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

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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.