COMPARATIVE CHARACTERISTICS AND ASSESSMENT OF THE RELATIONS OF ANTHROPOMETRIC INDICATORS AND MOTOR ABILITIES OF GIRLS' BASKETBALL PLAYERS 12–14 YEARS OLD

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Abstract Anthropometric indicators and motor abilities are significant components of the successful implementation of the physical potential of young basketball players. The aim of the study was to describe and compare anthropometric characteristics, indicators of physical and special preparedness for basketball players under the age of 12 and up to 14 years, to identify the presence and degree of relationship between these indicators in each group of athletes. Athletes (n = 50) were grouped in groups under 12 years (U12, 10.97 ±0.48 years; n = 24), and under 14 (U14; 12.96 ±0.49 years; n = 26), body height and body weight were measured, dexterity and indicators of special preparedness were tested and compared ("Throws into the basket from different positions", "Free Throws", "Ten eights"). U12 players showed lower performance than the U14 group in all tests except the "Free Throws" test. All athletes showed a strong correlation between jumping and dexterity ($p < 0.01$). The U14 athletes showed a strong ($p < 0.01$) and moderate ($p < 0.05$) relationship between the indicators of special preparedness. Assessment of indicators of physical development, physical and special preparedness of athletes, the study of the relationship of these indicators at different periods of ontogenesis will help rationally differentiate training loads, emphasize pedagogical influences and optimize the training process.

Key words basketballers, anthropometry, motor abilities, agility, variables

Introduction

The effectiveness of the training process for high-profile basketball players depends on a properly organized basic stage of training aimed at ensuring the physical and technical fitness of young athletes (Cieślicka et al., 2019; Erčulj, Blas, Bračič, 2010). The study of morphological features, in accordance with the requirements of the sport, the determination of sensitive periods of development of basic physical qualities, the diagnosis of the ability to learn various exercises, allow trainers to select, optimally combine and, if necessary, adjust training tools and

methods in accordance with specific conditions (Erčulj et al., 2010; Jakovljević, Karalejić, Pajić, Gardašević, Mandić, 2011; Chukhlantseva, 2019). The stage of basic preparation coincides with the period of active, but uneven development of the motor analyzer, which is manifested in the heterochronism of the formation of individual elements and structures of motility (Matulaitis, Skarbalius, Abrantes, Gonçalves, Sampaio, 2019). In certain periods of ontogenesis, the accelerated development of certain physical qualities and the more successful formation of motor skills are observed (Leonardi et al., 2018, Matulaitis et al., 2019; Nikolaidis et al., 2015). The process of mastering technical and tactical actions and developing special motor abilities is more effective if the tasks of physical and special training are solved comprehensively, and the emphasis of training influences coincides with the natural accelerations of the development of physical qualities and the formation of technical parameters (Guimarães et al., 2019; Ramos et al., 2020).

Functional, morphometric, and motor indicators are the most significant factors affecting the success of the implementation of the basic components of the physical potential of young basketball players (Leonardi et al., 2018; Matulaitis et al., 2019; Šišić, Sekulić, 2014). The most important morphological characteristics of basketball players are body height and body weight, which significantly affect athletic performance, allow you to determine how young athletes meet the selection criteria for training groups, are taken into account when predicting prospects and choosing the optimal one for the player, his role, as well as the formation of teams (Bilali, Bellova, Spahi, 2017; Guimarães et al., 2019; Jakovljević et al., 2011; Ramos et al. 2020; Shahdadi, Alisoufi, 2017). Leonardi et al. (2018) reported that basketball players of 13–15 years old are characterized by a high level of biological maturity, and high rates of special preparedness in athletes can be explained by the relationship of age and accumulated training experience. Karalejic, Jakovljevic, Macura (2011) revealed that the technical skills of young basketball players aged 12–14 depend on the anthropometric characteristics and the level of development of basic physical abilities, as well as changes in the relationship between them as sports qualifications improve.

