Development of a hydration index: a randomized trial to assess the potential of different beverages to affect hydration status


Co-authors: Neil Walsh1, Ronald J Maughan2, Phillip Watson2, Philip AA Cordery2, Alberto Dolci1, Nidia Rodríguez Sanchez3, Stuart DR Galloway3.

1School of Sport, Health and Exercise Sciences. Bangor University. Wales. United Kingdom. 2School of Sport, Exercise and Health Sciences. Loughborough University. United Kingdom. 3School of Sport. University of Stirling. United Kingdom.

Background: The water content of ingested beverages enters the body water pool at a rate dictated by the rates of gastric emptying and intestinal absorption. Water is subsequently lost from the body by various routes, primarily urine in the absence of sweating. The post-ingestion diuretic response following prior hypohydration is influenced by several characteristics of the drink, including primarily volume, energy density, electrolyte content, and the presence of diuretic agents.

Objective: This study investigated the effects of 13 different commonly-consumed drinks on urine output and fluid balance when ingested in a euhydrated state, with a view to establishing a Hydration Index (HI; i.e. volume of urine produced after drinking expressed relative to a standard treatment [still water]).

Design: Each subject (n = 72, euhydrated and fasted males) ingested 1 L of still water or one of three other commercially-available beverages over a period of 30 minutes. Urine output was then collected for the subsequent 4 h. HI was corrected for water content of drinks and was calculated as the amount of water retained at 2 h after ingestion, relative to that observed following ingestion of still water.

Results: Total urine masses (mean (SD)) over 4 h were smaller than the still water control (1337(330) g) after oral rehydration solution (ORS, 1038(333) g, P=0.004), full-fat milk (1052(267) g, P=0.006) and skimmed milk (1049(334) g, P=0.005). Cumulative urine output at 4h after ingestion of cola, diet cola, tea, cold tea, coffee, lager, orange juice, sparkling water and a sports drink were not different from the response to water ingestion. The mean HI at 2 h was 1.53(0.74) for ORS, 1.32(0.51) for full-fat milk, and 1.44(0.54) for skimmed milk.

Conclusions: An HI may be a useful measure to identify the short-term hydration potential of different beverages when ingested in a euhydrated state.

Key words: fluid balance, dehydration, rehydration.

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