

Carbohydrate Mouth Rinse Testing

Carbohydrate mouth rinse is an ergogenic aid that has gained increasing attention in sports performance research due to its potential to enhance exercise capacity without the need for ingestion (Deng et al, 2025). Unlike traditional carbohydrate supplementation, which provides a metabolic fuel source, carbohydrate mouth rinse is believed to exert its effects through central mechanisms. Specifically, receptors in the mouth detect the presence of carbohydrates and stimulate areas of the brain associated with reward and motor control, which may lead to improved performance by reducing perceived effort and increasing neural drive (Baltazar-Martins & Del Coso, 2019)

This strategy is particularly relevant in high-intensity or short-duration exercise, where energy availability is less likely to be a limiting factor, and performance may instead be influenced by central fatigue. Research within Sports Science has shown that carbohydrate mouth rinse can improve time-trial performance and exercise capacity, especially in fasted states or during prolonged activity (de Ataide e Silva et al, 2013). However, findings are not always consistent, and its effectiveness in short, maximal efforts such as sprinting remains an area of ongoing investigation.

The aim of this study is to examine the effect of a carbohydrate mouth rinse on a selected sport-related performance outcome, specifically sprint performance. Sprint time was chosen as it provides an objective and reliable measure of high-intensity performance relevant to many team and individual sports. By comparing sprint performance under carbohydrate mouth rinse and control conditions, this study seeks to evaluate whether this ergogenic aid offers a meaningful performance benefit in short-duration exercise.

Methodology Summary

A controlled, repeated-measures experimental design was used to investigate the effects of a carbohydrate (CHO) mouth rinse on sprint performance. Participants completed two conditions: a carbohydrate mouth rinse (CHO) and a placebo (PLA), allowing for direct comparison within the same individuals and reducing the impact of inter-individual variability. Where possible, conditions were administered in a randomised order to minimise order effects and bias.

A sample of physically active individuals ($n = 4-6$) participated in the study. All participants were familiar with high-intensity exercise and provided informed consent prior to testing. Each participant completed a standardised protocol on a Wattbike, beginning with a 5-minute warm-up at a rating of perceived exertion (RPE) between 3 and 5 to ensure adequate preparation without inducing fatigue.

Following the warm-up, participants performed 10 repeated 6-second maximal sprints, each separated by 24 seconds of recovery. A 25 ml solution of either CHO or PLA was swilled in the mouth for 10

seconds and then expectorated prior to the first sprint and again after the fifth sprint. Performance variables recorded included peak power output, average power output for each sprint, and RPE, providing both objective and subjective measures of performance.

Several variables were controlled to ensure consistency and reliability of results. Participants were instructed to maintain similar dietary intake prior to each trial and to avoid strenuous exercise and caffeine consumption in the hours leading up to testing. Testing sessions were conducted at a consistent time of day to minimise the effects of circadian variation. The same equipment, settings, and instructions were used across all trials to ensure standardisation.

Ethical considerations were addressed throughout the study. Participants were informed of all procedures, potential risks (e.g. fatigue or discomfort), and their right to withdraw at any time. As carbohydrate mouth rinse is not a banned substance, the protocol complied with World Anti-Doping Agency regulations. Overall, the study was designed to balance experimental control with practical feasibility in a laboratory setting.

Results Summary

The results compared sprint performance under carbohydrate mouth rinse (CHO) and placebo (PLA) conditions using mean power (MP), peak power (PP), and rating of perceived exertion (RPE) across 10 repeated sprints.

Table 1. Mean Performance Outcomes (CHO vs PLA)

Variable	CHO Condition	PLA Condition	% Difference
Mean Power (W)	554.2	556.8	-0.5%
Peak Power (W)	690.9	713.3	-3.1%
RPE	14.8	14.1	+5.0%

Overall, the findings indicate that the carbohydrate mouth rinse did not improve performance compared to the placebo condition. Mean power output was slightly lower in the CHO condition (554.2 W) compared to PLA (556.8 W), although the difference was minimal (−0.5%). Similarly, peak power output was lower in the CHO trial (690.9 W) compared to PLA (713.3 W), representing a small decrease of approximately 3.1%.

In terms of perceived exertion, RPE was marginally higher in the CHO condition (14.8) compared to PLA (14.1), suggesting that participants felt the exercise to be slightly more demanding when using

the carbohydrate mouth rinse. This contrasts with the proposed mechanism of carbohydrate mouth rinse, which is thought to reduce perceived effort via central nervous system stimulation.

Across the 10 sprints, both conditions showed a clear decline in power output over time, reflecting fatigue associated with repeated high-intensity efforts. This trend was consistent in both CHO and PLA trials, indicating that the mouth rinse did not meaningfully attenuate fatigue or improve performance maintenance.

Inter-individual variability was evident, with some participants showing small improvements in certain sprints under CHO conditions, while others performed better in the placebo trial. This variability suggests that responses to carbohydrate mouth rinse may be highly individual and influenced by factors such as motivation, fatigue, or familiarity with the protocol.

No inferential statistical analysis was conducted; however, the small differences observed between conditions suggest that any effect of carbohydrate mouth rinse on repeated sprint performance is likely to be trivial in practical terms.

Overall, the carbohydrate mouth rinse did not demonstrate a clear ergogenic benefit for short-duration, repeated sprint performance in this sample.

