

The main aspects of the implementation of technical and physical training of basketball players

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Abstract

Purpose. To define the main aspects of the implementation of physical and technical training of young basketball players. *Material.* Basketball players of all ages and qualifications: young basketball players aged 11 to 17 years old and skilled basketball players, masters of sports and honored masters of sports aged 18 to 20 years old took part in the study. In total, 841 sportsmen participated in the study. *Results.* The study of the technical and physical fitness of young basketball players at the age of 11-19 showed that the basketball players are in general at a lower level, than recommended by the programs. The indicators of 18-19 years old players can be rated as optimal. *Conclusions.* The insufficient development of physical qualities in adolescence, on which the formation of sportsmanship of basketball players will depend in the future, increases the duration of the formation of special skills during the acquisition of the technique of the sports kind and reduces the effectiveness of their use under the conditions of competitive games. The introduction of normative indicators of physical and technical fitness and rational distribution of time for all types of training by years of training and improvement of the competition system will make it possible to significantly increase the level of work with young basketball players in their long-term training.

Key Words: young basketball, physical fitness, qualities, technical and physical training

Introduction

At the present stage, the system of sports training of basketball players should reflect in full and take into consideration the actions that a sportsman performs in the course of the competition (GheÑu, 2010). Modern basketball requires from sportsmen high functional training and perfect mastering of all techniques of the game (Villani, at all, 2017). It has been proved (Koryahin, at all, 2016; Satern, 1998) that physical training and its organic interconnection with technical training is of great importance for the growth of basketball players' skills. Technical training determines the effectiveness of the training process. The scientific substantiation of this interconnection enables to effectively prepare basketball players of high class in the course of many years of training.

Based on the analysis of studying this issue (Anastasiadis, 2006; Cañadas, at all, 2015; Tsamourtzis, at all, 2002; Tsimachidis, at all, 2013), it has been established that the rapid development of achievements in world sports requires continuous search for new and more effective means of technical and physical training of basketball players. The assessment and analysis of the system of training and the results of the performances of the world's strongest sportsmen (Keller, & Platonov, 1993; Korjahin, 1998; Raiola, at all, 2016) show that success can only be achieved as a result of many years of training. It has been found out that it is precisely in adolescence that the formation of the foundation for further development and improvement of physical qualities takes place, on which the formation of basketball players' skills will depend in the future. That is why it is necessary to help remove disadvantages in the level of physical development and physical fitness of young sportsmen already at the early stages of many-years training.

The topicality of the study is stipulated by the need for an analysis of the existing system of physical and technical training of young basketball players, which makes it possible to purposefully select means and methods of training to improve the structure of complex training on a scientific basis.

Material & methods

Participants. Basketball players of all ages and qualifications were involved in the study, and namely: young basketball players aged 11 to 17 years old in the following quantity: 11 years old – 105, 12 years old – 101, 13 years old – 115, 14 years old – 101, 15 years old – 102, 16 years old – 101, 17 years old – 109 and skilled basketball players aged 18-19 years – 17 persons, 20 years old and older – 74 basketball players who were of masters of sports and honoured masters of sports.

The research related to human use has been complied with all the relevant national regulations and institutional policies, has followed the tenets of the World Medical Association (WMA) Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects, and has been approved by the 18th WMA General Assembly.

Procedures. In order to conduct the study, tests were used to assess the technical and physical fitness of the basketball players (Anastasiadis, 2006; Korjahin, 1998).

In order to assess the technical fitness, the following was used: movement in a defensive stance, push-passing the ball in a give-and-go play with two hands and an over-arm pass with one hand within 30 seconds at a distance of 2 m from the wall, foul shots, jump shots, a complex exercise in running, passing, catching, driving and throwing the ball into the basket, running for 20 m, standing long jump, height of jumping up with pushing of two legs, 3x40 sec running on the basketball court after 1 minute of rest. All tests meet the basic criteria of the theory of tests.

The assessment of the physical development of the basketball players was carried out using the anthropometry method for measuring the size and mass. The hand strength was determined by the method of dynamometry. Spirometry was used to determine external respiration.

Statistical analysis. All statistical analyses were performed using SPSS Version 21. For each characteristic there were determined average values, standard deviations, and Student criterion for unrelated samples.

