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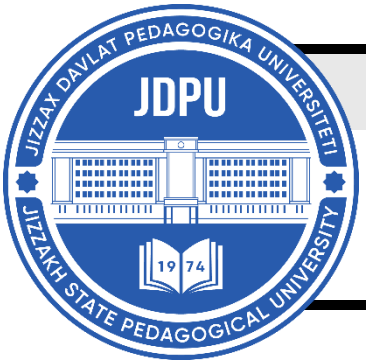

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DEVELOPMENT OF JUMPING AND HITING TECHNIQUES OF VOLLEYBALL PLAYERS AT THE TRAINING STAGE BASED ON PLYOMETRIC EXERCISES

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ABOUT ARTICLE

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Abstract: This article examines the effectiveness of developing the technique of jumping and striking in volleyball players during the training phase using plometric exercises. During the experimental study, the indicators of jump height, striking accuracy, and agility were assessed. The obtained results showed that the methodology developed based on pluometric exercises significantly improves the technical preparedness of female volleyball players.

Introduction. The effectiveness of offensive and defensive actions in modern volleyball largely depends on the athlete's jump height and the perfection of striking technique. In particular, the correct formation of these technical elements in female volleyball players at the training stage is of great importance for subsequent stages of sports training. Practice shows that traditional training methods often do not sufficiently take into account the physical and physiological characteristics of female athletes.

Plyometric exercises are an effective tool for developing speed muscle strength, improving jumping ability, and perfecting striking technique. However, the issue of using these exercises based on a methodology adapted for female volleyball players at the training stage has not been sufficiently scientifically covered. Therefore, it is advisable to develop a

methodology aimed at developing the technique of jumping and striking based on plummetric exercises.

The aim of the research. Determination of the effectiveness of the methodology for developing the jumping and striking technique of female volleyball players based on plummetric exercises at the training stage.

Objectives of the research. 1. Determination of the level of development of jumping and striking technique in female volleyball players. 2. Analysis of the possibilities of using plummetric exercises in the training process. 3. Development of a set of plometric exercises corresponding to the age and physiological characteristics of girls.

METHODOLOGY. The methodology was developed taking into account the age-related anatomical, physiological, and functional characteristics of female volleyball players. In particular, taking into account the level of development of the musculoskeletal system, joint mobility, and speed-strength capabilities, plummetric exercises were used at low and medium intensity, strictly observing the principle of safety. When performing exercises, special attention was paid to a soft landing, maintaining the correct technical position, and preventing overload.

Results. A set of plometric exercises aimed at developing the jumping and striking technique of female volleyball players at the training stage is presented. Exercises are selected taking into account the age, physiological, and functional characteristics of female athletes and are designed to be performed at low and medium intensity. The number of repetitions of each exercise, the rest interval, and the main indicators to be developed are clearly defined, which allows for effective load management during the training process (see Table 1).

Table 1

Complex of plometric exercises aimed at developing the jumping and striking technique of female volleyball players at the training stage

Exercise name	Exercise Description	Number of executions	Rest (sec.)	Key indicators to be developed
Standing jump	Soft two-leg jump and landing	6-8	40-60	Jump height
Jump forward	Jump forward, balance	6	40	Coordination
Jump onto a low-altitude platform	Jump onto a low-altitude platform	6-8	50	Fast force
Side jump	Sequential jumps to the right and left	6-8	40	Lateral motion and balance
Jump and strike simulation	Attacking strike action after jump	5-6	60	Strike technique

Quick leg switching	Low-intensity fast leg movements	10-12	30	Reaction and rate
Post-jump position	Quick positioning after jump	5-6	45	Tactical Adaptability and Stability

The set of plometric exercises presented in the table is distinguished by the fact that it is aimed at the comprehensive development of jumping and striking technique. The sequential arrangement of exercises, starting with the vertical jump from the spot and ending with the imitation of the impact after the jump, indicates the practical application of the "from simple to complex" principle. This approach serves the gradual formation of accuracy and stability of movements in female volleyball players.

Additionally, side jumps and quick leg switching exercises increase flexibility in game situations by developing coordination, balance, and reaction speed. The introduction of the positioning exercise after the jump plays an important role in ensuring tactical adaptation and stability. Determining the rest interval in accordance with the intensity of the exercises ensures the prevention of excessive fatigue and high-quality performance of exercises during the training process.

Plyometric exercises, systematically and organically integrated with the elements of technical training, served the development of jumping and striking movements as a single biomechanical and pedagogical system. In the training process, the sequence of phases of technical movements, inter-movement coordination, and balanced participation of muscle groups were taken into account. Technical elements were formed based on the principle of "from simple to complex," with a gradual increase in the load, which made it possible to increase the accuracy, stability, and level of automation of movements in female volleyball players.

