

Trampolines-acrobatic exercises in training of 7 year-old Taekwondo athletes

NATALYA MISCHENKO¹, MIKHAIL KOLOKOLTSEV², NATALYA USTSELEMOVA³, GALINA ILYINA⁴, DULAMJAV PUREVDORJ⁵, OYUNGEREL KHUSMAN⁶, BAYASGALANMUNKH BAATAR⁷, ELENA ROMANOVA⁸, SERGEY KOKHAN⁹

¹ Department of Theory and Methods of Physical Education, Ural State University of Physical Culture, Chelyabinsk, RUSSIA

² Department of Physical Culture, Irkutsk National Research Technical University, Irkutsk, RUSSIA

³ Department of Physical Culture, Nosov Magnitogorsk State Technical University, Magnitogorsk, RUSSIA

⁴ Institute of Humanities Education, Nosov Magnitogorsk State Technical University, Magnitogorsk, RUSSIA

⁵ Department of Clinical Medicine, Darkhan Medical School of Mongolian National University of Medical Sciences (MNUMS), Darkhan, MONGOLIA

⁶ Department of Bio- Medicine, Darkhan Medical School of Mongolian National University of Medical Sciences (MNUMS), Darkhan, MONGOLIA

⁷ Darkhan-Uul Medical School of Mongolian National University of Medical Sciences (MNUMS), Darkhan, MONGOLIA

⁸ Department of Physical Education, Altai State University, Barnaul, RUSSIA

⁹ Institute of General and Experimental Biology, Transbaikal State University, Chita, RUSSIA

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Abstract

Research aim. Developing and testing the method of using a trampolines-acrobatic exercises complex in Taekwondo training process to improve novice athletes' aged 7, physical, technical and coordination readiness.

Research materials and methods. Two groups of boys (control and experimental groups (CG and EG) of 12 children) aged 7 with an initial level of physical fitness took part in the research. In both groups, classes were held 3 times a week for 45 minutes. In the control group, training sessions were conducted according to the Taekwondo program (WTF) of the Federal standard of sports training in Taekwondo (2018). In the experimental group, two classes a week were held according to the traditional Taekwondo program. The main part of the third session in the EG is completely devoted to trampoline and acrobatic training, which was conducted in three stages during the school year and contained theoretical, practical and control sections. Before and after the experiment, the athletes' boundary testing of physical, coordination and technical readiness was carried out.

Research results. At the end of the experiment, the boys' in the experimental group physical, coordination and technical readiness level was significantly higher compared to the boys' in the control group testing results. After the experiment, the greatest increase in physical and coordination fitness tests indicators was observed in boys from EG. The increase in the technical readiness score according to the results of testing was significantly higher in EG boys. *Conclusions.* After the pedagogical experiment, the test results showed that the increase in boys' in the experimental group indicators values of speed, endurance, flexibility, strength abilities, static, dynamic balance and technical readiness was significantly higher than in boys in the control group. Acrobatic exercises and elastic support exercises use in the young Taekwondo athletes' training process proved to be effective. This is reliably confirmed by an increase in the score of techniques performed by boys in the experimental group. The proposed and tested method of young Taekwondo athletes', aged 7, sports training using a complex of trampoline and acrobatic exercises expands the list of existing pedagogical methods and tools used in children's training process and can be recommended for wide use in other types of martial arts.

Key Words: Taekwondo, Trampolines-acrobatic, Training method, Elastic support

Introduction

Martial arts, including Taekwondo, which is practiced by more than 50 million people in various countries, are widely spread among the world's population. The popularity of this sport is explained by the ability to form all types of a person's physical qualities in a harmonious form (Boloban et. al., 2016), improve health (Eletsy, 2018; Usina, 2020) and physique (Kazantseva, 2015; Tomenko et. al., 2017). Since 2000, trampolining has been an independent Olympic sport.

Currently, research in the field of sports among young novice athletes is of particular importance due to the early sports specialization, shortening the time for mastering motor skills and increasing complexity of sports equipment (Ilyina, 2015; Lyah, 2016; Mischenko et al., 2020). It is of scientific and practical interest to search

for new technologies and methods of conducting training sessions aimed at an athlete's comprehensive development and necessary physical qualities formation (Vorozheikin et al., 2020).