Results

The results of the studies of the technical and physical fitness of the basketball players of all ages and qualifications are shown in Table 1.

Table 1

Results of studies of technique training and physical condition of basketball players of all ages

No	Age, years Indicators	11- (n=105)	12 (n=101)	13 (n=115)	14 (n=101)	15 (n=102)
1.	Height, cm	158+2.09 5.50	161+2.23 6.15	172.7+2.93 6.21	177.4+2.15 6.11	181.9+2.11 5.98
2.	Height with a stretched hand up standing on tiptoe, cm	189.1+2.15 5.48	202+2.45 5.95	214.7+2.51 6.20	225.6+2.4 6.05	230.1 ±9.02 • 5.97
3.	6 m running, sec	1.71+0.04 0.072	1.67+0.039 0.069	1.61+0.04 0.081	1.53+0.037 0.071	1.48+0.04 0.08
4.	20 m running, sec	4.05+0.064 0.107	3.99+0.07 0.11	3.85+0.08 0.111	3.42+0.061 0.109	3.44+0.09 0.12
5.	Height of jumping up (absolute), cm	221+3.01 9.15	242.6+3.05 8.97	258+3.01 9.15	273.3+3.15 9.01	277+3.05 8.75
6.	Height of jumping up (relative), sec	32.17+2.17 5.36	36.8+2.15 5.33	42.0±2.54 5.64	43.1+2.16 5.31	46.9+2.34 5.45
7.	Standing long jump, m	175+2.95 8.75	182.9+3.05 9.01	198.1+3.15 9.4	227.7+3.11 9.05	232+3.24 9.45
8.	Running on the court, 3x40 sec	458.8+8.35 17.21	467.1+8.5 17.1	489.8+8.1 17.15	501+9.05 19.11	515+7.01 16.15
9.	Moving in a defensive stance, 100 m, sec	41.9+1.85 1.97	38.1+1.65 1.95	36.6±1.61 2.85	34.24+1.58 1.97	35.93+1.61 2.01
10.	A complex exercise 2x26 m, sec	26.02+0.597 0.731	22.03+0.61 0.820	19.82+0.59 0.791	18.01+0.615 0.831	17.2+0.601 0.822
11.	Penalty throws from 30 m (number of hits)	7.42+1.1 3.01	10.1 + 1.05 2.97	14.55+1.03 2.94	15.4+1.01 2.85	16.1+0.951 2.11
12.	Throws from 40 meters (number of hits)	5.5+1.45 3.82	8.6+1.4 3.51	14.0+1.35 3.45	15.1+1.30 3.52	16.2+1.31 3.51
13.	Passing a ball in a give-and-go play, number of times:					
	-“strong” hand	18.5+1.06 3.15	19.4+1.05 3.01	22.9+1.01 2.91	25.8+0.98 2.6	27.9+0.97 2.51
	-“weak” hand	11.2+1.11 3.19	14.3+1.01 2.97	17.1+0.99 2.95	20.1+0.991 2.71	22.1+0.92 2.49
	- push-passing with both hands	16.2+1.1 3.1	18.08+1.05 3.07	21.1+0.85 2.41	24.1+0.91 2.69	26.4+0.915 2.61

The study of the growth indicators of young basketball players in Ukraine showed that the height at the age of 12 and 13 years may be classified as a good level, and the height at the age of 15-17 years old is "below average" and is: at the age of 15 years old – 181.9 cm, at the age of 16 years old – 187.6cm and at the age of 17 years old – 190.6cm. The growth rates of young players at the age 18-19 years old (196.4 and 199 cm respectively) may be classified as optimal rate.

It has been found out that the growth indicator of young basketball players standing on tiptoe with a stretched up hand increases with age from 189.1 cm to 267.1 cm at the age of 19 years old and up to 269.2 cm in basketball players who are honoured masters of sports and masters of sports of international class. The dynamics of this indicator and growth rate. The obtained results make it possible to state that, until the age of 17-18 years old, basketball players generally reach the limit values of these indicators. It has been found out that the dynamics of these indicators has linear dependence up to the age of 17-18 years old.

