Improving speed training of qualified karate athletes at the stage of sports perfection

Rakhmatov Bektosh Shomurod ugli[1]., Rakhimova Malika Shukhratovna[1]

[1]Uzbekistan state university of physical education and sport, Chirchik, Uzbekistan

Abstract

Purpose: is to develop and experimentally substantiate the effectiveness of a methodology for improving speed training of qualified karate athletes.

Methods: analysis of scientific and methodological literature, pedagogical observation, pedagogical testing, and mathematical statistical methods.

Results: The increase in karate athletes' preparedness indicators reached significant values by the end of the experiment. Thus, in the CG, the indicators of the test "Olympic jump in 30 sec" were 24.8±2.93 at $p>0.05$, the increase in the indicator was 5.1%, while in the EG, the indicators were 25.2±2.34 at $p<0.05$, and the increase was 10.0%.

Conlcusion: The increase in the indicators of the experimental group at the end of the study was as follows: in the "Olympic jump in 30 sec" test - 10.0%; in the "Sit-ups from a supine position in 30 sec" test - 12.1%; in the "Hand strikes "Gyaku tsuki" in 30 sec (number) " test - 10.4%; in the "Leg kicks "Mawashi geri" in 30 sec (number)" test - 12.3%.

Keywords: speed training, physical fitness, physical qualities, physical development, plyometrics.

Introduction

Sport today is an integral component of modern world culture, representing a universal tool for strengthening public health, unlocking personal potential, self-expression, and actively combating negative social phenomena. As a result, its significance in the global value system has increased substantially. The international sports movement, which includes sports in Uzbekistan, has become one of the most influential and widespread social phenomena, uniting millions of people worldwide.

In recent years, Uzbekistan has been taking active and systematic measures to develop physical culture and mass sports, promote a healthy lifestyle among all segments of the population, and enhance the competitiveness of national athletes at the global level. Thanks to targeted state policy, new sports complexes are being built, sports infrastructure is being improved, and support for young talents and sports reserves is being strengthened.

Our renowned athletes, who have repeatedly confirmed and continue to prove the high level of Uzbek sports on the international stage, evoke admiration not only from our fellow citizens but have also gained recognition from the entire global sports community. The regular victories of Uzbek athletes in world championships, Olympic and Asian Games contribute to raising the country's international prestige and inspire young people to actively engage in sports.

In the structure of competitive karate, the speed of motor reaction, the quickness of executing technical actions, and the ability to instantly switch between actions play a decisive role. Under the constraints of limited match time and active resistance from the opponent, it is precisely these speed qualities that ensure success in both attack and defense. Modern requirements for a karateka's technical and tactical arsenal necessitate constant improvement in reactive, motor, and specialized speed.

Studies by V.N. Platonov, A.V. Tunyants, G. Hara, and G. T. S. Chelliah indicate that an athlete's movement speed is closely related to their coordination, neuromuscular activity, and level of speed-strength training, as well as dependent on the age-related and morphofunctional characteristics of the body.

Speed qualities in martial arts are characterized by:

- Speed of motor reaction (simple and complex);
- Speed of a single movement (for example, a lightning-fast kick);
- Frequency of movements (for example, a series of punches - tempo);
- Speed of movement (forward/backward, sideways);
- Instant change of direction (acceleration and deceleration during combat).

Authors such as L.S. Dvorkin and S.P. Ryabinin note the importance of incorporating variable methods and reaction-tempo exercises; Yu.I. Kuramshin emphasizes the need for multiple repetitions with a high level of concentration; R. Newton and G. Cometti recommend including plyometric and sensorimotor training.

Although extensive experience has been accumulated in global sports science in the field of speed training, aspects of applying neurocognitive stimuli, age-related dynamics, and interstyle differences in techniques remain unexplored. These gaps open up prospects for further research, especially in relation to karate athletes aged 15-16 at the stage of sports improvement.

