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DIFFERENCES IN SOME MOTOR SKILLS IN FEMALE BASKETBALL PLAYERS AT THE AGE OF 14, 15 AND 16

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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 female 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 study in our research are motor abilities in female basketball players aged 14, 15 and 16 years. The aim is focused at determining intergroup differences in the studied variables. A total of 18 variables were used in the research, 6 for the assessment of motor abilities. The obtained results confirm the first hypothesis. Regarding the motor variables, intergroup differences were determined in most of them. In the variable of running 4 times for 15 meters, 14-year-old female basketball players achieve statistically significantly lower results than 15- and 16-year-old female basketball players. In the variables Standing High Jump and Standing Long Jump, 16-year-old female basketball players achieve statistically significantly better results than 14- and 15-year-old female basketball players. 15-year-old female basketball players achieve significantly better results than 14-year-old female basketball players. No statistically significant differences were determined between the three subsamples in the variables Zigzag and Deadlift for 30 seconds. The obtained results confirm the second hypothesis. In the specific motor variable passing speed with two hands, 16-year-old female basketball players achieve the best results compared to 14- and 15-year-old subjects. In the variable leading between the stands, the best results are achieved by 15-year-old female basketball players. No significant difference was determined in this variable between 14- and 16-year-old female basketball players.

***Key words**: /female basketball players/, /motoric/, /abilities/,*

Introduction

In order to realize the structural elements of the basketball game, as well as to realize all the high-rhythm movements, players need to possess a specific morphology and extraordinary motor skills.

The connection of several corresponding structural models of movement determine a game situation, and an important role in solving a motor problem is the assessment of spatio-temporal parameters. The very structure of the basketball game favors players with fine motor skills.

Solving the spatio-temporal problems, which imperatively imposes playing basketball at the basic-motor level, depends on the degree of development and plasticity of the motor skills.

It is generally accepted that the tasks of motor abilities are: repetitive force, explosive force, speed and agility. They are actually motor movements, which are usually and most often arranged in simple motor structures.

Speed as a significant ability, which is constantly present before precision, in the specific motility of basketball players, is manifested as the speed of movement of the limbs, where the frequency of movements with variable amplitude comes to the fore. Apart from the mentioned capabilities, the flexibility, balance and agility factors are also present in the SM structure, to a moderate extent.

For basketball, the information related to coordination and precision is especially interesting, but, on the other hand, these abilities are the least researched, because there are still no reliable "pure" tests with which coordination can be assessed, as is the case with other motor abilities (speed, strength and precision, etc.).

The analysis of the game in basketball allows a logical conclusion that the mentioned motor skills are of fundamental importance.

In basketball, successful players, as a rule, are very mobile, of course individually more or less successfully, which depends on the level of development of motor abilities.

They are especially manifested in the movement of players without the ball and the movement with the ball. If basketball motor skills are to be analysed and the degree of their assimilation evaluated, then the structure of the players' movements must be investigated. Therefore, by all accounts, the proposed division into movements without and movements with the ball is acceptable, provided that it takes into account what the movements are in terms of direction, speed and duration. To this can be added the statement that all movements in basketball are locomotor and manipulative in nature. The movements of the player without the ball include the abilities that allow the player to run quickly, jump under the basket, change the direction of movement, move in defence and retreat. Those movements determine the game of basketball, in all situations when the player does not have the ball, and those movements depend on the degree of development, balance, etc. The movements of the player without the ball include:

Method of Research

Subject of the research

The subject of study in our research are certain motor skills and abilities of female basketball players aged 14, 15 and 16.

Aim of the research

The main goal of our study is to determine the differences in motor skills among female basketball players aged 14, 15 and 16 years.

The main objective of the research is aimed at determining the intergroup differences in the variables for the assessment of motor abilities among the three subsamples.

Sample of respondents

The sample of respondents was drawn from 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. Subsamples are named as:

- Female basketball players U14, female basketball players U15 and female basketball players U16.

Sample variables

A total of 6 variables were used for the assessment of motor abilities to achieve the set goals of the research.

Sample variables for assessments of specific motor abilities

1. The 4´15m run with a high start sec/ (T4´15)
2. The 20 m run with a high start /sec/ (T20M)
3. Sargent jump test (vertical jump test) /(SJT)
4. The standing long jump test/(LJT)
5. Curl up /30 seconds (CUP30)
6. Zig-zag agility test (Zig-Zag)

Measurement conditions and technique

The measurements were carried out in registered halls according to FIBA standards and proposals for the following ages U14, U15 and U16. The tests were carried out by trained measurers, teachers of physical and health education.

Data processing method

Basic descriptive statistical parameters were calculated for all applied variables;

- Arithmetic mean
- Standard deviation
- Coefficient of variability

- Lower and upper limit of the results (MIN-MAX)
- Symmetry coefficient – Skewness
- Coefficient of flatness – Kurtosis

To determine the quantitative and qualitative intergroup differences, the univariate and multivariate analysis of variance (ANAVA, MANOVA) was applied, and the univariate differences in the analyzed variables were determined by applying the LSD - post hoc test.

