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ROVNIYA. ¹, ROVNAYA O. ², GALIMSKIY V. ³¹Kharkiv State Academy of Physical Culture²Kirovograd Flight Academy of National Aviation University

Optimisation development coordinated young karate sportsmen abilities at the stage of preliminary base training

Abstract. Purpose: substantiation methodise perfection development of young karate sportsmen coordinated abilities at the stage of preliminary base training. **Material and Methods:** tested results of 57 young sportsmen divided in to 2 groups of equal preparatory level: control group (n=27) and experimental group (n=30) vestibular stability was tested by special tests and Romberg's (station) test. **Results:** the results of vestibular stability testing were established as the ground of coordinated young sportsmen abilities. Initial indices of static and dynamic equilibrium of control group didn't differ from experimental group. Introduction of program of optimization training progress promoted considerable increasing indices static and dynamic equilibrium. The development of these abilities provided more effective forming complicated coordinated technical actions of young karate sportsmen. **Conclusion:** worker out programme promoted increasing the level of vestibular stability, which expresses in motive and vegetative improvements. It is just because of right forming moving hobbies of long conservation (keeping) equilibrium body is the ground regulation vestibular apparatus (organs) of complicated sportsmen action.

Keywords: static and dynamic balance, motive tests, coordination abilities, program of optimization.

Introduction. The competitive activity causes the necessity of a high level of proficiency in special any movements which are carried out with a high precision in the conditions of the deficiency of time against a high neuroemotional pressure [2; 4; 19; 20; 21].

In practice of sports activity the search of new ways of the increase of technical skill of sportsmen is carried out, learning the efficiency to physical actions. The process of mastering of complicatedly-coordinated physical actions is successful if a sportsman not only has the high level of physical fitness, but also advanced abilities of management of own movements. Therefore the high level of the development of coordination abilities is a basis of management of the motive activity in sport. It is proved that quality of a performance of technical elements; especially in the fast-changing motive activity depends on the level of improvement of coordination abilities [5; 10; 11; 18].

The problem of the development of coordination abilities is presented in the modern scientific and methodical literature. So, a number of scientific data is devoted to a research of features of the development and a technique of the improvement of coordination abilities at pupils [8; 9], at sportsmen of different types of sport and various age groups [3; 6; 7; 12; 14].

The scientific researches are devoted to studying of the sensitive periods of the development of coordination abilities. The works are devoted to techniques of definition and criteria of an assessment [1; 12; 13; 15; 16; 17].

At the same time the problem of the development of coordination abilities of young karatekas is studied insufficiently [6; 10].

Besides, our researches and practical experience in CYSS showed that in the training process of young karatekas is paid not enough attention to the formation of abilities to operate difficult techniques in the conditions of the competitive activity. Such situation also proves relevance of the given research.

Communication of the research with scientific programs, plans, subjects. The research was conducted according to a subject of the Consolidating plan of the research work in the sphere of physical culture and sport for 2011-2015. The Ministries of Education and Science, youth and sport of Ukraine within a subject 2.18 "Improvement of mechanisms of management of the motive activity of sportsmen" (number of the state registration is 0111U000195).

The objective of the research: justification of a technique of optimization of the development of coordination abilities of young karatekas at a stage of preliminary basic preparation.

The following **tasks** were set for realization of the research objective:

1. To define specific features of the development of coordination abilities of young karatekas at a stage of preliminary basic preparation.
2. To develop and to prove experimentally a technique of optimization of the development of coordination abilities of young karatekas.

Material and methods of the research. Such *methods of the research* were applied to the solution of objectives: analysis and generalization of scientific literature, pedagogical testings, anthropometry, goniophotometry, time-keeping, coordinatometry, reflexometry, methods of mathematical statistics.

The pedagogical experiment was made in the conditions of the training process in which 57 young sportsmen took part who were divided into two groups of the equivalent level of preparation: the control group (n=27) and the experimental group (n=30).

Sportsmen of the control group trained according to the existing program in CYSS and sports clubs. Additional exercises for the development of coordination abilities were brought in the program of training of the experimental group.

Results of the research and their discussion. The general and special training exercises in interrelation with elements of technology of karate were applied in the training process (tab. 1).

