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IMPROVING THE INDICATORS OF TECHNICAL TRAINING OF YOUNG KARATEKAS WITH THE HELP OF MEANS AND METHODS OF FUNCTIONAL ALL-AROUND - CROSSFIT

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Abstract
The article presents the data of a pedagogical experiment conducted to improve the level of technical training of karatekas of 10–11 years old using the means and methods of the system of functional all-around – CrossFit, which is widely used in training and classes. The results recorded in the control and experimental groups, their main characteristics, absolute and relative changes in the arithmetic mean values of the data obtained, as well as the assessment of the statistical reliability of absolute changes based on the calculation of theoretical critical values of the Student's distribution, the number of degrees of freedom, and the level of significance.

Keywords: Control group, experimental group, technical training, functional all-around-CrossFit, Student's distribution, critical value, number of degrees of freedom, level of significance, statistical reliability, absolute, relative change.

Introduction

One of the priority tasks of physical education in the process of education and training of the younger generation - the heirs of our future, including young karatekas, is the preservation and strengthening of the health of athletes, the effective and rational use of health improvement products, the formation of respect for the values of a healthy lifestyle, as well as sustainable motivation for consistent and regular compliance with the basic principles and rules underlying it. Nowadays, more and more The relevance of innovative technologies in the field of physical education, sports and health care, as well as methods for the formation of physical training, focused on the personality and its comprehensive development, is increasing. Regular classes in the system of functional all-around - CrossFit not only contribute to the development of body muscles, but also increase the interest of athletes in sports and strengthen a healthy lifestyle among them.

The solution of the above urgent problems is associated with the use of modern means and methods that are rapidly gaining popularity all over the world. One of these areas is functional all-around - CrossFit, the use of which in the training of young athletes

shows the high relevance of the problem of improving the indicators of their technical training.

The pedagogical experiment was conducted with the participation of young karatekas of the sports school No 2 of the Mirzo-Ulugbek district of Tashkent. At the initial stage of the experiment, control and experimental groups (14 young athletes each) were formed from among 10-11-year-old karatekas with a similar level of training. At the beginning and at the end of the pedagogical experiment, based on the analysis of materials of scientific and methodological literature and generalization of their own practical experience, the results of ten tests were recorded, characterizing the level of technical training of the selected young karatekas.

Comparative data of the main statistical characteristics of the results of testing the level of technical training of 10–11-year-old karatekas from the control (n=14) and experimental (n=14) groups at the initial stage of the pedagogical experiment are given in Table 1.

Table 1 Comparative data of the main statistical characteristics of the test results describing the level of technical training of 10–11-year-old karatekas of the control (n=14) and experimental (n=14) groups at the initial stage of the pedagogical experiment

No	Control group			Experimental group			ARE	PR	t	R
Test	X	S	V, %	X	S	V, %				
1	9,82	1,24	12,63	9,71	1,26	12,98	0,11	1,12	0,23	>0,8
2	10,75	1,46	13,61	10,94	1,53	13,99	0,19	1,77	0,34	>0,7
3	9,44	1,10	11,62	9,63	1,15	11,94	0,19	2,01	0,45	>0,6
4	11,53	1,68	14,60	11,67	1,75	14,96	0,14	1,21	0,22	>0,8
5-	6,67	0,91	13,61	6,84	0,96	13,98	0,17	2,55	0,48	>0,6
6-	13,45	1,56	11,60	13,61	1,63	11,95	0,16	1,19	0,27	>0,7
7	9,38	1,37	14,61	9,17	1,37	14,97	0,21	2,24	0,41	>0,6
8	19,96	2,51	12,60	19,73	2,56	12,98	0,23	1,15	0,24	>0,8
9-	20,24	2,75	13,59	20,62	2,88	13,97	0,38	1,88	0,36	>0,7
10-	48,75	7,12	14,61	49,42	7,41	14,99	0,67	1,37	0,24	>0,8
							0,25	1,65		

Note: OR is the absolute difference, OR is the relative difference (in percentage).

