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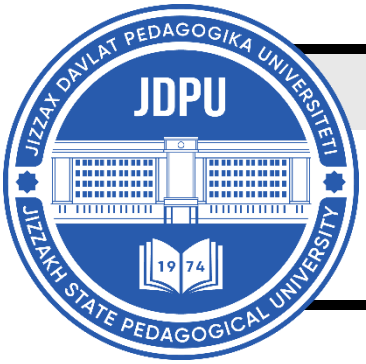

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METHODOLOGY FOR INTEGRATING STRENGTH AND SPEED IN PERIODIZED TRAINING SYSTEMS FOR FEMALE BASKETBALL PLAYERS

A'zam Akramovich Boltayev
PhD, Associate Professor, Oriental University

Umidaxon Eshmanova
Lecturer, Oriental University
Tashkent, Uzbekistan

ABOUT ARTICLE

Key words: 15–17 years old, female basketball players, strength, speed, integration, plyometric exercises, periodized training, explosive strength, sports physiology, neuromuscular coordination.

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Abstract: This scientific article examines the theoretical and practical foundations for harmoniously developing strength and speed qualities in 15–17-year-old female basketball players. It analyzes the effectiveness of periodized training systems based on factors such as adolescent physiology, pubertal changes, muscle fiber composition, and neuromuscular coordination. Additionally, it compares international practices, advanced methodologies, and the application of these principles within Uzbek sports schools, providing concrete recommendations.

Introduction

Basketball is a high-intensity sport that demands explosive power, speed, coordination, and rapid decision-making in every movement. For adolescent girls, developing physical attributes in a balanced manner not only enhances athletic potential but also strengthens their social and psychological well-being. The ages of 15–17 represent a critical period in terms of

physiological and psychological development. Without proper training approaches, excessive loads or incorrectly administered strength-speed exercises can lead to negative consequences.

Physiological Foundations

- Pubertal Changes: In girls aged 15–17, increased estrogen levels mean muscle mass does not increase as rapidly as in boys. Therefore, high-density training that doesn't overly fatigue muscles is essential for strength development.
- Muscle Fibers: Adolescent girls predominantly possess Type I (slow-twitch, endurance) fibers. To integrate strength and speed, exercises activating Type IIa and IIb (fast-twitch) fibers are necessary—such as plyometric loads.
- Neuromuscular Coordination: During this period, neuromuscular connections reach new levels. Coordination and explosive exercises help solidify the link between the brain and muscles.

1.Biomechanical Approach

Over 70% of basketball movements involve rapid stops and starts, sharp turns, jumps, and sudden accelerations. These require reactive strength (muscle response based on reaction) and explosive power (plyometric strength). Training should adhere to the following biomechanical principles:

- Force (F) = Mass (m) × Acceleration (a)
- Explosive Strength = Maximum Strength × Speed Component

2. Training System and Periodization

Period	**Goal**	**Type of Training**	**Recommended Duration**
Preparation (Sep–Dec)	Establishing a general base and foundational strength	Bodyweight exercises, stabilization, core muscle training	60–90 minutes, 4–5 times per week
Special Preparation (Jan–Mar)	Integration of strength and speed	Plyometric exercises, sprints, resistance running	75–100 minutes, 4 times per week

Competition (Apr–Jun)	Enhancing game performance	Game scenarios, reactive strength, short intervals	60–80 minutes, 3–4 times per week
Recovery (Jul–Aug)	Physical recovery	Light jogging, stretching, yoga, aquatic exercises	40–60 minutes, 2–3 times per week

4. Scientifically Based Exercise Examples

- Squat Jump: Develops explosive strength.
- Drop Jump (jumping down from a height): Enhances muscle reflex response.
- Sprint-Pause-Sprint (10 m – 3 sec pause – 10 m): Improves speed recovery ability.
- Resistance Band Drill: Stabilizes muscles.
- Medicine Ball Throw (5 kg): Increases core strength.

For 15–17-year-old female basketball players, developing strength and speed in harmony is most effective through a scientifically grounded, step-by-step approach. Consideration of muscle fiber composition, neuromuscular development, and psychological state is crucial. Each training phase should have clear objectives, and their interrelation contributes to overall athletic performance. Training programs based on plyometric, interval,

and reactive exercises aid in refining sports techniques. Before each training session, functional diagnostics—such as vertical jump tests, 10 m sprints, and muscle balance tests—should be conducted.

In athletes of this age group, muscle fibers of types I, IIa, and IIb are present, with IIa and IIb fibers being the primary drivers of strength and speed integration. Activating these fibers requires explosive exercises, plyometric loads, short sprints, and reactive movements. As training intensity increases, muscles operate through the anaerobic glycolytic system, placing additional demands on the cardiovascular and recovery processes. Furthermore, hormonal changes—such as fluctuations in estrogen and progesterone levels—affect muscle elasticity. Therefore, training should be adjusted according to the menstrual cycle, with optimal strength and speed potential during the ovulation phase.

Adolescents in this period may also experience psychological challenges, such as lack of self-confidence, feeling pressured in team settings, and social factors leading to feelings of inadequacy. Coaches should adopt individualized approaches during training, enhance motivation, integrate exercises with gameplay, and employ positive reinforcement methods in competitive environments. Core muscles—those in the central part of the body (lower back, lower abdomen, back)—deserve special attention, as they ensure body stability and facilitate balanced movements, especially during upward jumps, sharp turns, and stops. Incorporating exercises like planks, rotational throws, and Pallof presses helps transmit muscle strength effectively from the center to the periphery.

Conclusion. The harmonious development of strength and speed qualities in 15–17-year-old female basketball players is a decisive factor in enhancing their athletic skills, particularly in executing explosive movements swiftly and accurately during games. Given the ongoing physical and physiological changes during this age, training systems must be tailored to age, gender, and individual development rates. Integrating strength and speed requires systematic, phased training based on plyometric, sprint, reactive, and core-focused exercises. Considering factors such as muscle fiber types, cardiovascular system, hormonal status, and psychological preparedness, periodized training not only improves athletes' overall physical condition but also lays the groundwork for achieving high results in competitions. The scientific foundations, methodological approaches, and practical recommendations presented in this

article serve as essential guidelines for coaches and sports specialists working with 15–17-year-old female basketball players. Accordingly, physical education and sports schools, as well as specialized sports academies, should further refine training systems aimed at developing strength and speed integration.

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