Pedagogical control tests make it possible to judge the individual's abilities for successful specialization in basketball, where important characteristics of elite athletes are a high level of development of jumping ability, speed, strength, coordination of movements in combination with excellent technique, high accuracy of throwing the ball into the basket (Assefa, Kumar, 2018; Mitova, 2019; Sabin, Marcel, 2016). The importance of a player's ability to jump as high as possible is due to the fact that players must jump as high as possible, performing jump throws, free throws, when mastering the ball when bouncing off a shield or ring, and the specific components of jumping are explosive strength, speed and rhythm of movements (Cieślicka et al., 2019; Erčulj et al., 2010; Kozina et al., 2018). A high level of coordination abilities, as the main component of dexterity, is due to the need for players to repeatedly perform sudden abrupt stops, changes in direction and acceleration. Agility indicators are determined by the rate of change of direction of movement and depend on explosive strength, muscle coordination and flexibility (Kozina et al., 2018; Sabin, Marcel, 2016; Šišić, Sekulić, 2014). Some studies have revealed a moderate or very large relationship between vertical jump height and various dexterity indices, which indicates that the greater the explosive strength, the higher the dexterity indices (Alemdaroğlu, 2012; Asadi, 2016). Moreover, different values of the relationship vary depending on the age, gender, and qualifications of the players.

The most important for catching the ball are coordination abilities, for leading and passing the ball – varieties of speed, agility, and the effective implementation of throwing the ball into the basket is associated with a sufficient level of development of coordination abilities and speed-power qualities. The speed, agility, and jumping ability of basketball players have common physiological and biomechanical determinants (Asadi, 2016; Erčulj et al., 2010).

However, only a few studies examined the relationships between physical and special fitness in groups of young athletes (Cieślicka et al., 2019; El-Shafee, Kapouh, 2016; Kozina et al., 2018). In the context of our study, the data of El-Shafee, Kapouh (2016) are important, which reported a significant positive correlation between the indices of coordination abilities and basic basketball skills in 12-year-old athletes. Analyzing the motor abilities and potential of high-class European basketball players aged 13–15, Erčulj, Blas, Bračič (2010) found that athletes with a long training experience show a higher level of development of motor qualities, especially when performing special (basketball) motor tasks with a ball. Garcia-Gil et al. (2018) revealed a positive correlation ($p < 0.05–0.005$) between anthropometric characteristics and competitive performance indicators, except for the number of transfers for women from 18 to 32 years old Spanish women's league players. Regarding the relationship between physical training and the special performance of basketball players, relationships between the time of the dexterity test and the time of the dribbling test with the effectiveness of playing activity have been identified (Garcia-Gil et al., 2018).

In the literature available to us, there is an insufficient number of studies that have been conducted for young basketball players in order to study the nature of the relationship of anthropometric characteristics and indicators of physical and special fitness of athletes. This contradiction determines the relevance of our study.

The objectives of this study were, firstly, to describe and compare anthropometric characteristics, indicators of physical and special fitness for basketball players under the age of 12 and up to 14 years, and secondly, to identify the presence and degree of relationship between indicators of physical and special fitness indicators in each group of athletes.

Materials and methods

Participants

Of the girls – basketball players training in the Children's Sports School in Zaporizhia and taking part in the study (n = 50), two groups were formed, U12 (10.30–11.93 years; n = 24; 2 year of study), and U14 (12.05–13.80 years; n = 26; 3–4 year of study). Basketball players of both groups trained in accordance with the basketball curriculum for children and youth sports schools 3 times a week. Before the study began, participants and their parents received detailed written and verbal information about the possible risks and inconveniences of testing.

Written informed consent was obtained from parents or legal representatives, consent was obtained from participants. The experiments described by us were performed in accordance with the principles of the Declaration of Helsinki and approved by the Research Ethics Committee (No. 27439-067.015, protocol 2019/002 dated 3.09.2019) of the National University «Zaporizhzhia Polytechnic», Zaporizhzhya, Ukraine.

Organization of the study

To assess the physical development of basketball players, anthropometric measurements of the body mass (BM) and body height (BH) of the athletes were used, based on these measurements, the body mass index (BMI) (kg/m^2) was calculated. BM was measured to the nearest 0.01 kg using an electronic balance; BH was measured to the nearest 0.5 cm using a stadiometer.

