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THEORETICAL AND PRACTICAL ASPECTS OF DEVELOPING STRENGTH AND SPEED-STRENGTH QUALITIES IN QUALIFIED JUDOKAS

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ABOUT ARTICLE

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Abstract: This article examines the theoretical and practical aspects of developing strength and speed-strength qualities in qualified judokas. The importance of strength and speed-strength qualities in the effective execution of technical actions, overcoming an opponent's resistance, and performing attacking actions rapidly is analyzed. The article also presents practical recommendations on the means and methods used to develop these qualities and their application in the training process.

Introduction. In modern judo, achieving high-level sporting performance depends not only on an athlete's technical and tactical proficiency but also directly on the ability to perform these actions with high speed, strength, and precision. During a bout, strength and speed-strength qualities are important functional factors in breaking the opponent's balance, executing a technique within a short period of time, overcoming active resistance, and effectively completing attacking actions. In particular, in situations requiring the rapid execution of attacking actions, an athlete's ability to mobilize explosive strength is one of the key factors determining the effectiveness of technical performance.

The development of strength and speed-strength qualities in the training of qualified judokas is an important component of training process management. Particularly at the stage of improving sports mastery, the selection of specialized strength exercises should take into account the athlete's weight category, level of physical fitness, individual movement

capabilities, and the specific characteristics of competitive activity. At the same time, objectively assessing the level of strength and speed-strength development, purposefully planning training loads based on the results obtained, and ensuring an individualized approach are important conditions for effective management of athletic preparation.

The level of development of strength and speed-strength qualities determines a judoka's ability to perform technical actions rapidly, apply gripping and pulling force, overcome the opponent's resistance, break their balance, and effectively utilize explosive strength during throwing techniques. Therefore, the systematic and consistent inclusion of specialized exercises aimed at developing these physical qualities in the training process should be regarded as an important methodological means of improving both general and specific physical fitness. In this regard, it is advisable to determine the content of exercises and load parameters in accordance with the athlete's individual characteristics, while focusing not only on developing strength but also on the ability to express it rapidly under dynamic movement conditions.

Research Objective. To determine the effectiveness of a specialized set of exercises aimed at developing strength and speed-strength qualities in qualified judokas.

Research Objectives. 1. To determine the dynamics of changes in the strength and speed-strength fitness indicators of qualified judokas. 2. To develop and implement a specialized set of exercises aimed at developing strength and speed-strength qualities in the training process. 3. To evaluate the effectiveness of the specialized exercise set in improving the strength and speed-strength fitness of qualified judokas.

Research Results and Discussion. The strength and speed-strength fitness of judokas constitutes the biomechanical and physiological foundation of many technical and tactical actions performed during competitive activity. In particular, the effectiveness of actions such as breaking an opponent's balance, gripping, pulling, lifting, and throwing depends not only on the athlete's maximal strength capacity but also directly on the ability to mobilize this strength within a short period of time. Therefore, in developing strength and speed-strength qualities during the training process, it is important to purposefully use not only general physical exercises but also specialized exercises that closely correspond to the structure of judo techniques and the specific demands of competitive activity.

In the objective assessment of strength fitness, such indicators as maximum voluntary muscular strength (Po), maximum explosive strength (Fmax), and the time required to reach maximum explosive strength (tmax) have important diagnostic value. These indicators characterize the athlete's maximal strength capacity, the ability to generate force within a short

period of time, and the rate of force mobilization, respectively. At the same time, the use of integral indicators reflecting the manifestation of force per unit of time in assessing speed-strength fitness makes it possible to provide a more comprehensive characterization of the athlete's functional capabilities.

In the present study, the explosive strength index (J) and the ability to rapidly develop initial force (Q) were determined using the corresponding calculation formulas. Specifically, the explosive strength index was calculated using the formula J = Fmax/tmax, while the indicator of the ability to rapidly develop initial force was calculated using the formula Q = 0.5 Fmax/tmax. In addition, the G indicator was assessed as a measure characterizing the ability to accelerate force development. A comprehensive analysis of these indicators made it possible to evaluate not only the strength capacities of the judokas but also their ability to mobilize and develop force within a short period of time (see Table 1).

Table 1.

