



Effects of Caffeine on Anaerobic Performance

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Abstract

INTRODUCTION: Anaerobic performance refers to high intensity, short duration exercise performance focusing on speed and power. These are short duration exercises with a high intensity, lasting from three seconds to a maximum of two minutes. The predominate systems within the body working during these performances are the adenosine triphosphate and phosphocreatine (ATP-PC) systems which utilizes stores in the muscle and anaerobic glycolysis which generates ATP and leads to the metabolic byproduct, lactic acid. Caffeine is a central nervous system (CNS) stimulant. This drug increases the metabolism of fatty acids, and in turn spares muscle glycogen to enhance performance. Glycogen is the stored carbohydrate located within muscle tissue, and to a lesser degree, the liver. Caffeine can also reduce the perception of fatigue within individuals. The neural stimulus and motor unit firing rates stimulated by caffeine can also enhance strength. For the purposes of this study, both sparing of muscle glycogen and reduced CNS fatigue may contribute to increased anaerobic performance.

Purpose

PURPOSE: The purpose of this study was to evaluate the effects of caffeine on anaerobic exercise performance.

Methods

METHODS: Nine men (M; age 26.78 ± 6.96 yrs) of the UTA Kinesiology department, volunteered to participate in this study. Each subject had their bodyweight recorded prior to exercise testing. A value of 5mg/kg of bodyweight was used when consuming caffeine to enhance performance.

Methods (cont'd)

Caffeine was consumed by measuring the appropriate amount of coffee to correspond with the 5mg/kg value. Decaffeinated coffee was consumed as a placebo. Thirty minutes prior to exercise testing either the coffee or placebo were consumed, varying on two separate occasions and weeks. Each subject performed the exercises of pushups and pull-ups until maximum fatigue was achieved. The maximum numbers of repetitions were recorded for each subject for each exercise. The subjects also performed the 40-yard dash at a full sprint, with their time, in seconds, recorded. Exercise order was randomized for each test subject. After both sessions, caffeine and placebo, of exercise testing, heart rate (HR) and rate of perceived exertion (RPE) were recorded.

Results

RESULTS: The pushup repetitions calculated from the placebo group was 40.89 ± 10.01 and 43.78 ± 9.96 for the caffeine group, which resulted in a significant difference ($p = 0.00017$). The pull-up repetitions calculated from the placebo group was 12.2 ± 11.4 and 14 ± 13.03 for the caffeine group, which was also significantly different ($p = 0.007$). The 40-yard dash time in seconds calculated from the placebo group was (5.31 ± 0.42) and (5.32 ± 0.44) for the caffeine group, which did not show a significant difference ($p = 0.34$). The maximal value for HR was (93 ± 3 bpm) for the placebo group and (100 ± 3.9 bpm) for the caffeine group, resulting in a statistically significant difference ($p = 0.0000017$). RPE for the placebo group was (12.7 ± 0.87) and (13.2 ± 0.67) for the caffeine group, which was significantly different ($p = 0.007$).

Results (cont'd)