Trampoline and acrobatic training elements can be used in training sessions as a means to significantly increase the athletes' coordination and motor abilities.

Scientific studies of preschool children, engaged in trampolining and not engaged in this sport show differences in tests for coordination abilities that characterize the speed of adjustment to motor action, the ability to maintain balance, and the ability to respond to irritation (Paschenko et al., 2017). The effectiveness of using a trampoline exercises set in preschool children's specific coordination abilities development is proved. Positive results were found in tests on the ability to maintain balance and orientation in space, to coordinate movements (Kalashnikov, Zhalbe, 2017).

Plyometric tools and acrobatic exercises using effectiveness for young volleyball players' special physical fitness is proved (Novozhilova, Melnikov, 2011). The positive impact of mini-trampoline training on young skaters' aged 9-10 physical fitness is shown (Abramova & Kechkin, 2019). The use of acrobatic exercises elements in aerobic gymnastics was reported by Danil Chayun et al. (2020).

Analysis of the scientific literature on the current state of Taekwondo training process shows that physical, technical and coordination initial sports training should contain elements of trampoline and acrobatic training (Volkova, Volkov, 2020). The high efficiency of using the trampoline-acrobatic training technique in the Taekwondo athletes' aged 10-12 training process is proved (Kravtsevich, 2006) and the necessity of using this type of training for coordination qualities development is grounded (Volkova & Volkov, 2020).

Trampoline provides an even physical load, helps to increase muscle mass, develops the vestibular and musculoskeletal system, motor skills of the upper and lower extremities (Boloban et al., 2016). Trampoline exercises develop respiratory muscles and vital capacities of lungs, improve the functional characteristics of cardiovascular system, and lead to a person's positive psychological and emotional state (Babushkin et al., 2020).

The scientific literature provides data on the trampoline training use in a complex of measures for traumatic spinal cord injury (Citero, Mederdrut, Power, 2012), postural state improvement in patients after stroke (Miklitsch et al., 2013), motor functions improvement after cerebral palsy (Luskov et al., 2018) and autism in children (Carla Lourenço, 2015; Plyaskina et al., 2020). It is known that children's reading skills have improved as a result of using trampolines (Efimova, 2015).

Despite the large accumulated scientific and practical material on athletes' trampoline and acrobatic training use in various sports, there is no data in scientific literature on the use of this type of training in novice athletes' aged 7, engaged in Taekwondo training process. In our opinion, the lack of a program and methodological base for using a trampoline and acrobatic exercises complex in the athletes' aged 7 training process may reduce the effectiveness and lengthen the time of learning the curriculum, which affects the motivational component of sports activities. Therefore, the study of the trampoline and acrobatic training complex use for children aged 7, engaged in Taekwondo is relevant.

Research aim – Developing and testing the method of using a trampolines-acrobatic exercises complex in Taekwondo training process to improve novice athletes' aged 7, physical, technical and coordination readiness.

Material & methods

The experiment was conducted during the academic year (September 2019 - May 2020) at «Kore» Olympic reserve sports school in Chelyabinsk (Russia). The study involved 24 boys aged 7 with an initial physical fitness level. The boys were divided into two groups of 12 children each: control (CG) and experimental (EG). In both groups, training sessions were held 3 times a week for 45 minutes. In the control group, training sessions were conducted according to the Taekwondo program (WTF) of the Federal standard of Taekwondo sports training (2018). In the experimental group, two classes a week were held according to the traditional Taekwondo program and one lesson was completely devoted to trampoline and acrobatic training, based on the standard training program of sports training «Trampoline jumping, tumbling track and double mini-tramp» (Makarov & Pilyuk, 2012).

Trampoline-acrobatic training in EG was conducted in three stages and included theoretical, practical and control sections. At the first stage (September 2019), theoretical training and learning of the trampoline and acrobatic complex elementary exercises were conducted. Boundary control at this stage included the athletes' physical, coordination and technical readiness testing.

