Effects of Caffeine Dose Timing on Total Urine Excretion during Sodium-Aided Hyperhydration Protocols

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ABSTRACT

When used alone, both caffeine and sodium-aided hyperhydration (SAH) can be ergogenic. Although caffeine use in conjunction with SAH promotes diuresis, hyperhydration can be achieved, albeit at lower levels compared to SAH alone. Previous caffeine and SAH work has suggested most of the caffeine induced diuresis occurs within 15 min of consumption of a bolus of caffeine, sodium and water. This response suggests that caffeine-induces diuresis for only 15 min following its consumption, and/or that the diuretic effects of caffeine are dependent on hydration levels. **PURPOSE:** To determine the effects of caffeine, consumed at different time-points, on diuresis during SAH protocols. **METHODS:** Subjects were 17 healthy males (23 ± 5 yr, 177 ± 8 cm, 83.4 ± 15.3 kg). Each performed 4, 90 min hyperhydration trials in a randomized, double-blind fashion. Protocols began with a bladder void and measurement of urine specific gravity (USG) followed by ingestion of 15 mL $H_2O \cdot$ kg bm^{-1} with one of four treatments: Placebo (PL), 70.5 mg NaCl $\cdot$ kg bm^{-1} (Na), or a combination of NaCl and caffeine consumed in two different strategies: 70.5 mg NaCl + 5 mg caffeine $\cdot$ kg bm^{-1} taken at the start of the trial (NaCaf0), or 70.5 mg NaCl $\cdot$ kg bm^{-1} taken at the start and 5 mg caffeine $\cdot$ kg bm^{-1} taken at 75 min of the trial (NaCaf75). After consuming the water, subjects rested for 90 min performing a measured bladder void every 15 min. Total urine excreted (TUE) was expressed as a percentage of the total fluid consumed during the hyperhydration protocols. USG and TUE were compared using one-way repeated measures ANOVA with Sidak post hoc analyses. Levels of significance were set *a priori* at $P < 0.05$. **RESULTS:** USGs were 1.007 ± 0.003 (PL), 1.008 ± 0.003 (Na), 1.007 ± 0.004 (NaCaf0), and 1.009 ± 0.004 (NaCaf75) ($P > 0.05$). TUE for PL ($87 \pm 30\%$) was significantly higher than all other protocols ($P < 0.05$). TUE for NaCaf0 ($73 \pm 16\%$) was significantly higher than Na ($56 \pm 18\%$, $P = 0.02$) and NaCaf75 ($52 \pm 13\%$ $P < 0.01$). NSD in TUE was observed between Na and NaCaf75. **CONCLUSION:** The results reaffirm that, when caffeine is consumed at the beginning of a SAH strategy, hyperhydration can be achieved, but at a lower level compared to SAH without caffeine. The results also suggest that waiting to consume caffeine until 75 min after water is consumed does not result in caffeine induced diuresis during a SAH protocol.