ABSTRACT

The purpose of this investigation was to assess relationships between maximal isometric lower body strength and three different measurements of maximal lower body neuromuscular power after a bout of eccentric lower body exercise. Forty-five recreationally active males performed 20 minutes of downhill running (7.5 mph, -10% grade). Isometric knee extensor strength (KE), maximal cycling power ($P_{\text{MAX}}$), vertical jump height (VJ), and 10-meter sprint time (10m) were assessed immediately prior to exercise (baseline) and repeated 2, 24, 48, 72, and 96 h after exercise. Data are reported as mean±SEM. There was a significant effect of time on all measurements throughout the 96 h period after exercise. Isometric KE strength was 129.0±3.3, 113.2±3.3, 115.8±3.3, 119.0±3.2, 118.1±3.3, and 119.7±3.3 kg at baseline, 2, 24, 48, 72, and 96 h post-exercise, respectively. $P_{\text{MAX}}$ was 1086±31, 1014±28, 1024±32, 1042±31, 1042±30, and 1044±31 watts at baseline, 2, 24, 48, 72, and 96-hours post-exercise, respectively. VJ was 50.2±1.2, 48.7±1.2, 49.1±1.3, 49.7±1.3, 50.6±1.3, and 50.5±1.3 cm at baseline, 2, 24, 48, 72, and 96-hours post-exercise, respectively. 10m sprint time was 1.76±0.02, 1.80±0.03, 1.80±0.02, 1.79±0.02, 1.77±0.02, and 1.77±0.02 sec at baseline, 2, 24, 48, 72, and 96-hours post-exercise, respectively. There were significant relationships between isometric KE strength and both $P_{\text{MAX}}$ ($R^2=0.31$, $p<0.05$) and VJ height ($R^2=0.11$, $p<0.05$). Additionally, there was a significant relationship between isometric KE strength and $P_{\text{MAX}}$ at each time point ($R^2=0.23-0.34$, $p<0.05$). This was not true for VJ height or 10m sprint time. No relationship was present between isometric KE strength and 10m sprint time ($R^2=0.01$). The primary finding of this study was a significant relationship between isometric KE strength and $P_{\text{MAX}}$ and that this relationship was maintained at each time point after eccentric exercise. Therefore, we conclude that $P_{\text{MAX}}$ is a reliable method to assess decrements in neuromuscular power and athletic performance after a bout of muscle damaging eccentric exercise.

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