Methodology of differentiated finger training for armrestlers of initial training groups

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Abstract

Objective of the study was to develop a methodology for differentiated training of finger strength in armwrestlers aged 10-13 and to determine its effectiveness.

Methods and structure of the study. The experiment involved 32 arm wrestlers aged 10-13 years old in the weight categories 50 and 55 kg, with 0.5-1 year of training experience, without categories. Of these, 16 were the control and 16 experimental group. Tensodynamometry was used as the main testing method. The results of maximum efforts were recorded in the following basic anatomical movements of the young armwrestler's strength topography: finger flexors, four-finger flexors alternately (except for the thumb). Between the mount and the chain is a Grant Scalse brand electronic dynamometer to record the maximum force exerted by the test subject on the handle in static mode.

Results and conclusions. The study of the indicators of the strength of the muscles - the flexors of the fingers and its dynamics in arm wrestlers aged 10-13 years old in the initial training groups under the conditions of the formative experiment showed a more significant increase in the results in the experimental group. The greatest increase was established in terms of "Dynamometry of the strength of the middle finger" both on the left and on the right hand ($p<0.01$). Presumably, this is due to the fact that the middle finger, according to testing, is the strongest of all the fingers of the hand and therefore, in all complex exercises for hand strength, it receives the greatest load compared to other fingers. The use of differentiated finger training can become a predictor of an increase in the effectiveness of competitive activity, which deserves attention and further study.

Keywords: arm wrestling, grip strength, finger flexor muscles, initial training, tenzodynamometry.

Introduction. A feature of the physical training of arm wrestlers of any level is the increased attention to the development of strength not only of large muscle groups, which carry the main load during a competitive duel (muscles of the back, chest, shoulder girdle, shoulder), but also smaller ones, which allow you to impose your own fighting style on the opponent: the muscles of the forearm and brushes [5].

Numerous studies have established that the main discriminatory signs of mastery in arm wrestling are the strength of the hand and fingers [1, 3, 6, 8]. Conducted by L.V. Podrigalo et al., (2017) a comparative study of hand strength and strength endurance indicators among armwrestling athletes of different skill levels showed that the level of hand dynamometry is an important informative and adequate criterion that determines training in this sport, characterized by the maximum system-forming contribution. This model characteristic is of particular value at the level of the primary selection of athletes. At the same time, it is believed that grip strength, in comparison with other characteristics, is difficult to train, being to a greater extent genetically determined [4].

As observations of the training process and a survey of trainers show, training of the finger flexor muscles is often limited to only one or two exercises at the end of the workout, while at the same time, much more training time is devoted to working out other muscles of the forearm - brachioradialis, pronators and supinators, as well as shoulder muscles. - two-headed and three-headed. Therefore, the search for new methods of strength training of the muscles of the hand is an important area of scientific research in arm wrestling.

Objective of the study was to develop a methodology for differentiated training of finger strength in armwrestlers aged 10-13 and to determine its effectiveness.

Methods and structure of the study. The formative experiment was conducted from May 25 to October 25, 2022 at the arm wrestling section of the national team of the city Lukhovitsy, Moscow Region. The experiment involved 32 arm wrestlers aged 10-13 in the weight categories of 50 and 55 kg, with 0.5-1 year of training experience, who did not have any categories. Of these, 16 were the control and 16 experimental group.

Tensodynamometry was used as the main testing method. The force-measuring device was a height-adjustable rigid dynamometer hitch with various specialized handles. Between the mount and the chain is a Grant Scalse brand electronic dynamometer to record the maximum force exerted by the test subject on the handle in static mode. After the warm-up, the subject performed two attempts in each task, the best result is taken into account.

The results of maximum efforts were recorded in the following basic anatomical movements of the young armwrestler's strength topography: finger flexors, four-finger flexors alternately. The indicators were determined at the relevant point for the application of force (Table 1).

Athletes performed individual finger curls on an adjustable block with a handle with a thin rotating earring. Performed three or four sets of 15-18 repetitions with each finger. Weight was used 65-80% of a single maximum. Super series were performed with the finger of the left and immediately without rest of the right hand. The load increased due to an increase in intensity, in particular, due to an increase in the weight of the load. Weights increased as the number of repetitions in one approach began to exceed the specified number. In the training sessions, the method of repeated non-limiting efforts was used.

Results of the study and their discussion. The level of muscle strength - finger flexors in the experimental and control groups before the start of the study had no statistically significant differences.

The data in table 2 show a significant increase in all the presented indicators of finger strength in the experimental group. The greatest increase was established in terms of "Dynamometry of the strength of the middle finger" both on the left and on the right hand ($p<0.01$). Presumably, this is due to the fact that the middle finger, according to testing, is the strongest of all the fingers of the hand and therefore, in all complex exercises for hand strength, it receives the greatest load compared to other fingers. In addition, two exercises were performed for training the middle and index fingers, and one for all the others. At the end of the study, in the control group, the average value of the increase in carpal dynamometry indicators only tended to increase and amounted to only 7.5% ($p>0.05$), while in the experimental group it was 15.5% ($p<0.05$).

Conclusions. The study of the indicators of the strength of the muscles - the flexors of the fingers and its dynamics in arm wrestlers aged 10-13 years old in the initial training groups under the conditions of the formative experiment showed a more significant increase in the results in the experimental group. The use of differentiated finger training can become a predictor of an increase in the effectiveness of competitive activity, which deserves attention and further study.

Table 1. *An example of an exercise for the flexor muscles of the index finger in the experimental group*
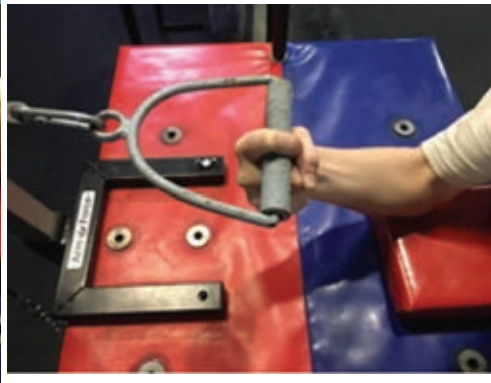
Name of exercise / hand position	Hand in neutral position	Hand in supinated position
Flexion of the finger with the handle of the adjustable block		

Table 2. *Comparison of the results of the strength of the finger flexor muscles in the control and experimental groups at the end of the experiment, left and right hand*

Types of controltests	Hand	Control X±m	Experimental X±m	t	p
Wrist dynamometry, kg	Left	36,9±2,74	43,1±2,14	2,4	<0,05
	Right	36,6±3,69	42,2±3,69	2,3	<0,05
Index finger dynamometry, kg	Left	12,8±0,7	15,0±1,07	2,8	<0.05
	Right	14,2±1,07	16,9±1,07	2,7	<0.05
Dynamometry of the middle finger, kg	Left	15,9±1,31	22,0±1,43	3,2	<0.01
	Right	16,7±0,95	22,2±1,31	3,4	<0.01
Dynamometry of the ring finger, kg	Left	12,2±0,83	17,4±2,02	2,6	<0.05
	Right	12,7±1,31	17,7±1,31	2,2	<0.05
Dynamometry of the little finger, kg	Left	8,9±1,07	10,4±1,07	2,4	<0.05
	Right	8,1±0,83	10,5±1,07	2,3	<0.05

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