



Formation of physical qualities in young basketball players

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PhD, Associate Professor **A.B. Sablin**^{1, 2}

PhD, Associate Professor **I.I. Kornishin**¹

E.A. Ulyanova²

PhD, Associate Professor **S.Yu. Khvostenko**³

¹Moscow Technical University of Communications and Informatics, Moscow

²Moscow City University, Moscow

³Vyatka State University, Kirov

Corresponding author: a.b.sablin@mtuci.ru

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Abstract

Objective of the study is to increase the physical fitness of basketball players aged 13-14 years at the initial stage of the general education training cycle.

Methods and structure of the study. The research involved 40 basketball players from the Dynamo Sports School in Moscow, who trained four times a week for 90 minutes. The pedagogical experiment, designed for the period from September 3 to December 3, 2024, included an assessment of physical qualities according to the following criteria: 30-meter run, 3x10-meter shuttle run, long jump, pull-ups, 6-minute distance run and forward tilt.

Results and conclusions. In the control group, after completion of the experiment, an increase in all tests was observed by 4-7%, but only in the 6-minute running test the increase reached a statistically significant level (1126 ± 16 to 1182 ± 14 , $p < 0.05$). The experimental group showed more significant progress, with an average increase in the range of 8-16% over the entire study period. Although the indicators in the forward bending and crossbar pull-up test increased (from 6.1 ± 0.8 to 6.8 ± 0.6 and from 9.1 ± 1.8 to 9.8 ± 1.5 , respectively), no statistically significant differences could be identified ($p > 0.05$). If you perform a set of physical exercises aimed at developing physical qualities during basketball training sessions at the general preparatory stage of training with athletes aged 13-14, their performance will significantly improve. The solution of the hypothesis is confirmed by the results of scientific research.

Keywords: *Keywords: physical fitness, basketball players, age 13-14 years, preparatory cycle, pedagogical experiment, assessment of physical qualities, growth of indicators, statistically significant level.*

Introduction. A current topic of our time is the low level of health of schoolchildren, this is due to many factors, but above all to the lack of physical activity, which causes spinal diseases and others [8, 9]. One of the effective means of physical inactivity is physical education or sports games, in particular basketball, which is one of the popular and exciting sports. Basketball helps to improve the physical fitness of children, develop strength, speed, endurance, flexibility and coordination skills [5, 7].

The level of development of physical qualities of basketball players is one of the most important factors on which the effectiveness of team and individual technical and tactical actions depends. No matter how technically and tactically competent a basketball player is, he will never achieve success without a good lev-

el of comprehensive physical fitness. A team in which the physical development of even one player does not meet modern basketball standards will not achieve success either [2, 6].

A favorable period for the development of most physical qualities is the age of 13-14 years [4, 10]. In this case, the main attention in developing strength should be focused on strengthening the muscle groups of the entire muscular system. It should be noted that children's strength should be developed by carefully using short-term dynamic strength stress. To develop speed, strive to maximize the pace of movement. To develop general endurance, use aerobic running for up to 30 minutes. Developing coordination of movement and flexibility at the stages of preliminary training creates the basis for successfully mastering



the technique of the sport [4, 10].

The annual training cycle assumes the presence of general and special preparatory stages of training. As a rule, at the general preparatory stage of training, exercises from general physical training prevail, however, in the standard basketball program at this stage, special basketball exercises are also present to an insignificant extent [2, 5-7].

Thus, in modern basketball, the requirements for the level of development of the physical qualities of athletes are constantly growing, so it is necessary to lay and develop these qualities from childhood and continue in adolescence.

Objective of the study is to increase the physical fitness of basketball players aged 13-14 years at the initial stage of the general education training cycle.

Methods and structure of the study. The pedagogical experiment involved 40 children aged 13-14 who attended the Dynamo basketball section. The pedagogical experiment was held from September 3 to December 3, 2024. After the primary data on the tests determining the level of development of the physical qualities of athletes were obtained, the athletes were differentiated into two groups of 20 people in such a way that the difference between the groups in all indicators of the studied physical qualities was not reliable. Both groups trained four times a week for 90 minutes. Children from the control group – CG trained according to the usual program for basketball players of sports schools, which provides for both the development of physical qualities and the performance of specific work in basketball [3]. Children in the experimental group EG performed different sets of physical exercises aimed at developing physical qualities. The sequence of performing sets of exercises during training was regulated by the recommendations of leading experts in the field of physical training of athletes [1]. At the beginning of the lesson, a warm-up of 10 minutes. Then, within 75 minutes, it was necessary to perform a set of exercises in a certain sequence:

1) development of speed of movement (repeated running on short segments of 10-15 m, shuttle run

2x10 m or 3x8 m, running in place for 10-15 sec, jerks from different starting positions);

2) coordination skills (forward and backward somersaults, jumping over a gymnastic goat, running between the posts, jumping over medicine balls, dribbling a ball between the posts);

3) strength qualities (there should be three approaches to each exercise. The exercises must be performed “to failure”, and rest between approaches is 60-100 sec. Bending and unbending the torso from a supine position, pull-ups from a hang on the bar, bending and unbending the arms in a prone position, bending with a partner on the shoulders, lying on the chest raising the arms and legs up, the plank exercise, squats);

4) general endurance (long but slow running without a ball or with a ball, alternating running and walking depending on how the athlete feels, recommended heart rate 130-155 beats/min);

5) flexibility (slowly perform exercises to stretch all muscle groups and increase the mobility potential of joints. Perform exercises from top to bottom from the neck muscles to the ankle joint).

