

# Influence of the level of speed-strength preparedness on the agility of volleyball players 12–13 years old

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**Purpose:** determine the impact level of indicators of speed-strength preparedness for the agility of young volleyball players 12–13 years.

**Material & Methods:** analysis of scientific and methodological literature, pedagogical testing of speed-strength qualities and agility, pedagogical experiment, methods of mathematical statistics. The study involved 25 volleyball players aged 12–13 years, training in the basic training group of the second year of training of the sports club "Lokomotiv" in Kharkov. Young athletes were divided into an experimental – 13 people and a control – 12 volleyball team.

**Results:** after the introduction of the experimental methodology, a link was found between the level of speed-strength abilities and the agility of volleyball players.

**Conclusion:** the positive influence of development of speed-strength qualities on indicators of agility of volleyball players that is necessary for selection of means and methods in training process of young athletes is proved.

**Keywords:** young volleyball players, agility, speed-strength readiness, indicators.

## Introduction

Modern volleyball presents increased requirements for the development of various aspects of fitness of athletes, especially their special physical training. The high development of speed-strength qualities and agility has a positive effect on all types of volleyball training and, first of all, on physical and technical training, which manifests itself in the ability of athletes to coordinate efforts in space and time, the accuracy and efficiency of motor activity, synchronous ownership of the movements of all parts of the body, etc. [1–3; 6].

Volleyball specialists emphasize that the use of the elements of acrobatics in the training process, together with the implementation of technical elements of volleyball, increases the general base of motor abilities of volleyball players, increases the speed-strength training of working muscles and reduces psychological insecurity before conducting the elements, contributing to more effective implementation of the main technical elements of volleyball [4].

The analysis of volleyball research determines the priority value of speed-strength training of young volleyball players in the expansion of the range of game actions, increasing the tension of the game requires the athletes to manifest maximum speed-strength abilities in situations that change rapidly on the volleyball court during the competitive activity [1; 3; 5].

Thus, it can be argued that the development of speed-strength abilities and agility of volleyball players is an urgent task in the long-term preparation of volleyball players.

**Relationship of research with scientific programs, plans, themes.** The research was carried out in accordance with the theme of the research plan of the Kharkov State Academy of Physical Culture "Psycho-sensory regulation of the motor activity of athletes of situational sports" (2016–2018).

**Purpose of the study:** determine the influence of the level of speed-strength preparedness on the dexterity of young volleyball players 12–13 years.

*Objectives of the study:*

1. Analyze the scientific and scientific-methodical literature on the problem posed.
2. Investigate the level of indicators of speed-strength and agility of volleyball players 12–13 years.
3. To develop and experimentally substantiate the methodology for improving the speed-strength preparedness and agility of volleyball players 12–13 years old.
4. Identify the relationship level of speed-strength preparedness and agility of volleyball players 12–13 years old.

## Material and Methods of the research

The study involved 25 volleyball players aged 12–13 years, training in the basic training group of the second year of training of the volleyball club "Lokomotiv" in Kharkov. Young athletes were divided into an experimental 13 people and a control group of 12 volleyball players in each.

**Research methods:** analysis of scientific and methodological literature; pedagogical testing of speed-strength preparedness and dexterity, pedagogical experiment, methods of mathematical statistics. Testing the indicators of speed-strength abilities was carried out by tests: a jump in length from a place with a push of two feet, a jump upwards from the take-off, a throw of a rammed ball (1 kg) in a jump from a place with a two-handed head to a distance through a volleyball net (height 235 cm). The level of dexterity was determined by the methods of A. V. Belyaev and M. V. Savin by tests: running to

agility on the volleyball court and throwing a tennis ball for accuracy in jumping through a rope to a target of 1x1 m [1].

Running for agility was performed on the volleyball court counter-clockwise. Execution: start from zone 1 from the position of the thrust sitting down: roll forward, jerk to the punched ball (1 kg), which lie on the attack line, take the ball and throw with two hands through the net into the attack zone; climb under the banquet (height 50 cm), take the second ball and continue the same actions as at the beginning of the test. After throwing the third ball through the net – drop (roll on the chest – the stomach, hip – back) and finish running backwards along the lateral line to the front.

The throw of the tennis ball into the target was carried out on the volleyball court with 10 throws of the tennis ball on the 1x1 target. The athlete, overcoming the rope above the central line of the volleyball court, at an altitude of 80% of the maximum volleyball jump, with a running jump was carried out by throwing a tennis ball.