The findings of this study indicate that a carbohydrate (CHO) mouth rinse did not enhance repeated sprint performance when compared to a placebo condition. Mean power and peak power outputs were slightly lower in the CHO trial, while rating of perceived exertion (RPE) was marginally higher. These results suggest that the mouth rinse did not provide the anticipated ergogenic benefit and, in this context, may have had little to no practical effect on performance. When interpreted alongside existing research within Sports Science, these findings both align with and challenge aspects of the current literature.

Discussion and Practical Implications

Previous studies have shown that CHO mouth rinse can improve exercise performance, particularly in endurance-based activities lasting longer than 30 minutes (Luden et al, 2016). The proposed mechanism involves activation of oral carbohydrate receptors, which stimulate brain regions linked to reward and motor output, thereby reducing perceived effort and enhancing performance. However, my findings contradict this evidence, as no improvement and in some cases slight reductions were observed in performance variables. This can be explained by the nature of the exercise protocol used. Repeated sprint exercise relies heavily on anaerobic energy systems and is limited more by peripheral fatigue (e.g. phosphocreatine depletion) than central fatigue (Billaut et al, 2013) As a result, the

central effects of CHO mouth rinse may not be sufficient to influence performance in such short, high-intensity efforts.

The results do, however, support more recent research suggesting that the effectiveness of CHO mouth rinse is highly context dependent. Studies have indicated that its benefits are more pronounced in fasted individuals or during prolonged exercise, where central fatigue plays a larger role (Zouhal et al, 2020). In contrast, during well-fed conditions or short-duration efforts, the ergogenic effect appears to be minimal. Therefore, the findings of this study are consistent with the idea that CHO mouth rinse is not universally effective across all exercise types.

Clear individual differences were observed among participants, with some showing minor improvements under CHO conditions while others performed better with the placebo. This variability highlights the importance of individual response to supplementation. Factors such as habitual diet, psychological expectation, training status, and sensitivity to ergogenic aids may all influence outcomes. For example, participants who believed the CHO rinse would be beneficial may have experienced a placebo effect, while others may not have responded at all. This reinforces the need for personalised approaches when considering supplementation strategies.

In terms of practical application, the findings suggest that CHO mouth rinse is unlikely to be beneficial for athletes engaged in repeated sprint or short-duration, high-intensity activities, such as those commonly seen in team sports. The lack of improvement in both performance and perceived exertion indicates that it does not provide a meaningful competitive advantage in this context. However, it may still have value in other sporting situations. For example, endurance athletes competing in events where carbohydrate ingestion is impractical or causes gastrointestinal discomfort may benefit from a mouth rinse strategy. It may also be useful in fasted training conditions, where the brain's sensitivity to carbohydrate presence is heightened.

Several limitations of the study should be acknowledged. The small sample size reduces the reliability and generalisability of the findings and limits the ability to detect statistically significant differences. Additionally, although efforts were made to standardise conditions, factors such as prior nutrition, hydration, sleep, and motivation were not fully controlled and may have introduced variability. The protocol itself, while practical, may not have been sensitive enough to detect subtle central effects of the mouth rinse.

Based on these findings, it is not recommended to use carbohydrate mouth rinse as a primary strategy to enhance repeated sprint performance. The evidence from this study suggests that any potential benefit is negligible in this context. However, given its low risk and ease of application, it may still be worth trialling in endurance settings or on an individual basis. Ultimately, practitioners should

consider the specific demands of the sport, the context of performance, and individual athlete responses before implementing this strategy in practice.

Ethical and Safety Considerations

The use of carbohydrate (CHO) mouth rinse presents relatively low risk compared to many other ergogenic aids, making it a practical option from a safety perspective. As the solution is not ingested but instead swilled and expectorated, the likelihood of gastrointestinal discomfort a common issue with carbohydrate supplementation is minimal (Painelli, et al, 2022). No adverse side effects were reported by participants in this study, which is consistent with existing research. However, there is still a small risk of mild discomfort, such as an unpleasant taste or irritation, and care should be taken to ensure hygiene and avoid accidental ingestion during high-intensity exercise.

From a regulatory standpoint, carbohydrate mouth rinse is fully compliant with the rules set by the World Anti-Doping Agency (WADA, 2026), as it does not contain any prohibited substances. This makes it a safe and legal option for athletes at all levels of competition. Nevertheless, practitioners should remain cautious when preparing or sourcing solutions to ensure no contamination with banned substances occurs, particularly when using commercially available products.

In practice, responsible use of CHO mouth rinse should involve individual assessment and informed decision-making. Athletes should be educated on its intended purpose, potential benefits, and limitations, particularly given the mixed evidence regarding its effectiveness. It is also important to trial the strategy in training before competition to assess individual response and ensure familiarity with the protocol (Soylu et al, 2024). Additionally, practitioners should consider the broader nutritional context, ensuring that mouth rinse is not used as a substitute for appropriate fuelling strategies where carbohydrate intake is necessary.

Furthermore, ethical practice requires transparency between practitioners and athletes, ensuring that expectations are realistic and not overstated. Monitoring athlete feedback, performance trends, and any unintended effects over time is also important to support safe implementation. Practitioners should prioritise evidence-based interventions and avoid over-reliance on supplements where training, recovery, and nutrition strategies may have a greater overall impact on performance.

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