Four Days of Caffeine Withdrawal in Caffeine Consumers Lowers Strength in Knee Flexors and Extensors


There is strong evidence supporting the ergogenic properties of caffeine with aerobic exercise, but potential ergogenic benefits to anaerobic activities remain in question. These studies of anaerobic exercise have varied designs and equivocal results. It is also unclear how caffeine withdrawal can affect performance. **PURPOSE:** To study the effects of caffeine withdrawal on peak torque (PT), average power, perceived exertion (RPE) and perceived pain index (PPI) during exercise with an isokinetic dynamometer in habitual caffeine consumers. **METHODS:** Physically active subjects (n=33; 30 female, 3 male; age: 21±1; mass: 60.25±6.79 kg) performed anaerobic exercise tests before and after 4 days of caffeine withdrawal. Isokinetic PT and average power were tested in the subjects’ dominant leg at 60°·s⁻¹, 180°·s⁻¹, and 300°·s⁻¹. Short duration endurance was assessed in 30 repetitions at 180°·s⁻¹. Isometric PT was measured at 30° and 90° flexion. Data were analyzed with either paired t-tests or repeated measures ANOVA with an alpha of 0.05 and presented as means ± SD. **RESULTS:** Following caffeine withdrawal, knee extension PT at 60°·s⁻¹ decreased by 7.5 N-m (92±21 vs. 84 ± 25 N-m; p=0.006); 30 repetitions PT at 180°·s⁻¹ decreased from 69±16 to 65±14 N-m (p=0.016); isometric PT at 30° of knee flexion decreased from 54±16 to 48±10 N-m (p=0.005); and isometric PT at 90° of knee flexion declined by 8.2 N-m (102±39 vs. 94±38 N-m; p<0.001). Knee flexion PT at 180°·s⁻¹ decreased by 2.8 N-m (40±12 vs. 37±10 N-m; p=0.049) and during 30 repetitions at 180°·s⁻¹ decreased from 40±9 to 37±10 N-m (p=0.04). Average power for extension at 60°·s⁻¹ decreased 6.6 N-m (78±23 N-m vs. 72±19 N-m; p=0.015) and flexion average power at 180°·s⁻¹ decreased from 86±37 to 78±29 N-m (p=0.05) following caffeine withdrawal. For 30 repetitions at 180°·s⁻¹, knee extension average power decreased 6 N-m (135±35 vs. 129±31 N-m; p=0.039) and flexion average power decreased 7.5 N-m (68±24 vs. 61±22 N-m; p=0.02). No significant differences in RPE or PPI following withdrawal were observed in response to the exercises. **CONCLUSION:** The current study demonstrated that caffeine withdrawal significantly decreases isokinetic and isometric torque and power in moderate-to-high caffeine consumers.