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IMPROVING THE METHODOLOGY OF DEVELOPMENT OF STRENGTH QUALITIES OF 15-16-YEAR-OLD JUDOKAS

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Purpose: to improve the methodology of developing strength qualities of 15-16-year-old judoists with the use of dynamic exercises.

Material and methods: analysis of scientific and methodological information, Internet sources and generalization of best practices, pedagogical testing; timing; pedagogical experiment, methods of mathematical statistics. 20 judokas, aged 15-16 years, took part in the pedagogical experiment. Athletes were divided into two groups: control and experimental with 10 judokas in each. The pedagogical experiment lasted three months (September - November 2020).

Results: based on the analysis of scientific and methodological information and generalization of best practices, it was found that the level of development of strength qualities largely determines the tactical and technical training of a judoka, the style, and nature of the competitive fight. The control group was engaged in the training program for Children's and Youth Sports School, and the judoists of the experimental group used a set of dynamic exercises in the training process. The exercises were distributed in such a way as to ensure the alternation of the load, mainly for the muscles of the legs, arms, back, abdomen, and general impact. At the beginning of the experiment, the control indicators of strength qualities did not reveal

significant differences between the control and experimental groups (p>0,05, the value of t ranges from 0.32 to 1.01).

Conclusions: during the experiment it was found that the use of sets of dynamic exercises in the training process has a positive effect on the judokas` strength preparedness. This is evidenced by the results obtained at the end of the experiment, so the judoists of the experimental group have significantly higher indices of strength preparedness in almost all tests (p <0.05, the value of t ranges from 2.10 to 2.34). In the test "Uchi-komi in 30 s" the result is also better in judoists of the experimental group, but it is statistically insignificant (t = 1.07; p> 0.05), this is since this exercise is specific to judo.

Keywords: judo, training process, qualified athletes, strength qualities, dynamic exercises.

Introduction

Judo is one of the four most popular sports in the world, along with Sambo, Greco-Roman, and Freestyle Wrestling. International Judo Federation (IJF) includes 198 national federations. In total, about 28 million people in the world practice Judo. In recent years, it is characterized by several trends: the increased intensity of motor actions on the tatami, increased its contact, increased the speed of technical and tactical techniques. Thus, the training of judokas began to be subject to new requirements that must be considered when planning a program to improve their skills. The high level of modern sport requires significant requirements for functional and strength preparedness, and knowledge of these basics will help not only the coach but also the athlete himself in achieving high sports results [3, 7, 9]. The coach-teacher must take care of the harmonious development of each athlete, and it is possible only through general strength training and many other vital motor qualities by all possible means of physical culture and sports [6, 12, 13].

The main task of special strength training in Judo classes is the development of those qualities that a judoka needs for successful training matches. Thus, the means of educating the special strength qualities of a judoka should be considered

exercises that contribute to the formation and improvement of skills in performing the elements of the fight or the whole techniques that a judoka performs alone or with a partner; educational and competitive fights of different orientation; moving games with elements of confrontation, etc. [3, 4, 10].

The level of development of strength qualities largely determines the tactical and technical training of a judoka, the style, and nature of the competitive fight. Thus, the ability to selectively detect significant muscular effort allows judokas to successfully perform combinations of techniques, timely use of countermeasures, which, as an indicator, increases the reliability of technical and tactical actions. The athlete in such conditions has confidence in his abilities, the fight becomes offensive and technically versatile [2, 8, 14].

Connection of work with scientific programs, plans, and themes. The study was conducted under the research topic of the Kharkiv State Academy of Physical Culture "Scientific and Methodological Foundations of Using the Information Technology in the Training of Specialists in the Field of Physical Culture and Sports" (state registration number 0113U001207).

Purpose of the study is to improve the methodology of developing strength qualities of 15-16-year-old judoists with the use of dynamic exercises.

Material and Methods of research

The following methods were used to solve the tasks of the research: analysis of scientific and methodological information, Internet sources and generalization of best practices, pedagogical testing; timing; pedagogical experiment, methods of mathematical statistics.

