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Research article

The Effect of Gender and Fatigue on the Biomechanics of Bilateral Landings from a Jump: Peak Values

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ABSTRACT





Female athletes are substantially more susceptible than males to suffer acute non-contact anterior cruciate ligament injury. A limited number of studies have identified possible biomechanical risk factors that differ between genders. The effect of fatigue on the biomechanics of landing has also been inadequately investigated. The objective of the study was to examine the effect of gender and fatigue on peak values of biomechanical variables during landing from a jump. Thirty-two recreational athletes performed bilateral drop jump landings from a 40 cm platform. Kinetic, kinematic and electromyographic data were collected before and after a functional fatigue protocol. Females landed with 9° greater peak knee valgus ($p = 0.001$) and 140% greater maximum vertical ground reaction forces ($p = 0.003$) normalized to body weight compared to males. Fatigue increased peak foot abduction by 1.7° ($p = 0.042$), peak rectus femoris activity by 27% ($p = 0.018$), and peak vertical ground reaction force ($p = 0.038$) by 20%. The results of the study suggest that landing with increased peak knee valgus and vertical ground reaction force may contribute to increased risk for knee injury in females. Fatigue caused significant but small changes on some biomechanical variables. Anterior cruciate ligament injury prevention programs should focus on implementing strategies to effectively teach females to control knee valgus and ground reaction force.

Key words: Anterior cruciate ligament injury, injury prevention, knee injury, sports biomechanics

Key Points

- Female athletes landed with increased knee valgus and VGRF which may predispose them to ACL injury.
- Fatigue elicited a similar response in male and female athletes.
- The effectiveness of sports injury prevention programs may improve by focusing on

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