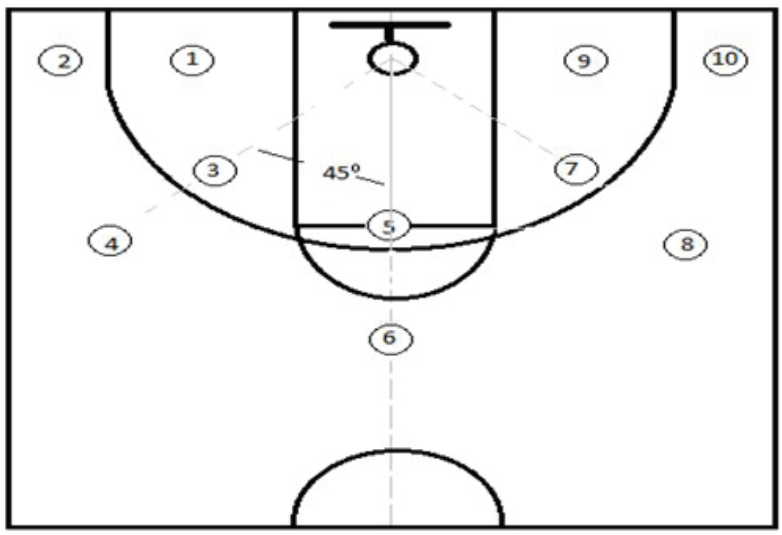
The physical fitness testing program included well-known and reliable tests (Miller, 2012). To evaluate explosive strength, the Vertical Jump Test (cm) was used; a detailed description of the test procedure is widely presented in the literature (Miller, 2012). To assess the ability to rebuild motor actions and speed, the Edgren Side Step Test (m)

was used (McCormick, 2014; Miller, 2012). To determine the level of development of the ability to regulate steps during acceleration and deceleration, the rate of change of direction and control of the body when moving forward, backward and in the transverse direction, we used the Agility T-Test (s) (Alemdaroğlu, 2012; Jakovljević et al., 2011; Miller, 2012; Šišić, 2014). The selected tests are real indicators of dexterity and objectively evaluate movement in different planes, providing a comprehensive assessment of mobility (Asadi, 2016; McCormick, 2014).

To assess the level of special preparedness, we used the tests proposed and described in detail in the basketball curriculum for sports schools (Mitova, 2019; Republican Scientific and Methodological Cabinet of the Ministry of Ukraine of Family, Sports and Youth [RSMCMUFSY], 2019).

Free Throws (percent of hits). The player performed 7 episodes of 3 throws (21 free-throw shoots). After the 1st and 2nd throw, a partner gave them the ball. After the 3rd throw, the player herself took possession of the ball and dribbled back to its original position. Take into account the percent of hits of the ball in the basket.

"Throws of the ball into the basket from different positions" the ball throwing test (40 throws) (Figure 1). The player performed 4 series of 10 throws from positions different in distance and location, which were marked on the court as follows: 1–2 positions – to the left of the shield, parallel to the front line passing through the projection of the ring; 3–4 positions – to the left of the shield at 45° from the center of the ring; 5–6 positions – on a line passing through the projection of the center of the ring at an angle of 90° (opposite the shield); 7–8 positions – symmetrically to positions 3–4 to the right of the shield; 9–10 positions – symmetrically to positions 1–2 to the right of the shield.



1, 2, 3, 4, 5, 6, 7, 8, 9, 10 – throwing positions.

Figure 1. Test "Throws of the ball into the basket from different positions"

For positions 1, 3, 5, 7, 9 the distance from the projection of the ring is 4 m, for positions 2, 4, 6, 8, 10 the distance from the projection of the ring is 5.5 m. The player performed throws from positions in a strict sequence:

1st series of throws (from a position –1, 2, 3, 4, 5, 6, 7, 8, 9, 10); 2nd series of throws (from the position –1, 2, 3, 4, 5, 6, 7, 8, 9, 10), etc. After each throw, the player independently picked up the ball and dribbled out to the position for the next throw. The attempt was counted on condition that 40 throws were completed in 5.5 minutes. Only one attempt was granted (RSMCMUFSY, 2019).

