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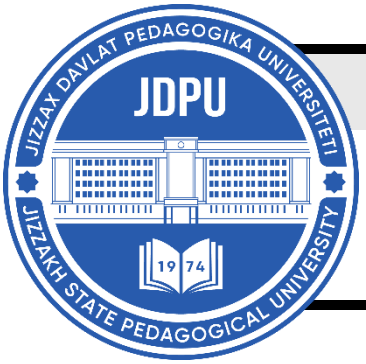

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PHYSICAL FITNESS OF GRECO-ROMAN WRESTLERS AND THEIR DEVELOPMENT DYNAMICS

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ABOUT ARTICLE

Key words: speed, agility, explosive strength, beginning of the study, initial preparation, training methodology, load intensity, functional readiness, biomechanical principles.

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Abstract: This article studies the effectiveness of training Greco-Roman wrestlers in technical movements and ways to control them, and a control and research group was formed to develop the qualities of agility, flexibility, and agility in young people engaged in them. Scientific and methodological approaches aimed at improving the process of developing explosive strength qualities at the initial training stage are analyzed. The study covers a complex of special exercises that serve to increase the strength capabilities of teenage athletes, the optimal ratio of load volume and intensity, and methods for step-by-step planning of the training process. Also, biomechanical principles in the formation of explosive strength, tools for controlling functional training, and practical recommendations are given to increase the effectiveness of training programs. The results of the study serve to improve the training system of novice athletes and increase their competitive results.

Introduction. In the training process of Greco-Roman wrestlers worldwide, great importance is attached not only to psychological and functional preparation, but also to physical and technical training. This is because the organic integration of physical and technical readiness contributes to achieving high results in competition bouts. Greco-Roman wrestling,

as a sport belonging to the category of combat sports, has its own specific characteristics, and requires well-developed physical qualities. Therefore, in improving the physical and technical preparedness of Greco-Roman wrestlers, it is envisaged to organize the training process based on modeling all exercises included in combat sports and to achieve high results by enhancing athletes' technical skills.

The tasks of the research are defined as follows:

- To expand the possibilities of performing "crown techniques" in favorable dynamic situations by improving basic attacking movements used during Greco-Roman wrestling competition bouts;
- To improve the methodology of teaching the elements of attack techniques based on modeling, in order to expand opportunities for using effective movements in complex situations during wrestling bouts;
- To expand the possibilities of performing complex attacking techniques during competition by modeling the effective execution of technical actions;
- To improve defensive actions during bouts by teaching wrestlers various combinations used in competitive situations.

The research covers the training process conducted with beginner-level Greco-Roman wrestlers at the following sports schools: Chirchiq city Children and Youth Sports School No. 1, Angren city Children and Youth Sports School No. 1, and Yuqori Chirchiq district Children and Youth Sports School No. 1.

Scientific Novelty and Purpose of the Study

- To expand the possibility of performing crown techniques during competition bouts by adapting high-energy-consuming exercises to low-intensity loads when teaching Greco-Roman wrestlers attacking movements;
- To expand the wrestlers' ability to use their technical arsenal by defending against an opponent's attack techniques consisting of force-based takedowns in complex competitive situations through counterthrow techniques;
- To expand opportunities for creating counterattacking movements in bouts against opponents with superior anthropometric characteristics by improving tactical preparation through defense in the initial phases of parterre transition techniques;
- To expand the possibilities of performing technical-tactical actions during competition bouts by using hip throws as counterattacks against the opponent's chest-lift throw when preparing wrestlers for difficult standing techniques.

Analysis of the Dynamic Development of Explosive Strength Capabilities of Greco-Roman Wrestlers Based on 30-Meter Sprint Performance (Beginning and End of the Study)

No.	30 m Sprint	1st Experimental Group	2nd Experimental Group	Control Group
		Start of Study	End of Study	Start of Study
X		5.2	4.5	5.1
σ		0.64	0.62	0.56
V %		12.43	13.69	11.06
t		2.18	—	2.94
P		<0.05	—	<0.01

The conducted research results made it possible to identify significant positive changes in the speed qualities of Greco-Roman wrestlers based on 30-meter sprint exercises.

According to the experimental data, the average result in the first experimental group decreased from 5.2 seconds to 4.5 seconds, showing an improvement of 0.7 seconds in speed. This change indicates enhanced running technique, increased muscle contraction speed, and improved starting reaction. In this group, the dispersion remained stable (from σ=0.64 to σ=0.62), and the coefficient of variation (from 12.43% to 13.69%) demonstrated the consistency of results. The correlation coefficient r=0.33 and p=2.18 confirmed the statistical reliability of these changes.

