

EFFECTS OF A CAFFEINE-CARBOHYDRATE MOUTH RINSING ON SPRINTING KINETICS AND KINEMATICS IN FASTED ATHLETES

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ABSTRACT

Carbohydrate mouth rinsing during an intermittent fasting has been reported to be advantageous for endurance performance; however, there appears to be no clear effect on repeated sprints. What has not been investigated previously is the effects of combined caffeine and carbohydrate (CAF-CHO) mouth rinsing on speed-endurance performance commonly performed by track and field athletes during a fasted state.

PURPOSE: To determine the influence of CAF-CHO mouth rinsing on sprinting kinetics and kinematics, as well as subjective exertion during a speed-endurance bout performed in a fasted state.

METHODS: In a counterbalanced, single-blind random order design, 11 high calibre, National level male sprinters and middle-distance runners performed three 15-sec all-out sprints on a Woodway non-motorized force treadmill, interspersed with 2-min active recovery between sprints. Athletes rinsed 25 ml of CAF-CHO (4g carbohydrate, 5 mg caffeine), or a similarly coloured placebo solution (PLA) prior to warm-up (30-min pre-trial), 1-min pre-trial, and the mid-way of each period of active recovery. On one occasion, no mouth rinse (NMR) was administered. The study was conducted within the second and third quarters of Ramadan, and each session separated by at least 72 hours.

RESULTS: At the start of each trial, the rating of perceived exertions (RPE), readiness to train, blood glucose, and lactate concentrations were similar ($p > 0.05$). A significant effect of trial was observed for the distance ($p = 0.019$), revealing a longer average distance achieved in the CAF-CHO compared to PLA trial (69.80 ± 3.57 vs. 68.08 ± 3.22 ; $p = 0.026$; ES: 0.5), and NMR (69.69 ± 3.82 ; $p = 0.680$; ES: 0.2). The difference between NMR and PLA also approached significance ($p = 0.073$; ES: 0.5). The CAF-CHO intervention also obtained better results in all other sprint measures such as average velocity, peak acceleration, and peak horizontal force, although these differences were not significant. Post-trial RPE was higher during NMR (7.23 ± 1.92) as compared to CAF-CHO (6.54 ± 2.15) and PLA (6.38 ± 1.94) ($p = 0.247$).

CONCLUSION: In challenging metabolic conditions, CAF-CHO mouth rinsing has the potential to improve measures of sprint training performance with a positive ergogenic effect on speed endurance performance

BACKGROUND

- During Ramadan, Muslim athletes will fast between the dawn and dusk for ~30 days.
- Mouth rinsing has demonstrated potential ergogenic effects to improve both endurance and high-intensity performances in non-Ramadan conditions (1, 4). The potential benefit of mouth rinsing was also observed on cycling endurance performance during Ramadan fasting (3); however, a recent study reported that carbohydrate (CHO) mouth rinsing did not affect repeated-sprint performance using the 2 sets of a 5x5s test (2). Meanwhile, effects of a caffeinated solution (CAF) combined with CHO have been shown to enhance sprint performance (1).
- Currently, no data is available on the effectiveness of a combined CAF-CHO mouth rinse intervention during Ramadan on speed-endurance performance in high calibre athletes.

Therefore, the purpose of this study was to assess the effects of CAF-CHO mouth rinsing on the kinetic and kinematic parameters during a speed-endurance running that typically performed by National-level sprinters, observing Ramadan fasting.

We hypothesised that mouth rinsing with CAF-CHO would improve speed-endurance performance.

METHODS

- Counterbalanced, cross-over, and single-blind random design.
- 11 National-level track and field athletes (age: 20.8 ± 1.9 y; 1.71 ± 0.03 m; 61.5 ± 4.7 kg) with 5.0 ± 1.6 years of competitive experience in 100m-800m.
- 3 x 15 s sprints on a non-motorized treadmill (Woodway, USA); room temperature (~ 22 °C); 10s rinse protocol.
- All subjects completed three trial conditions: (a) CAF-CHO using Redbull; (b) placebo (PLA) using Tartrazine, or (c) no mouth rinse (NMR) (Figure 1)

