THE EFFECT OF MUSCLE-DAMAGING EXERCISE ON MAXIMAL INTENSITY CYCLING AND DROP JUMP PERFORMANCE

Twist Craig1, Eston Roger2
(University of Chester1, University of Exeter2, United Kingdom)

The rate at which an individual can generate force is an important characteristic of athletic performance. The purpose of this study was to assess the effects of muscle-damaging exercise on the time to peak power during maximal intensity cycling and drop jump performance.

Twenty subjects were randomly assigned to a treatment (n = 10, age 22.6 (2.8) y, body mass 70.7 (12.9) kg, stature 1.76 (0.10) m) or control group (n = 9, age 20.8 (2.5) y, body mass 74.2 (10.2) kg, stature 1.76 (0.07) m) and randomly performed a 10 s cycle ergometer sprint, against a load corresponding to 0.70 Nm/kg for males and 0.67 Nm/kg for females. Data were recorded every 0.2 s, with the maximal value being used to reflect peak power output (PPO) and the time at which this value occurred was referred to as the time to peak power. Participants also performed a drop jump from a height of 50 cm from which the rebound height and the contact time during the jump were recorded. Indirect markers of muscle damage were also taken using measurements of perceived muscle soreness and isokinetic knee extensor torque at 60 and 360 deg/s. All measures were taken before and at 24, 48, 72 and 168 hours following a plyometric exercise protocol comprising of 10 x 10 maximal countermovement jumps.

Repeated measures ANOVA showed significant interactions of time by group on all dependent measures (P<0.05). Presence of muscle damage following the plyometric protocol was confirmed in the treatment group with significant reductions in isokinetic peak torque (F3.9,66.0HF = 7.6, P<0.05) and increases in muscle soreness (F2.57,43.7HF = 32.9, P<0.05). Furthermore, PPO was reduced below baseline at 24 h and 48h (F4,68 = 7.7, P<0.05), while time to peak power output was significantly higher at 48 h (F2.4,41.4 = 3.7, P<0.05). The treatment group also demonstrated a significant reduction in drop jump height (F,4,68 = 6.7, P<0.05) at 24 h, 48 h and 72 h, with corresponding increases in ground contact time at 48 h and 72 h (F4,68 = 3.7, P<0.05). Correlations of muscle soreness with PPO, time to peak power, drop jump height and contact time were -0.82, 0.64, -0.75 and 0.64 respectively (P<0.05).

These results provide further evidence that dynamic muscle performance is compromised in the days following muscle-damaging exercise. Moreover, the strong correlations between perceived muscle soreness and dynamic muscle performance suggest that inhibitory mechanisms might play a significant role following muscle-damaging exercise, in an attempt to limit further damage to the neuromuscular structures.

Keywords: Plyometrics, Anearobic Power, Muscle Soreness

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