To determine the speed of the hands, the "Ten eights" test (s) was used. The athlete took the starting position (with a slight slope forward, a basketball in one hand between the legs at the knees). On a signal, she completed the "eight" as quickly as possible, while the ball was passed from hand to hand – thus 10 "eights", when passing the ball was controlled with one hand. Only one attempt was granted.

Testing was carried out in a standard-sized basketball gym by two experienced professionals to ensure reliable measurements. A familiarization session was conducted before each test.

Statistical analysis

All statistical analyzes were carried out with SPSS version 22.00 software (IBM, Armonk, NY, USA). All data were presented as mean ± standard deviation of the Mean (SD). Statistical significance was set at $p < 0.05$. All variables had a normal distribution and satisfied the equality of variances according to the tests of Shapiro-Wilk and Leuven, respectively. The unpaired student test was used to determine if there are significant differences between U12 and U14. Pearson's correlation coefficients (r) were calculated to determine the relationships between anthropometric parameters, indicators of physical and special fitness. The value of r was classified as moderate ($0.3 < r \leq 0.5$), strong ($0.5 < r \leq 0.7$), very strong ($0.7 < r \leq 0.9$), almost ideal ($r > 0.9$) (Cohen, 1988).

Results

Table 1 presents the results of measurements of anthropometric indicators of both groups. The average BMI of the players was within the age limits and amounted to 16.896 ±1.72 kg/m^2 in U12, 22.07 ±11.94 kg/m^2 in the group of players U14. The results of independent t-tests show that the groups U12 and U14 differed in all studied parameters.

Table 1. Anthropometric parameters of the U12 and U14 basketballers

Parameters	U12 (n = 24)				U 14 (n = 26)				t-test for Equality of Means		
	$\bar{x}$	SD	min	max	$\bar{x}$	SD	min	max	mean difference	t	p
Age (years)	10.97	0.48	10.30	11.93	12.96	0.49	12.05	13.80	1.99	–12.18	0.000
Body height (cm)	156.18	4.61	145.60	162.22	167.85	4.81	159.60	175.30	11.66	–8.74	0.000
Body mass (kg)	41.27	3.64	34.80	49.00	54.16	5.71	44.75	62.84	12.88	–9.43	0.000
BMI (kg/m^2)	16.94	1.65	14.60	21.16	19.21	1.73	16.48	22.99	2.26	–4.72	0.000

Table 2 presents the results of testing the indicators of physical and special fitness of players in both groups. The results of independent t-tests show that the groups U12 and U14 differed in all the studied parameters except the "Free Throws" test (FT), with older athletes showing better results than younger ones (Table 2).

Table 2. Results of testing physical and special fitness of U12 and U14 basketball players

Tests	U12 (n = 24)				U 14 (n = 26)				t-test for Equality of Means		
	$\bar{x}$	SD	min	max	$\bar{x}$	SD	min	max	mean difference	t	p
Vertical Jump (cm)	29.46	7.30	8.00	41.00	39.69	6.55	28.00	57.00	10.23	–5.22	0.000
Edgren Side Step Test (м)	24.00	1.98	20.00	28.00	25.27	2.05	21.00	28.00	1.27	–2.23	0.031
Agility T-Test (s)	13.82	0.858	12.62	15.44	12.547	1.02	11.10	14.47	1.28	4.75	0.000
Throws the ball into the basket from different positions (number of hits)	11.25	3.25	7.00	18.00	14.19	3.97	8.00	23.00	2.94	–2.85	0.006
Free Throws (% of hits)	11.17	3.63	6.00	19.00	12.19	3.86	4.00	19.00	1.03	–0.97	0.034
"Ten eights" (s)	16.01	3.33	11.75	23.78	13.21	2.36	9.97	19.65	2.80	3.45	0.001

The results of the Pearson correlation analysis for group U12 showed a strong (r = 0.617, p = 0.001) correlation between BM athletes and the height of the jump, a strong correlation (r = 0.594, p = 0.002) between BM athletes and the test results Throws of the ball into the basket from different positions (TBBDP). A moderate positive relationship was found between the results of the Vertical Jump Test and the Edgren Side Step Test (ESST) (r = 0.406, p = 0.049), between the ESST and the Agility T test (r = –0.463, p = 0.023) (Table 3).

