Hamstrings to Quadriceps Peak Torque Ratios are Similar Between Positions in Male College Rugby Athletes

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Introduction

- Rugby is a physically demanding sport played all over the world and ACL injuries have resulted in the most missed time in elite rugby athletes
- ACL injuries likely happen due to muscular force production not adequately dampening the load on the knee joint during high velocity movements such as cutting and jump landing.
- Quadriceps and hamstrings co-contract during dynamic movements to assist in stabilizing the knee joint.
- The quadriceps and hamstrings act as antagonists and agonists, respectively, to the ACL in anterior knee shear loading.
- Decreased hamstrings strength relative to quadriceps strength (H:Q) is a potential risk factor for lower extremity injuries including ACL injuries.

Purpose

- To determine the hamstrings to quadriceps ratio at varying angular velocities in healthy male collegiate rugby athletes and compare by field position in the dominant leg

Methods

- Thirty-eight male collegiate rugby athletes (20.4±1.5 years, 180.9±6.6 cm, 91.4±11.7 kg) volunteered for this study
  - Forwards (n=22) and backs (n=16)
- Concentric knee extensors and flexors strength was determined in the dominant leg by isokinetic dynamometry at 60°/s, 180°/s, 240°/s and 300°/s.
- Peak torques for knee extensors and flexors of the dominant leg were determined at each angular velocity
- Hamstrings-to-quadriceps (H:Q) peak torque ratios were determined for the dominant leg at each angular velocity.

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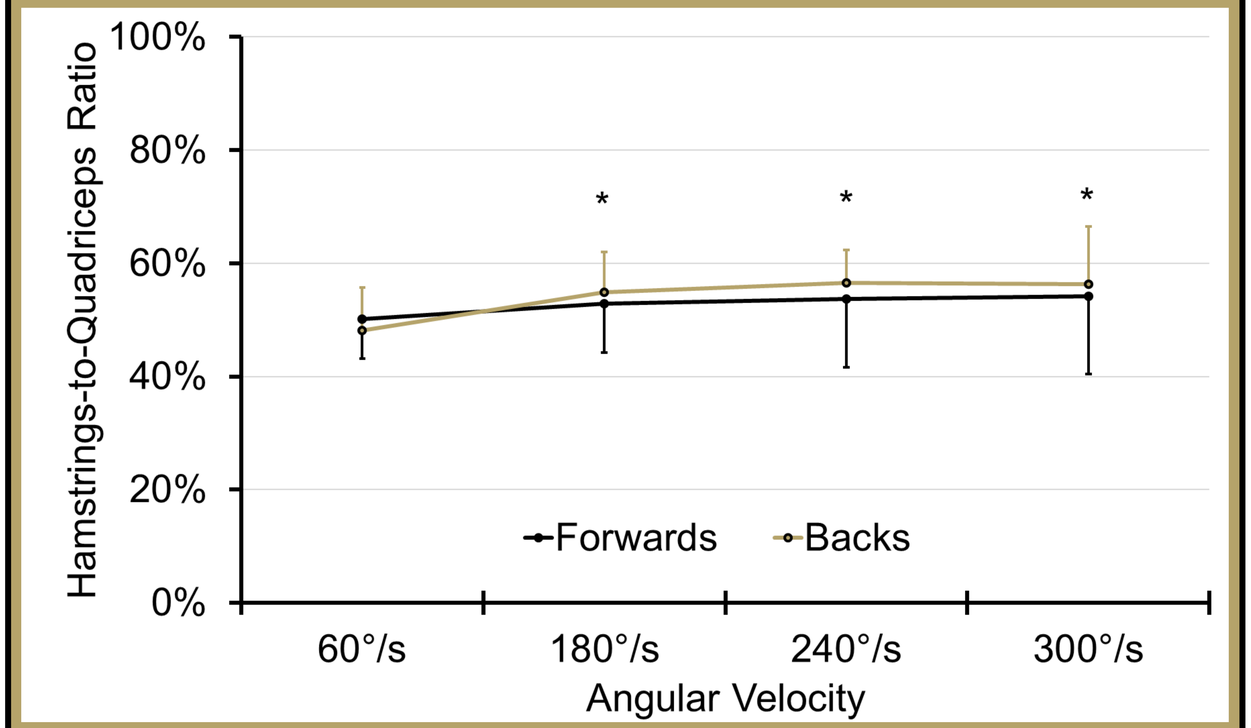