In order to check the effect of the level of speed-strength indicators on the dexterity indicators, the level of speed-strength preparedness and dexterity was investigated at the first stage, the experimental training methodology was developed and justified with the purposeful use of dexterity and speed-strength abilities. At the second stage, a comparative pedagogical experiment was conducted. The experiment was conducted from October 2016 to May 2017. The experimental group was engaged in the developed technique, the control group was trained according to the existing method of training in the Youth Sports School. All young volleyball players trained in the group of basic training and had experience of sports for 2–3 years. Training took 12 hours a week.

The pedagogical experiment was based on the application of the principle of advanced training to technical and tactical methods using the means and methods of speed-strength training and development of dexterity in basic training groups of volleyball players.

Selection of special volleyball exercises was aimed both at the simultaneous development of speed-strength qualities and dexterity, and on improving the technical skills of playing volleyball. Exercises for GDP were only 13% of the total training time, and 47% and 40% respectively were allocated to the development of speed-strength qualities, dexterity and technical techniques of volleyball players.

To develop dexterity, new and various motor exercises with novelty elements were used, namely: running at speed in various ways with changing the direction of the somersaults over the shoulder, through the head forwards and backwards and after the overturning of the performance of the reception or transfer of the ball, throw-forward, and reception or transmission ball, jumping through the gym bench with a turn to 90°, 180°, 360° and after the jump reception or transfer of the ball, jump on the block, landing rotation of 180° – receiving the ball with the fall, attacking blows on the suspended ball from the pov oroth jump in the 90°, sports games (volleyball, football) on a reduced site.

The agility exercises were performed in the first half of the workout. The amount of exercises in a single workout was small.

To increase the level of speed-strength qualities in the training sessions, the following exercises were used: jumping from a place, taking a run, taking out a basketball shield, a ring; jumping from deep squats; running jumps with the extraction of metric markings for the best result; jumping with a rope on two legs (variants: from foot to foot, moving forward, on one leg, to sit down, high hips); serial jumps up from the place, from a take-off with the removal of the object; jumping from a running start with a blow on a suspended ball; imitation of attacking strikes in the jump from the spot and after the take-off; Simulate locks in place and after moving; attacking blows through the net after taking off from various gears. Exercises for the development of speed-strength qualities were carried out in the middle and at the end of the main part of the training session of volleyball players.

## Results of the research and their discussion

The analysis of the studies shows that a number of specialists were engaged in determining the connections between the strength and maneuverability of athletes [12], others showed a correlation between dexterity and strength of the lower limbs [10], but we were guided by studies in the selection of exercises for testing, where the connections between speed-dexterity [1, 11].

The primary level of speed-strength abilities of volleyball players in the experimental and control groups was determined at the beginning of the pedagogical experiment of pedagogical testing.

As can be seen from the results of the primary testing of the groups under study, the difference in the rates of testing of velocity-strength qualities did not exceed an average of 2,3%, and in some cases, the control group had a slight advantage (Table 1).

The development of speed-strength qualities was carried out with the simultaneous training and improvement of technical techniques of volleyball, which were reflected in the agility indicators of young athletes.

The average dexterity of the experimental and control groups of young volleyball players at the beginning of the pedagogical experiment for the dexterity on the volleyball field had a difference of 4.4%, in the throw of the tennis ball for accuracy in the jump, the average results were the same (Table 2).

The correlation analysis carried out in the experimental group at the beginning of the pedagogical experiment revealed average links between the dexterity and speed-strength indicators  $r=-0,58$ , in the control group of the link between the dexterity and speed-strength indicators were  $r=-0,57$ . The results of the correlation analysis at the beginning of the pedagogical experiment indicate an approximate uniformity of the experimental and control groups in the parameters of the studied.

In the course of testing, the data obtained from the average indicators of the results of the experimental group give grounds to state that practically all the speed-strength characteristics that are necessary for playing volleyball have been improved during the pedagogical experiment, as evidenced by the studies [1; 3; 7; 8] (Table 1).

The results of the implementation of the pilot program

were most apparent at the end of the macrocycle preparation, in May 2017.

The increase in the results for the entire period of the pedagogical experiment was observed in terms of the experimental group:

– standing long jump – the indicator had an increase in the average result of 32,5 cm or 27% ( $P < 0,05$ )

– jump up from the take-off – the indicator of the average result improved by 9,8 cm or 8%, but did not have a significant difference ( $P > 0,05$ )

– throwing a ball of 1 kg in a jump from behind the head – the performance of this test improved the result by 1,62 m, or 13% ( $P < 0,001$ ).

In the control group, the following changes were observed:

– in the standing long jump, the gain was 24,7 cm or 21,6%, but did not have a significant difference ( $P > 0,05$ ) at  $t = 0,88$ ;

– jump up from the take-off – the increase in the average result was 8,4 cm or 6,9%, but did not have a significant difference ( $P > 0,05$ ) for  $t = 1,4$ .

