Effects of dose Timing on Fluid Excretion During Sodium-Aided Hyperhydration Protocols

SHELBY GREENE, ELIZAVETA ROSLANOVA, and DAVID M. MORIS

Kinesiology Lab; Department of Kinesiology; University of Texas – Permian Basin; Odessa, TX

Category: Undergraduate

Advisor / Mentor: Morris, David (morris_da@utpb.edu)

ABSTRACT

Co-consumption of sodium and water has been shown to be superior in promoting hyperhydration compared to consumption of an equal amount of water alone. Most sodium-aided hyperhydration studies have provided subjects with a bolus of fluid followed by a urine collection period. However the effect of providing equal amounts of fluid in a single vs. multiple doses over time on fluid retention has not been systematically studied. PURPOSE: To compare the effects of different dosing strategies on urine excretion levels following the consumption of consistent amounts of sodium and water. METHODS: Urine excretion was measured during five separate 2-hr hyperhydration protocols in 13 well hydrated male subjects (23 ± 3 yr, 176.1 ± 10.1 cm, 82.2 ± 19.4 kg) who were free from known renal, digestive, and cardiovascular disease. Each protocol began with a complete bladder void and assessment of urine specific gravity (USG). Subjects then consumed 20 mL H₂O · kg bm⁻¹ and 110 mg NaCl · kg bm⁻¹ in five different dosing strategies: the entire dose was consumed at the beginning of the period (1X), ½ of the dose was consumed at the beginning and ½ consumed after 60 min (2X), and ⅓ of the dose was consumed at the beginning and ⅓ was consumed after 45 and 90 min (3X), ¼ of the dose was consumed at the beginning and after 30, 60, and 90 min (4X), and 1/7 of the dose was consumed at the beginning and after 15, 30, 45, 60, 75, 90 min (7X). Protocols were administered in a randomized, crossover fashion. Total urine excretions (TUE) during the 2-hr collection periods were expressed as a percent of the H₂O consumed. USG and TUE were compared using repeated-measures ANOVA and Sidak post hoc analyses. RESULTS: USGs were 1.006 ± 0.004 (1X), 1.007 ± 0.003 (2X), 1.009 ± 0.005 (3X), 1.007 ± 0.004 (4X), and 1.007 ± 0.005 (7X) (P = 0.37 – 1.00) indicating that subjects were well and similarly hydrated for each trial. TUE expressed as a percentage of H₂O consumed were 75 ± 18% (1X), 69 ± 11% (2X), 52 ± 15% (3X), 59 ± 15% (4X), and 60 ± 16% (7X). Significant differences in TUE were seen between 1X and 3X (P = 0.03) and 2X and 3X (P = 0.006). No significant difference in TUE was detected between any of the other protocols (P = 0.16 – 1.00). CONCLUSION: The data suggest that hyperhydration is better achieved when water and sodium are consumed in three equal doses over 90 min when compared to consuming an equal amount of sodium and water dose in a single bolus or in two equal doses over a 60 min period. Consuming water in four or seven equal doses over 90 min did not result in better fluid retention than consuming an equal amount of water in a single bolus or in two equal doses over a 60 min period.