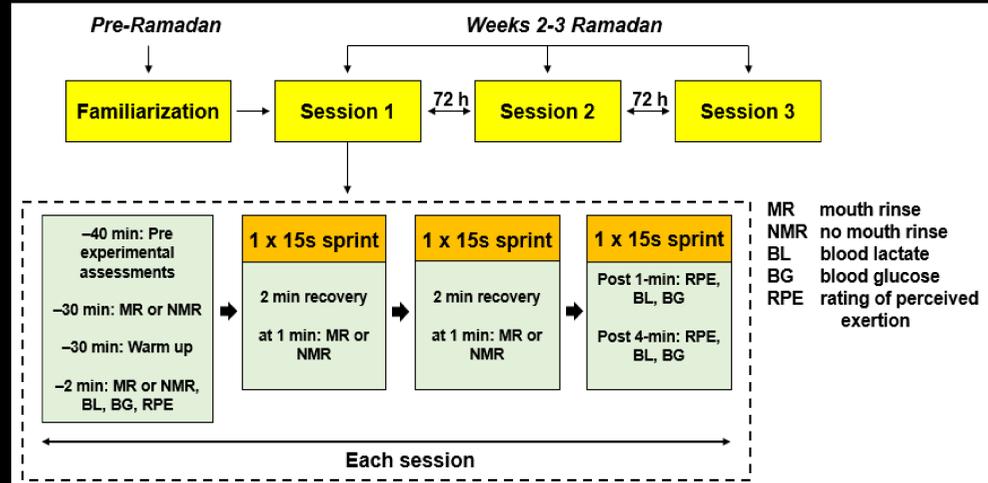


Figure 1. Schematic representation of the timeline of study procedures

RESULTS

- A significant main effect of trial was observed for the distance ($p = 0.019$), revealing a longer average distance achieved in the CAF-CHO compared to PLA trial (69.80 ± 3.57 vs. 68.08 ± 3.22 ; $p = 0.026$), but not NMR (69.69 ± 3.82 ; $p = 0.680$).
- Post-trial RPE was higher during NMR (7.23 ± 1.92) when compared to CAF-CHO (6.54 ± 2.15) and PLA (6.38 ± 1.94).
- CAF-CHO showed superior results in peak acceleration and peak horizontal force, but the differences were not significant ($p > 0.05$) (Figure 2).

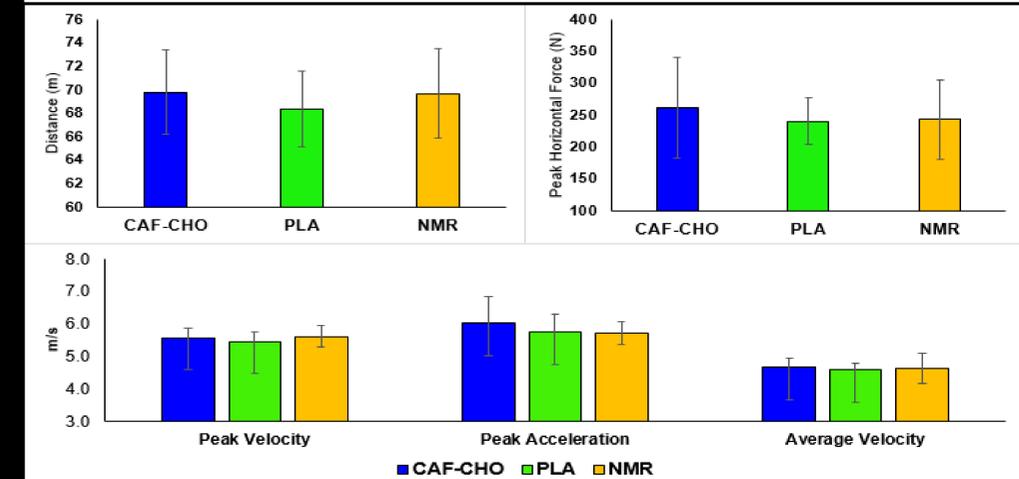


Figure 2. Effects of mouth rinse on sprinting parameters

SUMMARY

- Mouth rinsing with CAF-CHO significantly increased total sprint distance compared to PLA but not NMR.
- CAF-CHO outperformed PLA & NMR in measures of peak acceleration and horizontal force suggesting a potential for ergogenic effect in high calibre athletes.
- Mouth rinse is known to stimulate areas of the brain related to reward, motor drive, and motivation (4) and may enhance speed-endurance training in high calibre athletes during Ramadan fasting.
- It is important to include a NMR trial when assessing mouth rinse protocols.

References:

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