



An Extended Period of Carbohydrate Mouth Rinsing Prior to Consumption Has No Additive Benefit on Cycling Performance

Henry D. Gebhardt, Eric J. Jones and Dustin P. Joubert



Human Performance Lab; Department of Kinesiology and Health Science; Stephen F. Austin State University; Nacogdoches, TX

Abstract

Category: Masters

Introduction

Due to limited glycogen stores, carbohydrate (CHO) consumption during exercise is effective at improving performance in endurance events lasting longer than 90 minutes in duration. Recent research has established that CHO mouth rinsing may improve performance over shorter durations, independent of actual consumption. However, research is lacking in determining if an extended period of mouth rinsing has any additive benefit in conjunction with typical CHO beverage consumption over longer competition durations, where CHO ingestion/consumption is likely warranted. **PURPOSE:** Determine the effects of CHO mouth rinsing combined with consumption compared to CHO consumption alone on cycling performance. **METHODS:** Following an initial graded exercise test to determine $\dot{V}O_{2\max}$, 5 male cyclists completed two cycling performance trials in a randomized, double-blind, crossover design. In order to determine any added benefit of an extended CHO mouth rinse period prior to consumption, trials consisted of two drinking conditions: 1) placebo (PLA) mouth rinse plus CHO consumption and 2) CHO mouth rinse plus CHO consumption. For the mouth rinsing, a 25 mL solution (PLA: Gatorade Zero; CHO: Gatorade) was swished for 5 seconds before spitting out. Mouth rinsing was always followed up by actual consumption of 1.5 mL/kg of CHO beverage (Gatorade). Performance trials consisted of an initial 1-hour cycling bout at a workload corresponding to 60% $\dot{V}O_{2\max}$ on an electronically braked cycle ergometer (Wahoo Kickr). During this 1-hour segment, a 30-second sprint was performed every 10 minutes, for a total of 6 sprint efforts. The mouth rinsing/consumption protocol was performed every 4 km during the time trial. A two-way (condition x time) repeated measures ANOVA was used to determine effects on sprint power output and rating of perceived exertion (RPE) during the 1-hour segment as well as 20 km time trial performance. **RESULTS:** There were no main effects for condition or interactions for any of the performance variables measured. Average values \pm SD for the 6 sprint segments during the 1-hour bout were as follows: sprint power (watts, CHO: 425 ± 80 , PLA: 437 ± 48), heart rate (bpm, CHO: 157 ± 12 , PLA: 157 ± 8), RPE (CHO: 16.7 ± 3.3 , PLA: 17.3 ± 2.4). Further, 20 km time trial performance did not differ between conditions (CHO: 43.1 ± 3.8 min, PLA: 42.8 ± 3.6 min). **CONCLUSION:** In this limited sample, it does not appear that an extended CHO mouth rinsing period has any additive benefit to typical CHO consumption. This would suggest that any receptors thought to be stimulated through mouth rinsing are already stimulated adequately with normal CHO beverage consumption.

- Due to limited glycogen stores, carbohydrate (CHO) consumption has been consistently shown to benefit performance in endurance events lasting longer than 90 minutes.
- More recently, CHO mouth rinsing has been shown to benefit performance independent of actual consumption.
- While CHO mouth rinsing may be a useful strategy for individuals with gastrointestinal distress or in shorter duration events where glycogen depletion is not likely to occur, actual CHO consumption is likely to still be warranted for longer duration efforts.
- Since CHO mouth rinsing and CHO ingestion likely benefit performance through different mechanisms, the purpose of this study was to determine if an extended period of CHO mouth rinsing prior to consumption had any additive benefit on cycling performance beyond standard CHO beverage consumption.

Methods

- 5 trained cyclists completed two cycling performance trials in a randomized, double-blind, crossover design.
- To determine any added benefit of an extended CHO rinse, trials consisted of two drinking conditions: 1) Placebo (PLA) rinse plus CHO consumption, and 2) CHO rinse plus CHO consumption.
- For each condition, a 25mL solution was swished for 5 seconds (PLA: Gatorade Zero; CHO: Gatorade) before spitting out, followed by actual consumption of 1.5 ml/kg of CHO beverage (Gatorade).
- Performance trials consisted of an initial 1-hour cycling bout at a workload corresponding to 60% $\dot{V}O_{2\max}$ on an electronically braked cycling ergometer, interspersed with a 30-second all-out sprint that was performed every 10 minutes for a total of 6 sprint efforts.
- Following the initial 60-minute cycling bout, a 20 km time trial was performed using the simulation mode setting on the cycle ergometer.
- The mouth rinsing/consumption protocol was performed immediately following a 10-minute warmup, 1-minute prior to each sprint interval, immediately before beginning the 20 km time trial, as well as every 4km during the time trial, for a total of 12 beverages.