Table 1

Training means for the development of coordination abilities of young karatekas

General	Special
Rope jumping. Jumps up through an elastic band. Outleap on a hill of mats. Jumps through stuffed balls. Jumps on two feet on a ladder up.	Jumps –roll-over through an obstacle with imitation of various kicks. Walking by a back forward blindly and imitation of various kicks.
Acrobatic exercises (somersaults in body and legs bent, nape stand, head balance, fall overs, somersault). Gymnastic exercises (exercises on balance, various moves feet, splits). Exercises of taekwondo, kickboxing, Thai boxing (a movement in a fighting rack, a series of kicks by hands and feet, actions in defense, blocking, counterattack).	Jumps on marking with imitation of various kicks. Jumps with rotation with the help of hands and without. Jumps with imitation – a fight with a “shadow”. Rotations round a vertical axis in a semi-squat with a performance of various kicks.
Imitating exercises (various kicks by feet, by hands, movements at attack, counterattack, and defense: actions at an entrance and an exit from a clinch, a fight with a “shadow”).	Step movement on a straight line blindly with imitation of technique of various kicks.
The all-developing exercises: exercises on a trampoline (walking, jumping ups, jumps with contralateral landing).	Competitive exercises (the set series of kicks on paws rackets or protectors, sparrings with a certain task).

The experimental program contains 5 blocks of the training means aimed at the development of coordination abilities and training of basic elements of technique of karate.

The first block was made by the exercises aimed at the development of a static and dynamic balance. The close attention when performing these exercises was paid to correctness of a performance of a shock phase and a preservation of a balance after a kick. It gives the chance instantly to continue a fight.

The second block of training exercises is aimed at the development of ability to the accuracy of movements with rotations.

The third block of training tasks is aimed at the development of ability to differentiate spatial and temporary parameters of movements and the improvement of technique of joint performance of kicks by hands and feet in the average and the top level.

The fourth block of training tasks contained the exercises aimed at the development of abilities to evolution and coordination of physical actions and also on the improvement of technique of physical actions – attack and counterattack.

The fifth block of training tasks is directed on the performance of difficult hopping actions, and also on the improvement of technique of double kicks in the case and to the top level on a place and at the step movement.

All training tasks were performed taking into account the set amplitude of movements, accuracy, speed and rhythm. A certain part of exercises needs to be carried out blindly, at different distances with an unknown movement of an opponent.

When planning the training tasks directed on the increase of level of coordination opportunities such components of loading were considered: complexity of movements, intensity and duration, number of repetitions in one approach, duration of pauses and rest between exercises:

1. Exercises of various complexities were accepted for the development of coordination abilities – from rather simple, stimulating the touch systems and the neuromuscular device, to the most difficult, causing full mobilization of functionality of sportsmen.

2. Intensity of a performance considerably was defined by the need of the complex solution of problems of special preparation (tab. 2).

Table 2

Intensity of training loads (according to I. N. Pashkov, 2011)

Intensity zones on HR (bpm ⁻¹)	All-preparatory stage	Special and preparatory stage
1 zone – HR (130–150)	40%	35%
2 zone – HR (150–170)	40%	35%
3 zone – HR (170–180)	20%	30%

3. Duration of exercises fluctuated in the wide range at continuous performance from 10 s till 20 s and depended on the coordination complexity.

4. During the short work in each exercise (to 5 s), the number of repetitions fluctuated from 6 to 12 times. At longer tasks the number of repetitions in one approach made from 4 to 8 times.

5. Duration of pauses of rest between separate exercises fluctuated from 1 to 3 minutes. In some cases, when the task of a performance of exercise against exhaustion was set, duration of pauses of rest made 10–15 s.

Initial results of testing of the general coordination indicators in CG and EG didn't differ among themselves (tab. 3).

