of playing performance is affected to a smaller extent by transversal dimensions, volumes of body segments and adipose tissue (Dežman 1988; Erčulj, 1996).

A modern and perfect player can be considered a basketball player who performs all technical elements flawlessly, accurately and correctly, with and without the ball, in game conditions. A successful mastering of the basketball technique is greatly influenced by endogenous and exogenous factors, among which the most significant are: predispositions, genetic factors, morphological characteristics, working conditions, professional staff, etc.

Method of research

Subject and aim of the research

The subject of the study in this research are certain morphological characteristics in basketball female players aged 14, 15 and 16 years.

The aim of the research is focused at determining the differences in the morphological characteristics of female basketball players aged 14, 15 and 16 years.

Sample of respondents

The sample of respondents was selected from students of the youth basketball schools of ZKK Badel 1862 from Skopje and ZKK Struga 2009, aged 14, 15 and 16. The total sample of respondents includes 60

female basketball players and it is divided into three subsamples of 20 respondents each. The subsamples are named as: U14 female basketball players, U15 female basketball players and U16 female basketball players.

Sample variables

To realize the set goals of the research, 6 variables were used to assess the morphological characteristics. 1. Body height (AVT), 2. Body mass /kg/ (AMT), 3. Hand length /mm/ (ADSH), 4. Hand span /mm/ (ARSH), 5. Arm length /mm/ (ADR) and 6. Leg length /mm/ (ADN).

Results and Discussion

Interpretation of basic descriptive indicators

For all applied variables for the three groups of respondents, basic descriptive statistical indicators were calculated: arithmetic mean (X), standard deviation (SD), lower and upper limits of the range in which the results move (Min-Max), coefficient of variability (CV %), skewness-symmetry (Skew), kurtosis - elongation or flattening of the distribution (Kurt). The normality of the distribution is tested with the Kolmogorov - Smirnov test (KS).

Table 1. Basic descriptive statistical parameters of the anthropometric measures, among 14-year-old female basketball players

	Mean	Min	Max	SD	CV%	S.E	Skewn	Kurto	K-S
Height	164,25	152,00	174,00	6,04	3,68	1,35	-0,18	-0,42	p > .20
Body mass	58,50	42,00	75,00	10,60	18,12	2,37	0,38	-1,39	p > .20
RPalm	15,60	13,50	17,50	1,06	6,79	0,24	0,23	-0,05	p > .20
LPalm	19,65	17,00	21,50	1,42	7,25	0,32	-0,46	-0,80	p > .20
RHand	72,40	67,00	76,00	3,30	4,56	0,74	-0,55	-1,40	p < ,20
RLeg	95,15	86,00	106,00	5,21	5,48	1,17	-0,15	-0,28	p > .20

From the inspection of table 1, where the results of the first subsample, the 14-year-old respondentsit can be noted that the intervals between the minimum and maximum results contain one to four standard deviations, which leads us to the conclusion that the applied tests are with satisfactory sensitivity for all variables.

Based on the values of the standard deviations (SD) and their ratio with the arithmetic mean (Mean), it can be concluded that for most variables there is no statistically significant deviation of the results from the arithmetic mean. Skewness values for almost all variables in 14-year-old female basketball players are within the limits of the recommended values from -1 to +1, which indicates a symmetrical distribution of the results. The homogeneity of the results among female basketball players at the age of 14 is at a satisfactory level, which can be seen from the obtained values of the coefficients of variability. The results of the Kolmogorov-Smirnova procedure showed that all variables in female basketball players at the age of 14 are normally distributed.

