An investigation of the effects of behaviour on voluntary fluid intake during prolonged high-intensity exercise in a field setting

SL Abbott[1], JR Brotherhood[2], SH Holt[1]

[1]Human Nutrition Unit, Dept of Biochemistry, University of Sydney, NSW, 2006
[2]School of Exercise and Sport Science, University of Sydney, NSW, 1825

The effects of carbohydrate (CHO) consumption and fluid replacement during prolonged endurance exercise are additive, with each improving performance independently (1). The ingestion of CHO at 1g/min and fluid at 0.5 to 1.0 L/hr has been recommended, in order to provide the fuel and fluid needed to enhance performance and prevent significant dehydration in the majority of athletes (2, 3).

This study examined the voluntary drinking behaviour of six well-trained male triathletes exercising at high intensities in the field, and aimed at assessing the applicability of laboratory-based dietary recommendations to 'real-life' settings. A 41.6 km cycle followed immediately by a 12.8 km run was completed on two occasions (D1 and D2), separated by five days. The exercise was completed at hard training pace, which was self-monitored.

Two experimental fluids were used: an 8% CHO-electrolyte sports drink and a placebo resembling the sports drink (nil electrolytes, minute CHO). Each subject had access to 1500 mL of fluid during the cycle, and 750 mL during the run. The subjects were free to drink at their own desire. Pre- and post-weight drink bottle differences indicated voluntary fluid intake. Sweat loss was assessed by fluid balance measurements. Performance time, heart rate, and environmental measurements were also recorded. Air temperatures averaged 19 °C and 10 °C for D1 and D2, respectively.

There was no significant difference in mean total performance time or mean total heart rate between D1 and D2 ($P>0.05$). Total, cycling, and running sweat loss were significantly different between test days ($P<0.05$). This can be attributed to the colder weather conditions on D2. Total fluid intake was significantly different between subjects ($P<0.05$), but no difference was seen in total, cycling, or running fluid intake between days or treatments ($P>0.05$). The combined total mean fluid intake was 0.582 ± 0.228 L (0.27 L/hr). Therefore, for an 8% solution predicted CHO ingestion would be 46.56 ± 18.22 g (0.36 g/min).

The study highlighted potential differences between laboratory and field research. Clearly, fluid intake and possible CHO ingestion fell well short of laboratory-based recommendations (2,3). The fluid intake results are remarkable considering the vastly different weather conditions and sweat losses, and indicate that fluid replacement is a behavioural response rather than being physiologically driven. The practicality of fluid and CHO intake protocols often used in laboratory studies, and their applicability to behaviour under 'real' conditions is questionable. This study was used as a pilot for field research, however the results have important implications both for further field and laboratory research, as well as for sports nutrition education.

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