The level of strength training was determined by the following tests: 100-metres race (s); push-ups in 20 s (number of times); pull-ups on horizontal bar in 20 s (number of times); abdominal crunches in 20 s (number of times); standing long jumps (cm); pull-ups on horizontal bar (number of times); the maximum number of push-ups (number of times); squats with a partner of equal weight (number of times); hanging leg lifts on the stall bars (number of times); bent arm hang (s); static

uchikomi (without separating the partner's legs from the tatami) in 30 s (number of times).

The pedagogical experiment was conducted in groups of specialized training of 3rd year of study at Complex Youth Sports School №2 and SC "Slobozhanets" in Kharkiv. A total of 20 judokas, aged 15-16 years, took part in the pedagogical experiment. Athletes were divided into two groups: control and experimental, 10 judokas in each. The pedagogical experiment lasted three months (September - November 2020). The control group was engaged in the curriculum for Children's and Youth Sports School [1], and the judoists of the experimental group used a set of dynamic exercises in the training process:

1st set of exercises: push-ups; squats; 2-3 kg dumbbell side lateral raise (Monday, Wednesday, Friday).

2nd set of exercises: pull-ups on a low horizontal bar; abdominal crunches; hyperextension (Tuesday, Thursday, Saturday).

The exercises were distributed in such a way as to ensure the alternation of the load, mainly for the muscles of the legs, arms, back, abdomen, and general impact. Each exercise was performed with a reduced amplitude by bouncy movements, 3 sets each (30 s - exercising, 30 s - rest), the pace of exercising - 1 s = 1 time. Rest between exercises was 3 minutes. Sets of exercises were performed at the end of the main part of the lesson. Example of performing exercises of the 1st set:

- push-ups (30 s), rest (30 s); push-ups (30 s), rest (30 s); push-ups (30 s), rest (3 min);

- squats (30 s), rest (30 s); squats (30 s), rest (30 s); squats (30 s), rest (3 min);

- dumbbell side lateral raise (30 s), rest (30 s); dumbbell side lateral raise (30 s), rest (30 s); dumbbell side lateral raise (30 s).

Results of the research

Based on the analysis of scientific and methodological information, Internet sources, and generalization of best practical experience, it was found that the level of development of strength qualities largely determines the tactical and technical preparedness of a judoka, style, and nature of competitive fight [2, 5, 11].

As part of the pedagogical experiment, the assumption of a positive effect of dynamic exercises on the development of strength qualities was tested. At the beginning of the experiment, the control indicators of strength qualities between the control and experimental groups according to Student's t-criteria did not reveal significant differences (p> 0.05, the value of t ranges from 0.32 to 1.01) (Table 1).

Table 1

Indicators of strength preparedness of judokas of control (n = 10) and experimental (n = 10) groups at the beginning of the pedagogical experiment

№	Test		$\bar{X} \pm m$	t	p
1	100-metres race (s)	CG	14,21±0,22	0,45	>0,05
		EG	14,33±0,15		
2	push-ups in 20 s (number of times)	CG	18,30±1,08	0,32	>0,05
		EG	18,80±1,14		
3	pull-ups on horizontal bar in 20 s (number of times)	CG	10,30±0,42	-0,62	>0,05
		EG	9,90±0,48		
4	abdominal crunches in 20 s (number of times)	CG	14,20±0,84	0,48	>0,05
		EG	13,60±0,91		
5	standing long jumps (cm)	CG	191,60±4,78	0,78	>0,05
		EG	196,60±4,28		
6	maximum number of pull-ups on the horizontal bar (number of times)	CG	13,20±0,84	-0,48	>0,05
		EG	12,60±0,91		
7	maximum number of push-ups (number of times)	CG	52,90±1,93	-0,35	>0,05
		EG	51,90±2,07		
8	squats with a partner of equal weight (number of times)	CG	9,50±0,69	0,56	>0,05
		EG	10,10±0,87		
9	hanging leg lifts on the stall bars (number of times)	CG	9,96±0,48	-0,70	>0,05
		EG	9,10±0,53		
10	bent arm hang (c)	CG	40,70±0,79	1,01	>0,05
		EG	41,70±0,60		
11	Uchi-komi in 30 s (number of times)	CG	27,40±0,93	-0,58	>0,05

Note: reliability t = 2,093; p <0.05.