Table 2. Basic descriptive statistical parameters of the anthropometric measures, among 15-year-old female basketball players

	Mean	Min	Max	SD	CV%	S.E	Skewn	Kurto	K-S
Height	164,30	154,00	178,00	5,67	3,45	1,27	0,36	0,66	p > .20
Body mass	58,00	45,00	85,00	12,64	21,79	2,83	1,11	0,18	p < ,15
RPalm	16,33	14,50	18,50	1,27	7,78	0,28	-0,29	-0,97	p > .20
LPalm	19,18	18,00	21,50	1,12	5,82	0,25	0,87	0,03	p < ,15
RHand	70,95	64,00	80,00	3,22	4,54	0,72	0,84	3,00	p > .20
RLeg	94,30	85,00	101,00	5,46	5,79	1,22	-0,45	-1,05	p > .20

Table 2 presents the basic descriptive indicators for the second subsample, 15-year-old female basketball players. From the inspection of the table, it can be noted that the intervals between the minimum and maximum results contain one to four standard deviations, which lead to the conclusion that the applied tests have a satisfactory sensitivity for all variables.

Based on the values of the standard deviations (SD) and its ratio with the arithmetic mean (Mean), it can be concluded that for most variables there is no statistically significant deviation of the results from the arithmetic mean. The biggest deviation from the arithmetic mean is observed in the variable Body mass from a place SD=12.64.

Skewness values for almost all variables in 15-year-old female basketball players are within the recommended values of -1 to +1, indicating a symmetrical distribution of scores. Positive asymmetry – epicurticity (a greater number of results are in the zone of better results), is observed in the variable Body mass (Skewn.=1.11). From the obtained values it can be noted that all the studied variables show a flattening platykurtic distribution.

The homogeneity of the results among 15-year-old female basketball players is at a satisfactory level, which can be seen from the obtained values of the coefficients of variability. The greatest homogeneity is shown by the results of the variable Body height, where the coefficient of variability is minimal and amounts to CV=3.45%.

Table 3. Basic descriptive statistical parameters of anthropometric measures, general and specific motor abilities in basketball players aged 16

	Mean	Min	Max	SD	CV%	S.E	Skewn	Kurto	K-S
Height	172,25	150,00	198,00	9,42	5,47	2,11	0,39	3,12	p > .20
Body mass	63,85	44,00	76,00	8,87	13,89	1,98	-0,38	-0,52	p > .20
RPalm	16,76	14,00	21,00	1,80	10,71	0,40	0,69	0,34	p > .20
LPalm	20,14	17,50	25,00	1,91	9,50	0,43	0,88	0,68	p > .20
RHand	72,40	65,80	86,00	4,12	5,70	0,92	1,81	5,74	p > .20
RLeg	100,00	84,00	123,00	9,50	9,50	2,12	0,33	0,36	p > .20

The basic descriptive indicators for the third subsample, 16-year-old female basketball players, are presented in table 3. From the inspection of the table, it can be noted that the intervals between the minimum and maximum results contain from one to four standard deviations, which leads us to the conclusion that the applied tests have satisfactory sensitivity for all variables.

Based on the values of the standard deviations (SD) and its ratio with the arithmetic mean, it can be concluded that for most variables there is no statistically significant deviation of the results from the arithmetic mean.

Skewness values for almost all variables in 16-year-old female basketball players are within the limits of the recommended values from -1 to +1, which indicates a symmetrical distribution of the results. Positive asymmetry epicurticity (a greater number of results are in the zone of better results), is observed in the arm length variable (Skewn.=1.81), ,

The homogeneity of results among 15-year-old female basketball players is at a satisfactory level, which can be seen from the obtained values of the coefficients of variability.

The results of the Kolmogorov-Smirnova procedure showed that all variables in basketball players at the age of 16 are normally distributed.

Differences in morphological characteristics among 14-, 15- and 16-year-old female basketball players

With a multivariate analysis of variance (MANOVA) which determined the quantitative differences between the test groups in the morphological characteristics among the basketball players of 14, 15 and 16 years of age. The univariate analysis of variance (ANOVA) determined the quantitative differences between the groups of respondents based on each individual variable. Post-hoc analysis determined quantitative differences individually between groups, based on each individual variable.

