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**Original Article**

# Comparative analysis of strength preparation indicators of 12-13-year-old junior football players

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**Abstract.**
In this paper, the effectiveness of using the method of improving the strength qualities of young players 12-13 years is considered. Objective: The study was attended by 30 young players of 12-13 years old. Results: It was found that the average results in the experimental group were higher than in the control group, the largest changes occurred in the indicator of the standing triple jump (by 0.33% more in the experimental group than in the control group), and the same changes occurred in tests of the wrist dynamometry (right hand) - 1,5% better squeezing in the experimental group, the wrist dynamometer (left hand) - 0,8% more in the control. The test of the standing long jump is 0,42% higher in the experimental group than in the control group. This trend can be traced in other tests, so in the pull-up on the H- bar the difference was 3,1%, in a standing jump up – 4,8%. Conclusions. The lack of significant differences can be explained by the short term of the pedagogical experiment, as well as the homogeneity of groups. At the same time, the results of pedagogical observation, consultation with doctors, parents, review of the journal of general state showed that most of those involved in the experimental group increased their physical fitness.
**Key words:** general physical training, training process, pedagogical experiment.

## Introduction

**Relevance of the research**. The training process in the Youth Sports School is designed to prepare skilled players. It is implemented on the basis of the program material and the mode of sports schools. In order to solve the tasks most successfully it is necessary to construct educational process according to such criteria which would allow to develop the preparation of young footballers in various ways that is why we addressed to the Youth College.

Nowadays, the level of physical training of professional footballers is of at high level. To be able to act on a par with professionals, you need to demonstrate good technique, understand the tactical structure of the game and be physically trained. Physical preparedness can not be considered separately, but it should be represented as a component of a single whole, in which technical solutions are closely interconnected with the physical, mental, tactical capabilities of the athlete, as well as the specific conditions of the environment in which the sports action is performed [1, 3]. Physical training is especially important in working with young footballers. First, the level of development of physical qualities and capabilities depends on the mastery of technical methods of the game and tactical actions. Secondly, the influence of the means of football on the versatile physical development and the functional state of the body completely depends on the level of the skill in the game. Therefore, at the initial stage (age of 10-14 years), exercises in technique, tactics and two-way game do not strongly affect the body of the student. In order loads should be optimal for the classes, it is necessary to use a wide arsenal of general development and preparatory exercises. Thirdly, the role of physical training for young footballers in competitions begins to affect significantly only from the age of 15-16, and especially at the age 17-18 when the competition lasts several days in a row [9].

**Analysis of the latest publications.** Many native scholars engaged in improving the physical fitness of young footballers, in particular: Godik M. A. [6], Bangsbo J. [4] and others, but data obtained on the


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improvement of the sequence of in-depth teaching in techniques at the initial stage of training was not sufficient, that is why this topic is relevant [1, 5]

Problems of controlling the physical fitness of footballers were considered in the works of Godik M. A. [6]; Gakame R. Z. [7]; Golomazov S. [8]; Lebedev S. I., Koval S. S. [10] and many others. At the same time, the problems of physical fitness of footballers of the youth teams of different schools remain poorly developed.

Consequently, we can confidently state the importance and relevance of the topic under discussion.

*Purpose of the study was*: to determine the effectiveness of the method of improving the strength qualities of young players 12-13 years.

**Material & methods.**

**Participants.**

The study involved 30 players of children's and youth football clubs: IC "Arsenal" in Kharkiv (experimental group) (n = 15) and children's and youth sports school number 7 in Kharkiv (control group) (n = 15).

**Procedure.**

Pedagogical observations were conducted in the course of training young footballers SC "Arsenal". In the process of observation, the influence of the experimental complex of strength exercises on the indicators of general and special physical training of young football players of 12-13 years was determined.

**Experimental application of special strength exercises.**

Strength readiness was evaluated according to the control and pedagogical tests: the number of pull-ups on the H-bar, the long jump , the standing long triple jump , the wrist dynamometry, the kick on the distance ( with right and left leg), the throwing of the ball at a distance, kicking the ball from hands.

During the experiment ( 12 weeks), both groups of young footballers trained in a single program (according to the developed plan). The difference was that in the experimental group, instead of the traditional ways of developing strength , we used the exercises proposed by ourselves.

The first option (lasted from January 12, 2018 to January 31, 2018 at the general preparatory stage of the preparatory period) presented loads of 50 to 70% of the body weight of those engaged and raising from 2 to 20 times in one approach, allowing for the possibility of growth the absolute strength of the muscular players of the upper shoulder girdle and the lower extremities.

