The effect of carbohydrate mouth rinsing on fencing performance and cognitive function following a fatigue inducing simulated bout of fencing in national level foil fencers

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The ergogenic effect of carbohydrate (CHO) ingestion both pre and during endurance sport has been well documented (Shabort et al, 1999). Carter et al. (2004) were the first to have subsequently established a performance effect of CHO independent of blood glycogen levels signalling a potential key role of the central nervous system in mediating CHO absorption. In order to investigate this phenomenon they employed a protocol whereby participants rinsed a CHO solution in their mouth before spitting it out, which is currently referred to as carbohydrate mouth rinsing (CMR). CMR has subsequently been shown to improve high intensity exercise lasting between 30 and 60 minutes (Jeukendrup et al, 2013), however to date there exists no tests of CMR in relation to completion of an intermittent sports specific testing protocol. The present study sought to investigate the impact of CMR on cognitive and sports specific performance after a period of fatigue induced fencing. Twelve participants who were all regularly competing in national level fencing competitions and training a minimum of once per week volunteered to participate in the study (31.2±14.3 years; 81.4±16.5 kgs). On two separate occasions in a randomised cross over design, the participants undertook a standardised 10 minute sport specific warm up. The participants completed a Stroop and lunge test (measuring number of lunges and hits on target) pre and post execution of a previously validated fatigue inducing fencing protocol. During the fatiguing protocol the participants mouth rinsed between simulated fights 25ml of either a tasteless 6.7% maltodextrin solution (MALT) or 25ml of water (PLAC). Heart rate and perceived exertion (RPE) were measured throughout the fatiguing exercise protocol and blood lactate and glucose were measured pre and post exercise. A series of two-way repeated ANOVA's were conducted with the various cognitive and physiological outcomes serving as dependent measures. The results demonstrated no interaction between pre and post and trial for the number of lunges ($P>0.05$), however there was an interaction for lunge accuracy ($P<0.05$), with accuracy improving post fatiguing exercise in the MALT trial (Table 1). There was also a tendency for RPE to be lower during the MALT trial compared to the PLAC ($P=0.08$). In conclusion, this study provides evidence for a positive effect of CMR on accuracy in a sports specific task. The RPE data is in line with the hypothesised role that CMR plays in mediating central processing in the perception of exertion after fatiguing exercise. CMR may be a suitable alternative to ingestion of CHO pre and during competitive sports performance.

Table 1: Mean (±SD) lunge accuracy pre and post fatiguing exercise for both trials

| | Pre protocol (%) | Post protocol (%) |
|---|---|---|
| PLA | 82.1 (± 8.8) | 78.8 (± 6.4) |
| MALT | 81.2 (±8.3) | 87.6 (± 9.4) |

References:

Carter, J.M., Jeukendrup, A.E. & Jones, D. A. (2004). 'The effect of carbohydrate mouth rinse on 1-h cycle time trial performance'. *Medicine and Science in Sports and Exercise,* 36**,** pp. 2107-2111.

Jeukendrup, A.E., Rollo, I. & Carter, J.M. (2013). 'Carbohydrate mouth rinse: Performance effects and mechanisms.' *Sports Science Exchange,* 26(118), pp. 1-8.

Schabort, E.J., Bosch, A.N., Weltan, S.M. & Noakes, T.D. (1999) 'The effect of pre-exercise meal on time to fatigue during prolonged cycling exercise'. *Medicine and Science in Sports and Exercise,* 31, pp. 464-471.