At the end of the pedagogical experiment, after training for three months, the final tests of strength qualities in the control and experimental groups were conducted and the results are presented in Table 2.

Comparing the average results of athletes in the control and experimental groups at the end of the pedagogical experiment, it can be noted that the judoists of the experimental group have significantly higher indicators of strength preparedness in the following tests: 100-metres race (t=-2,15; p<0,05); push-ups in 20 s (t=2,11; p<0,05); pull-ups on horizontal bar in 20 s (t=2,18; p<0,05); abdominal crunches in

20 s (t=2,12; p <0,05); standing long jumps (t=2,10; p<0,05); the maximum number of pull-ups on the horizontal bar (t=2,22; p<0,05); the maximum number of push-ups (t=2,14; p<0,05); squats with a partner of equal weight (t=2,34; p<0,05); hanging leg lifts on the stall bars (t=2.31; p<0,05); bent arm hang (t=2,15; p<0,05). In the Uchi-komi test in 30 s, the result is also better in the judokas of the experimental group, but it is statistically insignificant (t=1,07; p>0,05), this is due to the fact that this exercise is specific to Judo (Table 2).

Table 2

Indicators of strength preparedness of judokas of control (n = 10) and experimental (n = 10) groups at the end of pedagogical experiment

№	Test		$\bar{X} \pm m$	t	p
1	100-metres race (s)	CG	14,01±0,25	**-2,15**	**<0,05**
		EG	13,33±0,19		
2	push-ups in 20 s (number of times)	CG	18,80±0,84	**2,11**	**<0,05**
		EG	21,60±1,02		
3	pull-ups on horizontal bar in 20 s (number of times)	CG	10,50±0,34	**2,18**	**<0,05**
		EG	11,50±0,31		
4	abdominal crunches in 20 s (number of times)	CG	14,60±0,76	**2,12**	**<0,05**
		EG	16,40±0,37		
5	standing long jumps (cm)	CG	196,60±5,43	**2,10**	**<0,05**
		EG	208,90±2,18		
6	maximum number of pull-ups on the horizontal bar (number of times)	CG	13,50±0,72	**2,22**	**<0,05**
		EG	15,50±0,54		
7	maximum number of push-ups (number of times)	CG	53,90±1,52	**2,14**	**<0,05**
		EG	59,20±1,95		
8	squats with a partner of equal weight (number of times)	CG	9,90±0,57	**2,34**	**<0,05**
		EG	11,90±0,64		
9	hanging leg lifts on the stall bars (number of times)	CG	9,80±0,49	**2,31**	**<0,05**
		EG	11,10±0,28		
10	bent arm hang (c)	CG	41,70±0,60	**2,15**	**<0,05**
		EG	44,40±1,11		
11	Uchi-komi in 30 s (number of times)	CG	27,70±0,82	1,07	>0,05

Note : reliability t = 2,093 ; p <0.05; t = 2.8 61 ; p <0.01.

The obtained data show that the judokas of the control group at the end of the pedagogical experiment when testing strength qualities showed improvements in tests from 1.1% to 4.2%, and the athletes of the experimental group improved the results at the end of the pedagogical experiment - from 6,3% to 23,0% (Fig. 1).

