TACSM Abstract

Controlled Cold Water and Water Slushy Ingestion, and Heat Performance in Subjects of Average Fitness

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ABSTRACT

Fluid ingestion is known to improve exercise performance and could lead to a heat sink effect, if cold enough. While research has been conducted on the influence of hydration in exercise performance, little has been done which consider beverages' temperature during controlled consumption. **PURPOSE**: To examine the effect of controlled consumption of water at different temperatures on heat performance in subjects of average fitness. **METHODS:** Fifteen males, ages 18-29, with no prior heat illness were recruited. Subjects were tested for body composition and peak oxygen consumption (VO_{2peak}) prior to testing. All subjects underwent three experimental trials [cold water (CD=4□C), water slushy (SL=-1□C), room temperature water (RM=22□C)] in a balanced crossover design. Subjects were required to exercise on a cycle ergometer at intensity 70% VO_{2peak} (vigorous exercise) in the heat (34.0±0.6□C, 41.7±2.7% RH, 3.6 km·hr·$^{-1}$ wind speed) until volitional maximum. Subjects were required to consume a controlled volume (2.5 g·$kg_{BodyMass}^{-1}$) of one of the treatments (CD, SL, RM) every 10 minutes each trial. Measurements for maximum exercise time (ExT), pre-/post-core body temperature change (ΔT_c), heart rate (HR), mean skin temperature (MT_{sk}), sweat rate (SR), and RPE were recorded. One-way (beverage) or two-way (beverage x time) ANOVA with repeated measures was used (α=0.05). **RESULTS:** ExT did not differ significantly between treatments (CD=33.8±9.4 min; SL=35.0±9.8 min; RM=31.5±8.6 min) but a trend (p=0.0680) was seen where SL&CD>RM, which was supported by all subjects having their longest bouts during CD (n=10) and SL (n=5) trials. Neither ΔT_c (CD=0.69±0.36˚C, SL=0.64±0.43˚C, RM=0.77±0.45˚C), or SR (CD=1545±1109 ml·hr^{-1}; SL=1837±692 ml·hr^{-1}; RM=1891±489 ml·hr^{-1}), differed (p>0.05) between treatments. A main effect for beverage was seen in HR (CD=157±16 bpm; SL=153±18 bpm; RM=160±17 bpm)(p<0.05) where SL<RM , but there was no significant differences in MT_{sk} or RPE (p>0.05). A main effect for time (p<0.05) was see in HR (T20=161±18 bpm>T10=153±16 bpm), MT_{sk} (T20=36.2±0.3˚C>T10=35.9±0.3˚C), and RPE (T20=5.8±2.1 (0-10)>T10=3.3±1.4 (0-10)). A trend towards significant beverage x time interaction was seen for HR (p=0.0900) but treatments did not respond differently over time for MT_{sk} or RPE (p>0.05). HR at volitional maximum differed between treatments (CD=168±20 bpm; SL=165±20 bpm; RM=173±20 bpm)(p<0.05), specifically SL<RM, but no differences were seen between MT_{sk} or RPE (p>0.05). **CONCLUSION:** SL appeared to improve performance over RM, but not CD. There may be a point where colder beverage temperature does not yield a greater heat sink effect or, results could have been due to shorter exercise time in subjects of average fitness.