THE ERGOGENIC EFFECTS OF CAFFEINE ON SUBMAXIMAL EXERCISE

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Abstract

Caffeine is a very abundant substance in society and is commonly found in coffee, tea, soft drinks, pre-workout drinks, and many others. This ingredient is found primarily in coffee beans which is the seeds of the coffee plant. In nature, this substance discovered to subside in a variety of plants and acts as a natural pesticide which prevents some insects from eating these plants. The ingestion of caffeine goes back to our ancestors in the Stone Ages in which they would chew or eat plants and bark that contain caffeine. Caffeine didn’t become popular and readily available through coffee until around the fifteen and sixteenth centuries. The caffeinated drink coffee came to Europe and the Ming Dynasty in China during the eighteenth century. Caffeine was mostly consumed by the upper class as a luxurious type of drink. More recently, this substance was found to be a central nervous system stimulant and that has been shown to improve wakefulness, thought processes, focus, and coordination. This has been used both medically and by the general public for these desirable psychological and physiological effects. In medicine, common uses for the drug are treating migraines, respiratory depression in neonates, and during certain hypotension episodes. For the general public caffeine is consumed through many mediums including coffee, soft drinks, and pill form and is used to fight fatigue, improve productivity, coordination, and focus.

Introduction

Caffeine is a very abundant substance in society and is commonly found in coffee, tea, soft drinks, pre-workout drinks, and many others. This ingredient is found primarily in coffee beans which is the seeds of the coffee plant. In nature, this substance discovered to subside in a variety of plants and acts as a natural pesticide which prevents some insects from eating these plants. The ingestion of caffeine goes back to our ancestors in the Stone Ages in which they would chew or eat plants and bark that contain caffeine. Caffeine didn’t become popular and readily available through coffee until around the fifteen and sixteenth centuries. The caffeinated drink coffee came to Europe and the Ming Dynasty in China during the eighteenth century. Caffeine was mostly consumed by the upper class as a luxurious type of drink. More recently, this substance was found to be a central nervous system stimulant and that has been shown to improve wakefulness, thought processes, focus, and coordination. This has been used both medically and by the general public for these desirable psychological and physiological effects. In medicine, common uses for the drug are treating migraines, respiratory depression in neonates, and during certain hypotension episodes. For the general public caffeine is consumed through many mediums including coffee, soft drinks, and pill form and is used to fight fatigue, improve productivity, coordination, and focus.

Purpose

The purpose of this study was to determine if caffeine has an ergogenic effect on submaximal exercise.

Methods

Participants

Five students (3 M, 2 F: Mean ± age 22.2 ± 1.17 years, height 178 ± 7.83 cm, weight 70.36 ± 12.32 kg) from the University of Texas at Arlington were recruited to participate in this study. Each participant completed a survey prior to the experiment and served as their own control. The participants were given either a caffeine pill (200mg) or a placebo in a randomized order one hour prior to testing.

Instrumentation

The submaximal exercise bouts included the use of a Monark cycle ergometer (818-5), a polar heart rate monitor and watch, the Borg RPE scale, and a Parvo Medics TrueOne 2400 metabolic cart with all its accessories (headgear, spit tubes, mouthpiece, etc.). All experimentation took place at the Maverick Activity Center in room 153.

Statistical Analysis

The null hypothesis was that there would be no significant difference when taking caffeine or placebo ( ) during a submaximal exercise test as measured by RPE, HR (bpm), Total Distance Traveled (km), and VO2 (ml/kg/min). To test for significance the alpha level was set at p ≤ 0.05 and a 2-tailed t-test was done using Microsoft Excel.

Results

Results (cont’d)

The values for the placebo trial at ten minutes of exercise were: RPE = 12.8 ± 1.10; HR =152.80 ± 20.01 bpm; VO2 = 22.12 ± 6.81 ml/kg/min, and at twenty minutes: RPE =13.80 ± 1.30; HR =151 ± 17.99 bpm; VO2 = 21.7 ± 5.31 ml/kg/min, and at twenty minutes: RPE =14.4 ± 1.67; HR =156.2 ± 12.42 bpm; and VO2 = 22.14 ± 7.74 ml/kg/min. The values for total distance were: caffeine 9.24 ± 2.52 km and placebo 8.08 ±1.69 km. There was no significant difference in any values between trials.

Conclusions

In conclusion, using an average caffeine dosage 2.84 mg/kg of body weight we did not find any significance in RPE, HR, Total distance traveled, and VO2. However, total distance traveled during the caffeinated trials was greater suggesting a possible effect of a sympathetic stimulus. We accepted the null hypothesis that there was no significant difference when taking caffeine or placebo during a submaximal exercise test as measured by RPE (Borg), HR(bpm), Total Distance Traveled (km), and VO2 (ml/kg/min).