For convenience and conditionally, in tables and diagrams, the indicators of technical training are indicated in the following order: 1 – time of movement forward in a combat stance for 15 m (s); 2 – time of moving back in a fighting stance for 15 m (s);

3 – the number of attacks with imitation of kicks per 10 seconds (times); 4 – the number of attacks with imitation of punches when jumping in 10 seconds (times); 5 – the number of attacks with imitation of kicks when jumping in 10 seconds (times); 6 – the number of attacks with a series of "Dolleo Chaga" hits on the bag in 10 seconds (times); 7 – the number of jumps on the spot with pulling the knees to the chest for 10 seconds (times); 8 – the number of blows of "Mavashi geri" while standing on one leg for 10 seconds (times); 9 – the number of steps with a yakuzuki kick in the gidanbarai stance for 20 m (once); 10 – the number of hits of the Yakuzuki with an elastic band in 1 minute (once).

The analysis of the data presented in the table shows that at the initial stage of the experiment, the relative differences in the arithmetic mean values of the indicators of technical training of the subjects of the control and experimental groups are not significant. In particular, the largest relative difference among the ten indicators studied was 2.55%, the smallest – 1.12%, and their average value – 1.65% (shown in the diagram in Fig. 1).

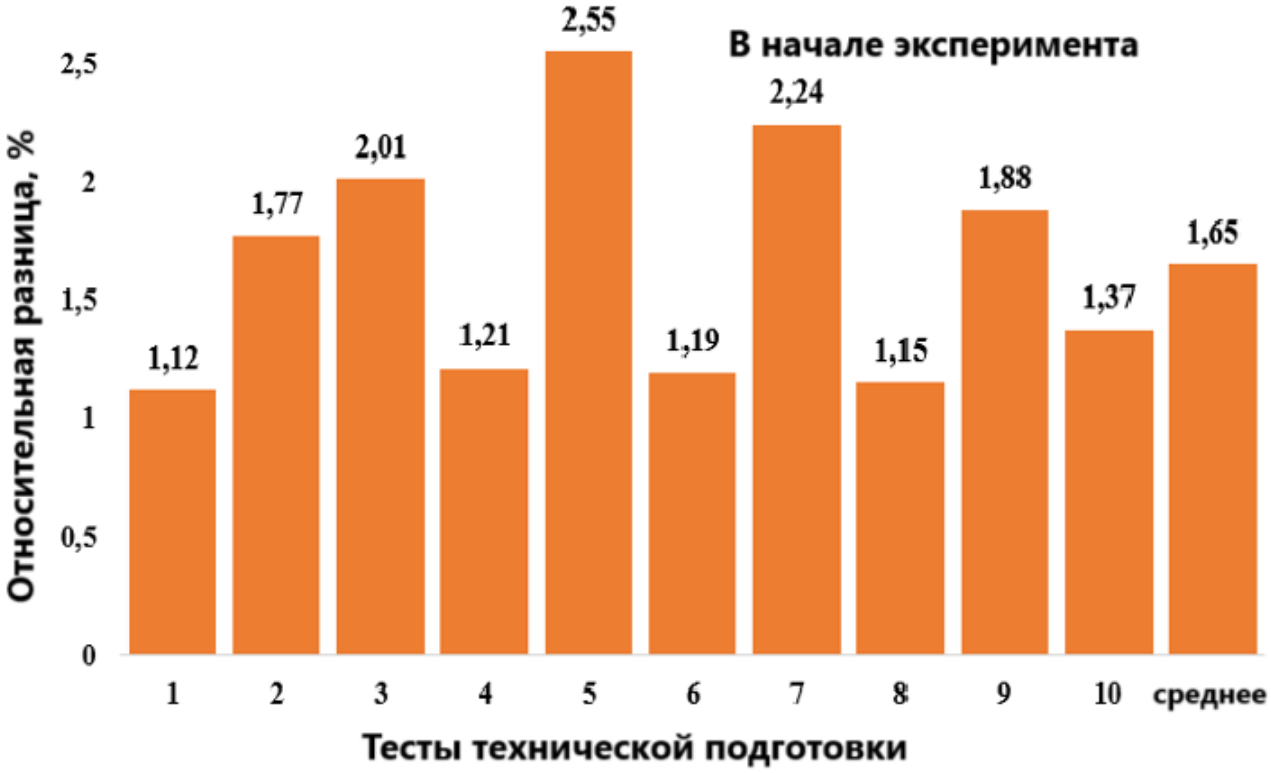

Figure 1. Diagram of relative differences in the arithmetic mean values of the indicators of technical training of 10–11-year-old karatekas of the control and experimental groups, recorded at the initial stage of the pedagogical experiment (in percentage).

