Technique for the development of strength abilities in boys aged 10-11 years engaged in hand-to-hand combat at the initial training stage

Kostsova Elena Vasilievna
Associate Professor, Department of Theory and Biomedical Foundations of Physical Education,
Vladimir State University named after Alexander and Nikolay Stoletov
Vladimir, Russia
agurova67@mail.ru
0000-0002-9447-4500

Repnikova Elena Alexandrovna
Associate Professor, Department of Physical Education and Sports,
Vladimir State University named after Alexander and Nikolay Stoletov
Vladimir, Russia
miledy76@yandex.ru
0000-0003-4734-9907

Izarovskaya Irina Valerievna,
Associate Professor, Department of Theory and Methods of Physical Education and Sports, Institute of Sport, Tourism and Service
South Ural State University
Chelyabinsk, Russia
izarovskaiaiv@susu.ru
0000-0002-8290-5334

Abstract.

The purpose of the article is to increase the efficiency of training children with the help of dynamic and static exercises. Materials and methods: boys aged 10-11 years engaged in hand-to-hand combat were divided into two groups at the initial training stage: experimental and control (15 people each). Strength training of the experimental group included exercises of a dynamic, static and mixed nature. The control group followed the traditional program with the predominant use of dynamic strength exercises. Results: the use of special strength exercises into the training process of the experimental group significantly increased the indicators of dynamic strength of the arms, abs and legs; static endurance of the arms, abs and legs. Conclusion Our strength exercises based on the mixed muscle performance have a targeted effect on the muscles of the arms, legs, and abs of children aged 10-11 years. These exercises have shown their effectiveness and expediency for improving the physical fitness of young athletes.

Keywords - hand-to-hand combat, dynamic force, initial stage of preparation, strength abilities, static endurance, physical fitness

I. INTRODUCTION

In hand-to-hand combat, athletes when performing certain movements have to use strength and endurance not only in a dynamic, but also in static form [1; 2; 9; 11; 12].

II. MATERIALS AND METHODS

The experiment was conducted from January to May 2018 on the premises of the Golden Lion sports club (Vladimir, Russia). The study involved 30 boys aged 10-11 years engaged in hand-to-hand combat at the initial training stage.

Strength exercises aimed at mixed muscle performance were developed (Tables 1-3).

TABLE I. STRENGTH EXERCISES FOR THE DEVELOPMENT OF DYNAMIC STRENGTH IN CHILDREN AGED 10-11 YEARS ENGAGED IN HAND-TO-HAND COMBAT

№	Name	Description	Time	Recommendations
1.	Push-ups	Lie on the back. Bend the arms at 90 degrees, lower the torso until parallel to the floor, return to the starting position.	30 s	Eyes looking in front of the head. Maintain a straight body throughout the exercise. Perform as fast as possible.
2.	Sit-ups	Lie on the floor with hands locked together behind the head, legs bent, feet supported by a partner holding them down. Lift the body until perpendicular to the floor and return to the starting position.	30 s	Buttocks on the floor, hands behind the head should not be unlocked, legs on the floor. Perform as fast as possible.
3.	Squat jumps	Squat position. Jump up, clap hands overhead, return to the starting position.	30 s	Jump as high as possible, do not bend legs.

Table 2 shows the exercises for the development of static endurance in young athletes.

TABLE II. STRENGTH EXERCISES FOR THE DEVELOPMENT OF STATIC STRENGTH IN CHILDREN AGED 10-11 YEARS ENGAGED IN HAND-TO-HAND COMBAT

№	Name	Description	Time	Recommendations
1.	«Chair»	Stand against the wall, bend the legs at 90 degrees, hands stretched forward.	As long as possible	Hold the buttocks, shoulders and head against the wall.
2.	Plank	Lie face down, bend the arms at 90 degrees and hold the position.	As long as possible	Eyes looking in front of the head, straight back.
3.	Lying leg raise	Lie on elbows, raise and hold straight legs 20-30 cm from the floor.	As long as possible	Do not bend the legs.

For the development of "the ability to accurately differentiate various muscle efforts in unforeseen situations and mixed modes of muscle performance" [4, 7, 9, 12] a set of exercises was developed with a static and dynamic regime of contractions (Table 3).

TABLE III. STRENGTH EXERCISES FOR THE SIMULTANEOUS DEVELOPMENT OF STATIC AND DYNAMIC STRENGTH IN CHILDREN AGED 10-11 YEARS ENGAGED IN HAND-TO-HAND COMBAT

№	Name	Description	Time	Recommendations
1.	Push-ups with incomplete muscle relaxation	Lie on the floor, bend the arms at 90 degrees, extend the arms.	30 s.	Eyes looking in front of the head, do not fully extend the arms.
2	Squats with incomplete muscle relaxation	Stand legs apart, hands on the head, bend the legs at 90 degrees.	30 s.	Do not fully extend the legs, back straight, heels on the ground.
3.	Scissors	Lie on the elbows, raise the legs 5 cm above the floor, open the legs and then bring them back together.	30 s.	Hold the legs, do not bend the legs

The methodology for using these sets of exercises suggested the use of separate sets in the main part of the training session for young athletes. In this case, exercises with both static and dynamic regime of muscle contractions (5-10 min) were used.

Within a separate training session, 20-25 minutes are given for the developed sets of exercises. One set is performed in dynamic mode, and the second set is in static mode.

