

## ORIGINAL RESEARCH

## THE INFLUENCE OF HIP STRENGTH ON KNEE KINEMATICS DURING A SINGLE-LEGGED MEDIAL DROP LANDING AMONG COMPETITIVE COLLEGIATE BASKETBALL PLAYERS

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## ABSTRACT

**Background:** A smaller knee flexion angle and larger knee valgus angle during weight-bearing activities have been identified as risk factors for non-contact anterior cruciate ligament (ACL) injuries. To prevent such injuries, attention has been focused on the role of hip strength in knee motion control. However, gender differences in the relationship between hip strength and knee kinematics during weight-bearing activities in the frontal plane have not been evaluated.

**Hypothesis/Purpose:** The purpose of this study was to determine the influence of hip strength on knee kinematics in both genders during a single-legged landing task in the frontal plane. The hypotheses were that 1) subjects with a greater hip strength would demonstrate larger knee flexion and smaller knee valgus and internal rotation angles and 2) no gender differences would exist during the single-legged landing task.

**Methods:** Forty-three Japanese collegiate basketball players (20 males, 23 females) participated in this study. Three-dimensional motion analysis was used to evaluate knee kinematics during a single-legged medial drop landing (SML). A hand-held dynamometer was used to assess hip extensor (HEXT), abductor (HAB), and external rotator (in two positions: seated position [SHER] and prone [PHER]) isometric strength. Spearman rank correlation coefficients ( $\rho$ ) were determined for correlations between hip strength and knee kinematics at initial contact (IC) and peak (PK) during SML ( $p < 0.05$ ).

**Results:** Negative correlations were observed between the knee valgus angle at IC and HEXT ( $\rho = -0.48, p = 0.02$ ), HAB ( $\rho = -0.46, p = 0.03$ ) and PHER ( $\rho = -0.44, p = 0.04$ ) strength in females. In addition, a significant positive correlation was observed between the knee flexion angle at PK and HEXT strength ( $\rho = 0.61, p = 0.004$ ) in males.

**Conclusions:** Significant correlations between hip strength and knee kinematics during SML were observed in both genders. Hip strength may, therefore, play an important role in knee motion control during sports activities, suggesting that increased hip strength may help to prevent non-contact ACL injuries in athletes of both genders. Moreover, gender-specific programs may be needed to control abnormal knee motion, as the influence of hip strength on knee kinematics may differ based on gender.

**Level of Evidence:** 3

**Keywords:** Gender differences, hip strength, knee biomechanics, risk of anterior cruciate ligament injury

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