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Effects of hamstrings-to-quadriceps ratio and the lower extremity performance during single-leg drop jump in female basketball players: A pilot study

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INTRODUCTION:
Lower limb injuries commonly occur in female basketball players due to basketball having a unilaterally dominant characteristic, which may lead to an imbalance in the strength and reaction of the lower limbs. In past studies, the effect of knee flexor and extensor strength differences in the lower limbs has been extensively discussed to the risk of injury. Additionally, lower limb strength and landing style significantly influence jumping performance. This may increase the incidence of non-contact injuries while landing and jumping. In contrast, the reactive strength index (RSI) is reliable for evaluating plyometric performance and examining both jump and landing capability. However, the relationships between the hamstrings-to-quadriceps (H/Q) ratio value and sports performance in both legs have yet to be thoroughly investigated. Therefore, this study aimed to examine the differences between single-leg drop jump (SLDJ) performance and H/Q ratio in female basketball players.
METHODS:
This study included seven professional women basketball players (age 24.1±1.5 years; height = 1.7±0.5 m; weight = 67.3±8.5 kg) who performed three SLDJ tasks for each leg from a 30 cm height platform. A motion analysis system with six cameras (Motion analysis crop, 200Hz) and one force plate (Kistler, 9260AA6, 2400Hz) was used to collect the lower extremity kinetic and kinematic data during SLDJ. The joint angle, moment, and joint stiffness were processed by Visual 3D software (C-Motion, USA). The dominant sides of the Participants lower extremities in this study were decided according to their H/Q ratio from manual muscle testing (MMT), which was conducted using the handheld dynamometer. A paired t-test was used to compare the differences between SLDJ performance, lower extremities MMT, and biomechanical variables of the dominant and non-dominant sides.
RESULTS:
There were significant differences between the H/Q ratio (62% vs. 43%, p=.021) on the dominant and non-dominant sides. The H/Q dominant sides performance was significantly better in jump high (p=.046) and RSI (p=.009) than the non-dominant side. Besides, the MMT showed that H/Q dominant sides hamstring strength was significantly higher (p=.035). In contrast, the quadriceps strength was significantly lower (p=.047) than the non-dominant side. Though the biomechanical variables during SLDJ have no significant difference in lower extremity angle and moment, the ankle and knee joint stiffness showed significantly greater in the H/Q dominant side.
CONCLUSION:
Our present results indicate that asymmetry of the H/Q ratio and lower limb strength affect their jumping performance. The difference in strength, RSI, and joint stiffness between the H/Q dominant and non-dominant side in womens basketball players may be a potential risk of injury in the future. We suggest players require appropriate lower limb muscular strength, especially for knee flexors in H/Q non-dominant side, to elevate performance and avoid injuries.

Topic: **Biomechanics**

Presentation **Poster**

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