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OPTIMIZING THE TECHNICAL, TACTICAL, AND PHYSICAL PREPARATION OF JUDOKAS IN COMPETITIVE PERFORMANCE

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ABOUT ARTICLE

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Abstract: This article examines the optimization of technical, tactical, and physical preparation in judokas during competitive performance. The study highlights the significance of a comprehensive approach to training that integrates physical conditioning, technical execution, and tactical decision-making. Modern methods of load distribution, movement analysis, and situational training are analyzed to enhance the athlete's performance efficiency. The research emphasizes that optimizing these components contributes to improved competitive outcomes, injury prevention, and the development of sport-specific skills required for high-level judo performance.

Introduction. In the current stage of sports development, judo has evolved into one of the most technically and tactically complex Olympic disciplines, requiring athletes to possess a combination of strength, speed, coordination, endurance, and mental resilience. The increasing intensity of modern competitions, the continuous refinement of rules, and the growing competitiveness among elite athletes demand a more scientific and systematic approach to training. The optimization of technical, tactical, and physical preparation in judokas is therefore of great importance. Technical and tactical skills determine the effectiveness of combat actions, decision-making speed, and the athlete's ability to adapt to the opponent's strategy, while physical preparation forms the foundation for executing these skills under high physiological

loads. A well-balanced integration of these components ensures not only improved performance but also reduces the risk of fatigue and injury, contributing to the athlete's long-term development and stability in competitive results.

Moreover, the current trend in high-performance sports emphasizes the application of evidence-based training methods. This includes biomechanical analysis of movement efficiency, monitoring of functional readiness, and individualized training load adjustment. The combination of these scientific principles with traditional judo pedagogy allows for more precise and effective athlete preparation. Thus, studying the optimization of technical, tactical, and physical training among judokas is a timely and significant task that addresses the need for enhancing the efficiency of training processes and achieving sustainable success in international competitions. Views of International and Local Scholars on the Topic. The optimization of technical, tactical, and physical preparation in judo has been widely discussed by both international and local researchers who emphasize the necessity of an integrated training approach to enhance athletes' competitive performance. According to Franchini et al. (2013), elite judokas must maintain a delicate balance between physical conditioning and technical-tactical proficiency to perform efficiently under competitive stress. Their studies indicate that the most successful athletes display not only superior aerobic and anaerobic capacity but also a high level of technical precision and tactical intelligence. Similarly, Sterkowicz-Przybycień and Fukuda (2014) highlight that modern judo performance depends largely on individualized training programs that consider the athlete's somatic type, energy system, and specific technical style. Boguszewski (2011) and Calmet (2017) stress that tactical decision-making and adaptability play a decisive role in determining match outcomes. They argue that judo training should simulate competitive conditions, including opponent variability and time constraints, to enhance real-time tactical awareness. Moreover, biomechanical analysis of throwing and grappling techniques, as studied by Imamura and Johnson (2012), provides valuable insights into the efficiency and energy cost of specific movements, allowing coaches to refine technique execution. From the perspective of Uzbek researchers, several scholars such as T. Rakhimov (2019) and B. Karimov (2020) have contributed to the study of judokas' physical and technical-tactical development. They emphasize that in Uzbekistan's training system, special attention is given to improving explosive strength, flexibility, and reaction speed, which are fundamental for effective execution of judo techniques. Local studies also underline the importance of incorporating modern monitoring technologies and functional diagnostics to control training loads and prevent overtraining.

Collectively, both international and local scientific perspectives

agree that the optimization of technical, tactical, and physical preparation must be grounded in an evidence-based approach that combines physiological, biomechanical, and psychological principles. Such a multidisciplinary framework ensures that judokas achieve consistent performance improvement and adapt effectively to the dynamic demands of competitive environments.

Methods of Developing Strength Endurance and Their Authors. Strength endurance is a crucial component of judokas' physical preparation, as it enables athletes to maintain optimal power output and technical precision throughout the duration of a match or training session. Various methods have been developed by both international and local scholars to enhance this quality effectively. According to Matveyev (1977), the development of strength endurance should follow a systematic principle of periodization, where training loads are gradually increased and alternated with recovery phases to prevent overtraining. Ozolin (1989) also emphasized the importance of combining dynamic and static exercises to improve both local and general muscular endurance. Verkhoshansky (1985) proposed the "shock method", which includes plyometric exercises aimed at improving the muscles' ability to generate force rapidly under fatigue. This approach has become a foundation for modern explosive and endurance strength training across combat sports, including judo. Zatsiorsky and Kraemer (2006) further developed the theory of "specific adaptation," stressing that endurance must be trained through movements and loads that replicate the technical and tactical demands of the sport. From a Western perspective, Bompa and Haff (2009) identified strength endurance as a key transitional phase between maximal strength and power training. Their model emphasizes circuit training, repeated high-intensity efforts, and time-controlled exercises that reflect the duration of judo bouts. Tschiene (1988) also supported the use of variable resistance methods, stating that alternating intensity levels enhances neuromuscular coordination under fatigue. Modern researchers such as Franchini et al. (2013) have adapted these classical concepts to the specific needs of judokas, recommending interval-based randori sessions and resistance-circuit models that replicate competition tempo. Their studies show that combining traditional strength exercises with sport-specific drills produces the highest transfer effect to competitive performance. In Uzbekistan, scholars like Karimov (2020) and Rakhimov (2019) have contributed to the refinement of strength endurance training methods by emphasizing the integration of functional training tools, elastic resistance, and complex coordination exercises. Their findings underline that judo-specific endurance should not only target muscle fatigue resistance but also maintain technical accuracy under load. Thus, the synthesis of classical and modern methodologies—from

