

Comparison of Joint Loading in Badminton Lunging between Professional and Amateur Badminton Players

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Abstract

The knee and ankle are the two most injured joints associated with the sport of badminton. This study evaluates biomechanical factors between professional and amateur badminton players using an injury mechanism model. The aim of this study was to investigate the kinematic motion and kinetic loading differences of the right knee and ankle while performing a maximal right lunge. Amateur players exhibited greater ankle range of motion ($p < 0.05$, $r = 0.89$) and inversion joint moment ($p < 0.05$, $r = 0.54$) in the frontal plane as well as greater internal joint rotation moment ($p < 0.05$, $r = 0.28$) in the horizontal plane. In contrast, professional badminton players presented a greater knee joint moment in the sagittal ($p < 0.05$, $r = 0.59$) and frontal ($p < 0.05$, $r = 0.37$) planes, which may be associated with increased knee ligamentous injury risk. To avoid injury, the players need to forcefully extend the knee with internal rotation, strengthen the muscles around the ankle ligament, and maximise joint coordination during training. The injuries recorded and the forces responsible for the injuries seem to have developed during training activity. Training programmes and injury prevention strategies for badminton players should account for these findings to reduce potential injury to the ankle and knee.