Table 3. Correlation matrix (coefficients "r"), characterizing the relationship between anthropometric indicators, indicators of physical and special fitness of basketball players of the U12 group (n = 24)

	BH	BM	VJ	ESST	AT-Test	TBBDP	FT	TE
BH	1							
BM	0.214	1						
VJ	0.255	**0.617****	1					
ESST	0.261	0.389	**0.406***	1				
AT-Test	0.063	–0.140	–0.341	**–0.463***	1			
TBBDP	–0.045	**0.594****	0.247	0.298	–0.324	1		
FT	0.260	0.186	–0.022	–0.012	0.050	0.350	1	
TE	0.063	–0.219	–0.262	–0.287	0.326	–0.245	–0.241	1

Note. BH = body height; BM = body weight; VJ = Vertical Jump; Edgren Side Step Test = ESST; Agility T-Test = AT-Test; Throws of the ball into the basket from different positions = TBBDP; Free Throws = FT; Ten Eights = TE.

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

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

The results of the Pearson correlation analysis for group U14 showed a strong correlation of BH and BM athletes (r = 0.568, p = 0.002). Strong correlations were found between the performance in the Vertical Jump Test (VJ) and Agility T test (r = 0.545, p = 0.004) and the VJ and the results in the FT (r = 0.561, p = 0.003). The ESST and Agility T test showed a strong relationship (r = –0.762, p = 0.000). There is also a strong correlation between the results in the tests "Throws of the ball into the basket from different positions" (TBBDP) and FT (r = 0.632, p = 0.001) and in the tests TBBDP and the indicators "Ten Eights" (r = –0.542, p = 0.004). A moderate negative relationship (r = –0.479, p = 0.013) was revealed between the indicators in the FT and Ten Eights tests (Table 4).

Table 4. Correlation matrix (coefficients "r"), characterizing the relationship between anthropometric indicators, indicators of physical and special fitness of basketball players of group U14 (n = 26)

	BH	BM	VJ	ESST	AT-Test	TBBDP	FT	TE
BH	1							
BM	**0.568****	1						
VJ	0.190	0.087	1					
ESST	–0.142	–0.190	0.361	1				
AT-Test	0.175	0.154	**–0.545****	**–0.762****	1			
TBBDP	0.305	0.103	0.324	0.219	–0.275	1		
FT	0.372	0.083	**0.561****	0.125	–0.267	**0.632****	1	
TE	–0.207	–0.071	–0.357	–0.305	0.371	**–0.542****	**–0.479***	1

Note. BH = body height; BW = body weight; VJ = Vertical Jump; Edgren Side Step Test = ESST; Agility T-Test = AT-Test; Throws of the ball into the basket from different positions = TBBDP; Free Throws = FT; Ten Eights = TE.

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

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

Discussion

Studying and describing anthropometric indicators, indicators of physical and special fitness, identifying the nature and degree of relationship between them among young basketball players at the basic stage of training constitute an important area of sports science (Jakovljević et al., 2011; Matulaitis et al., 2019). The main result of our study was the identification of the nature and degree of correlation between the indicators of body height and body weight with some indicators of physical and special fitness, which means that our data can be used both to assess and predict the potential of athletes, and to improve the training of beginner basketball players according to the principle of compliance focus of pedagogical influences on age-specific characteristics of athletes, with an emphasis on the leading parameters of technology and with special physical qualities in the most favorable age periods.

The body height of athletes is an important factor in game performance in basketball, respectively, tall athletes with a high level of motor abilities can become better players (Erčulj et al., 2010; Šišić, Sekulić, 2014). Basketball players of the U14 group are significantly higher than U12 athletes by an average of 6.95%. The body weight of athletes of the U12 group is 23.8% less than the basketball players of the U14 group. BMI in the U14 group is 11.81% higher than in the U12 group. Our data are consistent with the results of other researchers (El-Shafee, Kapouh, 2016; Leonardi et al., 2018, Ramos et al. 2020).

