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Three-dimensional Kinematics Of The Single-leg Squat In Women With Anterior Knee Pain

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(No relationships reported)

Anterior knee pain (AKP) is a musculoskeletal condition that frequently affects young women. The single leg squat (SLS) is a common test used clinically to detect aberrant movement patterns in patients with AKP. It is unclear to what extent knee pain influences patterns of movement in such tests and whether pain severity plays a role.

PURPOSE: To compare three-dimensional trunk, pelvis, hip and knee joint kinematics during the SLS between women with and without AKP. Further, we aimed to investigate the relationships between pain severity and kinematics during the SLS.

METHODS: Forty young women participated, including 20 with AKP (24.8 ± 4.6 yrs) and 20 without AKP (25.7 ± 3.7 yrs). All participants performed five individual SLSs on each leg while three-dimensional motion of the trunk, pelvis, hip and knee was recorded using a 10-camera optical motion analysis system (Vicon, Oxford, UK). Trunk, pelvis and lower limb joint angles were calculated using a reliable and validated kinematic model. Pain was quantified using the Kujala AKP Scale and a 10-point visual analogue scale. Multivariate ANOVA was used to compare kinematics of participants with AKP to those without. Bivariate correlation and linear regression analysis were used to determine relationships between kinematics and pain scores.

RESULTS: Women with AKP exhibited greater peak trunk flexion (28.5 ± 12.7 deg vs. 19.1 ± 13.6 deg; $p = 0.03$), peak contralateral pelvic obliquity (5.6 ± 4.2 deg vs. 2.8 ± 4.0 deg; $p = 0.03$), peak hip adduction (18.0 ± 5.6 deg vs. 13.1 ± 9.0 deg; $p = 0.05$), peak hip flexion (74.9 ± 12.7 deg vs. 65.7 ± 14.9 deg; $p = 0.04$), and knee medio-lateral distance (74.9 ± 12.7 mm vs. 65.7 ± 14.9 mm; $p = 0.04$) compared to controls. Kujala AKP score was positively related to peak hip abduction ($r = 0.52$; $p = 0.02$), current knee pain (VAS) was inversely related to peak hip flexion ($r = -0.57$; $p = 0.01$), and relative knee pain was inversely related to peak hip internal rotation ($r = 0.47$; $p = 0.04$) during the SLS.

CONCLUSIONS: Women with AKP demonstrated greater peak angular displacement at the trunk, pelvis, hip and knee than women without AKP. Further, pain severity was related to peak angular displacement at the hip.