



Does Greater Hamstrings-to-Quadriceps Ratio Influence Countermovement Jump Performance?

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BACKGROUND

Knee injuries are the most common joint injury, with a larger incidence rate in women compared to men. Hamstrings-to-quadriceps (HTQ) ratio has traditionally been utilized to assess potential injury rate by measuring the balance of strength of the hamstrings and quadriceps.

PURPOSE

This study compared the differences in countermovement jump (CMJ) performance in women with above versus below average HTQ.

METHODS

27 college-aged, recreationally trained females (age = 21.3±2.35, height = 165.71±7.17 cm, weight = 65.86±11.39 kg) participated. Peak torque (PT) was taken from maximal voluntary isometric contractions (MVICs) and isokinetic leg extension and flexion contractions from 60-300°·s⁻¹ for each leg. HTQ was calculated as PT from leg flexion divided by PT from leg extension for all muscle actions. CMJs were performed on force plates and metrics were taken from the unweighting, braking, and propulsive phases. The average HTQ for each isometric and isokinetic muscle action was determined. Subjects were then separated into above and below average HTQ groups for each leg. Independent samples t-tests assessed differences in force derived metrics from the CMJ for above versus below average groups for each leg independently.

CONCLUSIONS

There were minimal differences in force-derived CMJ metrics when comparing women with above and below average HTQ. The only differences found were in the eccentric phase, which might suggest HTQ has greater influence on eccentric capabilities during the CMJ.

- There were minimal differences in force-derived CMJ metrics
- Only differences found in the eccentric phase of the CMJ
- HTQ may be used to assist in increasing efficacy in the CMJ, specifically in the hamstrings for the eccentric phase

PRACTICAL APPLICATIONS

Strength coaches and practitioners can utilize HTQ as a way to gauge any potential muscular imbalances, specifically in the hamstrings, to assist in increasing efficiency in the CMJ. The present study suggests that HTQ may provide some relevance regarding eccentric performance in the CMJ, but may not be the best indicator of athletic performance as assessed by the CMJ. Strength coaches should consider examining individual anthropometrics and training history for a better understanding on individual knee injury risk and its application to better CMJ performance in conjunction with assessments of HTQ.

RESULTS

On the right leg when separated by above versus below average HTQ at MVIC, the above average group had greater braking phase duration ($p < 0.029$), while when separated by above versus below average HTQ at 300°·s⁻¹, the below average group had greater and eccentric braking rate of force development ($p < 0.031$). On the left leg, when separated by above versus below average HTQ at 300°·s⁻¹, braking phase duration was greater for the above average group ($p < 0.045$). There were no other differences between groups for CMJ metrics ($p \geq 0.053$).