The calculated absolute differences in arithmetic means, as well as theoretical critical values of the Student's distribution and estimates of statistical reliability based on the number of degrees of freedom and the level of significance, showed that all the identified differences are within the range of unreliable values (t in the range from 0.22 to 0.48 and P in the range >0.8 and >0.6).

This fact is proof that the pedagogical experiment was methodologically correctly organized.

Table 2 shows the data on the dynamics of changes in the main statistical characteristics of the indicators of technical training of karatekas of 10-11 years old from the control group, recorded (test and retest) at the beginning and at the end of the pedagogical experiment. It reflects the absolute and relative increase in arithmetic means, as well as the calculation of theoretical critical values of the Student's distribution and the estimation of statistical reliability based on the number of degrees of freedom and the level of significance.

Table 2 Dynamics of changes in the main statistical characteristics of the indicators of technical training of karatekas of 10–11 years old in the control group, recorded at the beginning and at the end of the pedagogical experiment (n=14)

test	The beginning of the experiment			End of the experiment			APP	OP	t	R
	X	S	V, %	X	S	V, %				
1	9,82	1,24	12,63	9,04	1,13	12,50	0,78	7,94	1,74	>0,05
2	10,75	1,46	13,61	9,82	1,32	13,48	0,93	8,65	1,76	>0,05
3	9,44	1,10	11,62	10,19	1,17	11,49	0,75	7,94	1,75	>0,05
4	11,53	1,68	14,60	12,69	1,84	14,50	1,16	10,06	1,74	>0,05
5-	6,67	0,91	13,61	7,42	1,00	13,47	0,75	11,30	2,09	<0.05
6-	13,45	1,56	11,60	14,52	1,67	11,49	1,07	7,93	1,75	>0,05
7	9,38	1,37	14,61	10,32	1,49	14,47	0,94	10,02	1,74	>0,05
8	19,96	2,51	12,60	22,05	2,75	12,48	2,09	10,46	2,10	<0.05
9-	20,24	2,75	13,59	22,13	2,98	13,47	1,89	9,34	1,74	>0,05
10-	48,75	7,12	14,61	53,67	7,78	14,50	4,92	10,09	1,75	>0,05
							1,53	9,37		

Note: AP is the absolute increase, OP is the relative increase (in percentage).

Analysis of the data presented in the table shows that the arithmetic mean values of the test results characterizing the level of technical training of karatekas in the control group changed in a positive direction during the experiment, that is, increased. In

particular, the smallest relative increase was 7.93%, the largest was 11.30%, and the average value for the group was 9.37% (shown in the diagram in Fig. 2).

At the same time, the results of assessing the statistical reliability of the increase in the arithmetic mean values of ten indicators of technical training in this group showed that eight of them have insignificant differences (t in the range of 1.74–1.76 at P>0.05), and two indicators have significantly improved (t = 2.09 and t = 2.10 at P<0.05).