The results of a comparative analysis of the indicators of physical and special fitness of athletes of two different age groups confirms the data that an active increase in motor qualities occurs in the age of 10–12 to 12–14 years. Thus, the performance in the "Vertical Jump" test for girls of the U14 group is higher by 34.73%, "Edgren Side Step Test" – by 13.54%, "Agility T test" – by 9.26%, respectively, among older athletes explosive power and the ability to rebuild motor actions are better developed. A similar difference is also recorded in the results of tests of special readiness. The accuracy during the test TBBDP for senior athletes is higher by 26.13%, the speed of hand movements in the test "Ten Eights" is higher by 17.49%. The efficiency of free throws in girls of the U14 group was higher by 9.13%, however, there was no significant difference in this test between the two age groups ($p > 0.05$).

In general, older basketball players in this sample were taller, heavier and showed better physical and special fitness. This trend is consistent with observations of the development of these indicators in young basketball

players (Jakovljević et al., 2011; Nikolaidis et al., 2015; Sabin, Marcel, 2016). It was previously reported that the age and length of training, differences in the volume and orientation of training loads have a significant impact on the level of training of young athletes (Guimarães et al., 2019; Matulaitis et al., 2019). Comparison of the obtained data on testing physical development and physical fitness with the proper standards for selection in educational groups, in accordance with the curriculum for sports schools, confirms their compliance with the training standard (RSMCMUFSY, 2019).

The results of the correlation analysis showed a smaller number of reliable relationships in the preparedness structure of basketball players of the U12 group compared to U14, since seven reliable relationships were revealed between the studied indicators in the U14 group, while four reliable relationships were found in the U12 group. Comparison of the results obtained by us with the results of other studies of young athletes-basketball players is limited by the small number of studies with the identical design and contingent of participants. Therefore, the results of this study were also compared with the results of studies of young basketball players and data for adult female basketball players (Clemente et al., 2019; Shahdadi, Alisoufi, 2017; Šišić, Sekulić, 2014). However, this fact does not exclude the use of the tests we have chosen, since these tests are successfully practiced in basketball.

The strength of the lower extremities, measured by a vertical jump, is an important factor in determining competitive success in basketball (Clemente et al., 2019; McCormick, 2014). The revealed strong positive correlation between body weight and the height of the vertical jump of the youngest female athletes, apparently means that at the age of 10–12 years, for beginner athletes, a large body mass causes a tendency to increase the height of the jump. This can probably be explained by the presence of mass in those muscles that are the main generators of effort in a vertical jump (extensors of the body and pelvis, knee and ankle joint). Our data are consistent with data from Nikolaidis et al. (2015), which note the importance of body weight for interpreting the variability of physical abilities in the puberty period. Thus, body weight moderately correlates with the height of the vertical jump of basketball players aged 11–13 years (Nikolaidis et al., 2015). The presence of a statistically significant correlation between body weight and the results in the test TBBDP by basketball players of the U12 group, which we identified is consistent with the previously obtained data (Bilali et al., 2017; Clemente et al., 2019). No statistically significant correlation between body height, physical and special fitness indicators of basketball players of both groups was revealed, which is indirectly confirmed by other studies, which reported that the body height of 14–18-year-old male players does not affect the results in dexterity tests (Jakovljević et al., 2011; Šišić, Sekulić, 2014).