Table 4. Differences in anthropometric measures between female basketball players aged 14, 15 and 16

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	0,55	3,38	12,00	106,00	**0,00**
Wilks' lambda	0,51	3,42	12,00	104,00	**0,00**
Hotelling's trace	0,81	3,45	12,00	102,00	**0,00**
Roy's largest root	0,59	5,20	6,00	53,00	**0,00**

R	14 год.		15 год.		16 год.		F	Sig.
	Mean	SD	Mean	SD	Mean	SD		
Height	164,25	6,04	164,30	5,67	172,25	9,42	8,08	**0,001**
Body mass	58,50	10,60	58,00	12,64	63,85	8,87	1,80	0,175
RPalm	15,60	1,06	16,33	1,27	16,76	1,80	3,43	**0,039**
LPalm	19,65	1,42	19,18	1,12	20,14	1,91	2,00	0,145
RHand	72,40	3,30	70,95	3,22	72,40	4,12	1,10	0,340
RLeg	95,15	5,21	94,30	5,46	100,00	9,50	3,85	**0,027**

By applying a multivariate analysis of variance (MANOVA), i.e. by testing the significance of the differences of the arithmetic means of the variables for the assessment of the morphological characteristics between the samples of young elite female basketball players (14, 15 and 16 years old), a statistically significant difference was determined, since Wilks' Lambda .51 and for degrees of freedom df=12, gives statistical significance at the Q=.000 level.

To determine in which measures and tests there are statistically significant differences, univariate analysis of variance was calculated for each variable. From the review of table 4, it can be seen that there are statistically significant differences in 3 out of 6 variables. Intergroup differences were determined in the variables: body height (F= 8.08; p= 0.001), hand length (F= 3.43; p= 0.039) and leg length (F= 3.85; p= 0.027).

Post hoc (LSD - least significant difference test) tests were also applied to determine which subsamples have statistically significant differences in each individual variable. The analysis of the tests is shown in table 5.

From the results presented in table 5, it can be noted that the respondents from the third subsample, 16-year-old basketball players, are significantly taller than 14- and 15-year-old female basketball players, while no significant difference in body height was determined between 14- and 15-year-old female basketball players.

From the review of table 5, it can be noted that there are no statistically significant intergroup differences in the body mass variable, despite the fact that 16-year-old female basketball players have the highest body mass.

In the hand length variable, a statistically significant difference was determined in favor of the 16-year-old female basketball players, they show higher values than the 14- and 15-year-old players, while no statistically significant difference was determined between the 14- and 15-year-old female basketball players in this variable.

In the variables body mass, hand length and arm span, no statistically significant differences were determined between the three subsamples, although higher values were observed in the 16-year-old basketball players. Regarding the leg length variable, the respondents from the third subsample differ statistically significantly from the first and second subsamples, the highest values were recorded for them. Noteworthy is the fact that the 14-year-old respondents have statistically significantly longer legs than the 15-year-old respondents.

Table 5. LSD – tests for the variables for the assessment of morphological characteristics