Results

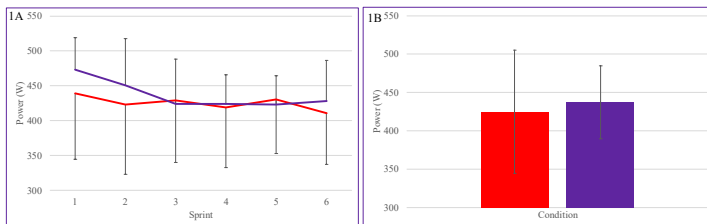
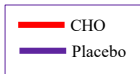


FIGURE 1. (A) Power output during 6, 30-second intermittent cycling sprint efforts over the course of 1-hour (sprint every 10 minutes) steady state ride at 60% $\dot{V}O_{2\max}$ for CHO and PLA mouth rinsing conditions. (B) Average power across all 6 sprints between conditions. All values represented as mean \pm SD.

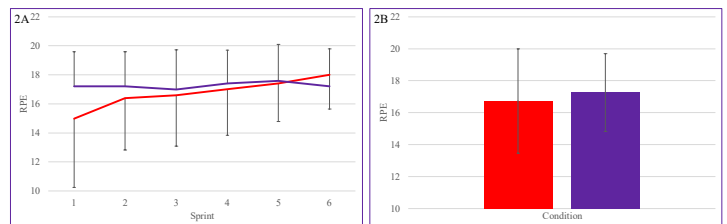


FIGURE 2. (A) Rating of perceived exertion (RPE) following 6, 30-second intermittent cycling sprint efforts over the course of 1-hour (sprint every 10 minutes) steady state ride at 60% $\dot{V}O_{2\max}$ for CHO and PLA mouth rinsing conditions. (B) Average RPE for all 6 sprints between conditions. All values represented as mean \pm SD.

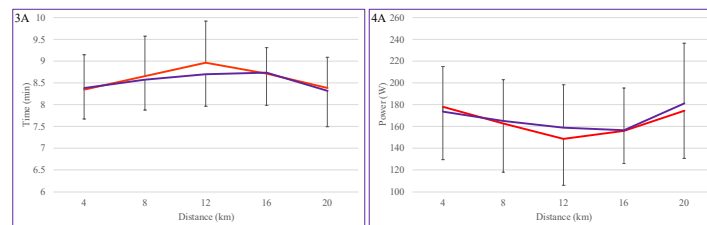


FIGURE 3. (A) Time splits for each 4 km segment of 20 km time trial for CHO and PLA mouth rinsing conditions. (B) 20 km time trial performance between conditions. All values represented as mean \pm SD.

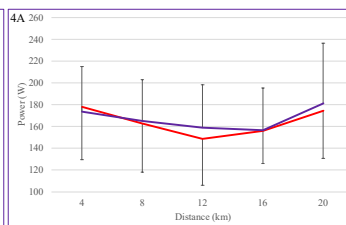


FIGURE 4. (A) Average power for each 4 km segment of a 20 km time trial for CHO and PLA mouth rinsing conditions. (B) Average power for 20 km time trial between conditions. All values represented as mean \pm SD.

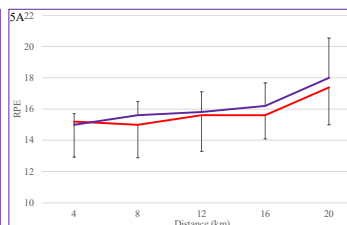


FIGURE 5. (A) RPE for each 4 km segment of a 20 km time trial for CHO and PLA mouth rinsing conditions. (B) Average RPE for 20 km time trial performance between conditions. All values represented as mean \pm SD.

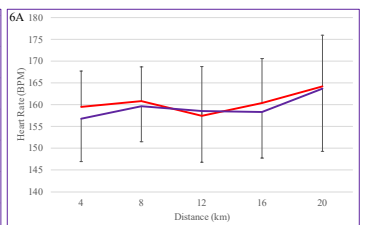


FIGURE 6. (A) Average heart rate for each 4 km segment of a 20 km time trial for CHO and PLA mouth rinsing conditions. (B) Average heart rate for 20 km time trial between conditions. All values represented as mean \pm SD.

Conclusions

- There was no main effect for condition or interaction for any of the tested parameters.
- In this limited sample, it does not appear that an extended CHO mouth rinsing period has any additive benefit to typical CHO consumption.
- This would suggest that any receptors thought to be stimulated through mouth rinsing are already stimulated adequately with normal CHO beverage consumption.