In this study, Pearson's correlation analysis showed a significant association for athletes of the U12 group between VJ and ESST, and for athletes of U14 between the VJ and Agility T test, VJ and FT. This significant relationship between special preparedness indicators is supported by other studies (Clemente et al., 2019; Garcia-Gil et al., 2018; McCormick, 2014; Shahdadi, Alisoufi, 2017) and allows them to be interpreted as evidence of the interdependence of the parameters of the motor function. Indirectly, this may indicate sufficient elasticity of muscle fibers, which in turn is an important component of the ability of muscles to develop working effort, for example, in jumping, for accelerations, sudden movements in order to change direction. Note that the relationship between VJ and the result of FT in the group of athletes U14 confirms the opinion that the jerky movement (jump), that is, the work of the legs, in a functional sense determines the kinematic background of the actions of the hands of basketball players with a free throw (Clemente et al., 2019; McCormick, 2014). Together they constitute a component of the system, where each represents a unity of variability and stability of the individual elements of its components. The best results of a vertical jump affect the improvement of dexterity, speed, and coordination of movements

and, consequently, the improvement of intermuscular coordination associated with the improvement of the activity of agonist muscles, synergist muscles and antagonist muscles (Asadi, 2016; Spiteri et al., 2016). Their coordinated work leads to high speed, accuracy of movement and cost-effectiveness. This information complements the data of other researchers and means that the explosive power of the lower extremities is associated with a wide range of indicators of physical and special fitness among young basketball players (McCormick, 2014; Nikolaidis et al., 2015).

In support of our results, previous studies have shown that speed and dexterity depend on muscle strength (Karalejic et al., 2011; Sabin, Marcel, 2016) and that the effects of training muscle strength can be transferred to actions that include rapid changes in direction (McCormick, 2014). In addition, data on the relationship between dexterity and lower limb power in athletes of the U12 group will help optimize training programs. We believe that the determination of the relationship between the components of technical readiness, including jump and throwing movement, is a promising direction in the study of sports equipment.

In the literature available to us, various variants of instructions, implementation and interpretation of the ESST results have been discovered, which are informative and reliable for assessing the ability to change direction. The relationship between the ESST and Agility T-Test indicators in girls of both groups revealed in our study may indicate that, at the age of 12–14 years, the effectiveness of the motor functional system is largely determined by the age maturity of the motor and vestibular analyzers, which leads to an improvement in coordination abilities. Thanks to this, athletes make maximum use of the speed-power potential, can quickly move in different directions, change movements at high speed. Our data are indirectly confirmed by the data of other researchers who reported a strong relationship between the results of the Agility T-test and ESST in adult athletes (Alemdaroğlu, 2012; McCormick, 2014; Spiteri et al., 2015).

Note that in the U14 group, in contrast to U12, significant correlations between the indicators of tests of special preparedness were revealed, which allows them to be interpreted as a positive effect of the effects of the training process. Perhaps this significant influence is explained by the fact that the level of dexterity largely determines the success of a basketball player working with the ball and, in particular, affects the efficiency of throwing the ball into the basket (Asadi, 2016; Assefa, Kumar, 2018).

The main component of technical and tactical preparedness is the effectiveness of the shots. In the testing process, the U14 group of basketball players more efficiently threw the ball into the basket from different points, and the percentage of hits is moderately correlated with the results in the “ten eights” test, respectively, more maneuverable basketball players are better at owning the ball.

A limitation of this study is that the relatively small number of participants in the experiment, in particular the formation of two different age groups from among them, does not allow making unambiguous statistical conclusions. The next limitation to be recognized is that the body composition of the beginning athletes was not assessed and playing positions were not taken into account. Although the testing procedures are suitable for evaluating basketball-specific actions, the level of training and experience of athletes may affect the selected indicators. Future research is supposed to be directed to the study of the relationship between a large number of variables, such as muscle strength and power, flexibility, balance, speed, body composition, and the athlete’s playing role.

Conclusions

In the light of this study, data on jumping ability, dexterity, and speed of movement are considered as the most important characteristics of the preparedness of young basketball players. A significant difference was revealed by age groups in relation to body size. Older basketball players (U14) showed better performance than younger athletes (U12) in all tests except the free-throw test. The results of this study indicate a significant correlation between jumping and agility in both groups of athletes. A significant correlation was found between the characteristics of the special preparedness of the athletes of the older group. Thus, comprehensive monitoring of the state of young athletes, the study of the relationship of changes associated with growing up with the experience of training in basketball are important for assessing the individual dynamics of the growth rate of the most significant indicators for a sport, determining the prospects of athletes and optimizing the training process of basketball players.

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