The Effect of Caffeine on Anaerobic Exercise

Author: Nelson Gonzalez

Faculty Sponsor: Judy R. Wilson, Ph.D.

Exercise Science Research Laboratory, The University of Texas at Arlington

Abstract

Caffeine is one of the most socially acceptable performance enhancement drugs used by athletes and is one of the most widely studied ergogenic aids by sports scientists. The effect caffeine has on exercise performance is well founded, generally eliciting a dampening of perceptual response during exercise allowing the athlete to perform at a higher level. However, in comparison to aerobic performance, less research has been conducted on the ergogenic potential on anaerobic performance. Most research has been conducted through the use of the Wingate anaerobic test (WAnT), which determines anaerobic power. The WAnT requires the subject to pedal a cycle ergometer at maximal speed for 30 s against a high braking force which is determined by the person's weight, sex and age. The WAnT in conjunction with caffeine supplementation has been shown to improve peak power and average power in trained subjects, while having mixed results for untrained subjects.

Purpose

The primary aim of this study was to examine the effect of a moderate dose of caffeine (5mg/kg BW) on ratings of perceived exertion (RPE), heart rate (HR), peak power and average power output during a Wingate test.

Methods

This randomized, single-blind, crossover study examined the impact of a moderate dose of caffeine (5mg/kg BW) during anaerobic exercise in 10 untrained, healthy male UTA student volunteers, between 18 – 25 years of age. Sugar-free Koolaid was mixed in a standard 16.7 fl. oz. bottle of water, with and without added caffeine (in the form of NoDoz tablets). All participants were tested on 2 separate occasions, and were instructed to avoid caffeine consumption 5 hours prior to the test administration. The first visit involved the participant consuming one of the two beverages 30 minutes before starting a 2 minute warm-up on the cycle ergometer. After the warm up, the participants were instructed to pedal as fast as possible against the high braking force for 30 seconds. Throughout the experiment HR, RPE data were collected, and average power and peak power were calculated using the Wingate software. The participants then are instructed to return for a second session, with the same protocol but consuming the remaining beverage.

Results

Table 1: Demographic Data

Parameter	M ± SD
Age (yr)	22.4 ± 1.4
Height (cm)	170.5 ± 4.2
Mass (kg)	78.3 ± 11.0
Typical Caffeine Intake (mg/day)	84.5 ± 52.5

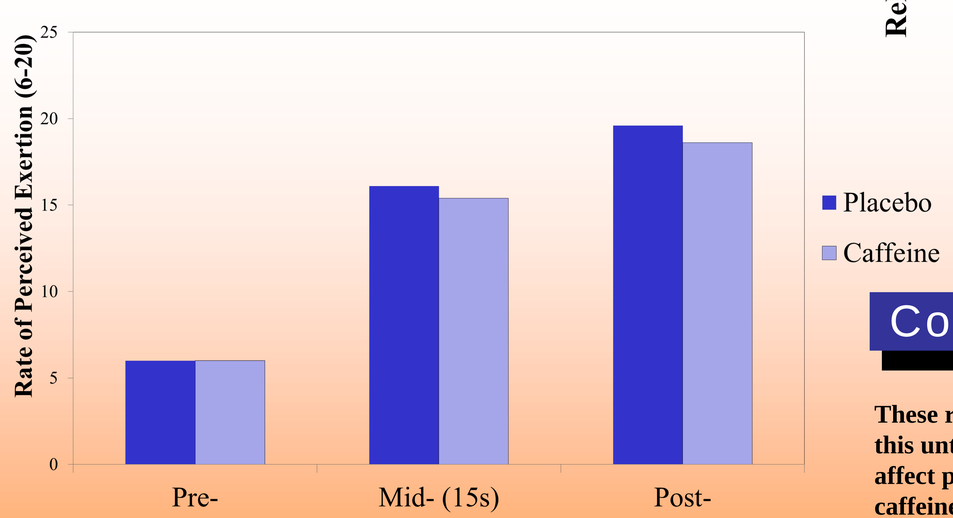

Figure 1: The Effect of Caffeine on Ratings of Perceived Exertion
The RPE prior to the start of the WAnT were constant in both caffeine and placebo trials. There was a slight decrease in the mid- and post- RPE numbers with caffeine, although not being statistically significant (p≥ 0.05).

Results (cont'd)

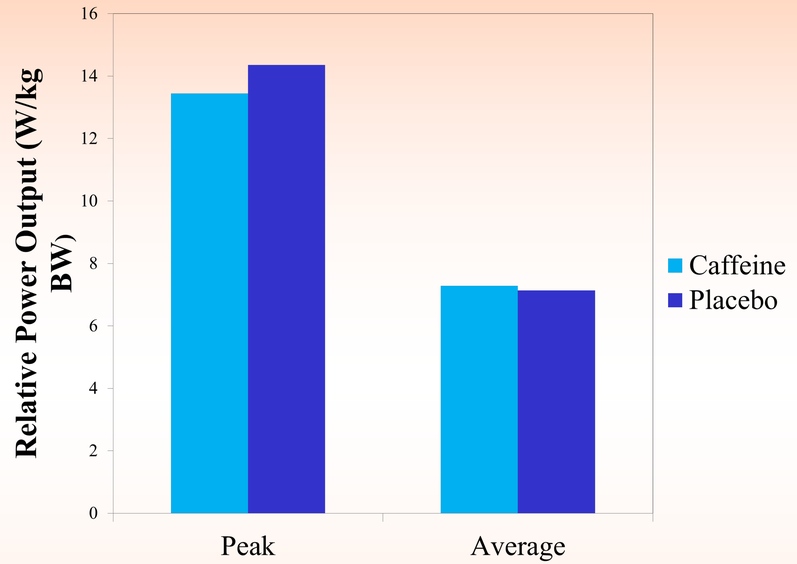

Figure 2: The Effect of Caffeine on Power Output
There was not a significant difference in peak power (p= 0.21) or in average power with caffeine (p= 0.74).

Conclusions

These results indicate that caffeine does not enhance performance in this untrained male population. Since caffeine is known to positively affect performance in trained individuals, these results suggest that caffeine supplementation might only result in significant performance enhancement if the athlete had a higher level of training. The dampening of the perceptual response of untrained male students was not strong enough to elicit performance enhancement.