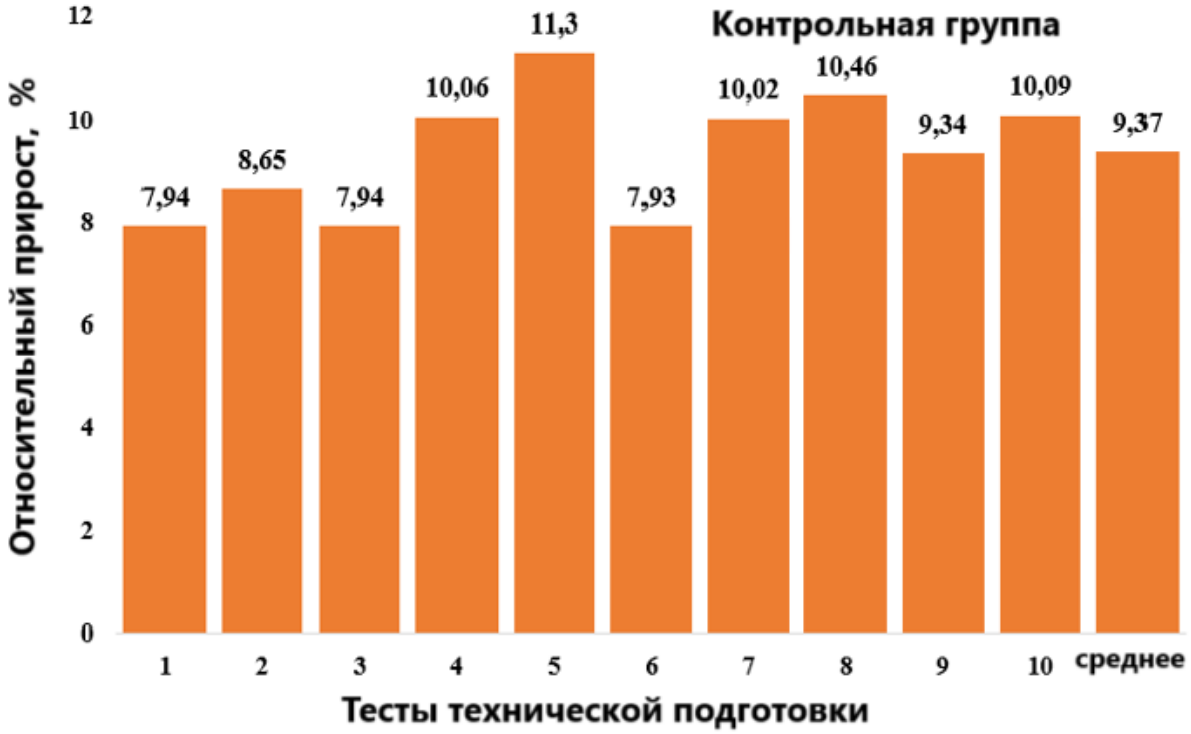

Figure 2. Diagram of relative increases in arithmetic mean values of indicators of technical training of 10–11-year-old karatekas of the control group in the course of a pedagogical experiment (in percentage).

The main statistical characteristics of the indicators of technical training of karatekas of 10–11 years old from the experimental group, recorded (test and retest) at the beginning and at the end of the pedagogical experiment, as well as data on the dynamics of changes, absolute and relative increase in arithmetic means, calculation of theoretical critical values of the Student's distribution and assessment of statistical reliability based on the number of degrees of freedom and the level of significance are given in Table 3.

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Table 3 Dynamics of changes in the main statistical characteristics of the indicators of technical training of karatekas of 10–11 years old in the experimental group, recorded at the beginning and at the end of the pedagogical experiment (n=14)

test	The beginning of the experiment			End of the experiment			APP	OP	t	R
	X	S	V, %	X	S	V, %				
1	9,71	1,26	12,98	8,23	1,00	12,15	1,48	15,24	3,44	<0.01
2	10,94	1,53	13,99	9,08	1,19	13,14	1,86	17,00	3,59	<0.01
3	9,63	1,15	11,94	11,17	1,24	11,10	1,54	15,99	3,41	<0.01
4	11,67	1,75	14,96	14,02	1,98	14,12	2,35	20,14	3,33	<0.01
5-	6,84	0,96	13,98	8,41	1,11	13,14	1,57	22,95	4,02	<0.001
6-	13,61	1,63	11,95	15,76	1,75	11,12	2,15	15,80	3,36	<0.01
7	9,17	1,37	14,97	11,06	1,56	14,14	1,89	20,61	3,40	<0.01
8	19,73	2,56	12,98	23,95	2,91	12,15	4,22	21,39	4,07	<0.001
9	20,62	2,88	13,97	24,42	3,21	13,14	3,80	18,43	3,30	<0.01
10	49,42	7,41	14,99	60,13	8,49	14,12	10,71	21,67	3,56	<0.01
							3,16	18,92		

Note: AP is the absolute increase, OP is the relative increase (in percentage).

Analysis of the data presented in the table shows that the arithmetic mean values of the test results characterizing the level of technical training of karatekas in the experimental group also changed in a positive direction, that is, increased, similar to the growth of the indicators of the control group. In particular, the smallest relative increase was 15.24%, the largest was 22.95%, and the average value for the group was 18.92% (shown in the diagram in Fig. 3).

