Willams et al. Journal of the International Society of Sports Nutrition 2011, 8(Suppl 1):P28
http://www.jissn.com/content/8/S1/P28

POSTER PRESENTATION Open Access

Effects of pre-exercise ingestion of a carbohydrate-electrolyte gel on cycling performance

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From International Society of Sports Nutrition: 8th Annual ISSN Conference and Expo
Las Vegas, NV, USA. 24-25 June 2011

Background

Exercise performance can benefit from pre-exercise ingestion of carbohydrate-electrolyte drinks. Carbohydrate-electrolyte gels may provide a convenient and effective energy source for subsequent exercise bouts, but supportive evidence needs to be provided. We examined the effect of pre-exercise ingestion of a commercial carbohydrate-electrolyte gel on cycling performance.

Methods

Following an overnight fast, healthy males (n = 12, age: 24 ± 7 yr, height: 181 ± 6 cm, body mass: 78.1 ± 9.4 kg, VO_{2max}: 47.6 ± 7.1 mL·kg^{-1}·min^{-1}, W_{max}: 316 ± 51 W) cycled steady state (40 min, SS1, 56 ± 4%W_{max}, SRM Ergometer) followed by a time trial (15 min, TT1,Wattbike cycle ergometer), a 2 hour passive recovery, and cycled steady state (20 min, SS2, power equal to SS1) followed by a time trial (15 min, TT2). Participants ingested either placebo (P, low-caloric gel, equal in flavour) or Maxifuel's Viper® Active Gel (V, 65 gram equal to one gel) (Maxinutrition Ltd, Hemel Hempstead, UK), 15 min pre-SS1 (+250 ml water), 0 hr post-TT1 (+750 ml water), 1 hr post-TT1 (+250 ml water), and 15 min pre-SS2 (+250 ml water). Maxifuel's Viper® Active Gel contains 22 g maltodextrin, 11.2 g sucrose, 1.5 g dextrose, 0.8 g fructose and 0.1g sodium per 100g). Experimental design was double-blind and randomized. Carbohydrate oxidation was calculated with stoichiometric equations from Jeukendrup & Wallis. Two-way ANOVA with post-hoc t-tests were used for analysis with significance accepted at $p < 0.05$.

Results

During SS1, heart rate, oxygen uptake, respiratory exchange ratio, rating of perceived exertion, plasma lactate and carbohydrate oxidation were not different between conditions. There was a trend for blood glucose (mmol·L^{-1}) with Viper during SS1 to be higher at 0 min (P: 4.26 ± 0.21, V: 6.36 ± 0.76) and 10 min (P: 3.89 ± 0.37, V: 4.98 ± 0.70), and lower at 20 min (P: 3.89 ± 0.47, V: 3.12 ± 0.69) and 30 min (P: 3.92 ± 0.45, V: 3.12 ± 0.69). During SS2, heart rate, oxygen uptake, rating of perceived exertion and plasma lactate were not different between conditions. Blood glucose (in mmol·L^{-1}) with Viper during SS2 was higher at 0 min (P: 3.80 ± 0.40, V: 5.33 ± 0.77) and 10 min (P: 3.56 ± 0.40, V: 4.10 ± 0.55). Respiratory exchange ratio was higher during SS2 for Viper at 5 min (P: 0.90 ± 0.09, V: 0.99 ± 0.08). Carbohydrate oxidation (g·min^{-1}) during SS2 was higher with Viper at 5 min (P: 2.11 ± 0.84, V: 2.97 ± 0.71). Cycling distance during TT1 and TT2 was 3.1% (P: 9467 ± 963 m, V: 9741 ± 817 m) and 3.4% (P: 9375 ± 943 m, V: 9667 ± 746 m) higher with the carbohydrate-electrolyte gel ingestion.

Conclusion

It is concluded that pre-exercise ingestion of a 65 gram commercial carbohydrate-electrolyte gel with multiple carbohydrates benefits cycling performance. In addition, the ingestion of the carbohydrate-electrolyte gel during recovery enhanced subsequent cycling performance. The consumption of commercial carbohydrate-electrolyte gels with different carbohydrates may be beneficial for athletes with multiple daily training sessions.

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Acknowledgements
Supplements were provided by Maxinutrition Ltd (Hertfordshire, UK). After study completion, funding for conference attendance was obtained from Maxinutrition Ltd (Hertfordshire, UK).

Published: 7 November 2011

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doi:10.1186/1550-2783-8-S1-P28
Cite this article as: Willams *et al.*: **Effects of pre-exercise ingestion of a carbohydrate-electrolyte gel on cycling performance.** *Journal of the International Society of Sports Nutrition* 2011 **8**(Suppl 1):P28.