

ORIGINAL RESEARCH

THE USE OF FUNCTIONAL TESTS TO PREDICT SAGITTAL PLANE KNEE KINEMATICS IN NCAA-D1 FEMALE ATHLETES

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ABSTRACT

Background: Landing with the knee in extension places increased loads on ligamentous restraints at the knee versus landing in flexion. Unfortunately, existing methods to predict landing kinematics require sophisticated equipment and expertise. The purpose of this study was to develop predictive models for sagittal plane tibiofemoral landing kinematics from the results of functional tests.

Methods: Twenty-nine female, NCAA-D1 college athletes (mean \pm standard deviation, age = 19.03 ± 1.09 ; mass = 66.56 ± 13.47 kg; height = 171.16 ± 7.92 cm) participated in a descriptive, laboratory study. Participants performed five unilateral, dominant lower extremity (LE) landings from a 35cm platform onto a forceplate. LE three-dimensional kinematics were captured with electromagnetic sensors interfaced with motion analysis software. Then in a randomized order, participants performed three standardized functional tests: single limb triple hop (SLTH), countermovement vertical jump (CMVJ) and the Margaria-Kalamen (MK) test. Sagittal plane tibiofemoral joint angle at initial contact (IC) and excursion (EXC) in the first 0.1s after ground contact were entered into a statistical software package. Multiple linear regression analyses generated one model predicting IC and one predicting EXC from the independent variables. Alpha levels were set a priori at $p \leq .05$.

Results: A two variable (MK, SLTH) linear regression model that predicted EXC was significant (Adjusted $R^2 = .213$, $p = .017$), however the model that predicted IC was not ($p = .890$).

Conclusion: Knee flexion excursion following a single leg landing task may be predicted with the MK and SLTH. The use of functional tests provides a practical means to predict landing kinematics to clinicians working with an active, athletic population.

Level of Evidence: 3, cohort study

Keywords: Anterior cruciate ligament, kinesiology, Margaria-Kalamen, triple hop, vertical jump

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