Results in the tests that characterize the speed-strength fitness of sportsmen show that in general, young basketball players in Ukraine have low indicators in the height of jumping up.

The young basketball players' low indicators in the relative height of jumping up, as well as other speed-strength indicators have been received. The following results have been obtained by testing the relative height of the in basketball players' jump: 11 years old players – 32.17 cm, 12 years old players – 36.8 cm, 13 years old players – 42.00 cm, 14 years old players – 43.10 cm, 15 years old players – 46.90 cm, 16 years old players – 48.40 cm, 17 years old players – 49.90 cm, 18 years old players – 54.00 cm, 19 years old players – 55.00 cm. A similar picture is observed in the indicators of 6 and 20 m running and a standing upward jump off both feet.

The results of the study revealed that the level of development of high-speed endurance is gradually increasing from year to year up to 17 years. 18 and 19 years old basketball players of high qualification (masters of sports) have much higher high-speed endurance. This is evidenced by the results shown in Picture 5.

Table 1 continued

No	Age, years Indicators	16 (n=101)	17 (n=109)	18 (national team =16)	19 (master of sports (n=17)	20 and older (Master of Sport of International Class and Honored Master of Sports, n=74)
1.	Height, cm	187.6+2.13 6.03	190.6+2.15 6.08	196.4+2.2 6.44	199+2.01 6.44	202.1+2.11 6.05
2.	Height with a stretched hand up standing on tiptoe, cm	246+2.51 6.13	253.4+2.78 6.54	265.2+2.5 6.6	267.1+1.44 6.31	269.2+3.1 6.09
3.	6 m running, sec	1.43+0.034 0.068	1.36+0.031 0.065	1.01+0.05 0.071	1.02+0.04 0.07	1.26+0.035 0.069
4.	20 m running, sec	3.37+0.08 0.111	3.29+0.07 0.11	2.99+0.09 0.12	2.97+0.09 0.11	3.15+0.052 0.106
5.	Height of jumping up (absolute), cm	295+3.01 8.61	302+3.15 8.95	318+3.14 6.96	319+3.47 9.01	322.2+3.46 7.04
6.	Height of jumping up (relative), sec	48.4+2.11 5.01	49.9+2.31 5.21	54.0+2.15 5.35	55+2.4 5.4	53.2+2.32 5.39
7.	Standing long jump, m	243.2+3.12 9.01	245+3.14 9.07	254+3.05 10.0	256+2.95 9.0	-
8.	Running on the court, 3x40 sec	525+7.95 18.1	531.1+8.15 19.5	596+7.15 15	609+7.35 16.0	575.6+9.16 17.86
9.	Moving in a defensive stance, 100 m, sec	33.1 + 1.65 1.95	32.9+1.7 1.91	30.8+1.8 1.95	30.5+1.6 1.9	30.86+1.52 1.82
10.	A complex exercise 2x26 m, sec	16.1+0.596 0.801	15.14+0.58 0.812	14.42+0.571 0.751	14.4+0.56 0.721	14.35+0.596 0.728
11.	Penalty throws from 30 m (number of hits)	17.4+0.98 2.15	20.1+0.85 2.01	24.9+0.94 1.99	25.5+0.95 2.01	25.2+0.998 2.08
12.	Throws from 40 meters (number of hits)	17.2+1.28 3.37	18.1 + 1.21 3.35	23.2+1.19 3.31	24.0+1.13 3.21	27.65+1.47 3.44
13.	Passing the ball in a give-and-go play, number of times:					
	- by a "strong" hand	29.1+0.87 2.32	32.2+0.92 2.41	37.8+0.81 2.17	38.1+0.75 2.15	38.76+0.96 2.47
	- by a "weak" hand	25.5+0.91 2.75	29.1+0.815 2.33	34.2+0.711 2.11	35+0.611 1.95	35.3+0.526 2.3
	- by push-passing with both hands	27.2+0.85 2.61	31.01+0.71 2.15	36.9+0.69 2.01	37.2+0.69 1.99	37.7+0.699 1.95

Note: x - the numbers given in the table and below mean: average error of the average value and standard deviations from the average value.