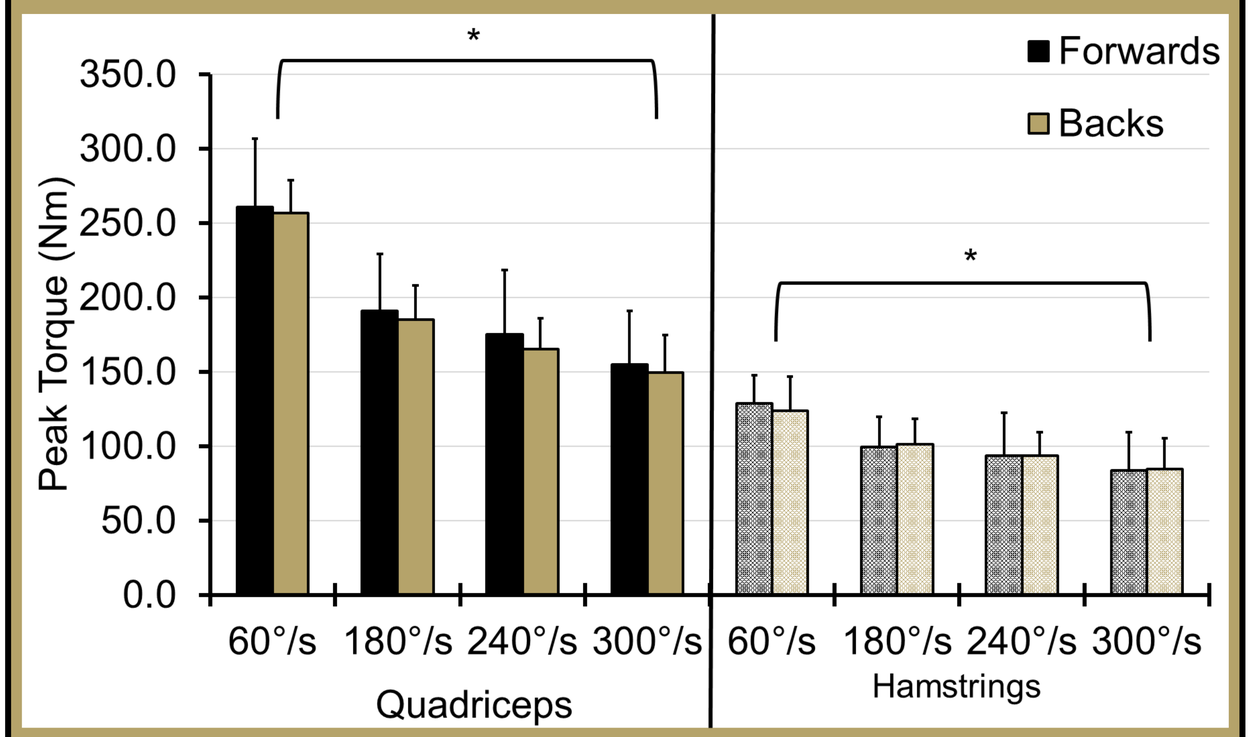

* Indicates a significant difference between angular velocities

Results

- There was no significant interaction effect for H:Q between legs at different angular velocities ($p<0.05$) and no significant main effect between right and left leg H:Q ($p<0.05$)
- There was a significant main effect for H:Q between angular velocities ($p<0.05$)
  - 60°/s less than 180°/s, 240°/s, and 300°/s
  - No significant differences between 180°/s, 240°/s, and 300°/s
- There was no significant interaction for quadriceps peak torque between right and left legs at different angular velocities ($p<0.05$)
- There was a significant main effect for quadriceps peak torque between angular velocities ($p<0.05$)
  - 60°/s > 180°/s > 240°/s > 300°/s
- There was no significant interaction for hamstrings peak torque between right and left legs at different angular velocities ($p<0.05$)
- There was a significant main effect for hamstrings peak torque between angular velocities ($p<0.05$)
  - 60°/s > 180°/s > 240°/s > 300°/s

Conclusions

- While H:Q does beneficially increase from 60 deg/s to 180 deg/s, the lack of further increases beyond 180 deg/s may indicate a potential injury risk.
- Previous reports have shown increased (>60%) H:Q ratios at high angular velocities in male college athletes. These results provide potential for improved training to reduce ACL injury risk.
- Velocities required by the demands of the sport may simultaneously increase the ACL injury risk and improve neuromuscular imbalances in these athletes.
- Resisted training performed at higher velocities may improve the H:Q at the specific velocities and reduce these athletes ACL injury risk
- Therefore, it is important for practitioners to evaluate H:Q across multiple angular velocities as the risk assessment may vary.