

THE EFFECT OF ACUTE CAFFEINE INGESTION ON MUSCULAR STRENGTH, POWER, AND ENDURANCE IN RESISTANCE-TRAINED HABITUAL AND NON-HABITUAL CAFFEINE USERS.

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INTRODUCTION

Pre-exercise caffeine ingestion has been shown to enhance exercise performance in tests of aerobic, anaerobic, strength, and power aspects. This effect is consistent among habitual caffeine users, where performance improvements are observed even with a pre-exercise dose similar to their daily ingestion. However, individual responses to acute caffeine intake can vary.

PURPOSE

This study aimed to investigate the effects of pre-exercise caffeine ingestion (3 mg/kg) on strength, power, and muscular endurance performance in resistance-trained male collegiate athletes, comparing moderate to high habitual caffeine (H) users with non-habitual caffeine (NH) users.

METHODS

- This was a double-blinded research design.
- 21 D3 male athletes, with 2 or more years of strength training, were divided into H group (n=10, daily dose of 150.2±48.7 mg) and NH group (n=11, daily dose of 28.3±22.0 mg), based on the whole group's average caffeine intake (86.3 ± 72.1 mg/day) following a 3-week self-reported daily caffeine questionnaire.
- During a total of 3 visits, the subjects participated in familiarization trials, followed by a randomly order of placebo trials and caffeine trials between 5:30 PM and 7:30 PM, with a minimum of 72 hours between visits.
- The familiarization trial included the sequence of a 10-minute dynamic warm-up, vertical jumps (VJ) on a Just Jump mat, trap-bar Deadlift (TB DL), bench press (B), and pull-ups (PU).
- Before the placebo and caffeine trials, the subjects were instructed to abstain from caffeine and vigorous exercise for 24 hours.
- Each subject ingested a clear capsule containing either all-purpose flour or 3 mg/kg of caffeine (H: 263.1±17.2 mg vs. NH: 260.1±30.7 mg) at 45 minutes before the trials.

RESULTS

Table 1. The performance outcomes in vertical jump, trap-bar deadlift, bench, and pull ups among all groups and trials.

Habitual Caffeine	Habitual Placebo	Non-Habitual Caffeine	Non-Habitual Placebo
Vertical Jump (31.02±2.20)	Vertical Jump (30.86±2.59)	Vertical Jump (30.30±3.75)	Vertical Jump (30.19±3.46)
TB DL (481.5±47.50)	TB DL (478.0±43.15)	TB DL (449.1±73.78)	TB DL (446.8±74.91)
Bench (249.40±45.23)	Bench (247.5±41.4)	Bench (201.7±34.73)	Bench (202.8±29.91)
Pull Ups@ (19.1±4.89)	Pull Ups (18.9±5.32)	Pull Ups* (15.00±6.02)	Pull Ups*@ (14.1±5.72)

Units: Vertical Jump: inches, TB DL and Bench: lbs, Pull Ups: repetitions

*p<0.05.

@p=0.0500.



METHODS

- The placebo and caffeine trials were in the identical sequence to the familiarization trial, with the subjects tested for the 1 repetition-maximum (1RM) in VJ, TB DL, B, and the maximum repetitions in PU.
- Within each group, the results were analyzed using paired t-tests between the placebo and caffeine trials. Between the H and NH groups, the results were analyzed using unpaired t-tests. The significance level was set a priori to p<0.05.

CONCLUSIONS

In the NH group, the caffeine ingestion resulted in a significant improvement in pull ups (muscular endurance) test, but not in muscular strength and muscular power tests. In the H group, the caffeine ingestion did not result in any significant improvements in muscular strength, power, and muscular endurance tests.

PRACTICAL APPLICATIONS

Taking caffeine at a dose of 3 mg/kg at 45 minutes before exercise improved the muscular endurance performance in NH users, but not in H users. The ergogenic effect of caffeine ingestion was not significant in muscular strength and muscular power tests in this study.

REFERENCES

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