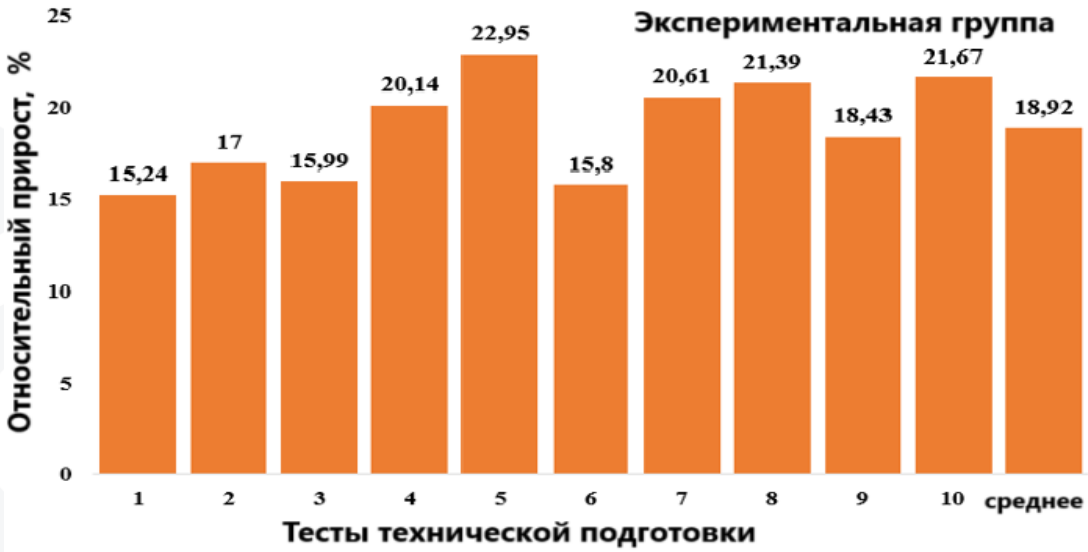

Figure 3. Diagram of relative increases in arithmetic mean values of indicators of technical training of 10–11-year-old karatekas of the experimental group in the course of a pedagogical experiment (in percentage).

At the same time, the results of the assessment of the absolute increase in the arithmetic mean values for the ten studied indicators of technical training of karatekas of this group based on the calculation of theoretical critical values of the Student's distribution, the number of degrees of freedom and the level of significance showed that eight of them significantly improved at a good level of significance (t in the range of 3.30–3.59 at P<0.01), and two more at a high level of significance (t=4.02 and t=4.07 at P<0.001).

Table 4 shows the data on the dynamics of changes in the main statistical characteristics of the indicators of technical training of karatekas of 10-11 years old in the control and experimental groups, recorded (test and retest) at the beginning and at the end of the pedagogical experiment. Arithmetic means, absolute and relative increments, as well as a comparative assessment of statistical reliability are presented.

Table 4 Comparison of the dynamics of changes in the main statistical characteristics of the indicators of technical training of karatekas of 10–11 years old in the control (n=14) and experimental (n=14) groups in the course of the pedagogical experiment