After completing all exercises, sum up the results of the session (5 min).

At the beginning and end of the study, to determine the effectiveness of the technique, all athletes passed control tests: 30 m run, 3x10 m shuttle run, long jump, pull-ups on a horizontal bar, 6-minute test, forward bend [1, 11].

Results and conclusions. After the initial testing of all physical qualities, two training groups were formed in such a way that there were no reliable differences between them in all tests ($p > 0.05$) (Table 1).

Table 1 shows that at the beginning of the pedagogical experiment, all the athletes' indicators for all tests did not have reliable differences. However, after the end of the pedagogical experiment, changes occurred. The average results of children in the CG from the beginning to the end of the study are presented in Table 2.

Table 1. Average results of both groups before the start of the study

Standard	KG (n=20)	EG (n=20)	p
30m sprint (sec)	5,6±0,5	5,8±0,6	>0,05
Shuttle run 3x10 m (s)	9,0±0,8	9,1±0,6	>0,05
Standing long jump (cm)	188±5,2	192±6,3	>0,05
Pull-ups on the bar (number of times)	5,9±1,1	6,1±0,8	>0,05
6 minute run (m)	1126±16	1117±13	>0,05
Forward bend (cm)	8,6±1,6	9,1±1,8	>0,05



Table 2. Comparison of results for the study period in the control group

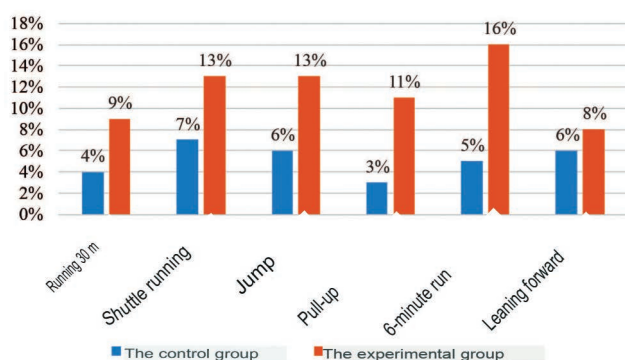
Standard	Before the study	After research	p
30 m sprint (sec)	5,6±0,5	5,4±0,6	>0,05
Shuttle run 3x10 m (s)	9,0±0,8	8,4±0,9	>0,05
Standing long jump (cm)	188±5,2	199±7,3	>0,05
Pull-ups on the bar (number of times)	5,9±1,1	6,1±0,9	>0,05
6 minute run (m)	1126±16	1182±14	<0,05
Forward bend (cm)	8,6±1,6	9,1±1,3	>0,05

Table 3. Comparison of results for the study period in the experimental group

Standard	Before the study	After research	p
30 m sprint (sec)	5,8±0,6	5,3±0,7	<0,05
Shuttle run 3x10 m (s)	9,1±0,6	7,9±0,5	<0,05
Standing long jump (cm)	192±6,3	216±7,1	<0,05
Pull-ups on the bar (number of times)	6,1±0,8	6,8±0,6	>0,05
6 minute run (m)	1117±13	1295±16	<0,05
Forward bend (cm)	9,1±1,8	9,8±1,5	>0,05

Table 2 shows that all average indicators of athletes from the control group improved during the study period, but reliable differences were observed only in the six-minute run test. In all likelihood, the traditional methodology of conducting classes in the basketball section contributes to the growth of endurance to a greater extent than other physical qualities. It is also possible that in this case the duration of the pedagogical experiment was insufficient. At the same time, the average data in the experimental group from the beginning to the end of the study are presented in Table 3.

Table 3 shows that almost all physical fitness indicators in the EG improved significantly from the beginning to the end of the pedagogical experiment. The increase in indicators was statistically insignificant only in the pull-up and forward bend tests. The increase in indicators in percentages for both groups from the beginning to the end of the study is shown in the figure.



Increase in indicators of both groups during the experimental period

The figure clearly shows the advantage of the EG over the CG in terms of the main physical qualities during the training period of three months. Such data allow us to assert that the use of the proposed means and methods for developing physical qualities at this age is effective for developing the physical qualities of 13-14 year old basketball players.

Discussion. Having analyzed the state of the issue according to literary sources, it should be concluded that the content of the educational and training process of basketball players at the general preparatory stage in the preparatory period of the annual training cycle should be aimed less at the technique of performing a competitive exercise and tactics, and more at developing physical qualities [5, 6]. It has been proven that the age of 13-14 years is for the development of most physical qualities [4, 10]. Based on the analysis of the relevant literature, exercise complexes were compiled aimed at developing physical qualities, which were experimentally tested in previously conducted studies [2, 5-7].

The final testing showed that in the control group, the athletes did not achieve reliable changes ($p > 0.05$) in most indicators (except for the 6-minute run test). This may be due to the peculiarity of the standard program, the period of the study. As for the EG, the average indicator for each test significantly improved during the experiment, however, despite the high percentage increase in all indicators, the increase in indicators in the pull-up and forward bend test was still statistically insignificant. Thus, it can be argued that the selected means and methods have proven their



effectiveness in developing the physical fitness of 13-14-year-old basketball players at the general preparatory stage of training.

Conclusion. The effectiveness of using the standard program in the preparatory period of the annual training cycle for 13-14-year-old basketball players is confirmed by the research results obtained in the CG. On the other hand, when athletes from the EG performed a special set of physical exercises aimed at developing physical qualities, their indicators significantly and reliably improved in almost all tests. This speaks to the effectiveness of the developed means and methods for developing physical qualities.

Conflict of interest. *The authors declare that they have no conflict of interest.*

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