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 motor skills in 14-year-old female basketball players

	Mean	Min	Max	SD	CV%	S.E	Skewn	Kurto	K-S
T4x15	16,51	14,70	19,25	0,99	6,02	0,22	0,78	2,17	p > .20
T20M	4,13	3,30	4,79	0,35	8,52	0,08	-0,62	0,85	p > .20
SJT	20,40	14,00	30,00	4,81	23,56	1,07	0,68	-0,43	p > .20
LJT	145,50	119,00	180,00	19,79	13,60	4,43	0,19	-1,06	p > .20
ZIGZAG	8,85	8,26	9,40	0,40	4,54	0,09	-0,05	-1,57	p > .20
CUP30	21,20	15,00	24,00	2,67	12,58	0,60	-1,01	0,20	p < ,15

From the inspection of table 1, where the results of the first subsample, the 14-year-old respondents, 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 are with satisfactory sensitivity for all variables.

Based on the values of the standard deviations (SD) and the negative 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. Negative asymmetry - epicurticity (a greater number of results are in the zone of weaker results), is observed in the variable PT30 sec. (Skewn.=-1.10). From the obtained values it can be noted that all studied variables show flattening (platykurtic distribution).

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 show the greatest homogeneity in the 20-meter running variable, where the coefficient of variability is minimal and amounts to CV=0.35%.

The results of the Kolmogorov-Smirnova procedure showed that all variables in basketball players at the age of 14 are normally distributed.

Table 2. Basic descriptive statistical parameters of motor skills in 15-year-old female basketball players

	Mean	Min	Max	SD	CV%	S.E	Skewn	Kurto	K-S
T4x15	15,72	14,08	18,08	1,34	8,51	0,30	0,40	-1,52	p < ,15
T20M	3,81	3,25	4,50	0,40	10,45	0,09	0,33	-0,88	p > .20
SJT	19,20	11,00	26,00	4,51	23,51	1,01	-0,37	-0,69	p > .20
LJT	149,50	105,00	172,00	18,48	12,36	4,13	-0,59	-0,10	p > .20
ZIGZAG	8,53	7,70	9,90	0,71	8,36	0,16	0,56	-1,20	p > .20
CUP30	21,15	15,00	26,00	3,69	17,44	0,82	0,18	-1,44	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 leads us 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 Jump in distance from a place SD=18.48.

Skewness values for almost all variables among 15-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 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-Smirnov procedure showed that all variables in female basketball players at the age of 15 are normally distributed.

Table 3. Basic descriptive statistical parameters of the motor abilities of 16-year-old female basketball players

	Mean	Min	Max	SD	CV%	S.E	Skewn	Kurto	K-S
T4x15	15,90	14,60	17,06	0,70	4,43	0,16	-0,04	-0,86	p > .20
T20M	4,11	3,50	4,50	0,25	5,98	0,05	-0,50	0,61	p > .20
SJT	22,85	13,00	30,00	3,79	16,58	0,85	-0,73	1,34	p > .20
LJT	169,90	135,00	222,00	21,48	12,64	4,80	0,49	0,72	p > .20
ZIGZAG	8,74	7,14	10,50	1,15	13,18	0,26	0,30	-1,44	p < ,15
CUP30	23,75	15,00	37,00	5,54	23,34	1,24	1,03	0,85	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 (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 The standing long jump test from a place SD=21.48.

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 and flattening (platykurtic distribution).

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 show the greatest homogeneity in the variable T4x15m, where the coefficient of variability is minimal and amounts to CV=4.43%. ,

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

Intergroup differences in motor skills among 14-, 15- and 16-year-old female basketball players

By applying a multivariate analysis of variance (MANOVA), i.e. by testing the significance of the differences in the arithmetic means of the variables for the assessment of motor abilities between the samples of young elite basketball players (14, 15 and 16 years old), a statistically significant difference was determined, since Wilks' Lambda .50 and for degrees of freedom df=12, gives statistical significance at the Q=.000 level.

To determine which of the measures and tests show statistically significant differences, univariate analysis of variance was calculated for each variable. From the review of table 6, it can be seen that there are statistically significant differences in 4 out of 6 variables. Intergroup differences were determined in the variables: Running 4 times for 15 meters (F= 3.16; p= 0.050), Running 20 meters (F= 5.48; p= 0.007), Sargent jump test (vertical jump test) (F= 3.59; p= 0.034)) and The Standing Long Jump test (F= 8.60; p= 0.001).

