

## Sublingual Caffeine Supplementation and Its Effects on Physical Performance Measures in Highly Fit United States Military Personnel

REGINALD B. O'HARA

William Beaumont Army Medical Center; Department of Clinical Investigations; El Paso, TX

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*Category: Professional*

### ABSTRACT

Caffeine is a commonly used countermeasure to combat sleep deprivation and alleviate physiological and psychological performance degradations in highly trained military personnel operating in extreme environments for extending periods. Although the mechanisms of action of caffeine are well described in the literature, the ergogenic effects of caffeine are variable based on the individual's nutritional status, sensitivity to caffeine, genetics, dose, timing, and overall physical condition. **PURPOSE:** To explore the effects of moderate doses of sublingual caffeine on physical performance measures and perceptions of fatigue in highly fit U.S. military personnel. **METHODS:** A convenience sample of eleven highly trained, active-duty military male participants (mean  $\pm$ SD: age, height, body mass, and predicted VO<sub>2</sub>max = 26.5  $\pm$  5.0 yr., 179.0  $\pm$  8.5 cm, 81.2  $\pm$  10.2 kg, and predicted VO<sub>2</sub>max 52.5 ml/kg/min, respectively) participated in this study. Participants consumed 6mg/kg of body mass of sublingual caffeine or placebo tablets sixty minutes before performing three sets of standard military push-ups and pull-ups to fatigue. They then completed a ten-mile moderately intensive walk on a treadmill, followed by three additional sets of complete push-ups/pull-ups. Study investigators measured participant's exercise heart rate response, rating of perceived exertion, and blood lactate levels during each exercise trial. **RESULTS:** A repeated measures double-blinded placebo was applied in the current study and a linear mixed model (LMM) was used to determine the mean differences in performance measures among the three scenarios (baseline, placebo, treatment). The performance outcomes in the three scenarios showed minimal differences in the fixed effects among baseline (p=0.38), placebo (p=0.37), and treatment (p=0.36) and no linear relationship was found. **CONCLUSION:** Findings from the study show that a moderate dose of sublingual caffeine did not attenuate perceived fatigue, nor did it enhance bodyweight supported muscular strength or endurance exercises following exhaustive exercise in our military cohort. However, participants reported no adverse side effects of the sublingual caffeine during or following fatiguing muscle exercise. Future research may include the using sublingual caffeine administered throughout training while comparing the effects of varying doses (3mg/kg, 6mg/kg) of sublingual caffeine on performance measures in a similar military cohort. Further research in formulating and exploring alternate caffeine delivery systems is necessary, especially for specialized military personnel who must perform long, arduous missions, which require physical and cognitive sustainment.