The studies of the level of technical fitness of young basketball players have shown that their individual indicators have a low rate of growth from year to year. So, the percentage of growth in 17 years old players in the movement in a defensive stance to 11 years players was 21.50. The results of the study have

shown that young basketball players, especially 14–15 years old players, have a small range of techniques. Young basketball players have a low level of skills of over-arm passing a ball with one hand, especially with the left one.

Concerning other indicators of technical fitness, the rate of growth is higher from year to year, but in general, young basketball players have low rates in tests that characterize the development level of techniques. It has been found that the percentage of foul throws performed by the young basketball players was: 11 years old players – 24,70; 12 years old players – 31,90; 13 years old players – 35,10; 14 years old players – 50,30; 15 years old players – 53,60; 16 years old players – 58,00 and 17 years old players – 67,00%.

Discussion

The analysis of the obtained results allows us to conclude that the selection work should be raised to a higher level. This conclusion confirms the available data in the literature (Khlifa, at all, 2013; Galan, at all, 2016).

The study of the growth rates of young basketball players has shown that they are generally at a level that is lower than recommended by the programs (Anastasiadis, 2006; Keller, & Platonov, 1993). The results of the growth indicators in different age categories are explained by the fact that basketball players of high qualification participated in the surveys in groups of 18–19 years old players, while in other age categories indicators of young basketball players of mass grades were used.

A very important indicator is the height of standing on tiptoe with a hand stretched up (Iedynak, at all, 2017; Satern, 1998). Their importance lies in the fact that they allow taking into account such a factor as the length of the hands and feet.

It has been established that, in comparison with other sports (especially volleyball players) (Boichuk, at all, 2017; Cañadas, at all, 2015; Raiola, 2014) basketball players of high qualification have low indicators of the relative height of the jump. Naturally, this also affects the absolute height of the jump, which in basketball players gets stabilized till the age of 18 years old (Anastasiadis, 2006).

On the basis of the obtained results, special attention should be paid to the level of development of high-speed endurance. Consequently, at the age of 11–17 years old, it is necessary to look for opportunities for increasing the efficiency of the training process concerning the development of high-speed endurance. This is consistent with the available literature data (Cañadas, at all, 2015; Keller, & Platonov, 1993; Mikes, 1986).

In general, the study of technical and physical fitness of young basketball players of Ukraine at the age of 11–19 years old has shown that they are generally at a lower level, than recommended by the existing programs (Korjahin, 1998). The best indicators can be belong, first of all, to the indicators of 18–19 years old players.

According to the range of techniques used, it has been found that at the age of 17–19, the basketball players should master the maximum number of techniques of the game. In this regard, it is necessary, in our view, to review the approaches to assessing the effectiveness of the work of trainers. One of the main criteria for assessing the effectiveness of their work should be the degree of compliance of young basketball players with model characteristics (Tsamourtzis, at all, 2002; Villani, at all, 2017), among which the leading place belongs to a wide range of technical fitness. The tests used to assess the level of technical as well as physical fitness should cover a wider range.

Conclusions

The insufficient development of all physical qualities increases the duration of the formation of special skills during mastering the techniques of the kind of sports and reduces the effectiveness of their use in competitive games.

Rather low indicators that characterize the growth of sportsmen indicate a low level of selection work. The level of development of high-speed endurance in young basketball players at the age of 11–17 years old indicates that it should, taking into account the tasks of technical training, look for opportunities to increase the effectiveness of the training process in terms of development of high-speed endurance.

The low level of technical fitness and weak growth rates from year to year reduce the ability of young basketball players to master hidden passes and a number of other techniques.

The lack of due attention to the age-old peculiarities of young basketball players and to the distribution of the amount of time for training, and especially technical training, is aggravated by the fact that teams of 12–14-year-old basketball players are formed in the Youth Sports School, due to which early specialization begins, which is focused on the formation of players for a certain role and training them to participate in the competition. There is no consistency or full scope in the development of the techniques, skills or formation of originality in it. 5. Along with the introduction of normative indicators in full concerning physical and technical fitness, rational distribution of time for all types of training by years of training and improvement of the competition system will allow to significantly increase the level of work with young basketball players in terms of their long-term training.

Conflict of interest

The authors state no conflict of interest.

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