Higher eccentric hamstring muscle fatigue in soccer match participation of young female players

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INTRODUCTION

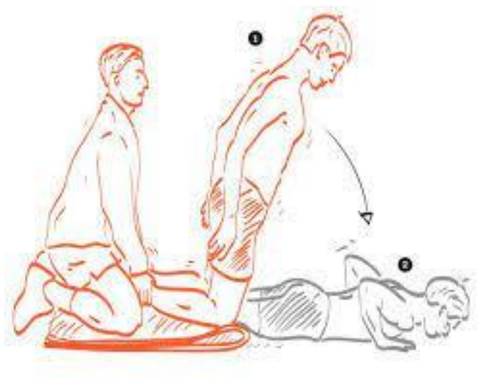
Anterior cruciate ligament (ACL) tears cause early, mid- and long-term consequences in terms of symptoms and function limitation. Identifying methods to reduce these injuries is paramount. Females have a significantly higher rate of ACL tears compared to males practicing the same sport. Hamstrings (HS) strength deficits and imbalance are risk factors for ACL injuries and muscular strains, with HS injuries being the most prevalent muscle injuries in all-level soccer players.

AIM

Aim of this study is to investigate and quantify HS eccentric strength before and after a soccer match in both men and women soccer players.

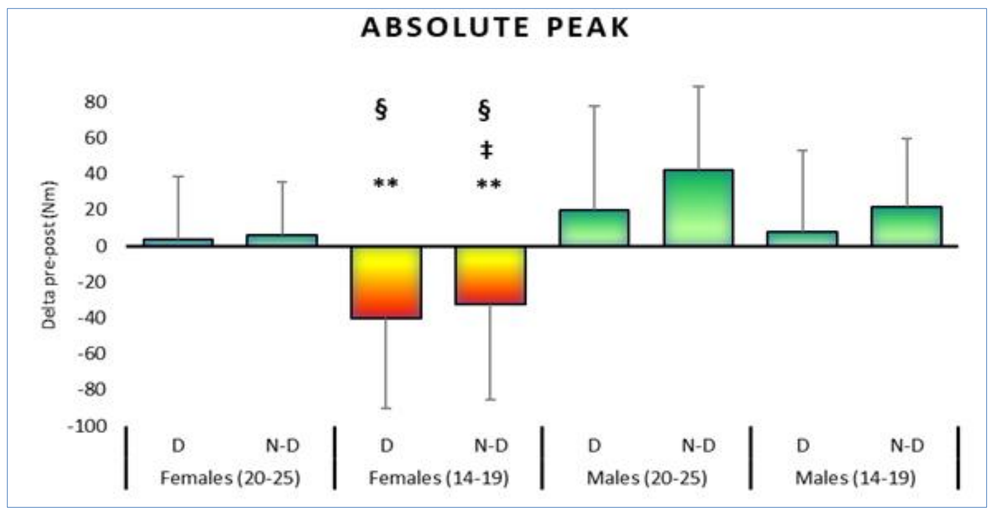
METHODS

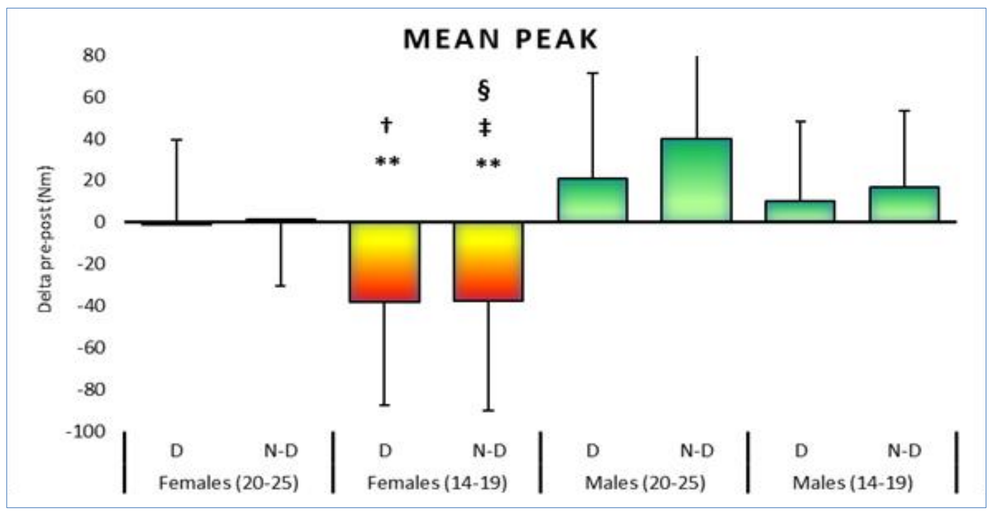
- 64 healthy men and women (age 14-25) semi-professional football players
- HS eccentric strength (mean and absolute peak torque, total work) measured with an automatic device during the execution of the Nordic hamstring exercise (NHE) before and after a 90-minute soccer match
- Concurrent measurement of the anterior-knee laxity (AKL) quantified with an arthrometer.