Table 3

Indicators of the general coordination abilities of karatekas of CG and EG at the beginning of the experiment

Tests	CG		EG		p	
	$\bar{X} \pm m$	σ	$\bar{X} \pm m$	σ		
Maintenance of a static balance on one foot with open eyes (s)	30,6±1,92	7,19	30,79±1,7	6,37	>0,05	
The same with closed eyes (s)	24,56±1,84	6,90	24,73±1,52	5,69	>0,05	
Exercise on coordination of movements of hands and feet (s)	16,77±0,71	2,67	15,21±0,47	1,78	>0,05	
Tepping-test (quantity)	25,73±0,71	2,65	27,47±0,68	2,54	>0,05	
Time of reaction to a sound irritant (s)	0,32±0,02	0,07	0,32±0,02	0,09	>0,05	
Time of reaction to a light irritant (s)	0,36±0,02	0,08	0,35±0,02	0,07	>0,05	
Accuracy of reproduction of length of the line without a visual control (sm)	1,77±0,29	1,08	1,56±0,18	0,68	>0,05	
Shuttle run (s)	11,08±0,21	0,77	11,21±0,26	0,98	>0,05	
The test of Romberg (s)	left	33,64±1,44	5,38	33,77±1,24	4,64	>0,05
	right	34,24±1,34	5,45	34,71±1,33	4,98	>0,05
Reproduction of an effort of 50% by the strongest hand (%)	16,46±2,70	10,12	17,85±2,41	9,00	>0,05	

Apparently from the table, indicators of coordination abilities between CG and EG had no reliable distinctions. However introduction of the program of optimization of training classes due to the inclusion of acrobatic exercises and sports caused a considerable improvement of indicators of coordination abilities in the experimental group (tab. 4).

Table 4

Indicators of general coordination abilities of CG and EG at the end of the experiment

Tests	CG		EG		p	
	$\bar{X} \pm m$	σ	$\bar{X} \pm m$	σ		
Maintenance of a static balance on one foot with open eyes (s)	36,86±0,42	1,57	40,94±0,77	2,88	<0,05	
The same with closed eyes (s)	29,49±0,55	2,05	31,25±0,55	2,04	<0,05	
Exercise on coordination of movements of hands and feet (s)	15,70±0,69	2,57	14,01±0,47	1,75	<0,05	
Tepping-test (quantity)	25,50±0,41	1,55	29,62±0,38	1,47	<0,001	
Time of reaction to a sound irritant (s)	0,26±0,05	0,02	0,19±0,04	0,02	<0,001	
Time of reaction to a light irritant (s)	0,31±0,03	0,07	0,25±0,01	0,02	<0,05	
Accuracy of reproduction of length of the line without a visual control (sm)	9,59±0,54	2,03	9,35±0,17	6,35	>0,05	
Shuttle run (s)	10,68±0,14	0,52	9,86±0,16	0,51	<0,01	
The test of Romberg (s)	left	34,12±1,24	4,62	38,51±0,96	4,20	<0,05
	right	39,04±0,95	3,57	42,54±0,94	3,52	<0,05
Reproduction of an effort of 50% by the strongest hand (%)	14,17±1,88	6,66	8,01±1,31	4,92	<0,05	

Results of the researches of coordination abilities testify to the improvement of their indicators in both groups. However introduction of the program of optimization in the experimental group promoted a considerable improvement of their general coordination abilities. So, the indicator of the first test in EG increased by 25,5%, and in CG – for 20,5%. The second indicator in EG increased by 22,6%, and CG – for 20,8%. Similar changes are observed in dynamics of the third indicator: EG – 7,14%, CG – 6,25%. The indicator the tepping-test in CG didn't change, and in EG increased by 6,9%. Sensomotor reactions are observed on a sound better in CG for 16% and for light – for 19%. In EG these indicators improved respectively for 14% and for 17,3%.

Considerably, in comparison with CG, indicators of shuttle run – 3,5% and 21,7% improved in EG. Similar changes are

observed in indicators of the test of Romberg: CG – 9,8% and EG – 14,9%, and in indicators of accuracy of reproduction of the set effort: CG – 13,3%, and in EG – for 17,8%.

The analysis of the conducted researches testify to the existence of a high level of communication between the general indicators of coordination abilities and special complicatedly-coordinated actions which considerably raised after the experiment in the experimental group (tab. 5).

