

BIOKINEMATIC ANALYSIS OF THE FALLING RECEPTION TECHNIQUE (“PADENIE”) IN HIGHLY SKILLED VOLLEYBALL PLAYERS

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Abstract: *The falling reception technique (“padenie”) is considered one of the most complex defensive skills in volleyball. This technique enables players to successfully receive low or fast-moving balls while simultaneously reducing the risk of injury. The padenie technique can be performed in various forms, each characterized by specific biokinematic features.*

Keywords: *volleyball; padenie; falling reception; forward fall; side fall; backward fall; biokinematics; 3D motion analysis*

The aim of this study was to conduct a biokinematic analysis of the padenie technique in highly skilled volleyball players. Using 3D motion capture and biomechanical modeling methods, the movement patterns, coordination, and range of motion of major body joints—including the spine, neck, shoulder, elbow, hip, knee, and ankle—were analyzed. The results provide valuable insights into movement efficiency, shock absorption, and coordination mechanisms involved in falling reception techniques.

Types of Padenie Techniques and Kinematic Analysis

1. Forward Falling Reception (Forward Roll / Standard Padenie)

Description:

This technique involves a forward fall combined with body rotation to receive the ball. It is commonly used for low or forward-directed balls.

Kinematic Characteristics:

- 1- Flexion of the spine and neck contributes to shock absorption.
- 2- Hip and knee flexion ensures a soft landing on the ground.
- 3- Coordinated positioning of the shoulder and elbow joints allows accurate ball control.

2. Side Falling Reception (Side Fall Reception)

Description: This technique is applied when the ball approaches from the side or outside the player’s frontal zone.

Kinematic Characteristics:

- 1- Lateral flexion and trunk rotation play a key role in movement execution.

2- Hip abduction and knee flexion assist in maintaining balance during the fall.

3- Coordinated shoulder and elbow movements ensure effective ball control.

3. Backward Falling Reception (Backward Fall / Back Roll)

Description: Used when receiving balls coming from behind the player.

Kinematic Characteristics:

1- Backward flexion of the spine and hip joints reduces impact forces.

2- Knee flexion contributes to controlled ground contact.

3- Coordinated upper-limb movements enhance ball control and minimize injury risk.

4. Short Pass Falling Reception

Description:

Applied for fast and sharply descending balls, requiring minimal falling motion.

Kinematic Characteristics:

1- Minimal flexion of the lower limbs with a lowered center of mass.

2- Rapid and precise elbow and wrist movements.

3- Slight spinal flexion, with most of the impact absorbed through the upper limbs.

Biokinematic Significance of the Padenie Technique

1- **Stability:** Core stability and spinal control are essential for balance during falling movements.

2- **Shock Absorption:** The hip, knee, and ankle joints play a critical role in reducing impact forces.

3- **Upper Limb Coordination:** Precise coordination of the shoulder and elbow joints ensures accurate ball direction.

4- **Rapid Recovery:** Effective execution allows players to quickly return to a ready position after the fall.

Conclusion: The padenie technique represents an essential defensive skill in highly skilled volleyball players, with each variation demonstrating distinct kinematic characteristics. Proper coordination of movements, optimal joint flexion, and accurate positioning of the upper limbs are crucial for successful ball reception and injury prevention. The findings of this study provide practical recommendations for coaches and athletes aimed at improving defensive skills and optimizing training methodologies.

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