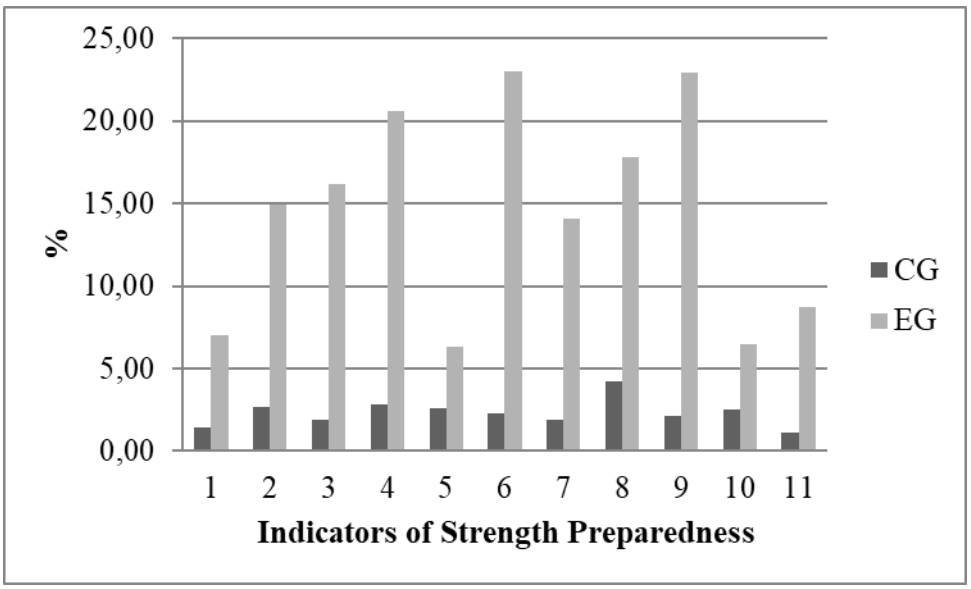

Fig. 1. Dynamics of indicators of strength preparedness during the pedagogical experiment in the control (CG) (n = 10) and experimental (EG) (n = 10) groups

Note: 1 - 100-metres race; 2 - push-ups in 20 s; 3 - pull-ups on horizontal bar in 20 s; 4 - abdominal crunches in 20 s; 5 - standing long jumps; 6 - maximum number of pull-ups on the horizontal bar; 7 - maximum number of push-ups; 8 - squats with a partner of equal weight; 9 - hanging leg lifts on the stall bars; 10 - bent arm hang; 11 - Uchi-komi in 30 s.

This dynamics of changes in the indicators of strength preparedness of judoists of the experimental group is associated with using sets of dynamic exercises in conjunction with the elements of technology in the training process.

Conclusions / Discussion

Many authors have studied strength preparedness of judokas in their works. Thus, A.F. Alekseev (2018), studied the features of the strength qualities of judoists in the groups of specialized training based on which he proposed and experimentally substantiated the program for the development of special strength qualities of 13-15-year-old judokas. Similar studies were conducted by I.O. Kriventsova, G.O. Ogar, O.O. Panina (2020), they developed a training microcycle for young judokas with extensive use of various general and special means of strength training. V.S. Dobrynsky (2016) experimentally substantiated the effectiveness of using the method of circuit training for the development of speed and strength qualities of young judokas aged 13-14 years. J. A. Dias and et. al. (2012) compared the grip strength of both judokas and non-judokas and found that judokas were not stronger than non-judokas in absolute terms (peak grip), but judokas were more resistant to fatigue. D.

Harris, S. Foulds, S. Latella (2019) based on the analysis of the special literature offered practical recommendations for the development of strength of the upper and lower extremities, speed force and strength endurance. M. Wyon and et. al. (2016) proved that the use of vitamin D3 had a positive effect on muscle function and strength in elite judokas when training indoors.

During the experiment, it was found that the use of complexes of dynamic exercises in the training process has a positive effect on the strength preparedness of judoists in the experimental group. This is evidenced by the results of the experiment. At the beginning of the experiment, the control indicators of strength qualities between the control and experimental groups did not reveal significant differences ($p>0,05$, the value of t ranges from 0,32 to 1,01). At the end of the experiment, it can be noted that the judokas of the experimental group have significantly higher indicators of strength preparedness in almost all tests ($p<0,05$, the value of t ranges from 2,10 to 2,34). In the Uchi-komi test in 30 s, the result is better by 4,3% in the judokas of the experimental group, but it is statistically insignificant ($t=1,07$; $p>0,05$), this is since this exercise is specific to Judo.

Prospects for further research will be aimed at determining the correlations between strength qualities and technical and tactical training of qualified judokas.

Conflict of interest. The authors state that no conflict of interest could be perceived as damaging the impartiality of the article.

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