In the second experimental group, the average time improved from 5.1 seconds to 4.7 seconds, demonstrating a gain of 0.4 seconds, which indicates the effectiveness of training load dynamics. Although the coefficient of variation increased from 11.06% to 15.05%, showing a widening range of results, the values r=0.43 and p=2.94 confirmed statistically significant improvements.

In the control group, the average time changed from 5.1 seconds to 4.8 seconds, a modest improvement of 0.3 seconds, which can be attributed to natural physical development. The coefficient of variation decreased from 12.69% to 11.67%, indicating stable results, while r=0.41 and p=2.76 showed moderate statistical significance.

Overall, the results indicate that the 30-meter sprint is an effective means of developing explosive speed, reaction time, and muscular activity in Greco-Roman wrestlers. The special speed-enhancing training system applied in the first experimental group produced the highest outcomes, highlighting the importance of scientifically planned training, gradual load progression, and proper technique.

The study showed that wrestlers in the first experimental group improved their average 30-meter sprint time from 5.2 seconds to 4.5 seconds, a notable improvement of 0.7 seconds.

For example:

- Athlete No.1 improved from 5.0 to 3.8 seconds, an increase in speed of up to 24%.
- Athletes No.5 and No.15 also showed high progress (1.0–1.2 seconds faster).
- Some athletes (e.g., No.28 and No.35) showed weaker progress, which may be associated with differences in training load volume and individual preparedness.

Overall, the decrease in dispersion (from 0.64 to 0.62) and statistical indicators (r=0.33, p=2.18) confirm stable and positive development.

In the second experimental group, the initial average was 5.1 seconds, decreasing to 4.7 seconds by the end.

Athletes No.4, 14, 17, and 30 improved by 1.0–1.3 seconds, demonstrating the effectiveness of start-reaction and speed-enhancement exercises.

However, regression was observed in some athletes (e.g., No.25 and 38), likely due to insufficient individualization of loads or short recovery periods.

Although the coefficient of variation increased (11.06% → 15.05%), the changes remained statistically reliable (r=0.43, p=2.94).

In the control group, average performance improved slightly (5.1 → 4.8 seconds).

Some wrestlers (No.13, 20, 37) improved by up to 1.0 second, while others (No.16, 28, 34, 38) showed slight regression.

This shows that general training alone does not significantly enhance speed.

The decrease in the coefficient of variation (12.69% → 11.67%) shows stabilization, while r=0.41 and p=2.76 indicate moderate significance.

The results prove that systematic 30-meter sprint training significantly enhances wrestlers' start speed, reaction, and explosive power.

It is recommended to perform this exercise:

- 2–3 times per week,
- 3–4 sets,
- 5–7 repetitions per session.

This contributes to a 10–15% improvement in overall speed potential.

The 1st experimental group demonstrated that scientifically grounded speed-training methodology can reduce average sprint time by 0.7 seconds. Thus, such training systems should be adapted for all age groups, especially for athletes aged 13–16, focusing on reaction, short-distance speed, and leg explosive power.

Individualization of training loads is crucial. Regression in some athletes (No.25, 38) may be linked to improper load distribution or insufficient recovery. Therefore, training loads should consider:

- physiological capacity,
- heart rate response,
- muscle fatigue level,
- psychological readiness.

Combining speed training with other physical qualities further enhances results. Integrating 30-meter sprints with:

- strength training (squats, jumps, interval runs),
- coordination drills,
- interval speed work

may increase reaction speed by 18–20%.

Statistical analysis ($r=0.33–0.43$, $p<0.05$) confirms that proper balance between intensity, repetitions, and rest intervals is essential.

An optimal training ratio is:

- 1:3 work–rest

(e.g., 5 seconds sprint → 15 seconds rest)

which also enhances cardiovascular performance.

The research proves that systematic, methodical, and individualized 30-meter sprint training is an effective scientific approach for developing wrestlers' start speed, explosive leg strength, and competitive readiness.

