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Scientific And Methodological Foundations Of Technical-Tactical And Physical Training In Volleybal

A.S.Safarov

Associate Professor, Karshi State University, Uzbekistan

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Abstract: This article analyzes the scientific foundations of developing volleyball players' technical, tactical, and physical preparedness, the principles of planning modern training processes, load dynamics, age-specific training systems, and the psychophysiological characteristics of competitive activity. It also presents scientifically grounded methodological approaches to improving motor skills, enhancing jumping ability, developing ball-handling techniques, and fostering tactical thinking in volleyball players.

Keywords: Volleyball, technical preparation, tactical preparation, physical qualities, jumping ability, strength training, coordination, competition process, psychological preparation, training methodology.

Introduction: Volleyball is considered a sport that requires high speed, jumping ability, precision, and tactical thinking among modern sports disciplines. Achieving high results in this sport demands that coaches plan the training process on a scientific basis, while athletes must master complex coordinative movements. Current scientific research in volleyball mainly focuses on improving jumping ability, analyzing spike force dynamics, enhancing playing technique, developing team tactics, strengthening psychological stability, and preventing injuries.

The training system for volleyball players requires a comprehensive approach: technical skills, physical qualities, tactical thinking, psychological stability, and functional capabilities must be developed in an interconnected manner. Therefore, this article thoroughly examines the scientifically grounded aspects of training volleyball players.

The main characteristics of volleyball include high speed, quick thinking, coordination, jumping ability, timely decision-making, and team cooperation. The dynamic structure of the game requires high energy expenditure within short time intervals. The game demands continuous tracking of the ball's movement trajectory, strong spatial perception, and rapid motor reactions.

In recent years, the speed of play, spike power, and the variety of combination plays in volleyball have significantly increased. In particular:

• the introduction of the libero position has improved defensive systems;

• high-tempo combinations (A, B, and C attacks) have increased offensive efficiency;

• accelerating the attack immediately after receiving the serve has become a decisive factor in determining match outcomes.

Therefore, in the training process it is necessary to systematically develop team tactics alongside technical skills.

In volleyball, the following physical qualities are of primary importance:

• Jumping ability — directly influences the effectiveness of attacking spikes and blocking.

• Strength — especially the explosive strength of the leg muscles.

• Endurance — enables maintaining high intensity throughout the match.

• Speed — affects reaction to the ball and the execution speed of game actions.

• Flexibility — contributes to injury prevention and increases movement amplitude.

Jumping ability is developed through plyometric exercises, weighted jumps, sprints, and explosive movement drills. For example:

• short-distance maximal sprints;

• vertical jumps (countermovement jump, squat jump);

• lateral jumps;

• hurdle jumps.

Training load is gradually increased, and muscle fatigue is carefully monitored.

Strength exercises are carried out in three stages:

1. General strength – strengthening body stability, back, and leg muscles.

2. Specific strength – movements closely related to game activities (spike simulations, block jumps).

3. Explosive strength – plyometric exercises and short, high-intensity drills.

Strength training is integrated with technical preparation.

Speed training is developed through:

• rapid changes of direction (agility drills);

• short-duration maximal effort movements;

• exercises with complex coordination tasks.

The development of coordination ensures the effective acquisition of technical skills.

The main technical elements in volleyball include:

• serving;

• receiving;

• ball passing;

• attacking spikes;

• blocking;

• defensive movements.

Each element has a technical model, and training is conducted according to this model.

Serving is the opening action of the game and, in many situations, a crucial part of transitioning to an attack. In modern volleyball, powerful overhand serves, running serves, and accurately targeted serves are used. When performing a serve, the following are important:

• backward extension of the body;

• correct alignment of the striking arm;

• spin and speed of the ball;

• push-off from the support point during jump serves.

The primary task of receiving the ball is to deliver it accurately to the setter. Reception technique is based on body stability, proper positioning of the feet, and correct striking angle. A reliable reception enhances the efficiency of the attack.

The attacking spike is a multi-stage movement consisting of the following:

1. Approach run;

2. Jump;

3. Strike;

4. Landing.

Each stage is based on biomechanical principles. Jump height and strike power are closely linked to the player's explosive strength.

Blocking is a central element of defense. A correctly executed block can reduce the effectiveness of the opponent's attack by up to 50%. Key aspects of blocking technique include:

• correct timing of the jump;

• proper hand positioning to form a barrier;

• anticipating the ball's trajectory.

Individual tactics involve the player making optimal decisions on the court, positioning correctly, and anticipating the opponent's actions.

In group tactics, combinations performed by two or three players together are taught. For example:

• "Right-side attack combination";

• two-player block;

• fast defensive schemes.

In team tactics, the following are developed:

• overall defense and attack systems;

• serve reception schemes;

• adaptive game plans against opponents.

In modern volleyball, the 5–1 and 4–2 systems are most commonly used.

The training of volleyball players is usually planned as follows:

1. General preparation phase;

2. Specific preparation phase;

3. Competition phase;

4. Recovery phase.

Each phase has its own load intensity.

Training loads are based on the following principles:

• regularity;

• continuity;

• progressive overload;

• cyclicality;

• individualization.

Load parameters are controlled and monitored by the coach.

In volleyball, psychological qualities include:

• stress tolerance;

• self-confidence;

• concentration during competition;

• volitional qualities.

Psychological preparation exercises are developed using autogenic training, concentration drills, and visualization techniques of competition.

During competition, a player's performance is evaluated based on the following indicators:

• accuracy and power of serving;

• effectiveness of attacks;

• effectiveness of blocking;

• accuracy of reception;

• efficiency of defense.

The obtained results help optimize the training plan.

Training volleyball players requires a scientifically grounded, systematic approach. High performance can only be achieved when physical qualities, technical skills, tactical thinking, psychological preparation, and injury prevention are developed in an interconnected manner.

This article highlights the main directions for organizing the volleyball training process from a scientific and methodological perspective. The results indicate that planning the training process based on scientific principles has a significant impact on improving athletes' performance.

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