Indicators for Assessing the Strength and Speed-Strength Fitness of Qualified Judokas

No.	Indicator	Description	Unit of measurement
1	Po	Maximum voluntary muscular strength	kg
2	Fmax	Maximum value of explosive strength	kg
3	tmax	Time required to reach maximum explosive strength	s
4	J	Explosive strength index; ability to produce force within a short period of time	kg/s
5	Q	Ability to rapidly develop initial force	kg/s
6	G	Ability to accelerate force development	kg/s

Note: Po - maximum voluntary muscular strength; Fmax - maximum value of explosive strength; tmax - time required to reach maximum explosive strength; J - explosive strength index; Q - ability to rapidly develop initial force; G - ability to accelerate force development.

These indicators make it possible to comprehensively and objectively assess the strength and speed-strength fitness of judokas, as well as to determine the level of development of these physical qualities throughout the training process. Their interrelationship characterizes the athlete's ability to mobilize strength within a short period of time, overcome resistance, and perform technical actions at high speed.

To determine the effect of the specialized exercise set on the strength and speed-strength fitness of qualified judokas, the relevant functional and strength indicators were reassessed in the experimental group at the beginning and end of the pedagogical experiment. The analysis included indicators characterizing the athletes' strength capacities, their ability to

produce force within a short period of time, and their capacity to generate high levels of force during motor activity. Comparative analysis of the results made it possible to determine the effectiveness of the specialized training exercises and the dynamics of changes in the strength and speed-strength qualities of the athletes (see Table 2).

Table 2.

Changes in Strength and Speed-Strength Indicators in the Experimental Group under the Influence of Specialized Training

Indicator	Before the experiment	After the experiment	Change
Po, kg	144,5±4,5	158,5±4,5	+14,0
Fmax, kg	126,6±4,2	138,7±4,24	+12,1
J, kg/s	170,6±28,9	217,0±26,2	+46,4
Q, kg/s	227,0±34,05	286,1±24,1	+59,1
G, kg/s	159,5±11,4	179,6±21,6	+20,1

Note: Po - maximum voluntary muscular strength, kg; Fmax - maximum value of explosive strength, kg; J - explosive strength index, kg/s; Q - ability to rapidly develop initial force, kg/s; G - ability to accelerate force development, kg/s.

The table presents the pre- and post-experimental results of the main indicators characterizing the strength and speed-strength fitness of qualified judokas. The obtained data demonstrate positive changes in all the studied indicators by the end of the experiment. These changes indicate that the specialized training exercises had a positive effect on the athletes' ability to produce force and mobilize it within a short period of time.

In particular, the Po (maximum voluntary muscular strength) indicator increased from 144.5±4.5 kg before the experiment to 158.5±4.5 kg after the experiment, representing a positive change of 14.0 kg. This result indicates an improvement in the athletes' maximal strength capacity and suggests enhanced force potential required for gripping, pulling, breaking the opponent's balance, and performing throwing techniques. The Fmax (maximum value of explosive strength) also increased considerably during the experiment. This indicator rose from 126.6±4.2 kg to 138.7±4.24 kg, with an overall increase of 12.1 kg. The improvement in explosive strength is particularly important in judo, as it contributes to the rapid execution of technical actions with high levels of force, overcoming active opponent resistance, and effectively completing attacking actions.

More pronounced positive changes were observed in the indicators characterizing speed-strength capabilities. Specifically, the J (explosive strength index) increased from 170.6±28.9 kg/s before the experiment to 217.0±26.2 kg/s after the experiment, demonstrating an improvement of 46.4 kg/s. This change indicates an enhanced ability of the athletes to express force at a higher rate. Since the effectiveness of technical actions in judo depends not

only on the absolute magnitude of force but also on the ability to mobilize it within a short period of time, the positive dynamics of this indicator are of particular practical significance. The Q (ability to rapidly develop initial force) indicator also demonstrated one of the most pronounced changes. The value increased from 227.0±34.05 kg/s to 286.1±24.1 kg/s, representing an improvement of 59.1 kg/s. This result indicates an increased ability of the athletes to rapidly mobilize force during the initial phase of movement. This capacity is particularly important in judo for sharply breaking the opponent's balance, performing gripping and pulling actions, and initiating throwing techniques.

