

**BIOKINEMATIC CHARACTERISTICS OF THE BLOCKING
TECHNIQUE IN HIGHLY SKILLED VOLLEYBALL PLAYERS**

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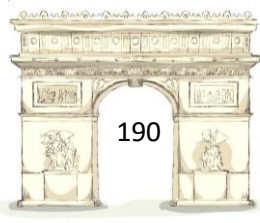
Abstract: *The blocking technique is one of the most important defensive actions in volleyball and plays a decisive role in determining match outcomes at the elite level. This technical movement involves complex kinematic and biomechanical processes that require precise coordination of body segments and joints. Effective execution of the block depends on synchronized muscular activity, optimal joint positioning, and rapid movement response, which together ensure maximal reach, stability, and accuracy.*

The aim of this study was to investigate the bio kinematic characteristics of the blocking technique in highly skilled volleyball players using modern 3D biomechanical analysis methods. The kinematic behavior of major body joints, including the spine, neck, shoulder, elbow, hip, knee, and ankle, was analyzed to determine angular displacements, ranges of motion, and inter-joint coordination during the blocking action.

The research was conducted using 3D motion capture and biomechanical modeling techniques, allowing for a detailed quantitative assessment of joint movements throughout different phases of the block. The analysis revealed that effective blocking performance is strongly associated with coordinated extension of the lower limb joints, optimal spinal alignment, and timely activation of the upper limb joints. Proper synchronization between the hip, knee, and ankle joints contributes to increased vertical jump height, while coordinated shoulder and elbow movements enhance hand positioning and blocking precision.

The findings indicate that insufficient joint mobility or poor coordination negatively affects blocking efficiency and may increase biomechanical load on specific body segments. In conclusion, this study provides a comprehensive bio kinematic interpretation of the volleyball blocking technique and highlights key movement parameters essential for performance optimization. The results offer valuable practical recommendations for coaches and sports specialists aimed at improving technical skills, preventing injuries, and enhancing competitive performance. This research contributes to the scientific and methodological development of elite volleyball training.

Keywords: *valleyball, blocking technique, biokinematics, 3D motion analysis, biomechanics, elite athletes*



LITERATURE

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