Tests	Gruppa									
		X	S	V, %	X	S	V, %	AP	OP	t	R
1	KG	9,82	1,24	12,63	9,04	1,13	12,50	0,78	7,94	5,95	>0,05
	EG	9,71	1,26	12,98	8,23	1,00	12,15	1,48	15,24	11,78	<0.01
2	KG	10,75	1,46	13,61	9,82	1,32	13,48	0,93	8,65	6,04	>0,05
	EG	10,94	1,53	13,99	9,08	1,19	13,14	1,86	17,00	12,28	<0.01
3-	KG	9,44	1,10	11,62	10,19	1,17	11,49	0,75	7,94	5,99	>0,05
	EG	9,63	1,15	11,94	11,17	1,24	11,10	1,54	15,99	11,66	<0.01
4-	KG	11,53	1,68	14,60	12,69	1,84	14,50	1,16	10,06	5,96	>0,05
	EG	11,67	1,75	14,96	14,02	1,98	14,12	2,35	20,14	11,40	<0.01
5	KG	6,67	0,91	13,61	7,42	1,00	13,47	0,75	11,30	7,15	<0.05
	EG	6,84	0,96	13,98	8,41	1,11	13,14	1,57	22,95	13,76	<0.001
6	KG	13,45	1,56	11,60	14,52	1,67	11,49	1,07	7,93	5,98	>0,05
	EG	13,61	1,63	11,95	15,76	1,75	11,12	2,15	15,80	11,52	<0.01
7	KG	9,38	1,37	14,61	10,32	1,49	14,47	0,94	10,02	5,94	>0,05
	EG	9,17	1,37	14,97	11,06	1,56	14,14	1,89	20,61	11,63	<0.01
8	KG	19,96	2,51	12,60	22,05	2,75	12,48	2,09	10,46	7,17	<0.05
	EG	19,73	2,56	12,98	23,95	2,91	12,15	4,22	21,39	13,94	<0.001
9	KG	20,24	2,75	13,59	22,13	2,98	13,47	1,89	9,34	5,97	>0,05
	EG	20,62	2,88	13,97	24,42	3,21	13,14	3,80	18,43	11,28	<0.01
10	KG	48,75	7,12	14,61	53,67	7,78	14,50	4,92	10,09	5,97	>0,05
	EG	49,42	7,41	14,99	60,13	8,49	14,12	10,71	21,67	12,17	<0.01

Note: AP is the absolute increase, OP is the relative increase (in percentage).

Analysis of the table data shows that the arithmetic mean values of the test results characterizing the level of technical training of karatekas of 10-11 years old, both in the control and experimental groups, have changed in a positive direction, that is, they have increased. At the same time, a significantly larger increase was observed in the experimental group compared to the control group. In particular: the minimum relative increase was 15.24% against 7.93% in the control group (difference +7.31%), the maximum relative increase was 22.95% against 11.30% (difference +11.65%), the average relative increase was 18.92% against 9.37% (difference +9.55%) (see the diagram in Figure 4).

