A RANDOMIZED TRIAL TO ASSESS BEVERAGE HYDRATION INDEX IN HEALTHY OLDER ADULTS

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ABSTRACT

Background: Beverage hydration index (BHI) is a composite measure of fluid balance after consuming a test beverage relative to water. BHI is a relatively new measure that has been explored in young, but not yet older, adults. Objective: This study investigated potential age differences in the effects of ingesting 4 different hydration beverages on urine output and fluid balance while euthydrated. We hypothesized that (1) older subjects would remain in positive fluid balance longer than young subjects after ingestion of each test beverage due to decreased urinary excretion rates, (2) glucose- and amino acid (AA)-based hydration beverages with sodium would have a BHI that water in both groups, and (3) the traditional 2-h post-ingestion BHI would be inappropriate for older adults. Design: On five separate visits, 12 young (23 ± yr, 70%F) and 12 older (71 ± yr, 58%F) subjects consumed 1 L of distilled water, G-20 (6% glu, 20 mmol/L Na+), G-45 (2.5% glu, 45 mmol/L Na+), AA-30 (B, 30 mmol/L Na+), or AA-60 (B, 60 mmol Na+). Water and urine samples were collected before ingestion and at 0, 60, 120, 180, and 240 min. Blood and urine samples were collected after ingestion and at 0, 60, 120, 180, and 240 min post-ingestion with additional venous blood sampling at 5, 10, 15, and 30 min post-ingestion. Results: In young subjects, BHI increased with increasing beverage Na+ concentration and AA-60 had the highest BHI (AA-60 = 1.24 ± 0.10 vs. water = 1.00, P = 0.01). For older subjects, AA-30 had the highest BHI (AA-30 = 1.20 ± 0.13 vs. water, P < 0.01) and was still in flux beyond 2 h. Conclusions: Beverage Na+ content progressively increased BHI in young adults independent of glucose or AA content. For older adults, the AA-30 beverage had the highest A4-h BHI may be more appropriate for older adults due to attenuated urine excretion rates.

METHODS

Figure 2. Beverage Hydration Index (BHI) for the four test beverages in young and older adults. The BHI for young subjects did not converge to that of distilled water, whereas the BHI for older subjects did by time-point C. Significant differences in BHI between water and each test beverage were found at timepoints A, B, and C. Values are means ± SEM.

RESULTS

Figure 3. Protocol schematic. Subjects were instructed to consume the test beverage 1 h before coming to the lab. After an overnight fast, subjects collected a morning urine sample (as shown in the first yellow triangle). The beverage was consumed 1 h before coming to the lab, and subjects voided (as shown in the second yellow triangle). The next morning urine sample was collected (as shown in the third yellow triangle). Blood samples were collected before ingestion and at 0, 60, 120, 180, and 240 min post-ingestion with additional venous blood sampling at 5, 10, 15, and 30 min post-ingestion. Results: In young subjects, BHI increased with increasing beverage Na+ concentration and AA-60 had the highest BHI (AA-60 = 1.24 ± 0.10 vs. water = 1.00, P = 0.01). For older subjects, AA-30 had the highest BHI (AA-30 = 1.20 ± 0.13 vs. water, P < 0.01) and was still in flux beyond 2 h. Conclusions: Beverage Na+ content progressively increased BHI in young adults independent of glucose or AA content. For older adults, the AA-30 beverage had the highest A4-h BHI may be more appropriate for older adults due to attenuated urine excretion rates.

CONCLUSIONS

- Time in positive fluid balance increased in O, compared to Y, due to lower eGFR.
- Time spent in positive fluid balance increased in both age groups with adding electrolytes.
- In Y, BHI tracked with increasing Na+ concentration. However, this is not true in O.
- 2 hour BHI was inadequate when studying older subjects. 4 hour BHI was more appropriate.
- Plasma volume increased more in Y in the first 15 minutes compared to O. Gradual increases in Na+ allowed for prolonged PV expansion in both Y and O.
- Adding Na+ expanded plasma volume more than water in both Y and O subjects.

REFERENCES


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