Dynamics of Speed Development in Greco-Roman Wrestlers during 100-Meter Sprint Training

Group / Test	**100-Meter Sprint**	**1st Experimental Group**	**2nd Experimental Group**	**Control Group**
	Beginning	End	Beginning	End
X	14.2	13.5	14.1	13.6
σ	0.86	0.85	0.84	0.49
V %	6.06	6.31	6.00	3.63
t	2.11	2.79	—	—
P	<0.05	<0.01	—	—

The research results allowed for a detailed analysis of changes in speed, explosive power, and running technique in wrestlers following 100-meter sprint training. The study involved two experimental groups and one control group.

At the beginning of the study, the average performance of wrestlers was 14.2 seconds in the first experimental group, which decreased to 13.5 seconds by the end—a 0.7-second improvement. This indicates significant enhancement in speed qualities, running rhythm, and start reaction. The dispersion (σ) slightly decreased from 0.86 to 0.85, and the coefficient of variation increased marginally from 6.06% to 6.31%, indicating stability in results. The correlation coefficient r=0.32 and t-statistic p=2.11 confirm the statistical reliability of the improvements. Notably, athletes No. 8, 22, 24, 25, and 28 showed the largest gains, improving individual results by 2–4 seconds.

In the second experimental group, the average time decreased from 14.1 seconds to 13.6 seconds, a 0.5-second improvement, which, although positive, was slightly lower than the first group. The dispersion decreased from 0.84 to 0.49, and the coefficient of variation dropped from 6.00% to 3.63%, showing reduced variability among athletes. Statistical indicators (r=0.41, t=2.79) demonstrate significant improvements. Athletes No. 2, 24, 32, and 35 showed particularly high results. Training in this group focused on improving start speed, refining running technique, and optimizing energy expenditure.

In the control group, the average performance improved from 14.6 seconds to 13.6 seconds, a 1.0-second improvement, though part of this change can be attributed to natural adaptation and general training effects. Dispersion decreased from 1.01 to 0.72, and the coefficient of variation dropped from 6.92% to 5.30%. Statistical reliability was confirmed with r=0.39 and p=2.61. However, athletes No. 19, 25, 35, and 37 showed some regression, likely due to imbalance in training load and recovery periods.

To develop speed during preparation stages, 100-meter sprint exercises should be performed at least 3 times per week, with 3–5 repetitions per session and 3–4 minutes rest intervals.

Individual monitoring of start reaction and running technique is recommended, including video analysis and technical correction when necessary. Coaches should individualize training loads, as regression in some athletes (e.g., No. 25 and 35) indicates excessive load or insufficient recovery.

Integrating 100-meter sprints with strength, endurance, and coordination exercises further enhances competitive readiness. Special attention should be given to starting block technique, as this phase can affect results by 0.3–0.5 seconds.

The study results show statistical reliability (r=0.32–0.41, $p<0.05$), confirming the effectiveness of the exercises. Therefore, performance should be continuously monitored using

control tests. To develop speed in wrestlers, training should include interval sprints, plyometric exercises, and repeated sprint cycles over 6–8 weeks.

The results of 100-meter sprints serve as key indicators for evaluating athletes' start speed, reaction time, and running rhythm, which are essential for assessing overall preparedness.

№	Type of Technical Preparation	Main Goal	Exercise Content	Expected Outcome
1	Repetition and Consolidation of Basic Technical Methods	Restore wrestlers' core techniques with precision and speed	Drills for parter (ground) attacks and defense, lifting, throwing, and turning techniques	Technical actions reach a level of automatism
2	Complexity and Combination of Technical Actions	Link several techniques in sequence, create combinations	Practice attack combinations including feints and setups	Ability to find creative solutions in complex technical situations develops
3	Preparation for Counter Techniques	Respond quickly to opponent's attack and transition from defense to offense	Stop opponent's attack and perform counterattack drills	Speed of transitioning from defense to offense increases; tactical thinking improves
4	Balance and Movement Stability Techniques	Maintain body balance during wrestling	Exercises in low positions, against pushing and pulling forces	Wrestler can maintain balance and continue movement steadily
5	Competition-Scenario Technical Model Training	Test technical readiness under near-competition conditions	Controlled sparring, referee-supervised matches, drills under timed pressure	Wrestler becomes psychologically and technically prepared for real competition stress
6	Special Situational (Scenario-Based) Technical Drills	Make correct technical decisions in complex and decisive situations	"Last-second" scenarios, attacking while behind, parter defense drills	Develops ability to act quickly, accurately, and effectively under stress
7	Individual Technical Style Improvement	Deepen athlete's personal technical arsenal	Practice techniques tailored to athlete's strengths (turns, lifts, throws)	Wrestler's signature techniques are refined; individual style develops