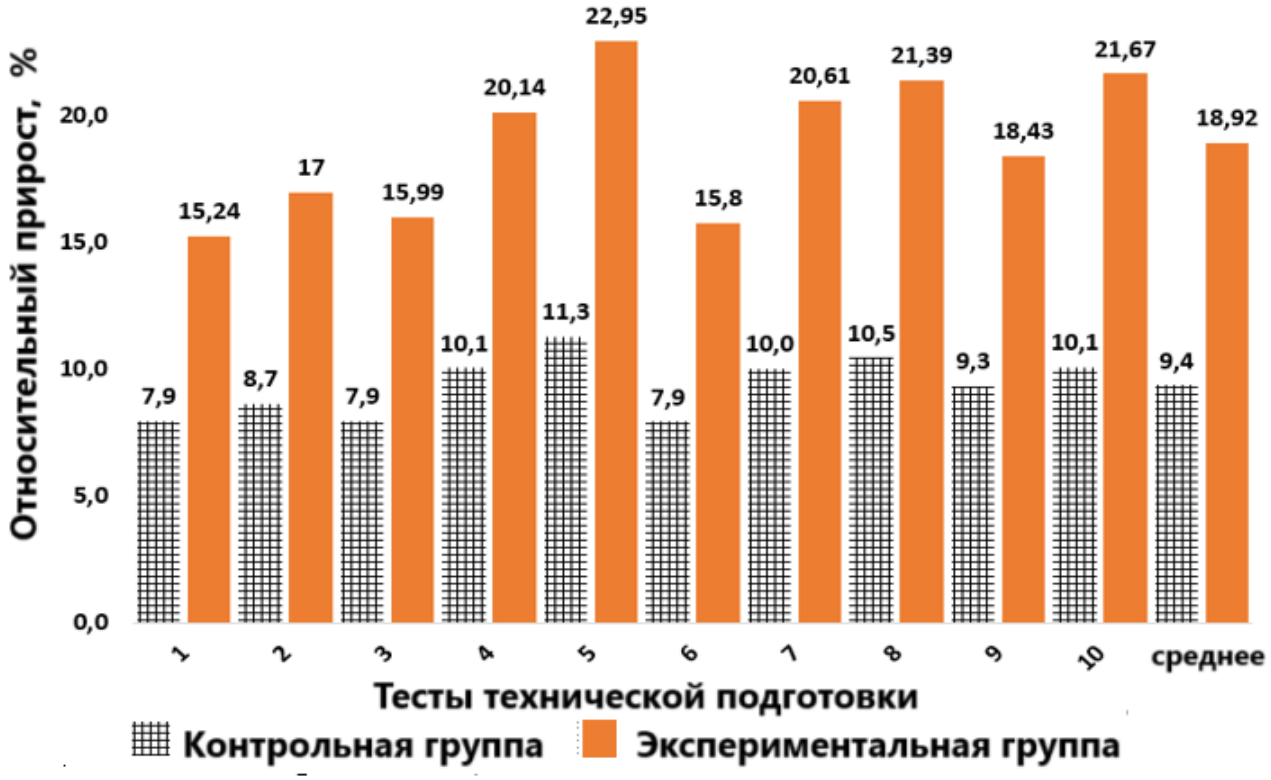

Figure 4. Diagram of comparison of relative increases in arithmetic mean values of indicators of technical training of 10–11-year-old karatekas of the control and experimental groups in the course of a pedagogical experiment (in percentage).

Table 5 presents the data on the comparison of the relative increases in the arithmetic mean values of the indicators of technical training of karatekas of 10–11 years old in the control and experimental groups for each test, as well as their ratio.

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Table 5 Dynamics of relative increments of arithmetic mean values of indicators of technical training of karatekas of 10–11 years old control (n=14) and experimental (n=14) groups in the course of pedagogical experiment and their ratio

Tests	Control group	Experimental group	OP EG/KG
1-	7,94	15,24	1,919
2-	8,65	17,00	1,965
3	7,94	15,99	2,013
4	10,06	20,14	2,002
5	11,30	22,95	2,030
6	7,93	15,80	1,991
7	10,02	20,61	2,057
8	10,46	21,39	2,045
9	9,34	18,43	1,974
10	10,09	21,67	2,147
average	9,37	18,92	2,018

Note: OP EG /KG is the ratio of the relative increase in the results of the experimental group during the experiment to the control group.

Analysis of the table data shows that the relative increases in the arithmetic mean values of the indicators of technical training of the subjects of the experimental group exceeded the corresponding indicators of the control group: in the 1st test – 1.919 times (15.24 : 7.94), in the 2nd test – 1.965 times, in the 3rd test – 2.013 times, in the 4th test – 2.002 times, in the 5th test – 2.030 times. in the 6th test – 1.991 times, in the 7th test – 2.057 times, in the 8th test – 2.045 times, in the 9th test – 1.974 times, in the 10th test – 2.147 times.

On average, the relative increase in the experimental group was 2.018 times higher than in the control group (18.92 % : 9.37 %).

Conclusion

In the course of the pedagogical experiment, it was established that the relative differences in the arithmetic mean values for ten indicators of technical training were: the largest – 2.55%, the smallest – 1.12%, with an average value of 1.65%. At the same time, the results of checking the absolute differences in the arithmetic mean values according to the Student's criterion showed that all of them are in the range from t = 0.22 to t = 0.48 at the significance levels P>0.8 – P>0.6 and are not statistically significant. This fact indicates that the pedagogical experiment was methodologically correctly organized.

The average relative increase in the indicators of technical training in karatekas of 10-11 years old in the experimental group was 18.92%, while in the control group it was 9.37%. The ratio of these indicators (18.92: 9.37 = 2.018) indicates that the improvement in the experimental group was more than twice as significant.

Analysis of the results of the absolute increase in arithmetic mean values in the control group showed that eight tests demonstrated statistically insignificant improvement at a satisfactory level of significance (t=1.74–1.76; P>0.05), and only two tests had a statistically significant improvement (t=2.09–2.10; P<0.05).

At the same time, in the experimental group, eight tests showed a statistically significant improvement at a good level of significance (t=3.30–3.59; P<0.01), and two tests showed a high level of significance (t=4.02–4.07; P<0.001).

Thus, it was established that the means and methods used in the training of the experimental group turned out to be much more effective in comparison with the methods and means used in the training of the control group.

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