The Effects of Caffeine on Physical Performance and Perceived Exertion in Caffeine Users and Non-Caffeine Users During Resistance Training

KINE 3325 – Undergraduate Research Methods – Research Project

Andre Wilson, Carlin Johnston, Cecilia Acuna, Cliff Gardner, Eryka Aghedo, Gemina Genuzio

Dr. Priscila Caçola

Department of Kinesiology, University of Texas Arlington, Arlington, TX 76019

ABSTRACT

BACKGROUND: Caffeine has been used as a supplement primarily for aerobic exercise to keep athletes focused. There has been little research on the effects of caffeine during anaerobic training. The research found on the effects of caffeine on aerobic training mostly have positive results, therefore it is important to see whether or not caffeine would have the same positive effects during anaerobic training.

PURPOSE: The purpose of this study is to study the effects of caffeine on caffeine and non-caffeine users during resistance training.

METHODS: 10 men and 9 females physically active college students participated in this study (average age 22.2 ± 2.32 years). Subjects tested two days, one using the caffeine supplement and one using a placebo. Heart rate (HR) was measured before the exercise and after each set. Rate of Perceived Exertion (RPE) was measured after every exercise.

RESULTS: Paired samples t-test was used to compare caffeine and placebo trials for HR, RPE, and Burpees. There were no significant differences with HR, RPE, and number of burpees in the caffeine and placebo trials. Independent t-tests were used to compare the total workout of caffeine and non-caffeine users. There were no significant results between caffeine and non-caffeine users.

CONCLUSIONS: A moderate amount of caffeine (200 mg) does not have an effect on HR and RPE during resistance exercise. A higher dose of caffeine could enhance the effects of caffeine and prove to be a beneficial supplement.

PURPOSE

The purpose of this study is to study the effects of caffeine on caffeine users and non-caffeine users during resistance training.

INTRODUCTION

The present study researches the ergogenic effects of caffeine versus placebo during resistance training in caffeine and non-caffeine users. The reason for conducting this study is to see if caffeine benefits physically active individuals while doing resistance training by decreasing their rate of perceived exertion allowing them to do more repetitions. Previous research has shown that ergogenic aids improve physical performance, concentration, and motivation (Hogervorst et al, 2008). However there is some inconsistency between previous studies.

This study focused on the effects that caffeine has on physical performance and RPE during resistance training. Resistance training is the focus of the study instead of aerobic training because the majority of studies with caffeine focus on aerobic exercise. A study done at the University of Nebraska-Lincoln indicates that "ingestion of caffeine-containing supplement[s] resulted in an acute increase in upper-body strength in resistance-trained men" (Beck et al, 2006).

The purpose of this research is to see the effects of caffeine on caffeine users and non-caffeine users on physical performance and perceived exertion during resistance training. We hypothesize that perceived exertion will decrease and physical performance will improve with caffeine consumption 30 minutes prior to resistance training.

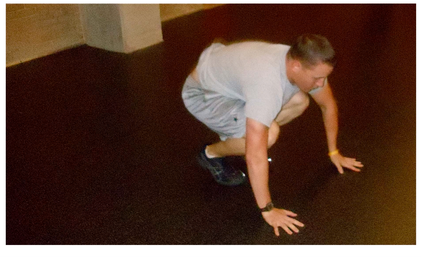
METHODS

Participants:

- Physically active more than 3 days/week

19 College Students
ages 20-27
(avg. 22.2 ± 2.32 years)

- 11 Caffeine Users (6 Males, 5 Females)
- 8 Non-Caffeine Users (4 Males, 4 Females)



METHODS

Prior to testing each subject filled out a written consent form that thoroughly explained testing protocol and safety issues.

Resistance Exercise Protocol:

- Two testing days, one using the caffeine supplement and the other using the placebo.
- Each test exercise session consisted of 5 separate resistance exercises
  - o *leg press, bench press, bicep curls, hamstring curls, and lat pull down*
- Each exercise included 4 sets of 10 repetitions
- Rest time between sets - 30 seconds
- Rest time between exercises - 1 minute
- Finally subjects performed as many burpees as possible without taking more than a two second rest between each burpee.

Measurements:

- Heart rate at the end of each set
- RPE at the end of each exercise

Each subject was asked to fill out a post exercise questionnaire that assessed the amount of sleep the subjects got the night before, how they felt after the workout, and whether or not they ate before the workout.

RESULTS

There were no significant results were found between caffeine users and non-caffeine users.

Number of burpees, Rate of Perceived Exertion and Heart Rate differences were not significant between caffeine and placebo trials.

Our study fails to reject the null hypothesis.

Exercise	Caffeine	Placebo	p value
Leg Press	11.42	11.95	p= 0.163
Biceps	12.47	12.21	p= 0.583
Bench Press	12.21	12.21	p= 1.00
Lat Pulldown	11.79	11.58	p= 0.60
Hamstrings	11.47	11.37	p= 0.755
Burpees	16.16	16.58	p= 0.259

Figure 1: Paired Samples t-Test Comparing Rate of Perceived Exertion

Exercise	Caffeine	Placebo	P value
Leg Press	115.89	119.53	p= .206
Biceps	127.89	127.84	p=.988
Bench Press	119	122.47	p= .310
Lat Pulldown	125.84	127	p=.723
Hamstrings	114.05	113.05	p=.701
Burpees	169.89	169.68	p= .929

Figure 2: Paired Samples t-test Comparing Heart Rate

DISCUSSION

This study has found that 200mg of caffeine supplementation is not effective for improving physical performance and RPE during resistance training.

Many people take caffeine and workout, but are unaware of the ergogenic effects of caffeine during exercise. Also, people who do not use caffeine do not know the benefits of consuming caffeine for performance because they have probably never used it to try and improve their workout. Therefore, the findings of our study may influence caffeine users to continue their daily usage and may encourage non caffeine users to incorporate caffeine into their daily routine.

Active individuals wanting to use caffeine supplements prior to a resistance training workout may see a high level of ergogenic effects.

CONCLUSION

We hypothesized that the caffeine dose given would decrease perceived exertion and improve performance. However our results did not conclude that caffeine does not decrease perceived exertion or improve performance during resistance training.

A moderate amount of caffeine (200 mg) does not have an effect on HR and RPE during resistance exercise for caffeine and non-caffeine users.