The second stage of the experiment (October 2019) included the study of basic trampoline and acrobatic exercises set. At the third stage (November 2019 - May 2020), the training program provided for joint performance of acrobatic series and basic exercises on a trampoline. A milestone control testing of the students' physical, coordination and technical readiness was carried out. In both groups, the content of the training session preparatory part (15-20% of the total time of the session) provided an explanation of the lesson tasks and the students' body preparation for performing physical activities. For the development of strength, speed, agility and flexibility, drill, general development exercises with and without accessories, various types of walking and

running were used. Preparatory jumping exercises were performed with imitation of the technique of kicks and blows in Taekwondo.

The main part of the two-week classes in the experimental group and three in the control group was conducted according to the Taekwondo program (WTF). In the experimental group, the entire main part of the third lesson per week (70% of the total lesson time) was conducted by the method of circular training with an emphasis on learning or improving the technique of small acrobatics exercises, trampolining, mini-trampoline, and tumbling track. The duration of the trampoline and acrobatic training complex at each station was 5-7 minutes. To increase the emotional background of training sessions and consolidate motor skills, outdoor games and trampoline relays were held at the end of the main part of the training.

To solve the tasks of the final part of the third lesson (10% of the total lesson time), the experimental group used funds from the sections of general and special physical training of the Taekwondo sports training program. Before and after the pedagogical experiment, boundary control of the students' physical fitness was carried out using motor tests: «running 30 m», sec.; «running 6 min», min; «push-ups from the knees», the number of times in 1 min; «abdominal crunch», the number of times in 1 min; «standing long jump», cm; «leaning forward from a standing position», cm. Coordination readiness was evaluated using tests: «shuttle run 3x8 m», sec.; «static balance on 1 leg», sec.; «dynamic balance: from a standing position along the gymnastic bench, 4 turns», sec. Statokinetic stability was determined after performing tests: «5 turns around axis bending», sec.; «passage along a 30 cm corridor at a 10 m distance», the number of spades.

The Taekwondo techniques performance was evaluated in points (from 0 to 9) using the following tests: «front kick to the upper level»; «circular kick to the upper level»; «straight blow to three levels»; «straight blow to the middle level + front kick to the middle level + circular kick to the middle level».

The work was carried out in accordance with the ethical standards of the Human rights Committee of the Helsinki Declaration of 2008. (World Medical Association Declaration of Helsinki, 2013), does not infringe on the rights or endanger the well-being of young athletes. The parents' consent to the survey was obtained.

Statistical analysis was performed with the calculation of the average value (M), minimum, maximum, standard deviation (σ), standard error (m) and the calculation of the Student's confidence criterion (Student's t-test) (Ustseleмова et al., 2019)

Results

A comparative assessment of the physical and coordination readiness of boys, aged 7 before and after the pedagogical experiment is presented in Table 1.

Table 1. The boys' physical and coordination readiness indicators values before and after the experiment (M±m)

Test	Control group (n=12)		Experimental group (n=12)	
	Before the experiment	After the experiment	Before the experiment	After the experiment
Physical fitness				
Running 30 m, sec	7,8±0,57	7,2±0,54	7,9±0,63	6,4±0,53*
Running 6 min, min.	664,2±29,5	724,3±31,9	667,4±29,9	796,2±34,3*
Push-ups from the knees, the number of times in 1 min	8,0±0,96	10,0±1,33	9,0±1,12	13,0±1,41*
Abdominal crunch, the number of times in 1 min	22,0±2,10	24,0±2,15	23,0±2,13	29,0±2,26*
Standing long jump, cm	97,4±3,97	110,5±4,25*	96,3±3,95	121,2±5,24*
Leaning forward from a standing position, cm	4,0±0,42	7,0±0,56*	5,0±0,64	9,0±0,95*
Coordination readiness				
Shuttle run 3x8 m, sec	9,5±0,53	8,2±0,31*	9,6±0,56	7,3±0,82*
Static balance on 1 leg, sec:				
Right	9,0±1,16	11,0±1,36	8,0±0,85	14,0±0,64*
Left	7,0±0,93	9,0±1,38	7,0±0,94	13,0±1,71*
Dynamic balance: from a standing position along the gymnastic bench, 4 turns, sec	7,2±1,04	11,0±1,34*	7,0±0,95	13,0±1,42*
Statokinetic stability: after performing 5 turns around axis bending, passage along a 30 cm corridor at a 10 m distance, the number of spades	8,0±0,95	7,0±0,33	9,0±0,96	5,0±0,22*