Table 6. Differences in general motor abilities between 14, 15 and 16-year-old female basketball players

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	0,56	3,47	12	106	**,000**
Wilks' lambda	0,50	3,64	12	104	**,000**
Hotelling's trace	0,90	3,81	12	102	**,000**
Roy's largest root	0,73	6,47	6	53	**,000**

R	14 год.		15 год.		16 год.		F	Sig.
	Mean	SD	Mean	SD	Mean	SD		
T4x15M	16,51	0,99	15,72	1,34	15,90	0,70	3,16	**,050**
T20M	4,13	0,35	3,81	0,40	4,11	0,25	5,48	**,007**
SJT	20,40	4,81	19,20	4,51	22,85	3,79	3,59	**,034**
SJT	145,50	19,79	149,50	18,48	169,90	21,48	8,60	**,001**
ZIGZAG	8,85	0,40	8,53	0,71	8,74	1,15	0,80	,455
CUP30	21,20	2,67	21,15	3,69	23,75	5,54	2,58	,085

Table 7. LSD – tests for motor variables

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
T4x15M	1	2	,791*	0,33	0,02	0,13	1,45
		3	0,615	0,33	0,07	-0,05	1,28
	2	1	-,791)*	0,33	0,02	-1,45	-0,13
		3	-0,175	0,33	0,60	-0,84	0,49
	3	1	-0,615	0,33	0,07	-1,28	0,05
		2	0,175	0,33	0,60	-0,49	0,84
T20M	1	2	,320*	0,11	0,00	0,11	0,53
		3	0,029	0,11	0,79	-0,19	0,24
	2	1	-,320)*	0,11	0,00	-0,53	-0,11
		3	-,291)*	0,11	0,01	-0,51	-0,08
	3	1	-0,029	0,11	0,79	-0,24	0,19
		2	,291*	0,11	0,01	0,08	0,51
SJT	1	2	1,2	1,39	0,39	-1,58	3,98
		3	-2,45	1,39	0,08	-5,23	0,33
	2	1	-1,2	1,39	0,39	-3,98	1,58
		3	-3,650)*	1,39	0,01	-6,43	-0,87
	3	1	2,45	1,39	0,08	-0,33	5,23
		2	3,650*	1,39	0,01	0,87	6,43
LJT	1	2	-4	6,31	0,53	-16,64	8,64
		3	-24,400)*	6,31	0,00	-37,04	-11,76
	2	1	4	6,31	0,53	-8,64	16,64
		3	-20,400)*	6,31	0,00	-33,04	-7,76
	3	1	24,400*	6,31	0,00	11,76	37,04
		2	20,400*	6,31	0,00	7,76	33,04
ZIGZAG	1	2	0,32	0,26	0,22	-0,20	0,84
		3	0,107	0,26	0,68	-0,41	0,62
	2	1	-0,32	0,26	0,22	-0,84	0,20
		3	-0,213	0,26	0,41	-0,73	0,30
	3	1	-0,107	0,26	0,68	-0,62	0,41
		2	0,213	0,26	0,41	-0,30	0,73
CUP30	1	2	0,05	1,31	0,97	-2,57	2,67
		3	-2,55	1,31	0,06	-5,17	0,07
	2	1	-0,05	1,31	0,97	-2,67	2,57
		3	-2,6	1,31	0,05	-5,22	0,02
	3	1	2,55	1,31	0,06	-0,07	5,17
		2	2,6	1,31	0,05	-0,02	5,22

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 7, it can be noted that the respondents from the second and third subsamples, 15- and 16-year-old female basketball players, are significantly faster than 14-year-old female basketball players, while no significant difference was found between the 15- and 16-year-old female basketball players in the variable Running 4 times for 15 meters..

In the 20-meter Running variable, a statistically significant difference was determined in favor of the 15-year-old female basketball players, which showed higher values than the 14- and 16-year-old female basketball players, while no statistically significant difference was determined between the 14- and 16-year-old female basketball players in this variable.

In the Surgent (vertical jump) test variable, 16-year-old basketball players show statistically significantly better results than 14- and 15-year-old female basketball players. Among 14- and 15-year-old female basketball players , there is no significant difference in this variable.

In The Standing Long Jump test 16-year-old basketball players show statistically significantly better results than 14- and 15-year-old female basketball players. 15-year-old female basketball players achieve significantly better results in this variable than 14-year-old female basketball players.

No statistically significant differences were found between the three subsamples in the Zig-zag and Deadlift variables for 30 seconds.

Conclusion

Based on the obtained results and their interpretation intergroup differences were determined in most of the motor variables. In the variable of Running 4 times for 15 meters, the respondents from the first subsample achieve statistically significantly lower results than the 15- and 16-year-old female basketball players.

In the 20-meter Running variable, 15-year-old female basketball players achieve better results than 14- and 16-year-old female basketball players. In the Standing High Jump and Standing Long Jump variables, 16-year-old female basketball players achieved statistically significantly better results than 14- and 15-year-old female basketball players. 15-year-old female basketball players achieved significantly better results than 14-year-old female basketball players. No statistically significant differences were found between the three subsamples in the variables: Zig-zag and Curl- up 30 seconds. The obtained results confirm the second hypothesis.

Based on the obtained results, it can be concluded that among basketball players of this age, there are generally differences in their motor status, which was expected. Our recommendation is to prepare appropriate training programs in which special emphasis will be given to the perceived weaknesses of basketball players of the studied ages.

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