Transverse Plane Knee Kinematics Differ Between Asymmetrical Hip Rotation Groups

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Femoral anteversion has been associated with greater passive hip internal rotation relative to external rotation and is commonly described as an asymmetrical unilateral hip rotation (AUHR). Individuals with greater AUHR would have increased internal rotation of the femur that could contribute to differences in rotational lower extremity joint kinematics during dynamic activities, increasing the risk of anterior cruciate ligament (ACL) injuries. **PURPOSE:** To compare transverse plane hip and knee kinematics during the landing phase of a drop vertical jump (DVJ) in those with above ($AUHR_{HIGH}$) and below ($AUHR_{LOW}$) average AUHR. **METHODS:** AUHR was measured bilaterally on 23 Division I female soccer players (19.2 ± 1.0 yrs, 168.4 ± 6.0 cm, 63.6 ± 5.2 kg). Three-dimensional hip and knee kinematics were collected during 3 DVJ trials from a height of 30cm. The initial contact, maximum, and excursion transverse plane hip and knee angles during the landing phase were averaged across the 3 trials for analysis. Participants were classified as $AUHR_{HIGH}$ or $AUHR_{LOW}$ based on the average AUHR in the overall sample (right=7.1°, left=12.9°). Separate one-way ANOVAs compared AUHR groups in transverse plane hip and knee kinematics. **RESULTS:** Differences ($AUHR_{HIGH}$ vs. $AUHR_{LOW}$) were observed with maximum knee rotation where the $AUHR_{HIGH}$ had less knee internal rotation in the right (8.8±3.6° vs. 13.2±4.8°, P=0.021) and left limbs (9.7±4.9° vs. 14.1±4.1°, P=0.031) compared to the $AUHR_{LOW}$. There were no other differences observed in transverse plane kinematics of the hip and knee during a DVJ. **CONCLUSIONS:** Greater AUHR may structurally position the femur in a more inwardly rotated position and promote increased rotation of the femur on a fixed tibia during landing, resulting in less knee internal rotation angles. This internal rotation of the femur is described by AUHR in a static position, not by excessive inversion during dynamic activities. These findings suggest that structural difference at the femur could potentially contribute to dynamic malalignments that increase the risk of ACL injuries.

ABSTRACT CLASSIFICATION
Biomechanics and Neural Control of Movement
403 musculoskeletal mechanics/modeling