The second option (from 02.02.2018 to 21.02.2018 at the general preparatory stage in the preparatory period) – exercises that allow to increase the level of strength training of the lower limbs of the football player due to the loads . These loads that rising from 4 to 15 times in one approach, allow to increase the power of muscles, which are manifested in conditions of relatively small external resistance.

The third variant (lasted from 23.02.18 to 16.03.18 at the special preparatory stage of the preparatory period) - strength exercises combining loads from the first and second options.

*Method of control tests:* assessment of the general strength qualities of young footballers was conducted by the tests: " standing jump up", " pull-up on the H-bar" , standing triple jump ", "wrist dynamometry". All tests used in the work were previously tested for reliability and informative. An assessment of special strength qualities was carried out while using such tests: standing kicking ball at a distance (right, left leg), dropping the ball on a range, kicking the ball from hand to range (right foot).

**Pedagogical experiment**. In order to check the effectiveness of the proposed methodology, aimed at improving of the strength training of young footballers of 12-13 years with the use of complex training tasks, a pedagogical experiment was conducted (simultaneous and consistent use of strength exercises with dosed loads for 12 weeks). In each microcycle, there scheduled three classes of loading conducted in a day. As a result, the duration of the pedagogical experiment was 12 weeks, in which young footballers of 12-13 years old from two children's and youth football schools participated: the Arsenal Children's and Youth Football Club, an experimental group in which multi-purpose training complexes were used and Children's and Youth Sports School №7 in Kharkiv - a control group which was engaged in a common methodology.

**Statistical data processing.** Methods of mathematical statistics are used in accordance with the known recommendations with the use of computer programs "EXCEL" and "SPSS" [2,12].

**Results:**

The analysis of the indicators of general physical fitness before the beginning of the experiment showed that the difference between the indicators in the experimental group is lower than in the control, but these indicators are insignificant and unreliable ($p > 0,05$) (Table 1). Young players in the control group in the test of the standing long jump showed a better result than in the experimental group by 1.8 cm, in pulling -up 0.2 times more, in standing triple jump up to 0.2 cm longer ; the wrist dynamometry of the young the players of the experimental group when squeezing - with the right hand by 0,5 kg, with the left hand by 0,3 kg more (Table 1).

Table 1

Indicators of test results before the study begins

| Tests (control exercices) | Groups | | t | p |
|---|---|---|---|---|
| | Ccontrol (n=15) | Experiment (n=15) | | |
| | $\bar{X}$±m | $\bar{X}$±m | | |
| Long standing jump , cm | 199,2± 0,11 | 197,4± 0,12 | 0,51 | p>0,05 |
| Pulling-up , number of times | 8,4± 0,86 | 8,2± 0,86 | 0,16 | p>0,05 |
| Standing triple jump, cm | 556,6± 0,23 | 556,4± 0,28 | 0,55 | p>0,05 |
| Standing jump up , cm | 36,7±2,7 | 35,3±2,5 | 0,38 | p>0,05 |
| Right-hand wrist dynamometry, (kg) | 20,7± 2,88 | 20,2± 2,31 | 0,13 | p>0,05 |
| Left hand wrist dynamometry , (kg) | 19,4± 1,73 | 19,1± 1,15 | 0,14 | p>0,05 |

Influence of the complex of special strength exercises on the general physical fitness of young footballers 12-13 years after the experiment:

From the data obtained in the control groups it is vivid that the changes are insignificant and unreliable (p> 0,05). In the control group, after 3 months of training, the following changes were observed in the indices: in the standing jump up test (t = 1,54; p> 0,05), the index improved by 0,2%, in the pull –ups on the crossbar (t = 1,03; p> 0,05), the index grew by 3,5%, in the standing long triple jump (t = 1,81; p> 0,05) increased by 0,3%, in a standing jump up (t = 1,81 ; p> 0,05) increased by 1.4%, the right wrist dynamometry of the right hand (t = 0,54; p> 0.05) increased by 9.3%, and the left hand dynamometry of the arm (t= 0,74p> 0,05) increased by 8,1% (Table 3).