Note. * significant difference in test values after the experiment ($p<0.05$)

After the experiment, an increase in the indicators values of EG boys' all physical and coordination readiness tests was found ($p<0.05$). In boys from CG, a statistically significant increase in the indicators values was observed only in four tests. The increase in CG and EG athletes' physical and coordination fitness indicators values after the experiment is presented in Table 2.

Table 2. The increase in CG and EG athletes' physical and coordination fitness indicators values after the experiment

Test	Control group		Experimental group	
	in units	%	in units	%
Physical fitness				
Running 30 m, sec.	0,6	7,69	1,5	18,9
Running 6 min, min	60,1	9,1	128,8	19,2
Push-ups from the knees, the number of times in 1 min	2	25,0	4	44,4
Abdominal crunch, the number of times in 1 min	2	9,1	6	26,1
Standing long jump, cm	13,1	13,4	24,9	25,8
Leaning forward from a standing position, cm	3	75,0	4	80,0
Coordination readiness				
Shuttle run 3x8 m, sec	1,3	13,6	2,3	23,9
Static balance on 1 leg, sec:				
Right	2	22,2	6	75,0
Left	2	28,5	6	85,7
Dynamic balance: from a standing position along the gymnastic bench, 4 turns, sec	3,8	52,7	6	85,7
Statokinetic stability: after performing 5 turns around axis bending, passage along a 30 cm corridor at a 10 m distance, the number of spades	1	12,5	4	44,4

After the experiment, the greatest increase in all tests indicators was observed in boys from EG. Table 3 shows the results of the CG and EG boys technical readiness before and after the pedagogical experiment.

Table 3. The CG and EG athletes' technical readiness before and after the experiment (points±m)

Test	Control group		Experimental group	
	Before the experiment	After the experiment	Before the experiment a	After the experiment
Front kick to the upper level	4,31±0,44	5,25±0,74	4,56±0,56	7,36±1,05*
Circular kick to the upper level	4,21±0,36	5,21±0,72	4,12±0,24	7,12±0,97*
Straight blow to three levels	4,91±0,56	5,31±0,98	4,95±0,62	7,68±1,13*
Straight blow to the middle level + front kick to the middle level + circular kick to the middle level	4,11±0,45	5,21±0,87	4,12±0,48	7,76±1,25*

Note. * significant difference in points after the experiment ($p < 0.05$)

A significant increase in the technical readiness score was observed in all tests only in boys from EG ($p < 0.05$). In both observed groups, an increase in the boys' technical readiness indicators values was registered (Fig.1).