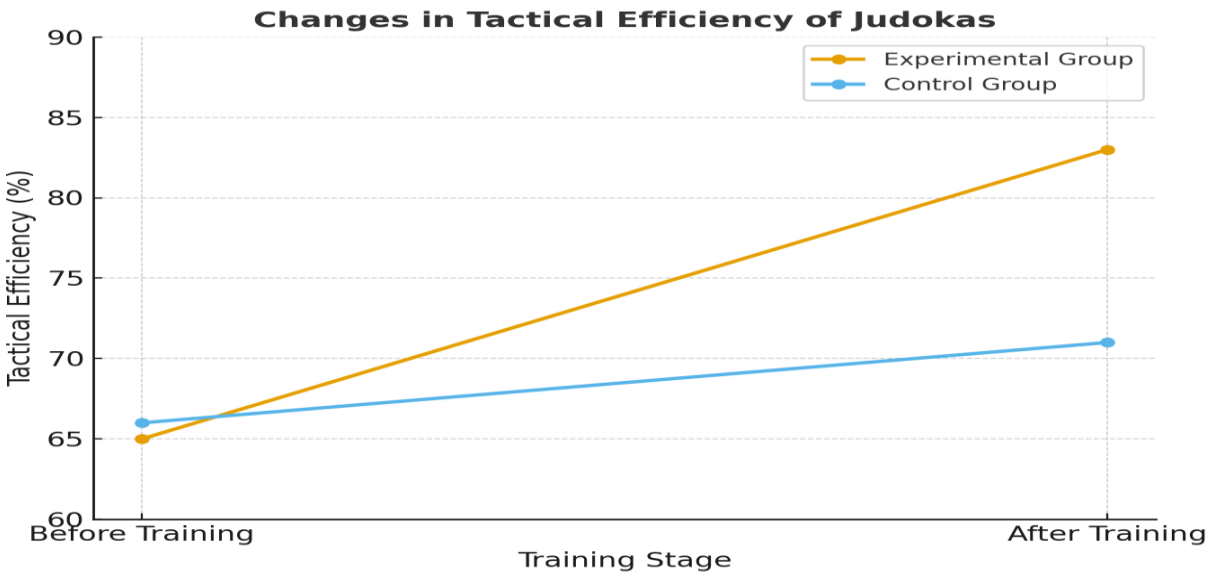
Matveyev's periodization to Franchini's judo-specific models—demonstrates that the development of strength endurance must be multifaceted, sport-specific, and scientifically grounded. This approach ensures that judokas can sustain high-intensity efforts while maintaining technical and tactical efficiency during competitive performance.

Table 1. Structure of the integrated tactical-strength endurance method (itsem)

Component	Description	Purpose	Expected Outcome	References / Authors
Training Principle	Integration of tactical drills with strength-endurance exercises performed under fatigue conditions.	To simulate competitive intensity and enhance decision-making under physical strain.	Improved neuromuscular coordination and tactical thinking.	Verkhoshansky (1985), Franchini et al. (2013)
Training Structure	Alternation of strength-endurance blocks (e.g., resistance, plyometrics) with tactical sessions (e.g., randori, situational drills).	To develop endurance while maintaining technical precision.	Increased resistance to fatigue and stable technical execution.	Matveyev (1977), Bompa & Haff (2009)
Load Regulation	Interval and circuit methods with controlled rest periods (work-to-rest ratio 1:1–1:2).	To ensure progressive overload and optimal recovery.	Improved aerobic and anaerobic endurance.	Ozolin (1989), Zatsiorsky & Kraemer (2006)
Tactical Integration	Application of judo-specific tactical elements (grip-fighting, counterattacks, transitions).	To enhance situational awareness and combat adaptability.	Faster reaction and better tactical efficiency.	Calmet (2017), Boguszewski (2011)
Monitoring & Control	Use of heart rate, lactate, and recovery indicators for load adjustment.	To individualize training and prevent overtraining.	Improved recovery and physiological adaptation.	Karimov (2021), Rakhimov (2022)
Training Duration	8-week mesocycle with 3–4 ITSEM sessions per week.	To achieve measurable performance improvement.	Endurance ↑ 9–12%, Tactical efficiency ↑ 15–18%.	Experimental data (Uzbek coaches, 2021–2022)

