The effect of carbohydrate mouth rinse on physical performance during a 24.5 km cycling time trial

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Abstract

It is commonly acknowledged that carbohydrate intake during exercise can improve endurance capacity and exercise performance during prolonged exercise lasting more than 2h.[1,2,3] An investigation by Carter and colleagues[4] where the infusion of carbohydrates had no improvements in cycling performance, led to the theorization of the hypothesis that it could possibly exist an effect of carbohydrate mouth rinse on the central nervous system via mouth/tongue receptors which could promote an improved sense of well-being and a decreased rate of perception of effort during exercise. [5,6,7,8]

Recently, plenty of research associating carbohydrate mouth rinses to positive effects in athletic performance have arisen, not only in endurance activities.[9,10,11]

The purpose of the present study was to examine the effects of carbohydrate mouth rinse on physical performance during a 24.5 km cycling time trial. Twenty trained cyclists volunteered to participate in the investigation (41.0±10.5 years; 76.9 ± 7.9 kg of body mass). In a randomized, placebo-controlled double-blind and crossover experimental design, participants took part in two experimental trials in which they completed a simulated time trial of 24.5 km.

A group of healthy subjects, training at least 2h per week and who usually engaged in competitive cycling events, were included in this trial. A five-minute session was performed to familiarize all participants with the virtual simulator. This session was performed right before the first trial and had several variations of slope to familiarize participants with the change of gear, as this happens in a real bicycle.

In one occasion participants mouth-rinsed a 6.4% carbohydrate mixed solution (CHO) and in the other occasion participants rinsed an artificially flavored placebo (PLA) for 5 seconds in each 12.5% of total completion of the trial (figure 1.).

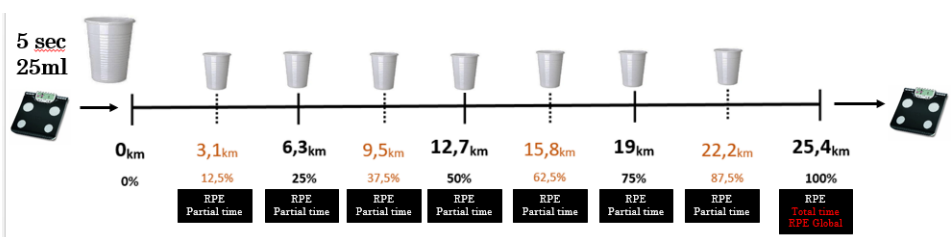

Figure 1. Experimental procedure with identification of mouth rinse timing, quantity and duration of the rinse, along with measured parameters of time (partial and total) and RPE (rate of perceived exertion)

On the 24h preceding the first experimental trial, subjects recorded their dietary intake and were asked to replicate these patterns of diet in the second trial and consume the previous meal 2h before the trial. Subjects were also instructed to absent from any strenuous physical activity on the 48h preceding the experimental trials. Subjects abstained from alcohol intake, coffee and coffee like-beverages on the 24h preceding the trials. Adherence to these standardizations was checked verbally before each trial.

The data was analyzed using a two-sides ANOVA analysis (mouth rinse and time) with repeated measures. Variables were also measure with Cohen's effect size (ES). The statistical significance was stablished in a value of $P < 0.05$ for all the analysis. The data are presented as mean ± standard deviation.

There were no statistical differences in the time (in seconds) employed to complete the distance within the two groups (CHO: 2941 ± 391; PLA: 2986 ± 383, $p = 0.252$; ES: 0.12). Similarly, average power output during the trial presented no difference between treatments (CHO: 223.8 ± 50.69; PLA: 218.4 ± 47.3 W, $p = 0.280$; ES = 0.12%). He same was observed in peak power output (CHO: 729.4 ± 270.5; PLA: 695.8 ± 235.4 W, $p = 0.375$; ES = 0.14%) and rate of perceived exertion (CHO: 16.00 ± 1.34; PLA: 15.35 ± 1.76, $p = 0.061$; ES = 0.37%).

In conclusion, mouth rinsing with a mixed carbohydrate solution did not improve performance time of a cycling time trial in recreationally active cycling males. Average power output, climbing power output, peak power output and rate of perceived exertion were also unaffected by mouth rinsing with a carbohydrate solution compared with placebo. The present study provided important new insights regarding the utilization of carbohydrate mouth rinse in recreational cyclists.

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