

UNIVERSITI TEKNOLOGI MARA

**THE EFFECT OF CARBONATED
CARBOHYDRATE MOUTH
RINSING ON TIME TO EXHAUSTION
RUNNING PERFORMANCE**

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ABSTRACT

Carbohydrate mouth rinsing (CHO) has been shown to activate the oral receptor that is related to reward and behavioural center of the brain that contributed to enhanced exercise performance. Therefore, this research investigates the effect of carbonated carbohydrate (C- CHO) mouth rinse (MR) on prolonged running performance in time to exhaustion (TTE). Twelve healthy males (n=12) among trained runners (aged: 20.8 ±1.0 years) were selected for this randomized design, double blind, solution MR crossover study but one subject had dropped out during the trial experiment. Each participant performed a time to exhaustion (TTE) running exercise at speed equivalent at 80% maximal oxygen consumption ($\dot{V}O_{2max}$) (determined during first visit). The participants were given either C-CHO or placebo; non- carbonated CHO (PLA; NC-CHO) to mouth rinse for 10 second and spit into a baker. Physiological (blood glucose, heart rate and oxygen capacity) and psychological markers (perceived exertion, arousal, feeling scale, and gastrotestinal comfort scale) were collected intermittently. TTE performance for C-CHO was significantly longer ($p<0.05$) in each trial. However, the longer TTE with different solution in order effect (C-CHO, NC-CHO, PLA) did not reach statistical significance ($P=0.196$). Exhaustion time in $\dot{V}O_{2max}$ and rate perceived exhaustions (RER) with C-CHO, showed no significant difference ($P=0.885$) in comparison with NC-CHO and PLA trial. Heart rate, oxygen uptake, plasma insulin, glucose, lactate in the C-CHO, NC-CHO and PLA were not significantly different in TTE. Rate perceived exhaustions (RPE) in the C-CHO, NC-CHO and PLA were not significantly different in each running performance trial. Meanwhile perceives activation scale (FAS) and feeling scale (FS) increased significantly during exercise in each 15 min TTE and each trial. From the current study, by rinsing C-CHO were not significantly improve performance in prolonged running. However, C-CHO does trigger extra signal towards FAS which may counter any potential benefits of CHO mouth rinsing in exercise performance.

Keywords: mouth rinsing, exercise performance, time to exhaustion

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Carbohydrate (CHO) consumption has been shown to improve exercise performance. A study by Rollo et al., (2011) explained that consuming 40 - 60 g-l.hr^l of CHO enhanced running performance. Furthermore, individuals on a high-CHO diet (70% of dietary energy from CHO) and increased muscle glycogen stores appeared to improve endurance capacity compared to the normal (50%) and low (10%) CHO diet groups (Thomas et al., 2016; Walkers et al., 2019). The mechanism underlying these enhancements might be the increase of blood glucose (hyperglycaemia) and muscle glycogen sparing during exercise (Mccartney et al., 2017). Based on these studies, athletes were advised to practice a CHO diet to ensure energy sufficiency during exercise. The most common CHO replacement method is ingesting CHO fluids (calorie beverages) (Thomas et al., 2016). Thus, athletes are advised to drink between 1250 mL to 1500 mL of this calorie beverage for every 1 kg body weight lost to replace sweat loss during exercise (Thomas et al., 2016).

Despite the benefit of drinking CHO fluid intake during exercise, athletes often neglect this practice due to fluid unavailability and undesirable side effect. Consequently, athletes, particularly runners, are at risk of experiencing gastrointestinal (GI) discomfort (Smith et al., 2021) and severe soreness during exercise especially attributed to environmental heat stress (Kamaruddin et al., 2022). These conditions have been linked to the up and down motion that may induce cramps and, stress, besides compromising abdominal reflux (Tomko et al., 2019). Several studies have reported that runners experience GI discomfort during long-distance races (Smith et al., 2021; Tomko et al., 2019; Van Nieuwenhoven et al., 2005). Most athletes begin training and competition dehydrated and/or do not ingest enough fluids during exercise (Magee et al., 2017) the poor drinking habits among athletes pose a challenge in to encourage CHO fluid intake during exercise to replenish their energy reserves. (Jeukendrup et al., 2014; Kamaruddin et al., 2019)