Peak torque ratios of hamstrings to quadriceps do not differ between positions or angular velocities in female collegiate rugby athletes

Amanda G. Ware, Ava L. Denner, Kyle L. Sunderland
Exercise and Performance Nutrition Laboratory, Lindenwood University, St. Charles, MO 63301

WOMENS RUGBY

Introduction

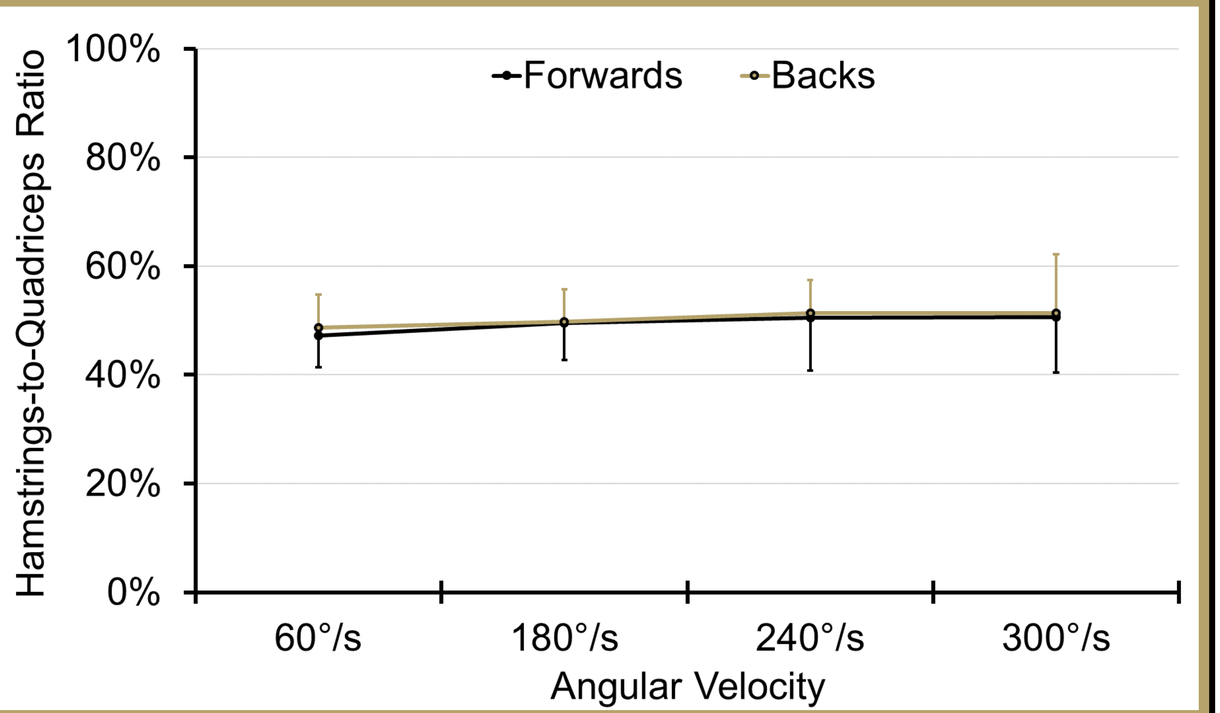
- Female athletes playing high-risk sports suffer anterior cruciate ligament (ACL) injuries at a 4- to 6-fold greater rate than male athletes.
- ACL injuries likely happen due to muscular force production not adequately dampening the load on the knee joint during high velocity movements such as cutting and jump landing.
- Quadriceps and hamstrings co-contract during dynamic movements to assist in stabilizing the knee joint.
- Decreased hamstrings strength relative to quadriceps strength (H:Q) is a potential risk factor for lower extremity injuries including ACL injuries.
- Female collegiate athletes with lower H:Q at higher angular velocities have been shown to experience higher incidence of ACL injuries.
- The incidence of ACL injuries has been shown to be relatively high in female collegiate rugby athletes.