Methods

To address the given task, two equal-sized groups of athletes (experimental and control) were formed, each consisting of 15 individuals. The control group athletes continued to train according to the standard training program, while the experimental group's training program incorporated a specially developed set of exercises aimed at improving speed qualities.

The effectiveness of the experimental methodology was assessed by testing athletes and subsequently analyzing the dynamics of changes in the main indicators of their speed preparedness throughout the experiment.

Two complementary sets of exercises aimed at developing various components of speed training for 15-16 year old karate athletes have been developed. These sets were designed taking into account the age-related and physiological characteristics of adolescents, as well as the specifics of competitive activities in karate.

The exercise sets form the basis of a microperiod, in which three key goals are pursued:

1. Development of rapid motor reaction (sensorimotor component);
2. Improvement of movement frequency and explosive strength;
3. Enhancement of decision-making speed and movement switching ability.

Each of the sets includes 6 to 7 exercises aimed at developing the following speed components:

- locomotor (movement speed),
- manual (hand movement speed),
- reaction (visual and auditory),
- coordination speed (action switching, complex coordination).

The duration of each exercise ranges from 10 to 30 seconds (depending on intensity); the number of repetitions/sets is 2 to 4 per exercise; rest between exercises: 30-60 seconds (depending on exercise intensity); rest between sets: 5 minutes of active recovery, including breathing exercises, light stretching, and hydration.

This regimen aims to maintain high intensity, prevent central nervous system fatigue, and form stable neuromotor connections. Exercises alternate in type and movement structure to activate different motor chains and minimize adaptation. Sensory-reactive stimuli are incorporated: the coach gives commands to move or change technique based on audio or visual signals. Paired exercises are included to model real competitive situations. Some exercises contain plyometric elements and emphasized speed work, which develops explosive strength and improves technique tempo.

Scientific and practical significance. The research results contribute to deepening scientific understanding of the mechanisms and patterns of improving speed training for qualified karate athletes aged 15-16 years. The obtained data reveal the dynamics of changes in speed indicators and the effectiveness of the proposed specialized training methodology. The practical significance lies in the possibility of applying this methodology in the training process to purposefully enhance the speed capabilities of karate athletes at the stage of sports improvement.

Results and discussion

To assess the effectiveness of the developed methodology, a pedagogical experiment was conducted, with the reliability of results verified using mathematical statistical methods. The level of general and special physical preparation of karate athletes was evaluated through a set of tests that assessed various aspects of their physical condition and preparedness. Comparative indicators obtained from testing athletes in the control and experimental groups before and after the experiment are presented in Table 1.

The average statistical indicators at the final stage of the experiment in the test "Lifting the torso from a supine position in 30 seconds" for the experimental group of karate athletes were 22.1±2.52 at $p<0.05$, an increase of 12.1%, and in the control group - 21.9±2.39 at $p>0.05$, an increase of 5.8%.

A similar trend is observed in the average group indicators for the test "Hand strikes "Gyaku tsuki" in 30 seconds (number) ". In the CG, the test indicators were 35.5±4.37 at $p>0.05$, an increase of 2.0%; in the EG, the data were 36.1±3.79, an increase of 10.4% at $p<0.05$.

Table 1. **Dynamics of changes in GPP and SPP indicators in CG and EG (n=30)**

No.	Indicators studied	Control group (n=15)							Experimental group (n=15)						
		At the beginning of the study		At the end of the study		t_{cr}	P	Increase (%)	At the beginning of the study		At the end of the study		t_{cr}	P	Increase (%)
		$\bar{x} \pm \sigma$	υ	$\bar{x} \pm \sigma$	υ				$\bar{x} \pm \sigma$	υ	$\bar{x} \pm \sigma$	υ			
1	"Olympic Jump" in 30 sec (count)	23.6±3.20	13.6	24.8±2.93	11.8	1.07	P > 0.05	5.1	22.9±2.42	10.6	25.2±2.34	9.3	2.69	P < 0.05	10.0
2	Lifting the torso from a supine position in 30 seconds	20.7±2.34	11.3	21.9±2.39	10.9	1.31	P > 0.05	5.8	19.7±2.23	11.3	22.1±2.52	11.4	2.76	P < 0.05	12.1
3	"Gyaku tsuki" hand punches in 30 sec (number)	34.8±4.51	13.0	35.5±4.37	12.3	0.45	P > 0.05	2.0	32.7±3.74	11.4	36.1±3.79	10.5	2.48	P < 0.05	10.4
4	"Mawashi geri" kicks in 30 sec (number)	22.7±2.76	12.2	23.9±2.87	12.0	1.17	P > 0.05	5.3	22.0±2.3	10.5	24.7±2.41	9.8	3.10	P < 0.01	12.3