Table 5

Indicators of special complicatedly-coordinated actions of karatekas of EG and CG after the introduction of the program of optimization of the training process

Tests	Investigation phase	EG (n=30)	CG (n=27)	p
Static balance on the right foot (s)	To	12,67±0,24	12,71±0,23	>0,05
	After	43,5±1,89*	24,81±0,94*	<0,01
Static balance on the left foot (s)	To	22,98±1,05	22,93±0,88	>0,05
	After	43,93±1,52*	34,19±1,09*	<0,01
Dynamic balance right foot (s)	To	8,55±0,24	8,75±0,27	>0,05
	After	44,81±1,55*	27,25±1,16*	<0,01
Dynamic balance left foot (s)	To	9,90±0,59	10,04±0,37	>0,05
	After	47,02±1,84*	30,72±1,19*	<0,01
5 sidekicks to the top level raising of the right foot (s)	To	6,68±0,11	6,74±0,15	>0,05
	After	5,18±0,12*	6,14±0,13*	<0,01
5 sidekicks to the top level raising of the left foot (s)	To	6,99±0,16	7,04±0,13	>0,05
	After	5,50±0,11*	6,53±0,14*	<0,01
Sidekicks by the right foot in the average level for 10 s (quantity)	To	16,5±0,20	16,3±0,11	>0,05
	After	19,3±0,30*	19,41±0,12*	>0,05
Sidekicks by the left foot in the average level for 10 s (quantity)	To	15,80±0,12	15,50±0,21	>0,05
	After	18,8±0,21*	18,53±0,23*	>0,05
2 kicks by hands – the front in a breast and the second in a stomach for 10 s (quantity)	To	8,71±0,21	8,76±0,23	>0,05
	After	10,21±0,18*	10,05±0,23*	>0,05
The same 5 combinations (s)	To	8,14±0,31	8,09±0,27	>0,05
	After	7,36±0,17	7,48±0,13*	>0,05
2 kicks by hands and one sidekick in the average level of 5 series (s)	To	15,14±0,09	15,09±0,11	>0,05
	After	12,70±0,07*	12,90±9,09*	>0,05
Attack - counterattack (s)	To	5,14±0,09	5,17±0,07	>0,05
	After	4,16±0,07*	4,12±0,08*	<0,01

Note. * – intragroup distinctions.

The analysis of results of the research testifies that positive changes of indicators of coordination abilities are observed in EG and CG. More substantial increase of results of the research is observed in EG.

The greatest improvement was observed in indicators of a static balance on the right and left foot – 70,1% and 48,70%, and also a dynamic balance of the right and left foot – 19,07% and 18,77%. Considerable rates of a gain of indicators of EG were observed in tests: 5 kicks by the right and left foot to the top level of 22,5% and 28,6%, attack and counterattack – 19,1%, two kicks by hands in a breast and a stomach – 11,7 and 12,2%.

Rates of a gain of indicators of the test sidekicks are expressed in the average level for 10 s the right and left foot – 17,5% and 19,1%.

Statistically reliable indicators of testing after the experiment were observed and in the control group, however rates of a gain were much lower in general.

Thus, the application of the experimental program of improvement of the complicatedly-coordinated activity of karatekas provided a considerable improvement of the studied indicators in comparison with the existing program of CYSS.

Conclusions. The directions of optimization of training activity are established As a result of the conducted research of

a condition of the level of the development of coordination abilities. It is known that coordination of movements represents the coordinated direction of tension and relaxation of muscles. This coherence is defined by the level of a muscular tone which is regulated constantly by the vestibular touch system. Constant physical actions (accelerations and stops, rotations in a supported and unsupported situation) cause a considerable irritation of semicircular channels which states change a tone of separate muscular groups that causes a violation of accuracy and a coherence of physical actions.

The offered program is directed on the increase of vestibular stability which is expressed in motor and vegetative shifts. The developed blocks of training tasks provided the increase of a static and a dynamic balance, as indicators of a vestibular stability. A correct formation of movement skills of long preservation of a balance of a body is a regulation basis a vestibular system of complicatedly-coordinated actions of sportsmen.

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Anatoliy Rovnyy: Doctor of Science (Physical Education and Sport), Professor; Kharkiv State Academy of Physical Culture: Klochkovska str. 99, Kharkiv, 61058, Ukraine.

ORCID.ORG/0000-0003-0308-2534

E-mail: tolik.rovnyy@mail.ru

Olga Rovnaya: PhD (Biology); Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.

ORCID.ORG/0000-0003-1519-5632

E-mail: rovnayaolga@mail.ru

Volodymyr Galimskiy: PhD (physical education and sport), Kirovograd Flight Academy of National Aviation University: Dobrovolskiy str. 1; 25005, Kirovograd, Ukraine.

ORCID.ORG/0000-0001-7682-2009

E-mail: Galimskiy@rumbler.ru