Positive dynamics were also observed in the G (ability to accelerate force development) indicator. This measure increased from 159.5±11.4 kg/s to 179.6±21.6 kg/s, representing an increase of 20.1 kg/s. This change indicates an improvement in the athletes' ability to accelerate force production. Consequently, more favorable functional conditions were established for performing specialized movements that require the effective integration of strength and speed. Overall, the analysis of the table data demonstrates a consistent positive trend across all indicators associated with maximal strength, explosive strength, and the rapid mobilization of force by the end of the experiment. In particular, the improvements in the J and Q indicators indicate enhanced ability of qualified judokas to express their strength rapidly. This is an important factor contributing to the biomechanical and functional efficiency of attacking actions performed within a short period of time during judo bouts.

The positive changes observed during the experiment can be attributed to the targeted content of the specialized training program. In addition to developing strength, particular attention was paid to the ability to express force under rapid movement conditions, mobilize force within a short period of time, and perform high-intensity movements. Such an approach corresponds to the specific physical preparation requirements of qualified judokas and contributes to the integrated development of strength and speed-strength qualities.

At the end of the experiment, statistically significant differences were identified for several indicators. Po and Q demonstrated differences at the $P<0.01$ level, while J and G demonstrated differences at the $P<0.05$ level. These findings provide statistical support for the effectiveness of the specialized exercise set in developing strength and speed-strength capacities in qualified judokas. Although some positive changes were also observed in the control group, the absence of statistically significant differences in the main indicators further highlights the effectiveness of the specialized training content applied in the experimental group. Therefore, purposeful supplementation of the traditional training process with

specialized strength and speed-strength exercises can be considered one of the effective approaches to improving the specific physical fitness of qualified judokas.

Conclusion. The strength and speed-strength qualities of qualified judokas are among the key physical factors contributing to the effective execution of technical and tactical actions, overcoming an opponent's resistance, and achieving stable competitive performance. The results of the study demonstrated that the purposeful and systematic inclusion of specialized strength and speed-strength exercises in the traditional training process had a positive effect on the athletes' maximal strength, explosive strength, and ability to mobilize force within a short period of time.

Based on the obtained results, it is advisable to organize the development of strength and speed-strength qualities in qualified judokas on a differentiated basis, taking into account the athlete's weight category, individual physical capabilities, and level of preparedness. It is also recommended to progressively regulate the volume and intensity of training loads and systematically apply specialized exercises aimed at the rapid expression of force. This approach can serve as a practical and methodological basis for improving the specific physical fitness of judokas and increasing the effectiveness of their technical and tactical actions.

References:

1. Boguszewska, K., Boguszewski, D., & Buśko, K. (2010). Special Judo Fitness Test and biomechanics measurements as a way to control of physical fitness in young judoists. Archives of Budo, 6(4), 205–208.

2. Franchini, E., Branco, B. M., Agostinho, M. F., Calmet, M., & Candau, R. (2014). Influence of linear and undulating strength periodization on physical fitness, physiological, and performance responses to simulated judo matches. Journal of Strength and Conditioning Research. https://doi.org/10.1519/JSC.0000000000000460

3. Franchini, E., Panissa, V. L. G., & Julio, U. F. (2013). Physiological and performance responses to intermittent uchi-komi in judo. Journal of Strength and Conditioning Research, 27(4), 1147–1155.

4. Henry, T. (2011). Resistance training for judo: Functional strength training concepts and principles. Strength & Conditioning Journal, 33(6), 40–49. https://doi.org/10.1519/SSC.0b013e31823a6675

5. Ratamess, N. A. (2011). Strength and conditioning for grappling sports. Strength & Conditioning Journal, 33(6), 18–24.

6. Shestakov, V. B. (1999). Printsip individualizatsii v sisteme fizicheskoy podgotovki dzyudoistov vysshey kvalifikatsii [The principle of individualization in the physical preparation system of highly qualified judokas] (Abstract of PhD dissertation). Moscow, Russia, 23–25.

7. Yushkov, O. P., & Shpanov, V. I. (2001). Sovershenstvovanie metodiki trenirovki i kompleksnyy kontrol za podgotovlennostyu sportsmenov v vidakh edinoborstv [Improvement of training methodology and comprehensive monitoring of athletes' preparedness in combat sports]. Moscow: MGIU, 40 p.