In the throw of a printed ball 1 kg in a jump from behind the head – the increase in the average result was 0,83 m or 7,4%, but did not have a significant difference ( $P > 0,05$ ) at  $t = 1,6$ .

The level of development of speed-strength qualities in the control group, trained according to the standard program of the Children's Sports School, was at a lower level compared with the experimental group.

Improvement of the results of speed-strength abilities in the experimental group of volleyball players helped to improve

the indicators of agility (Table 2).

For the experimental group in the run of agility on the volleyball court, the average result improved by an average of 19,4 s at  $t = 4,9$  or by 14%, and had a significant difference ( $P < 0,001$ ); in the tennis ball's throw on the accuracy of the jump (10 attempts) the result improved on average by 1,95 times at  $t = 2,8$  or by 31%, and had a significant difference ( $P > 0,05$ ).

For the control group in the agility on the volleyball court, the result improved on average by 2,3 seconds at  $t = 1,1$  or by 6%, and had no significant difference ( $P > 0,05$ ) in the throw of the tennis ball for accuracy in the jump (10 attempts), the result improved by an average of 0,37 times at  $t = 0,99$  or 28%, and did not have a significant difference ( $P > 0,05$ ).

After conducting the pedagogical experiment, the correlation ties in the experimental group were strengthened  $r = -0,64$ . In the control group, we determine the decrease in the relationship –  $r = -0,17$ . The results of the correlation analysis confirm our hypothesis about the relationship between the level of speed-strength preparedness and the dexterity of volleyball players.

The obtained results confirm and supplement the scientific data on the connection of dexterity and the level of speed-strength preparedness of the lower extremities in volleyball women's teams [10]. The use of experimental methodology confirmed the study of volleyball specialists in the role of speed-strength qualities in the training of young volleyball players [3; 7–9].

## Conclusions

1. Analysis lyteraturnykh sources showed that the problem of speed-Effect Study of power qualities at lovkost voleybolystov javljaetsja aktualnoy.

2. As a result of pedagogical testing, approximately the same

**Table 1**  
Changes in the rates of speed-strength qualities during the pedagogical experiment ( $n_1=13, n_2=12$ )

No. i/o	Test	Units	Groups	At the beginning of experiment	At the end experiment	t	P
				$\bar{X} \pm m$			
1.	Standing long jump	Cm	EGn <sub>1</sub>	173,3±12	205,8±10	2,1	<0,05
			CGn <sub>2</sub>	174±16	199,3±24		
2.	Jump up from the take-off	Cm	EGn <sub>1</sub>	36,9±4,40	46,7±3,90	1,7	>0,05
			CGn <sub>2</sub>	37,4±5,20	45,8±2,80		
3.	Throw a printed ball (1 kg) in a jump from behind the head	m	EGn <sub>1</sub>	6,2±0,25	7,82±0,26	4,5	<0,001
			CGn <sub>2</sub>	6,3±0,32	7,1±0,40		

**Table 2**  
Changes in agility during the pedagogical experiment in the experimental and control groups ( $n_1=13, n_2=12$ )

Test	Units	At the beginning of experiment	At the end experiment	P	t
		$\bar{X} \pm m$			
<b>Experimental group</b>					
Running to the dexterity on the volleyball court	(s)	144,2±3,24	124,8±2,21	<0,001	4,9
A throw of a tennis ball on accuracy in a jump	(times)	1,77±0,26	2,92±0,33	<0,05	2,8
<b>Control group</b>					
Running to the dexterity on the volleyball court	(s)	148,7±2,10	145±2,46	>0,05	1,1
A throw of a tennis ball on accuracy in a jump	(times)	1,77±0,20	2,08±0,24	>0,05	0,99

indicators of speed-strength training and agility in the experimental and control groups of volleyball players were obtained with a difference in the results of 2,3% and 4,4%, respectively. Correlation analysis has revealed the average connections between the agility and speed-strength readiness in the experimental  $r=-0,58$  and the control  $r=-0,57$  groups.

3. The experimental technique aimed at simultaneous development of speed-strength qualities and dexterity was developed and justified, which was determined in a reliable increase in the indices of volleyball players of the experimental group. Only the results in the jump up from the take-off improved by an average of 6.9%, but did not have a significant difference

( $P>0,05$  at  $t=1,7$ ).

4. The application of the experimental methodology for the development of speed-strength preparedness and agility contributed to the strengthening of correlation relationships  $r=-0.64$  in the experimental group of volleyball players 12–13 years.

**Prospects for further research.** Proceeding from the above, further studies are planned to be conducted in the direction of determining the influence of the level of speed-strength preparedness on the effectiveness of the competitive activity of volleyball players of the basic training group.

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