In the test "Mawashi geri kicks in 30 seconds (number)," the indicators in the experimental group were 24.7±2.41 at p<0.05, with an increase of 12.3% in this case, while in the control group they were 23.9±2.87 at p<0.05, with an increase of 5.3%.

Conclusion

At the beginning of the pedagogical experiment, the control and experimental groups had statistically similar initial data for all considered indicators. However, the research results revealed high effectiveness of our proposed methodology for improving speed training of qualified karate athletes aged 15-16.

When analyzing the level of physical quality development in athletes of both groups, an improvement in results for all assessed parameters was observed at the end of the experiment. The athletes in the experimental group demonstrated a more pronounced increase in indicators compared to the control group, which confirms the presence of positive dynamics and advantages of the experimental approach.

Thus, the testing of the proposed methodology confirmed its effectiveness in improving the speed preparedness level of karate athletes and demonstrated a statistically significant superiority compared to the traditional training system used in the control group.

References

Vikhmann V.D. **(1994).** *Karate-do School. Fundamentals. Theory and Practice*. - Moscow, p.176.

Guralev V.M. **(2021).** *Using Crossfit Training in Combat Sports* (Review and Analysis of Scientific Data) / V.M. Guralev, V.M. Dvorkin, A.Yu. Osipov // Bulletin of Tula State University: Physical Culture and Sports, p. 113-119.

Dits S.G., Azizova I.N., Nikitina L.M. **(2018).** *Crossfit in the System of General Physical Training of Students:* A Study Guide. S.G. Dits, I.N. Azizova, L.M. Nikitina. - Kazan: KFU, 2018. - 34 p.

Zhurakovsky E.A. **(2017).** *Using Crossfit Tools for Middle School-Aged Karate Athletes* / Physical Culture and Sport in the Modern World: Problems and Solutions. No. 1. p. 37-42.

Zatsiorsky V.M. **(2019).** *Physical Qualities of an Athlete: Fundamentals of Theory and Training Methodology* / V. M. Zatsiorsky. - 4th ed. - Moscow: Sport, p. 200.

Puzyrev N.V., Kolinenko E.A. **(2021).** Application of CrossFit Methods in Special Physical Training of Freestyle Wrestlers / N.V. Puzyrev, E.A. Kolinenko. - Physical Culture and Sports in Modern Society. Proceedings of the All-Russian Scientific and Practical Conference Dedicated to the Year of Science and Technology. Khabarovsk, 2021. pp. 194-197.

Baker, D. **(2021).** *Strength and Conditioning for Combat Sports*. Springer.

Gierczuk, D. **(2020).** *Tactical Preparation in Combat Sports.* Journal of Sport Sciences, 38 (6), 745-759.

Grigore, V. et al. **(2022).** *The Impact of International Competitions on Training Systems.* Journal of Sports Research.

AUTHOR BIOGRAPHY:



Bektosh Shomurod ugli RAKHMATOV

Employment
Professor at Uzbekistan state university of physical education and sports

Degree
PhD

Research interests
Taekwondo, Physical education and sport, Theory of physical education, Analyzing of sport competitions

Malika Shukhratovna RAKHIMOVA

Employment
Student of PhD at Uzbekistan state university of physical education and sports

Degree
MD

Research interests
Karate, Physical education and sport, Theory of physical education, Analyzing of sport competitions.

E-mail:
maxaxoy1@gmail.com