Assessing Single-Leg Squat Quality: Kinematic Predictors for Experienced and Inexperienced Clinicians
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The single-leg squat (SLS) is commonly used by physical therapists (PTs) in the clinical assessment of the lower limb. SLS performance is associated with hip muscle function, knee loading patterns and risk of musculoskeletal injury. The kinematic parameters relating to clinician observations of SLS quality, however, are yet to be illuminated. Furthermore, it is unknown if such parameters are related to clinician experience.

PURPOSE: To reveal the pelvis, hip and knee kinematic parameters used to determine SLS quality by experienced and inexperienced clinicians.

METHODS: Eight student and eight post-graduate level musculoskeletal PTs agreed to rate each SLS. Twenty-two healthy, young adults (23.8 ±3.1 years) were videoed while performing three SLSs on each leg. 3D motion of the pelvis, hip and knee was recorded using a 10-camera optical motion analysis system (Vicon, Oxford, UK). Quality of each SLS performance was rated from video data using a 10-point ordinal scale (i.e. 1 = lowest, 10 = highest). SLSs were re-scored two weeks later by all assessors. Stepwise multiple regression analysis was performed to determine kinematic predictors of stability scores for experienced PTs and student PTs. Inter- and intra-rater reliability was determined using a two-way mixed model to generate intra-class correlation coefficients (ICC) of consistency.

RESULTS: The second SLS on each side was analyzed for each participant, providing 44 SLSs for analysis. Experienced PT scores were greater than student PT scores (6.4 ±1.8 vs 6.1 ±1.5; p = 0.02). Variance in experienced PT scores was predicted by peak knee flexion, peak hip adduction, and knee medio-lateral displacement (R² = 0.64, p = 0.01). Variance in student PT scores was predicted by peak knee flexion, and knee medio-lateral displacement (R² = 0.57, p = 0.01). Inter-rater reliability was good for PTs (ICC = 0.71) and students (ICC = 0.60). Intra-rater reliability was excellent for PTs (ICC = 0.81) and good for PT students (ICC = 0.71).

CONCLUSION: Experienced PTs and student PTs are both capable of reliable assessment of SLS stability; however experienced PT assessments bear somewhat stronger relationships to lower limb kinematics. PT ratings were related to hip and knee motion, while student PT ratings were specific to the knee.