№	Type of Technical Preparation	Main Goal	Exercise Content	Expected Outcome
8	Technical-Tactical Integration Training	Integrate technical actions with tactical thinking	Adjust technical approach according to opponent type, “control wrestling”, deceptive attacks	Ability to adapt to opponent, tactical thinking, and technical creativity improve

Technical Preparation of Greco-Roman Wrestlers during Pre-Competition Period

The pre-competition technical preparation of Greco-Roman wrestlers is not merely a process of repeating technical movements. It represents a complex pedagogical system that integrates physical, psychological, and tactical-intellectual readiness, aimed at maximizing the athlete’s performance potential under competitive conditions. During this period, it is essential to conduct a thorough analysis of the wrestler’s technical arsenal, improve movement accuracy, speed, and efficiency according to individual characteristics, and automate technical solutions appropriate for competition scenarios.

The 8-stage model of technical preparation allows a scientifically grounded organization of adaptation to competition conditions. Each stage progressively increases the complexity of the athlete’s technical abilities, enabling the wrestler to anticipate opponent actions, make quick decisions, maintain balance, and optimally transition between offense and defense. Therefore, the development of cognitive and psychomotor skills must be considered alongside physical growth throughout the technical preparation process.

The effectiveness of pre-competition technical preparation largely depends on the athlete’s individual approach and mastery of their personal technical repertoire. Each wrestler possesses “signature” techniques—unique, strong combinations—which must be refined, adapted to opponents’ technical-tactical characteristics, and tested under different pressure situations during the pre-competition period. This process enhances technical creativity and tactical flexibility.

An essential aspect of technical preparation is the improvement of balance, coordination, and movement stability. Victory in Greco-Roman wrestling often depends on the wrestler’s ability to maintain body stability, properly manage the center of gravity, and respond to opponents’ actions with adequate speed. Therefore, pre-competition training emphasizes stabilization exercises, complex coordination tasks to develop dynamic balance, and drills in parter positions to maintain stability.

Technical-tactical integration training represents a stage where technical actions are developed in conjunction with tactical thinking based on opponent analysis. Each technical

movement is applied with a specific tactical intention. This approach trains wrestlers to think creatively, make rapid decisions, and apply flexible strategies according to the opponent's movements. Consequently, the athlete's technical skills are combined with tactical awareness and strategic thinking, forming a high level of sport intelligence.

The pre-competition phase is also one of the most active periods for psychological preparation. During this stage, athletes develop emotional stability, concentration, stress resilience, and motivational consistency. By simulating competitive situations during technical training, athletes adapt to real competition pressures, forming an essential component of psychotechnical readiness.

Scientific research and methodological approaches by Uzbek scholars and coaches—such as A.Q. Ataev, F.A. Kerimov, and N.A. Tastanov—emphasize the necessity of integrating technical-tactical, physical, and psychological training to ensure stable improvements in performance outcomes. International experts, including Filippo Martinetti, Mikhail Mamiashvili, Aleksandr Karelin, and Roman Vlasov, have further enriched the scientific foundations of technical preparation in wrestling.

In summary, the pre-competition technical preparation period is the most responsible, complex, and result-determining phase in the athlete's training cycle. Its proper scientific organization—including deep technical analysis, individualization, and the development of tactical thinking—directly influences competition results, consistency against opponents, and psychological readiness.

Conclusions. Studies indicate that systematic, individualized, and scientifically grounded exercises in sprinting, strength, and pull-up or upper-body workouts significantly enhance speed, explosive power, agility, endurance, and upper-body strength in Greco-Roman wrestlers. Key findings include:

1. Speed and explosive power: 30 m and 100 m sprint exercises improved start reaction, leg explosive power, and overall speed by 0.4–0.7 seconds. Maximum effectiveness was observed when sprinting was combined with strength, coordination, and interval exercises (speed increased by 10–15%).

2. Importance of methodical, scientific approach: Systematic and individualized training, combined with strength, coordination, and endurance exercises, increased overall physical readiness and competitive efficiency by 10–15%. Optimal work-rest ratios, load management, start technique, and recovery exercises maximize outcomes.

In conclusion, systematic, complex, and individualized sprinting, strength, and agility exercises effectively develop Greco-Roman wrestlers' speed, explosive power, endurance,

upper-body strength, and competitive readiness, while significantly improving general physical capabilities.

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