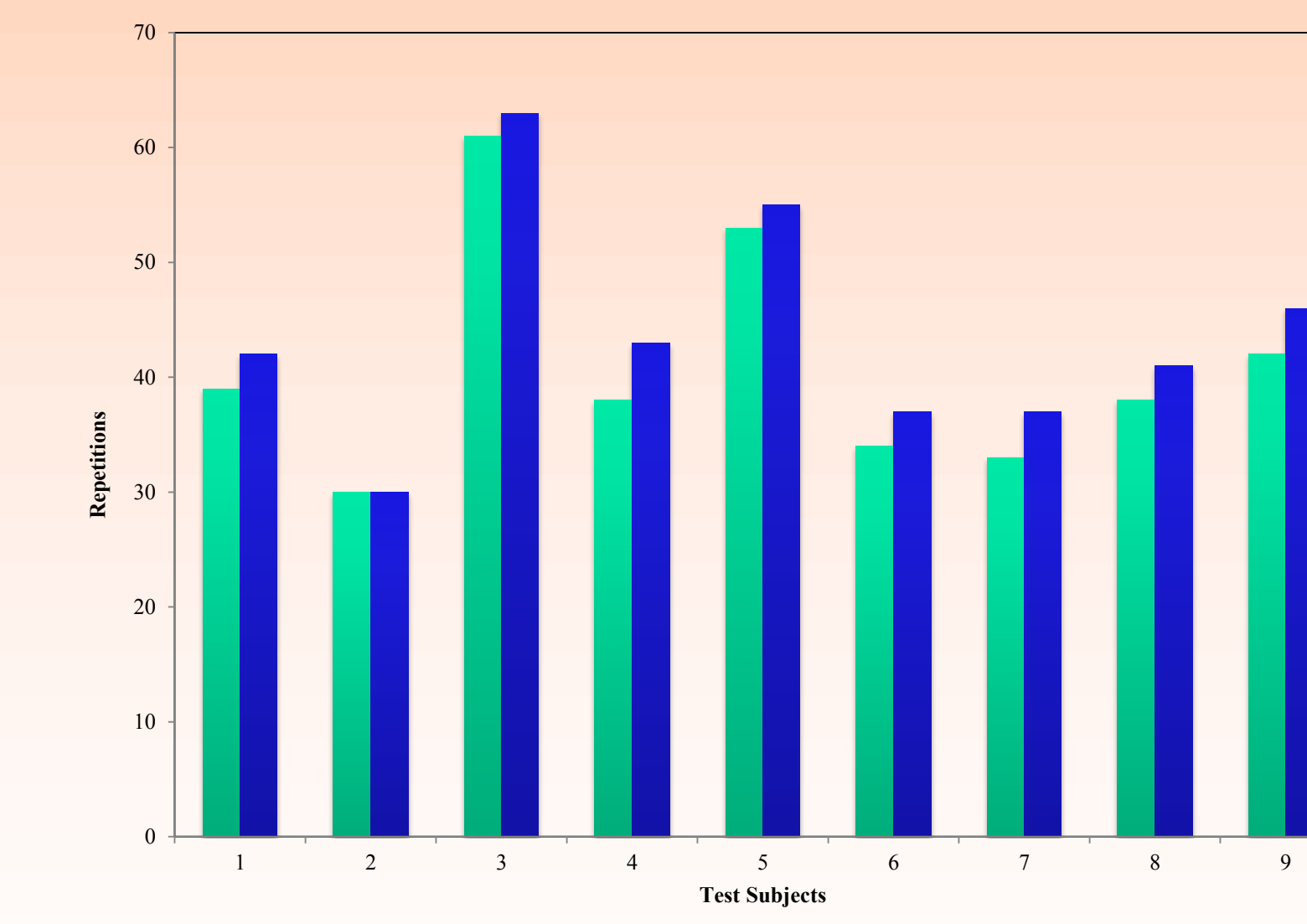


Figure 1: The Number Of Pushups Performed With Caffeine Vs With Placebo

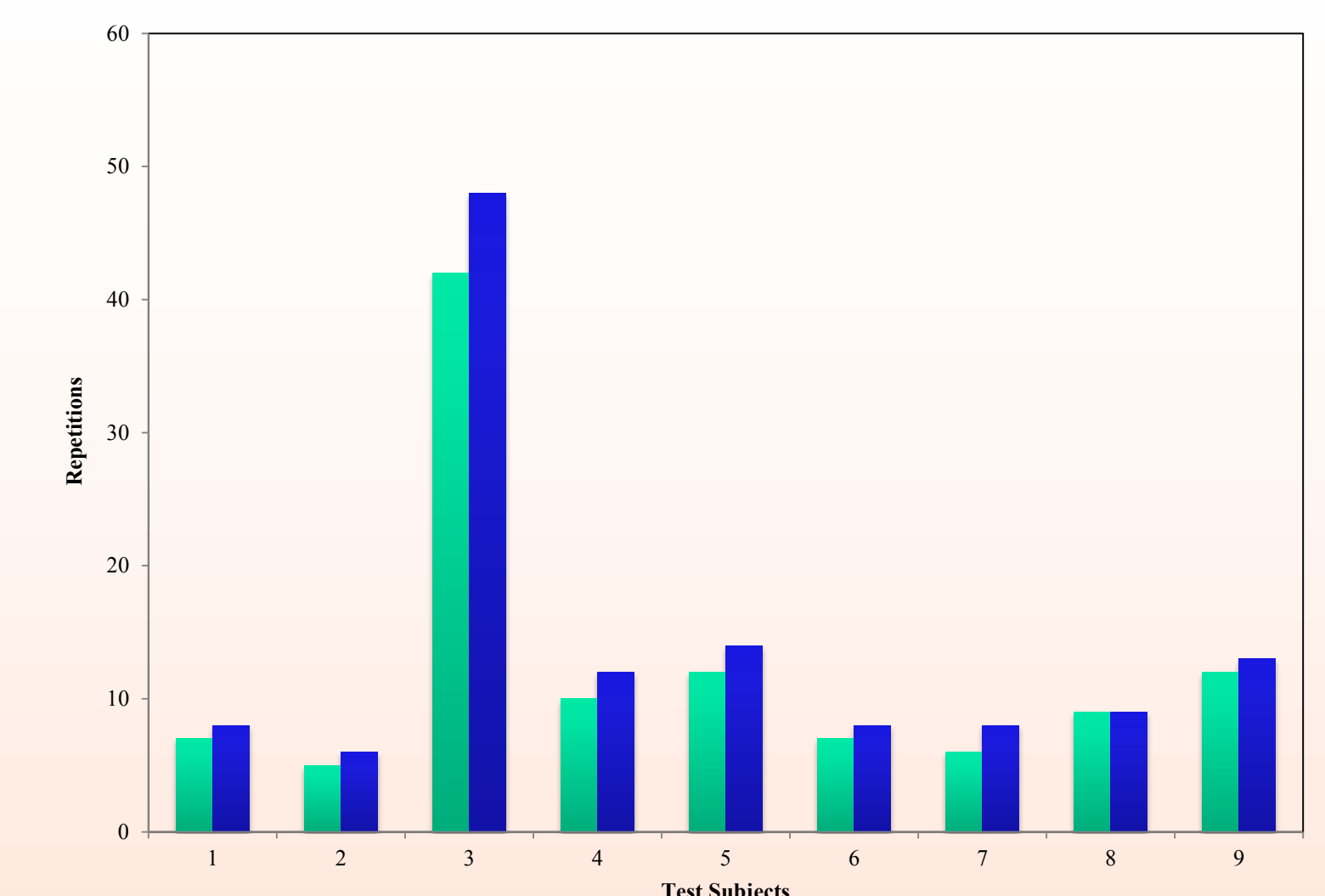


Figure 3: The Number Of Pull-ups Performed With Caffeine Vs With Placebo

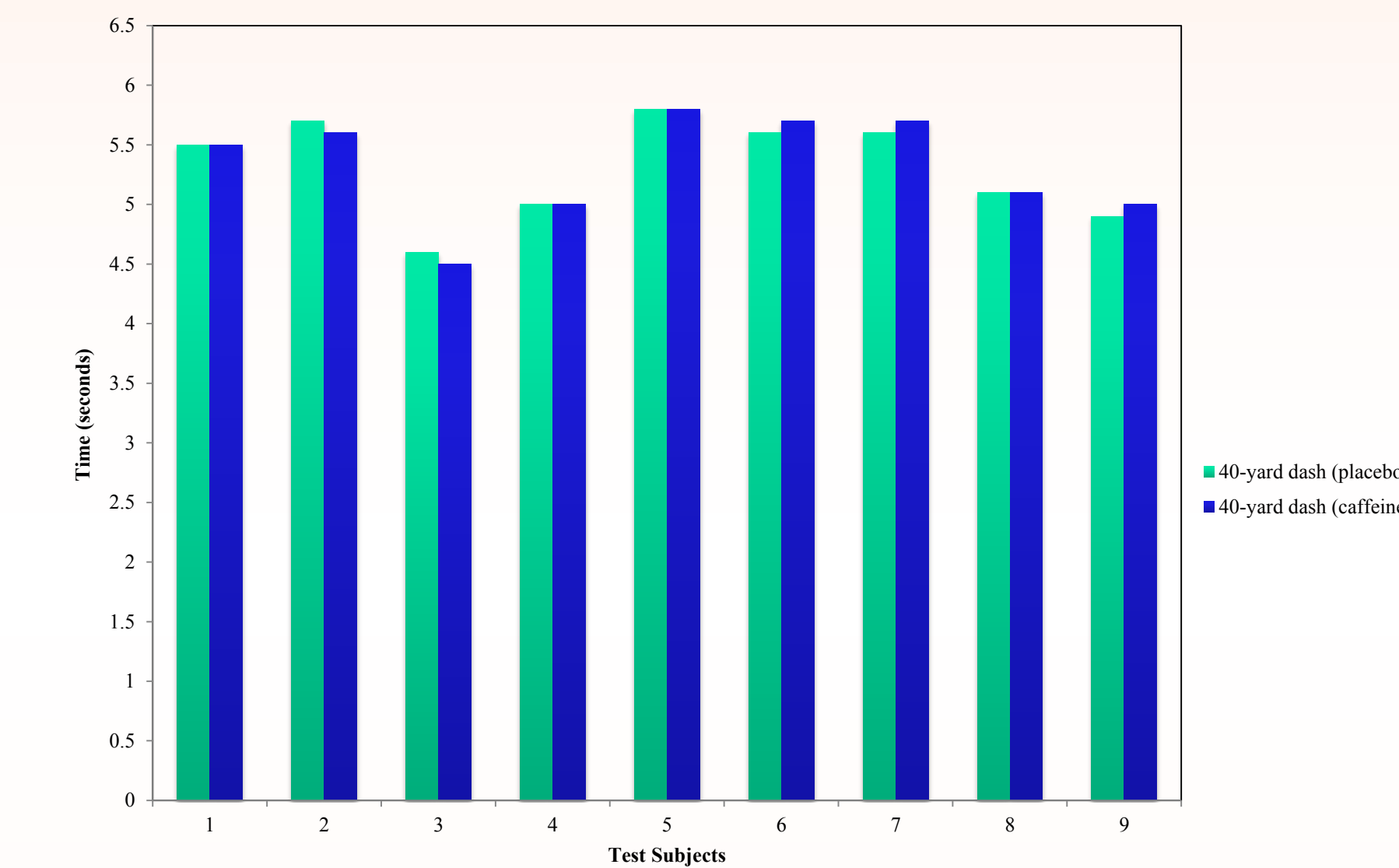


Figure 5: The Time Of The 40-Yard Dash Performed With Caffeine Vs With Placebo

Conclusions

CONCLUSION: The results of this study support previous findings that caffeine consumption does have a positive effect on anaerobic exercise performance.