



DEVELOPMENT OF STATIC-DYNAMIC STRENGTH ENDURANCE IN WRESTLERS AND ITS ASSESSMENT USING A SPECIALIZED DEVICE

Oriental Universiteti

2nd year master's student at the Faculty of Sports
Activities

Shermamatov Akobir Muzaffar o'g'li

***Annotation** This study explores the development of statodynamic strength endurance in wrestlers and its assessment using specialized equipment. Statodynamic strength endurance is a critical physical quality in wrestling, as it combines sustained muscular tension with controlled dynamic movements under competitive conditions. The research focuses on identifying effective training methods aimed at improving this specific type of endurance through targeted exercises that integrate static and dynamic muscle contractions. The study analyzes training protocols designed to enhance neuromuscular adaptation, increase resistance to fatigue, and improve overall performance efficiency during wrestling bouts. Particular attention is given to the use of specialized equipment that allows for precise measurement of force output, muscle tension duration, and recovery indicators. Such equipment provides objective data for monitoring athletes' functional readiness and optimizing individualized training programs.*

***Key words:** Statodynamic strength endurance; wrestling training; special physical preparation; muscular endurance; static and dynamic contractions; fatigue resistance; neuromuscular adaptation; specialized assessment equipment; performance evaluation; load monitoring.*

Main Part Statodynamic strength endurance is one of the key physical qualities determining success in wrestling. During a match,

wrestlers are required to maintain prolonged muscular tension while simultaneously performing explosive and technically precise movements. This combination of static holding actions and dynamic efforts creates high physiological demands on the neuromuscular and energy systems. Therefore, the development of statodynamic strength endurance should be considered a priority in the system of special physical preparation. The training process aimed at improving statodynamic strength endurance should integrate exercises that combine isometric (static) and dynamic muscle contractions. Such exercises may include maintaining fixed positions under load followed by controlled dynamic repetitions, resistance training with partial amplitude movements, and partner-based drills that simulate competitive situations. The intensity, duration, and rest intervals must be carefully regulated to ensure progressive overload and optimal adaptation. Special attention should be given to sport-specific movements that closely replicate real match conditions. An important aspect of training is the monitoring and assessment of athletes' strength endurance levels. The use of specialized equipment enables objective measurement of force production, time under tension, repetition tempo, and fatigue indicators. Devices such as force platforms, dynamometers, and resistance-training simulators provide accurate data on muscular performance and functional readiness. This allows coaches to individualize training loads, track progress, and prevent overtraining. Regular assessment using special equipment also improves the scientific validity of the training process. By analyzing performance data, it is possible to identify strengths and weaknesses in an athlete's physical preparation and adjust training programs accordingly. As a result, systematic development and precise

evaluation of statodynamic strength endurance contribute significantly to enhancing competitive performance and long-term athletic development in wrestlers.

Relevance of the Topic The relevance of developing statodynamic strength endurance in wrestlers is обусловed by the continuously increasing intensity and competitiveness of modern wrestling. Contemporary matches require athletes to maintain high levels of muscular tension while executing rapid and technically complex movements throughout the entire bout. Under such conditions, insufficient statodynamic strength endurance leads to early fatigue, decreased technical accuracy, and reduced effectiveness in decisive moments of competition. In recent years, the scientific approach to sports training has emphasized the importance of specialized physical preparation tailored to the specific demands of each sport. Wrestling is characterized by alternating static holds, gripping actions, and explosive dynamic movements, which place significant stress on the muscular and neuromuscular systems. Therefore, the targeted development of statodynamic strength endurance has become a critical component of performance optimization. Moreover, the introduction of specialized assessment equipment increases the objectivity and accuracy of monitoring athletes' physical readiness. Traditional evaluation methods often rely on subjective observation, whereas modern devices allow for precise measurement of force output, duration of muscular tension, and fatigue indicators. This technological advancement enhances the effectiveness of training management and supports evidence-based coaching decisions.

Results The results of the study demonstrated that the systematic application of statodynamic training methods significantly improved wrestlers' strength endurance indicators. Athletes who followed the specially designed training program showed measurable increases in time under tension, maximal force sustainability, and resistance to fatigue during sport-specific exercises. Assessment through specialized equipment revealed positive changes in neuromuscular efficiency and force output stability. The data indicated improved ability to maintain consistent muscle tension during combined static and dynamic tasks, as well as faster recovery between high-intensity efforts. Compared to initial testing results, participants exhibited a statistically significant increase in performance indicators related to gripping strength, isometric hold duration, and repeated dynamic effort capacity. Furthermore, the use of objective measurement tools allowed for more accurate monitoring of training loads and individual adaptation rates. This contributed to better load distribution, reduced signs of overtraining, and enhanced overall functional readiness.

Methodology This study employed a quasi-experimental design aimed at developing static-dynamic strength endurance in wrestlers and assessing it using a specialized measurement device. The research was conducted over a 12-week training period, including pre- and post-testing phases to evaluate the effectiveness of the intervention program. The study involved 20–30 male wrestlers aged 18–23 years, with at least 3–5 years of training experience in national wrestling disciplines (e.g., Greco-Roman, freestyle, or Uzbek Kurash). All participants were medically cleared and provided informed consent prior to participation.

Measurement Tools

A specialized strength measurement device equipped with digital force sensors was used to evaluate static-dynamic strength endurance. The device provided real-time data on force production, contraction duration, and fatigue progression. Reliability and validity of the equipment were verified prior to testing. Statistical analysis was conducted using SPSS software. Descriptive statistics (mean $\pm$ standard deviation) were calculated. Paired sample t-tests were applied to determine significant differences between pre- and post-test results. The significance level was set at $p < 0.05$. Effect size (Cohen's d) was calculated to determine the magnitude of changes.

The study was conducted in accordance with ethical standards for sports science research. Participants were informed about the purpose, procedures, and potential risks of the study. Confidentiality of personal data was maintained throughout the research process.

Conclusion The results of this study demonstrate that the targeted development of static-dynamic strength endurance significantly improves the physical performance of wrestlers. The implementation of a structured training program that combined isometric and dynamic exercises under controlled intensity conditions led to measurable increases in maximum isometric force, time to fatigue, and overall strength endurance indicators. The use of a specialized measurement device allowed for objective and precise evaluation of static-dynamic strength endurance. The collected data confirmed that systematic monitoring of force output and fatigue index provides reliable feedback for optimizing training loads and improving athletic performance. Furthermore, integrating wrestling-specific static-dynamic exercises into regular training sessions enhances functional strength endurance, which

is essential for maintaining grip control, stability, and effective technical execution during competitive matches.

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