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Potential for Non-Contact ACL Injury Between Step-Close-Jump and Hop-Jump Tasks

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ABSTRACT

This study aimed to compare the kinematics and kinetics during the landing of hop-jump and step-close-jump movements in order to provide further inferring that the potential risk of ACL injuries. Eleven elite male volleyball players were recruited to perform hop-jump and step-close-jump tasks. Lower extremity kinematics and ground reaction forces during landing in stop-jump tasks were recorded. Lower extremity kinetics was calculated by using an inverse dynamic process. Step-close-jump tasks demonstrated smaller peak proximal tibia anterior shear forces during the landing phase. In step-close-jump tasks, increasing hip joint angular velocity during initial foot-ground contact decreased peak posterior ground reaction force during the landing phase, which theoretically could reduce the risk of ACL injury.

Key words: Stop-jump, inverse dynamics, shear force

Key Points

- The different landing techniques required for these two stop-jump tasks do not necessarily affect the jump height.
- Hop-jump decreased the hip joint angular velocity at initial foot contact with ground, which could lead to an increasing peak posterior GRF during the landing phase.
- Hop-jump decreased hip and knee joint angular flexion displacement during the landing, which could increase the peak vertical loading rate during the landing phase.

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