

Caffeine Withdrawal and Acute Consumption Effects on Reaction Time and Muscular Strength, Power, and Endurance

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Studies on the benefits of caffeine to anaerobic exercise have varied designs and equivocal results. Previous work in our lab has demonstrated positive effects of caffeine using laboratory-based tests. **PURPOSE:** To study the effects of caffeine withdrawal and caffeine supplementation on field tests of power output, muscular strength, endurance, and reaction time. **METHODS:** Physically active, habitual caffeine consumers (n=50; 40 female, 10 male; age: 22±3; mass: 63.9±10.0 kg; average caffeine: 258±128mg) participated in a placebo-controlled intervention. All subjects abstained from caffeine for 4 days prior to withdrawal testing (T1), supplemented with 5mg·kg of caffeine for 3 days and on the final testing day (T2) consumed 6mg·kg of caffeine or placebo (insoluble fiber) one hour before testing. Power was assessed using peak vertical jump height, while muscular strength and endurance were assessed using a handgrip dynamometer. Subjects performed three handgrip trials to determine their maximal voluntary contraction (MVC). They then performed an isometric hold to volitional failure at 40% of their respective MVC. Reaction time was measured using a commercial application for a tablet computer. Data are presented as means ± standard deviation and were analyzed with SPSS 22.0 using either independent or paired t-tests with an alpha of 0.05. **RESULTS:** Following four days of caffeine withdrawal, peak vertical jump height decreased from 17.49±3.70in to 17.00±3.58in (p<0.001). There was a trend for an increase in power output (calculated from vertical jump) in caffeine: 3583.6±893.0W vs placebo: 3120±691W (p=0.065). Following caffeine withdrawal, there was also a trend for reaction time to slow by 0.01415±0.05414 sec (p=0.083). There was no significant difference in handgrip strength or muscular endurance following caffeine withdrawal or acute supplementation. **CONCLUSION:** This study demonstrates that caffeine withdrawal may be detrimental to performance and supplementation provides limited benefit using these chosen field tests. However, our previous findings using an isokinetic dynamometer to assess muscular strength and power provide more consistent results indicating that caffeine withdrawal can hinder muscular strength and power and that supplementation may provide an acute ergogenic effect.