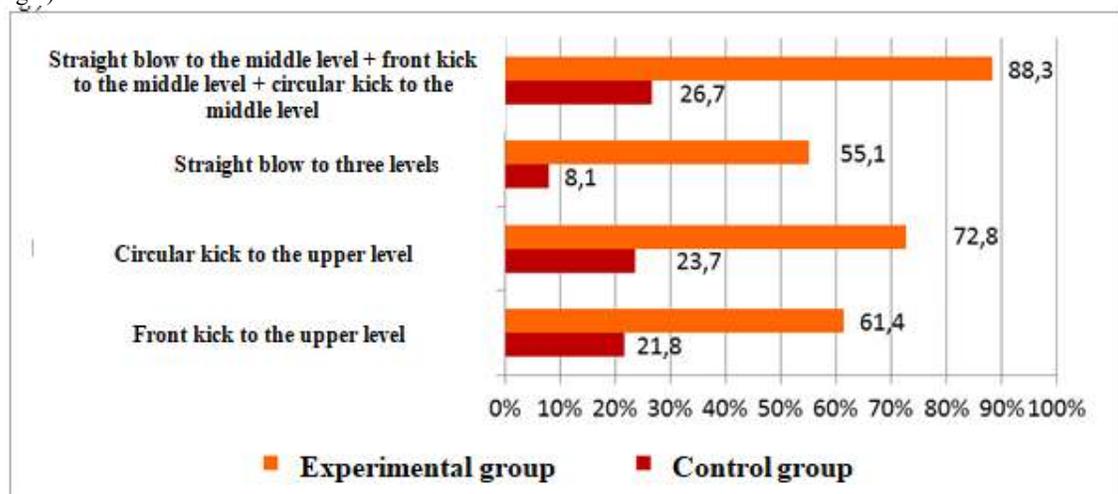


Figure 1. Increase in the boys' form CG and EG technical readiness indicators values (%)

In all test trials, the increase in boys' in the experimental group technical readiness indicators was higher compared to the results of boys in the control group.

Dicussion

High requirements for combat athletes' physical, coordination and technical readiness in modern sports encourage specialists and scientists to search for new pedagogical tools and methods of athletes' sport training (Fabio Scamardella et. al., 2020; Korobeynikov et. al., 2020). Analysis of scientific and methodological literature shows that young Taekwondo athletes' trampoline and acrobatic training is used in a limited quantities, there are no practical recommendations on a trampoline and acrobatic exercises complex use in young athletes' aged 7 training process.

Our research results confirmed the effectiveness of using the trampoline-acrobatic training method in Taekwondo to improve the boys' aged 7, physical, coordination and technical abilities. This is consistent with the results of monitoring the Taekwondo athletes aged 10-11 training (Volkov & Volkov, 2020).

In our opinion, learning to jump on a trampoline at the age of 7 should begin with mastering exercises aimed at adapting children to the elastic support conditions. Then exercises that contribute to the development of special qualities and skills necessary for mastering gymnastic elements with complex rotations should be applied.

The experimental complex of trampoline-acrobatic training proposed by us provides for performing exercises with overcoming the athletes' own body weight; exercises aimed at developing flexibility (rotations, swings, turns, bends, flexion-extension); developing coordination abilities (somersaults forward, backward, crouching; flips (wheel, from a place, from a tempo jump), stands (in a somersault, in a bridge); running on a trampoline (duration 1-2 minutes); bridge from a lying position, standing; familiar exercises from unusual positions (jumps with turns at 90⁰, 180⁰, 360⁰, jumps with passing and catching objects (ball), jumps with moving forward, backward with performing tasks of various nature, etc.); balance exercises (jumps with turning and fixing a certain pose).

The results of the boys, aged 7, in the experimental group performing trampoline and acrobatic training in the main part of the weekly third training session showed that at the end of the experiment, the level of the athletes' physical, technical and coordination readiness was higher compared to the results of testing in the control group, where training was conducted according to the traditional program.

At the end of the research, the greatest increase in the boys' in the experimental group physical fitness indicators values was found in the flexibility test (80.0%), in the static and dynamic balance tests (85.7%). Technical readiness increased by 88.3% according to the test result «straight blow to the middle level + front kick to the middle level + circular kick to the middle level». The significant increase in the indicators values of young athletes' coordination readiness found by us is consistent with the research results by other authors (Boloban, et. al., 2016).

We believe that further study of a trampoline and acrobatic exercises complex use in the training process to improve physical, coordination and technical training is a promising direction for sports improvement in Taekwondo and complex coordination sports.

Conclusions

The final testing after the pedagogical experiment showed that the increase in the boys' of the experimental group speed, endurance, flexibility, strength abilities, static, dynamic balance and technical readiness indicators values was significantly higher than that of the boys from the control group who were engaged in traditional Taekwondo training methods. The use of elastic support exercises in Taekwondo training proved to be effective. This is reliably confirmed by an increase in the techniques score in boys of the experimental group. The proposed and tested method of training young Taekwondo athletes at the age of 7 using a complex of trampoline and acrobatic exercises expands the list of existing pedagogical methods and tools used in the training process and can be recommended for wide use in children's sports training in other types of martial arts.

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