In total, 2-4 sets are performed without rest between exercises. Rest is provided between sets - 7-10 minutes [4; 13]. The number of training sessions is 3 times a week.

III. Results and discussion

The effectiveness of the developed sets of exercises was tested in a pedagogical experiment. Before the experiment, boys from the control and experimental groups had significant differences in terms of the dynamic strength of the abs muscles and the static endurance of the leg muscles ($p < 0.05$). The results of the second measurement are given in (Table 4).

TABLE IV. STRENGTH EXERCISES FOR THE SIMULTANEOUS DEVELOPMENT OF STATIC AND DYNAMIC STRENGTH IN CHILDREN AGED 10-11 YEARS ENGAGED IN HAND-TO-HAND COMBAT

	Test	Experimental group		Control group	
		At the beginning	At the end	At the beginning	At the end
Dynamic strength (number of times)	Push-ups	19.3±1.68	23.7±1.89	21,5±**1,99**	23,3±1,61
		18.5%		8.4%	
	Sit-ups	18.8±1.25	20.6±1.21	22,4±0,71	23,3±0,96
		9.6 %		4.0%	
	Squat jumps	25.1±0.84	27.1±1.44	24,6±***0,52***	25,4±0,70
		8.0%		3.2%	
	«Chair»	85.1±**10.40**	101.6±11.22*	117,4±5,56	121,4±5,77
		19.4%		3.4%	
Static endurance (s)	Plank	29.3±6.07	37.9±5.80	26,3±3,10	29,1±3,45
		29.4%		10.6%	
	Lying leg raise	91.9±11.27	106.3±11.97	98,4±12,66	103,4±13,00
		15.7 %		5.0%	

Table 4 shows that in the experimental group there was a more significant increase in all indicators characterizing the dynamic strength abilities and static endurance of young athletes compared with the control group.

IV. Conclusion

Our strength exercises based on the mixed muscle performance have a targeted effect on the muscles of the arms, legs, and abs of children aged 10-11 years. These exercises have shown their effectiveness and expediency for improving the physical fitness of young athletes.

Acknowledgment

This article was supported by the Government of the Russian Federation (Act No. 211 dd. March 16, 2013; contract No. 02.A03.21.0011); according to the state assignment of the Ministry of Education and Science of the Russian Federation (grant No. 19.9733.2017 / БЧ).

References

[1] S.M. Ashkinazi and E.A. Bavykin, "Improvement of System of Special Physical Training of Athletes of Complex (Mixed) Martial Arts," Theory and Practice of Physical Culture, 2014, no. 6, pp. 94–98.
[2] S.M. Ashkinazi, "Issues of theory and methods of hand-to-hand combat in the Armed Forces of the Russian Federation," St. Petersburg: VIFK, 2001, 241 p.
[3] A.V. Gursky, "Motor Variability as a Factor of Increase of Athlete"s Fitness Level," Theory and Practice of Physical Culture, 2013, no. 6, pp. 68–70.
[4] Yu.F. Kuramshin, "Theory and methodology of physical education: textbook," Moscow: Soviet Sport, 2012, 464 p.
[5] S.E. Tabakov, S.V. Eliseyev and A.V. Konakov, "Exemplary sports training programs for children and youth sports schools, specialized children and youth schools of the Olympic reserve," Moscow: Soviet Sport, 2005, 240 p.

[6] G.V. Rudenko, O.V. Kostromin, G.I. Mokeev and K.V. Shestakov, “Training of Qualified Kickboxers within Year Macrocycle,” Theory and Practice of Physical Culture, 2014, no. 6, pp. 66–68.
[7] Yu.A. Shulika, “Psychological and pedagogical issues of increasing special endurance in martial arts,” Theory and Practice of Physical Culture: trainer. magazine in a journal,” 2004, no. 8, pp. 35–36.
[8] O.P. Yushkov, S.G. Khachekyan and V.A. Khorikov, “Complex Control in Trainnig System for Wrestlers,” Theory and Practice of Physical Culture, 2007, no. 7, pp. 42–43.
[9] M. Fernstrom, M. Tonkonogi and K. Sahlin, “Effects of acute and chronic endurance exercise on mitochondrial uncoupling in human skeletal muscle,” J. Physiol., 2003, vol. 554, pt. 3, pp. 755–763.
[10] C.S. Filko, B.A. Beidleman and S.R. Muza, “Effectiveness of preacclimatization strategies for high – altitude exposure,” Exerc. Sport Sci Rev., 2013, vol. 41, pp. 55–63.
[11] P. Gollnick and H. Matova, “The muscle composition ofskeletal muscle as a predictor of athletic success,” Am. J. Sports Med., 1984, vol. 12, no. 3, pp. 212–217.
[12] K. Hakkinen, P.V. Komi and P. Tesch, “Effect of combined concentricandeccentrik strength training and detrainingon force-time, muscle fibre, and metabolicharacteristic of leg excensor muscles,” Scandinavian journal of Sports Sciences, 1981, vol. 3, no. 2, pp. 50–58.
[13] K. Katayama, H. Matsro, K. Jchidaet et. al. “Intermittent hypoxia improves endurance performance and subminimum exercise efficiency,” High Alt Med Biol, 2003, no. 4 (3), pp. 291–304.