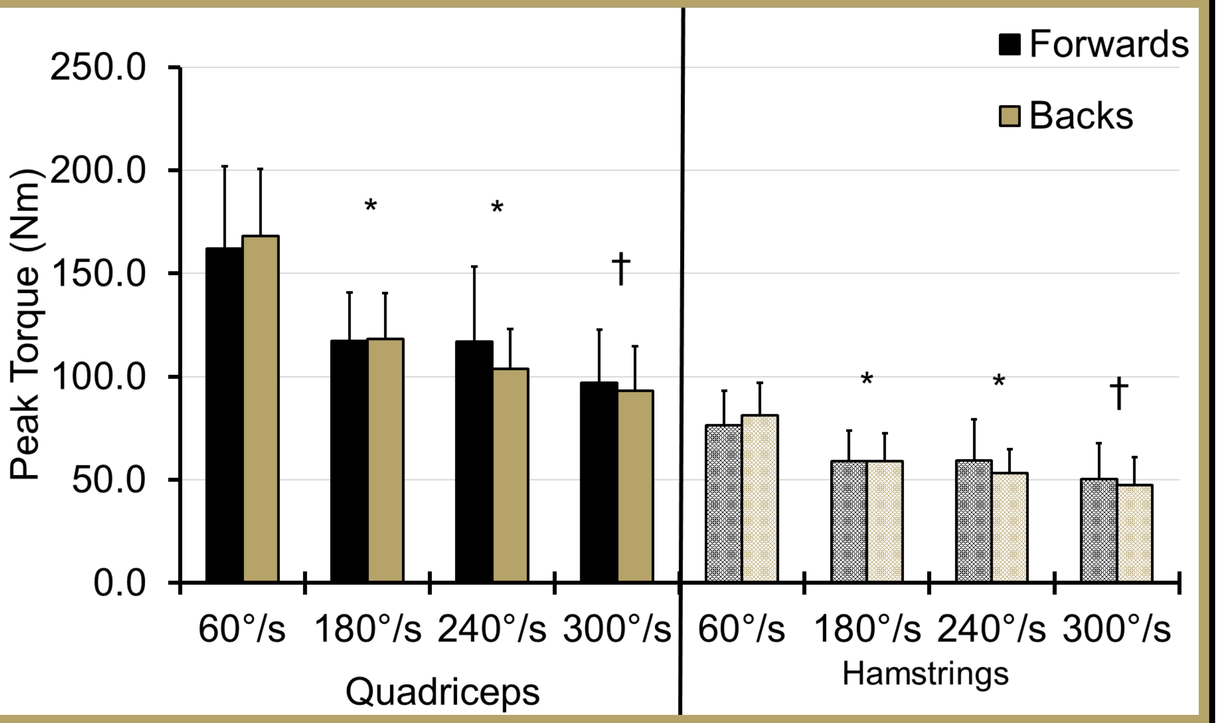
Purpose

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

Methods

- Forty-seven female collegiate rugby athletes (n=31 forwards, n=16 backs) volunteered for this study.
- Concentric knee extensors and flexors strength was determined for both legs by isokinetic dynamometry at 60°/s, 180°/s, 240°/s and 300°/s.
- Peak torques for knee extensors and flexors of each leg were determined at each angular velocity
- Hamstrings-to-quadriceps (H:Q) peak torque ratios were determined for each leg at each angular velocity.
- Two-way repeated measures ANOVA was utilized to examine differences between H:Q at each angular velocity and differences in H:Q between positions.





Different symbols represent significant differences within the muscle groups between angular velocities

Results

- There was no significant interaction effect for H:Q at different angular velocities ($p>0.05$) and no significant main effect between positions H:Q ($p>0.05$)
- There was no significant interaction for quadriceps peak torque between positions at different angular velocities ($p>0.05$)
  - There was no significant main effect for quadriceps peak torque between positions ($p>0.05$)
  - 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 hamstring peak torque between positions at different angular velocities ($p>0.05$
  - There was no significant main effect for hamstrings peak torque between positions ($p>0.05$)
  - 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

- There were no significant differences in H:Q between positions as well as no significant difference in H:Q between each angular velocity.
- These results may indicate that there is an elevated ACL injury risk in this population.
- Female collegiate rugby athletes have been shown to have a 5.3 times greater risk of an ACL injury compared to their male counterparts.
- Our current data present an opportunity for improved training practices in order to reduce the potential risk of ACL and hamstring injuries in female collegiate rugby athletes.
- A training emphasis on improving relative hamstring strength across the velocity spectrum may reduce the ACL injury risk in these athletes.