

Eccentric Hip Strength And Kinematic Differences Between The Dominant And Non-Dominant Legs Of Men And Women During A Hopping Task

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Women injure the anterior cruciate ligament (ACL) at a much higher rate than men. Many of these injuries have been suggested to occur when female athletes land from a jump. During this activity, the female knee is more likely to go into a position of increased valgus and rotation angles that stresses the ACL. Eccentric dynamic control by the hip abductors could decrease the magnitude of the valgus and rotation angles of the knee. The purpose of this study was to evaluate and compare eccentric hip abduction strength and kinematics of the lower extremities of men and women. Eighteen healthy volunteers participated in the study (10 female, age=22.1±2.3 years, ht=167.01±5.03 cm, mass=63.95±8.61 kg; 8 males, age=24.1±2.2 years, ht=179.55±3.11 cm, mass=76.22±9.23 kg). The dominant leg was determined to be the leg used to kick a ball. Peak angles in the sagittal, frontal, and transverse planes were determined for the hip, knee, and ankle during a functional hopping task. The hopping task consisted of a single leg hop over a 10 cm box from a distance of 45% of the subject's height. Subjects completed four trials and the average peak angles during landing were used for analysis. All subjects performed an isokinetic test for eccentric hip abduction (120°/s) to collect average peak torque measurements (normalized to body mass). The hopping task and strength test were performed bilaterally. Ten separate 2x2 mixed model ANOVAs (gender x leg) were performed on each joint angle and average peak torque. There were no significant main effects for gender for any of the joint angles or average peak torque. While not significant ($p=0.078$), women demonstrated larger peak knee valgus angles (13.22°) than men (9.16°). There was a significant main effect for leg dominance at all three joints. The non-dominant leg had higher peak hip internal rotation ($p=0.015$), higher knee external rotation ($p=0.014$), and lower peak ankle internal rotation angles ($p=0.006$) than the dominant leg. There were no significant differences in average peak torque between the dominant and non-dominant hip, however, 7 of the 18 subjects (4 women, 3 men) had side-to-side differences greater than 15%. Joint angles did not differ between genders, however, asymmetry in both joint angle and strength exist in the lower extremities. Further investigations should address the clinical significance of increased rotational movements of the non-dominant lower extremity, as well as the effect of side-to-side eccentric hip abduction strength differentials.