Table 3

Indicators of the results of the pedagogical experiment of football players after the experiment of the control group (n = 15)

| Tests (control exercises) | Groups | | % gain | t | p |
|---|---|---|---|---|---|
| | Before starting the experiment | After completing the experiment | | | |
| | $\bar{X}$±m | $\bar{X}$±m | | | |
| Standing long jump , см | 199,2± 0,11 | 199,5± 0,16 | 0,2 | 1,54 | p>0,05 |
| Puling up H-bar , .times | 8,4± 0,86 | 9,7± 0,91 | 3,5 | 1,03 | p>0,05 |
| Standing long triple jump, см | 556,6± 0,23 | 558,3± 0,91 | 0,3 | 1,81 | p>0,05 |
| Standing jump up, см | 36,7±2,7 | 37,2± 2,21 | 1,4 | 0,14 | p>0,05 |
| Right hand wrist dynamometry, kg | 20,7± 2,88 | 22,8± 2,54 | 9,3 | 0,54 | p>0,05 |
| Left hand wrist dynamometry, kg | 19,4± 1,73 | 21,1± 1,51 | 8,1 | 0,74 | p> 0,05 |

In the experimental group, after 3 months of training, the following changes were observed in the indices: in the standing jump up test (t = 5.28; p> 0.001), the index is improved by 0.6%, in pulling - up on the H-bar (t = 2.39; p < 0.05) the index increased by 6.4%, in the standing long triple jump (t = 0,17; p> 0,05) increased by 0,66%, in a standing jump up (t = 0,57; p > 0.05) increased by 6.2%, the right hand wrist dynamometry (t = 0.51; p> 0.05) increased by 7.8%, the left hand wrist dynamometry (t = 0.89; p> 0.05) increased by 7.3% (Table 4). The percentage gain in the control and experimental groups is different. So in the test, the standing long jump is 0.40% higher in the experimental group than in the control group.

This trend can be traced in other tests. Thus, in the pull-up on the crossbar the difference was 3.1%, in the standing long triple jump - 0.33%, in a standing jump up - 4.8%. In the wrist dynamometry (right hand) - 1,5%, wrist dynamometry (left hand) – by 0,8% more in the control (Table 4). Thus, there is a tendency to improve the strength training of football players of 12-13 years as a result of the use of the proposed program.

Table 4

Indicators of the results of the pedagogical experiment of football players after the experiment (experimental group) (n = 15)

| Tests (control exercises) | Groups | | % gain | t | p |
|---|---|---|---|---|---|
| | Before starting the experiment | After completing the experiment | | | |
| | $\bar{X}$±m | $\bar{X}$±m | | | |
| Sanding long jump,cm | 197,4± 0,12 | 198,5± 0,17 | 0,66 | 5,28 | p<0,05 |
| Pull-up, number of times | 8,3± 0,86 | 10,6± 0,76 | 6,4 | 2,39 | p<0,05 |
| Standing long triple jump , cm | 556,4± 12,28 | 559,5± 12,34 | 0,66 | 0,17 | p>0,05 |
| Standing jump up , cm | 35,3±2,5 | 37,5±2,9 | 6,2 | 0,57 | p>0,05 |
| Right-hand wrist dynamometry, (kg) | 20,2± 2,31 | 21,9± 2,36 | 7,8 | 0,51 | p>0,05 |
| Left hand wrist dynamometry , (kg) | 19,1± 1,15 | 20,6± 1,23 | 7,3 | 0,89 | p> 0,05 |

**Discussions.**

The results of our research is continuing the series of studies on the physical fitness of footballers of different qualifications [1] and age [6,7]. The obtained data confirm the opinion [5] that in many ways the increase in the results in both groups is associated with the general physical development of children [4], which at this age are significantly added in height and weight indicators, have a set of necessary motor skills and the abilities[8]. Our results confirm the importance of the development of strength qualities in this period [3], since the tendency for selection in elite football is now traced in the choice of players who can compete, who can successfully resist in personal matches and win their so-called micro-gambits [3]. The analysis made it possible to determine that the training effect from the impact of exercises with loads on the development of special physical qualities of football players depends [11], as shown on studies of a number of authors [6], from the correct definition of the amount and duration of the execution of strength work [11].

**Conclusions**.

The developed system of special exercises positively influenced the development of special physical qualities of young players after the completion of the experiment. The lack of significant differences can be explained by the insignificant term of the pedagogical experiment, as well as the homogeneity of the groups. At the same time, the results of pedagogical supervision, consultations with doctors, parents, review of the journal of general state showed that most of those involved in the experimental group increased their physical fitness. We consider that planning of strength preparedness is an integral part of the construction of the training process for young players at the stage of preliminary basic training.

**Prospects of subsequent researches.**

Further research will focus on determining the effectiveness of using this technique in the training process of 13-14 year old football players.

**Conflict of Interest**. The authors declare that there is no conflict of interest.

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