This approach, ensuring the combination of strength and speed indicators in the process of striking after the jump, had a positive effect on the flexible execution of technical actions in game situations. As a result, the athletes significantly improved the efficiency of performing technical actions, the speed of decision-making, and the overall effectiveness of the game even in complex game situations.

In order to determine the effectiveness of the methodology based on plummetric exercises used in the research process, specially selected control tests were used. The data in the table show that as a result of training based on plometric exercises, positive changes were noted in the indicators of all control tests of female volleyball players. (see Table 2).

Table 2

Dynamics of indicators of control tests of female volleyball players as a result of training based on plometric exercises

Control tests	Vertical landing jump (cm)		Standing Long Jump (cm)		1 kg. Throwing a medicine ball from behind the head (m):		Attack Accuracy (%)		Agility test 4×10 m (s)	
	TB	TO	TB	TO	TB	TO	TB	TO	TB	TO
x̄ average	28,5	32,2	160	176,5	4,6	5,4	52,0	68,5	12,4	11,2
standard deviation	3,5	3,0	14,0	13,0	0,6	0,5	7,0	6,5	0,9	0,8
V, %	12,28	9,04	8,75	7,37	13,04	9,26	13,46	9,49	7,26	7,14
t	3,53		2,99		3,55		5,98		3,45	
p	<0,05		<0,05		<0,05		<0,05		<0,05	

A significant increase in the indicators of high jump and standing long jump at the end of the study confirms the effective influence of plummetric exercises on the development of speed and explosive strength.

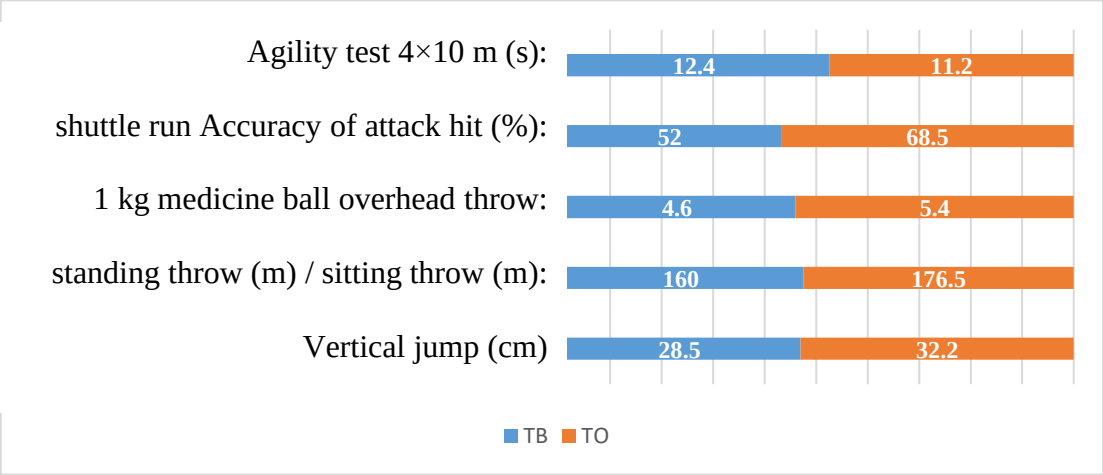

Figure 1. Dynamics of indicators of control tests in female volleyball players

Discussion. Also, a significant improvement in the results of throwing 1 kg of medicine ball indicates an increase in the strength and speed indicators of the muscles of the upper body, especially the shoulder girdle and torso muscles. This situation positively influenced the effectiveness of the striking technique, ensuring the effective transmission of the force impulse during the attack. A reliable increase in the accuracy of an attacking shot indicates the stabilization of technical actions, an improvement in the sequence of actions, and the development of accuracy in the execution of a shot.

A decrease in the time recorded in the agility test confirms an improvement in the ability to quickly perceive movement speed, coordination, and spatial orientation under the influence

of plometric exercises. This shows that it expands the possibilities of quick positioning in game situations, timely movement changes, and effective execution of technical elements.

Conclusion. The results of the conducted research showed the high effectiveness of the developed methodology based on plometric exercises in the development of jumping and striking technique of female volleyball players at the training stage. In the experimental process, the use of plummetric exercises in close integration with the elements of technical training led to a reliable improvement in the indicators of jump height, accuracy of strikes, and agility. Also, the use of plometric exercises at low and medium intensity, corresponding to the age and physiological characteristics of female athletes, made it possible to achieve high sports results while reducing the risk of injury. The obtained scientific results substantiate the expediency of the developed methodology for its implementation in the training process and make it possible to recommend it as an effective tool for improving the technical training of female volleyball players.

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