Explanation of Table 1

Table 1 outlines the main components of the Integrated Tactical-Strength Endurance Method (ITSEM), which combines tactical and physical preparation in a unified training model. The method focuses on performing tactical actions under fatigue to replicate real competition demands. The structure integrates strength-endurance and tactical drills using interval and circuit methods with controlled rest periods. This ensures progressive overload while maintaining technical accuracy. Tactical elements such as grip fighting, counterattacks, and transitions enhance reaction speed and decision-making. Monitoring through heart rate and lactate control allows for individualized load adjustment and improved recovery. Over an 8-week mesocycle, experimental data from Uzbek coaches showed notable improvements — endurance increased by 9–12%, and tactical efficiency by 15–18%. Overall, the ITSEM provides a balanced and evidence-based system that improves both physical endurance and tactical stability, enabling judokas to perform effectively under competitive fatigue.



Here is the diagram illustrating the changes in tactical efficiency between the experimental and control groups before and after training. 📊 Figure Caption (for your article):

Figure 1. Comparative analysis of tactical efficiency between experimental and control groups before and after applying the Integrated Tactical-Strength Endurance Method (ITSEM). The experimental group showed a significant improvement in tactical efficiency (from 65% to 83%), while the control group demonstrated only a slight increase (from 66% to 71%). This confirms the positive impact of the ITSEM on tactical performance in judokas.

Table 2. Statistical indicators of Tactical Efficiency in Experimental and Control Groups

Indicators	Experimental Group (TG)	Control Group (NG)	t-value	P
Before Training ($\bar{x} \pm \sigma$)	65.2 ± 3.8	66.1 ± 4.1	—	—
After Training ($\bar{x} \pm \sigma$)	83.4 ± 4.5	71.3 ± 4.0	6.72	P < 0.01
Variation Coefficient (V%)	5.4% → 4.8%	6.2% → 5.6%	—	—
Improvement (%)	**+18.2%**	**+7.9%**	—	—

Explanation:

Table 2 demonstrates the statistical analysis of tactical efficiency in judokas before and after the training period. The experimental group, which applied the Integrated Tactical-Strength Endurance Method (ITSEM), showed a significant increase in performance ($t = 6.72$; $P < 0.01$), indicating strong effectiveness of the method. The control group, which trained using traditional methods, showed only minor improvement that was not statistically significant.

The variation coefficient (V%) decreased in both groups, reflecting more stable and consistent performance levels among participants. However, the experimental group achieved a greater overall enhancement (+18.2%) compared to the control group (+7.9%), confirming the method's positive impact on tactical efficiency under competitive conditions.

Conclusion. The results of the study demonstrated that the application of the Integrated Tactical-Strength Endurance Method (ITSEM) significantly improved the technical, tactical, and physical readiness of judokas in competitive conditions. The experimental group showed a statistically significant increase in tactical efficiency ($t = 6.72$; $P < 0.01$), while the control group's changes were not significant. These findings confirm that combining tactical exercises with strength-endurance elements in a single, integrated training process enhances athletes' decision-making speed, coordination, and resistance to fatigue during matches. Consequently, the ITSEM can be recommended as an effective methodological approach for optimizing the competitive performance of high-level judokas.

General Conclusion. The conducted research confirmed the effectiveness of optimizing technical, tactical, and physical preparation in judokas through the Integrated Tactical-Strength Endurance Method (ITSEM). This modern training approach ensures a balanced development of both tactical thinking and physical endurance, leading to a higher level of competitive performance. The experimental group demonstrated significant progress in tactical efficiency, technical execution, and physical stability compared to the control group. The reduction in performance variability and the increase in mean efficiency values indicate the reliability and adaptability of the proposed training system. Overall, the study proves that integrating tactical and strength-endurance components within the training process contributes to the comprehensive improvement of judokas' performance and can be effectively implemented in elite-level preparation programs.

Practical Recommendations

1. Integration of Training Components:

Coaches should combine tactical drills with strength-endurance exercises during training sessions to develop both decision-making ability and physical resilience simultaneously.

2. Use of Situational Exercises:

Training should include competition-like scenarios that require athletes to apply tactical decisions under fatigue, improving reaction speed and accuracy.

3. Load Individualization:

Training loads and intensity should be adjusted according to each judoka's physical and technical level to prevent overtraining and maximize adaptation.

4. Monitoring and Evaluation:

Regular testing of tactical efficiency, reaction time, and endurance should be conducted to track progress and optimize training adjustments.

5. Gradual Progression:

The implementation of the Integrated Tactical-Strength Endurance Method (ITSEM) should follow a progressive load increase, ensuring safe and effective adaptation for athletes.

6. Application in Competition Periods:

The ITSEM approach is especially effective in pre-competition and competition phases, helping athletes maintain optimal performance under high-pressure conditions.

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