

Neuromuscular Fatigue Following A Singles Badminton Match

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Introduction

A typical badminton singles match involves numerous intense and high impact movements. Lunges are believed to induce significant muscle damage following a match. The purpose of this study was to investigate changes in knee extensor neuromuscular function after a simulated 1 hour badminton singles match in relation to the number of lunges performed in the match.

Methods

Ten Australian state-level male badminton players volunteered to participate in this study. Both femoral nerve and muscle electrical stimulations were used in the present study. Maximal voluntary isometric contraction (MVC) torque of the knee extensors and flexors, voluntary activation during the knee extension MVC (VA), torque generated by a doublet (DT), 20 Hz (T_{20}) and 80 Hz stimulation (T_{80}) were measured pre, immediately (8 - 10 min after match), 1-hour and 24-hour post match. Lunges were obtained from video analysis from each match. Pearson product-moment correlations were computed to examine relationships between variables using ANOVA.

Results

Average (\pm SD) match HR was 162.0 ± 11.0 bpm, post-match BL was 7.2 ± 1.3 mM \cdot l $^{-1}$, and 194 ± 18 lunges were performed per match per player. Core body temperature increased from 36.5 ± 0.5 °C to 39.4 ± 0.5 °C immediately post match. Knee extension and flexion MVC torque pre-match were 278.4 ± 50.8 Nm and 143.0 ± 36.2 Nm, respectively. Decrease in knee extension (11%, 14%) and flexion (18%, 16%) MVC torque immediately and 1-hour post match were observed, respectively ($P < 0.05$). VA, DT, T_{20} and T_{80} decreased significantly ($P < 0.001$) immediately and 1-hour post exercise. No significant changes were observed in T_{20}/T_{80} immediately post-exercise from baseline (0.66 ± 0.07), but a 10% decrease was observed at 1 hour post-match ($P < 0.05$). Significant ($P < 0.05$) correlations were observed between the number of lunges and the magnitude of decrease in MVC torque ($r = 0.68$, $P < 0.001$) immediately post exercise and ($r = 0.36$, $P < 0.05$) 1-hour post exercise.

Discussion

Moderate muscle soreness developed after 1-hour simulated badminton matches, but muscle function returned to baseline by 24 hours post match, indicating moderate muscle fibre damage. Since VA decreased without changes in T_{20}/T_{80} , and knee flexion MVC torque also showed similar changes to those of knee extension MVC torque that was thought to be affected by lunges, the decrease in MVC torque appeared to be associated with central rather than peripheral fatigue or muscle damage. The moderate muscle soreness developing after 1-hour simulated badminton matches and muscle function returning to baseline by 24 hours post-game, together suggest minimal muscle fibre damage.

Conclusion

It was concluded that both central and peripheral factors contributed to alterations in neuromuscular fatigue and that muscle damage was moderate after the singles matches in which the game intensity were close to those in competitive tournaments.