

The effect of an 80-minute intermittent running protocol on hamstrings strength: Implications for the increased susceptibility to hamstrings injury.

Epidemiological research has shown a possible relationship with fatigue and hamstrings injury (Woods et al., 2005). There has also been evidence of increased susceptibility to hamstrings injury due to reduced hamstrings torque production and an imbalance between the hamstrings and quadriceps muscle groups (Orchard et al., 1997). However there is no research which has investigated the effects of a long-duration running protocol on hamstrings and quadriceps torque relationship. **PURPOSE:** To examine the effects of an 80-minute intermittent running protocol (IRP) on concentric hamstrings (Hc), concentric quadriceps (Qc) and eccentric hamstrings (He) muscle torque. The conventional (HcQc) and functional (HeQc) hamstrings: quadriceps torque ratios were also examined. **METHODS:** The dominant and non dominant kicking legs of twenty two semi-professional Australian Rules Football players were examined before (baseline) and immediately following (post) an 80-minute IRP on a **Woodway® Force 3 non-motorized treadmill**. Each subject completed maximal Hc, Qc and He muscle contractions on a Biodex isokinetic dynamometer at an angular velocity of $60^{\circ}\text{sec}^{-1}$ at baseline and post the 80-minute IRP. The IRP was divided into 4 x 20-minute quarters consisting of five MS efforts, sixteen fast runs (65% of MS), thirty two jogs (35% of MS) and thirty two walks (20% of MS) per quarter. **RESULTS:** There was a decrease in He torque in the dominant (pre, $212.64 \pm 55.15\text{Nm}$; post, $190.77 \pm 54.28\text{Nm}$, $p < 0.01$) and non dominant (pre, $206.47 \pm 62.36\text{Nm}$; post, $190.18 \pm 58.43\text{Nm}$, $p < 0.01$) legs. There was no decrease ($p > 0.05$) in Hc and Qc torque in either leg following the IRP. The HeQc ratio decreased in the dominant (pre, 0.89 ± 0.25 ; post, 0.82 ± 0.25 , $p < 0.01$) and non dominant (pre, 0.93 ± 0.26 ; post, 0.87 ± 0.25 , $p < 0.05$) legs, however there was no decrease ($p > 0.05$) in the HcQc ratio for either leg following the IRP. **DISCUSSION:** Maximal He torque is reduced following an 80-minute IRP on a non-motorised treadmill. There appears to be no detrimental effect on maximal Hc and Qc torque production. There is a reduction in the functional HeQc torque ratio however there is no effect on the conventional HcQc torque ratio. **CONCLUSION:** The duration of the intermittent running protocol used in this study is similar to many team game sports. The intermittent running protocol was enough to reduce eccentric torque production, which may provide an insight into hamstrings muscle function and increased risk of injury following games of longer duration.

Orchard, J., Marsden, J., Lord, S., & Garlick, D. (1997). Preseason hamstring muscle weakness associated with hamstring muscle injury in Australian footballers. *The American Journal of Sports Medicine*, 25(1), 81-85.

Woods, C., Hawkins, R. D., Maltby, S., Hulse, M., Thomas, A., & Hodson, A. (2004). The Football Association Medical Research Programme: an audit of injuries in professional football - analysis of hamstring injuries. *British Journal of Sports Medicine*, 38, 36-41.

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