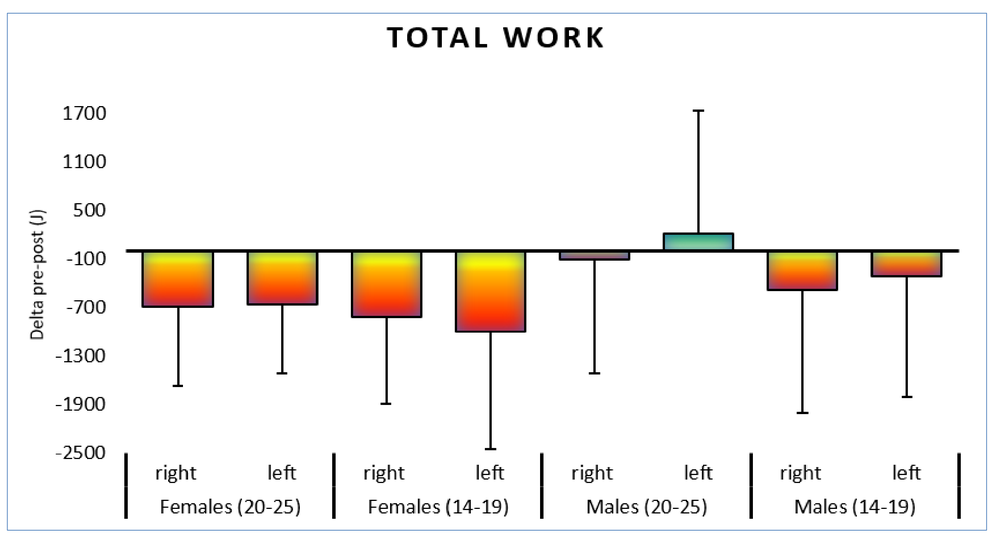


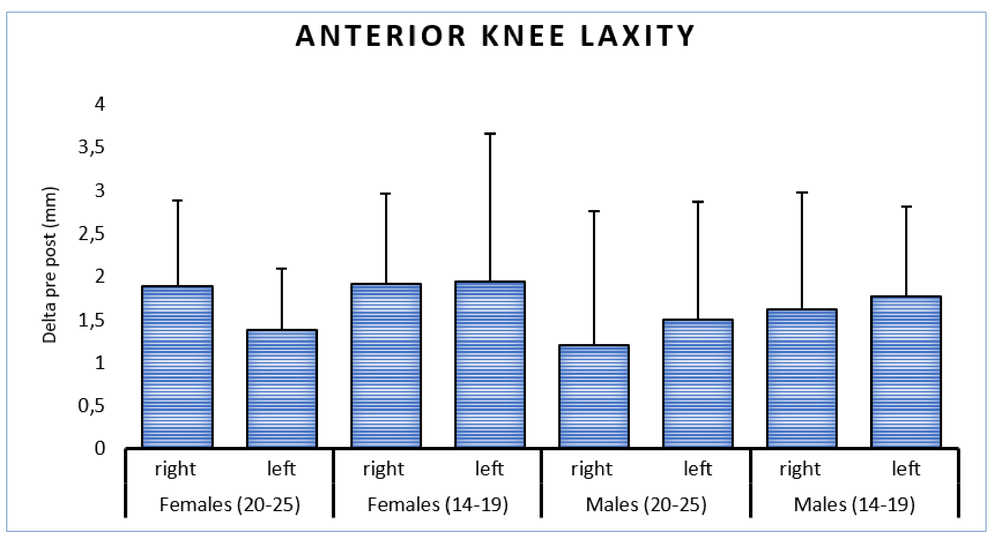
RESULTS

Mean and absolute eccentric HS peak torque significantly decreased by 24.5 Nm (SD 49.1 - p<0.005) and 21.9 Nm (SD 49.2 - p<0.0005) in females, whereas their male peers significantly improved by 19.9 Nm (SD 40.5 - p=0.01) and by 20.9 Nm (SD 46.1 - p=0.02), respectively. Both pre- vs post-match inter-gender mean and absolute eccentric HS peak torque changes were statistically significant (p<0.0005). Younger female players (14-19 years old) present a statistically significant higher decrease in mean and absolute peak HS eccentric strength compared to older female players and males.









HS total work in females significantly decreased by 831.1 J (SD 1149.6, p<0.0005) compared to the males' reduction of 235.3 J (SD 1471.2).
Inter-gender variations of the HS total work were statistically significant (p=0.007).

Pre- vs post-match AKL difference and dominant vs non-dominant limbs comparison of the strength parameters showed no statistical difference.

CONCLUSIONS

Eccentric strength and work of HS present differences based on the athlete's gender, as measured performing the NHE test. Mean peak, absolute peak, and total work showed more fatigability in females compared to their male peers. The subgroup of the 14-19 years old female players experienced the highest reduction in strength parameters.