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Height	1	2	-0,05	2,29	0,98	-4,64	4,54
		3	-8,000)*	2,29	0,00	-12,59	-3,41
	2	1	0,05	2,29	0,98	-4,54	4,64
		3	-7,950)*	2,29	0,00	-12,54	-3,36
	3	1	8,000*	2,29	0,00	3,41	12,59
		2	7,950*	2,29	0,00	3,36	12,54
Body mass	1	2	0,5	3,42	0,88	-6,35	7,35
		3	-5,35	3,42	0,12	-12,20	1,50
	2	1	-0,5	3,42	0,88	-7,35	6,35
		3	-5,85	3,42	0,09	-12,70	1,00
	3	1	5,35	3,42	0,12	-1,50	12,20
		2	5,85	3,42	0,09	-1,00	12,70
RPalm	1	2	-0,725	0,45	0,11	-1,62	0,17
		3	-1,155)*	0,45	0,01	-2,05	-0,26
	2	1	0,725	0,45	0,11	-0,17	1,62
		3	-0,43	0,45	0,34	-1,32	0,46
	3	1	1,155*	0,45	0,01	0,26	2,05
		2	0,43	0,45	0,34	-0,46	1,32
LPalm	1	2	0,475	0,48	0,33	-0,49	1,44
		3	-0,485	0,48	0,32	-1,45	0,48
	2	1	-0,475	0,48	0,33	-1,44	0,49
		3	-0,96	0,48	0,05	-1,92	0,00
	3	1	0,485	0,48	0,32	-0,48	1,45
		2	0,96	0,48	0,05	0,00	1,92
RHand	1	2	1,45	1,13	0,20	-0,81	3,71
		3	1	1,13	1,00	-2,26	2,26
	2	1	-1,45	1,13	0,20	-3,71	0,81
		3	-1,45	1,13	0,20	-3,71	0,81
	3	1	1	1,13	1,00	-2,26	2,26
		2	1,45	1,13	0,20	-0,81	3,71
RLeg	1	2	0,85	2,22	0,70	-3,59	5,29
		3	-4,850)*	2,22	0,03	-9,29	-0,41
	2	1	-0,85	2,22	0,70	-5,29	3,59
		3	-5,700)*	2,22	0,01	-10,14	-1,26
	3	1	4,850*	2,22	0,03	0,41	9,29
		2	5,700*	2,22	0,01	1,26	10,14

Discussion of the results

Based on the obtained results and their interpretation, it can be concluded that there is a big difference in the results. It was expected that the respondents from the third subsample, the 16-year-old female basketball players would achieve the best results, but this did not happen.

Based on the determined intergroup differences in the anthropometric variables, it can be concluded that the respondents from the third subsample, the 16-year-old female basketball players, are significantly taller than the other two groups of respondents, which is normal, because they have entered the puberty period when body growth is in an accelerated phase. A higher share of fat tissue is one of the physical changes that are characteristic of the fast body development of girls in puberty (Cumming, Standage, Gillison, & Malina, 2008). At this age, girls show less interest in very intensive motor activities, such as strength training with weightlifting or endurance training, and at the same time achieve worse results in those sports

in which muscle force and strength as well as velocity play an important role (Malina, Bouchard, & Bar-Or, 2004).

Based on the determined intergroup differences in the anthropometric variables, it can be concluded that the respondents from the third subsample, the 16-year-old basketball players, are significantly taller than the other two groups of respondents, which is normal, because they have entered the puberty period when body growth is accelerated. The same is observed in the hand length variable, which is normal, considering the rapid growth of limbs. It is noteworthy that the respondents from the first subsample have longer legs than the respondents from the second subsample. This is certainly the result of the different selection of basketball players, who are from different backgrounds.

Conclusion

The research was conducted on a sample of 60 respondents,divided into three subsamples of 20 female basketball players aged 14, 15 and 16. A total of 6 variables were used in the research to assess some morphological characteristics. The aim of the research is to determine the differences in some morphological characteristics, among the three studied subsamples. Based on the obtained results, their interpretation and discussion, the following conclusion emerges.

- Regarding the variables for the assessment of some morphological characteristics, it was concluded that the respondents from the third subsample, the 16-year-old female basketball players, are significantly taller than the other two groups of respondents. Respondents from the first subsample have longer legs than respondents from the second subsample. The study established significant differences between individual types of young female players in terms of their body height, body weight, all three somatotypes (ectomorphic, endomorphic and mesomorphic) and the percentage of muscle tissue. After eliminating the effect of body height, statistically significant differences were observed in the percentage of bone tissue, whereas the differences in the percentage of muscle tissue were no longer statistically significant. It is also interesting that no differences were established between the individual types of players in terms of the percentage of fat tissue (Erčulj, F ; Bracic.M. 2010).

Based on the obtained results, it can be concluded that among basketball players of this age, there are generally differences in their morphological status, which was expected.

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