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Establishing Inter-Day Reliability of Neuromuscular Coordination of the Lower Extremity During a Drop-Jump Landing

Kerry N. Callaghan, Abigail L. Daly-Smith, Bailey T. Capra, David A. Phillips. Montclair State University, Montclair, NJ

Prior studies have indicated that females have increased quadriceps activation compared to males, which may contribute to the increased rate of anterior cruciate ligament (ACL) injuries in females. Research examining muscle activation timing with a focus on the timing of initial peak activation is limited. **PURPOSE**: To determine the minimum number of trials necessary to establish a stable mean for initial peak activation, the reliability of time to initial peak muscle activation across days, the standard error of measure (SEM), the smallest detectable difference (SDD), and compare the algorithm identifying initial peak to manual visual inspection. **METHODS**: Nine healthy adults with no history of lower extremity injury were recruited. Participants completed 10 drop jumps onto two force plates during two data collection sessions. Muscle activation was tracked using five electrodes on the gluteus maximus, gluteus medius, biceps femoris (BF), vastus medialis (VM), and gastrocnemius. Intraclass correlation coefficient (ICC) was used to determine reliability of time to initial peak muscle activation between both sessions. The sequential estimation method was used to establish a stable mean. **RESULTS:** 175 trials were viable. To ensure a stable mean is established 97.5% of the time, it was determined nine trials are necessary. Data were good and moderately reliable for time to initial peak for the vastus medialis and biceps femoris with ICC(3,1) = 0.79 and ICC(3,1) = 0.68 respectively. The algorithm agreed with visual inspection for VM (96%) and BF (97.7%) of the time respectively. The SEM and SDD were 9.8 ms and 27.3 ms for VM, and 11.5 ms and 32.0 ms for BF. **CONCLUSIONS:** These findings suggest muscle activation timing during a drop jump landing is good to moderately reliable across two data collection sessions.