Consumption of a Caffeinated Soft Drink during Exercise in the Heat Worsens Dehydration

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Chronic dehydration is linked to kidney dysfunction in workers regularly exposed to hot environments. Sugar-rich beverages, such as soft drinks, are regularly consumed on work sites. Such hypertonic drinks decrease plasma and extracellular fluid volumes during rest. Consuming a soft drink-like beverage after resting heat exposure worsens dehydration in rats. It is unknown if drinking a caffeinated soft drink exacerbates dehydration during exercise in the heat. **PURPOSE**: Test the hypothesis that consuming a caffeinated soft drink during exercise in the heat increases the magnitude of dehydration. **METHODS**: Twelve healthy subjects (age: 24±5 y, 3 females) completed randomized soft drink (Mtn Dew, Soda) and water control (Water) trials. Subjects completed four 1 h work-rest cycles (45 min exercise, 15 min seated rest) in a 35°C, 65% RH environment. During rest, subjects drank 500 mL of the assigned rehydration beverage (~11°C). Physiological variables, and venous blood and urine samples were taken pre- (PRE), and post-exercise (POST) after 15 min supine rest in a moderate environment. Percent changes in plasma volume were estimated from changes in hemoglobin and hematocrit. Data are reported as a change from Pre (mean±SD). **RESULTS**: Increases in core temperature (Soda: 0.8±0.3, Water: 0.8±0.3°C, p=0.46) and changes in nude body weight (Soda: -0.3±0.8, Water: 0.0±0.7%, p=0.20) were not different between trials. Urine specific gravity was higher at POST (p<0.05), but there were no differences between trials (Soda: 0.006±0.013, Water: 0.007±0.009, p=0.89). At POST, plasma osmolality was elevated in Soda (2±3 mOsm/kg) and reduced in Water (-6±3 mOsm/kg, p<0.01). Urine osmolality was higher at POST (p<0.01), but there were no differences between trials (Soda: 69±368, Water: 185±311 mOsm/kg, p=0.12). Plasma volume was lower in Soda at POST (p<0.02), but there were no differences between trials (Soda: -2±7, Water: -2±7%, p=0.15). Elevations in heart rate were higher in Soda at POST (Soda: 20±12, Water: 12±12 bpm, p<0.03). Mean arterial pressure was elevated in Soda (p<0.01) at POST, but was not different between trials (Soda: 58±8, Water: 2±5 mmHg, p=0.33). **CONCLUSIONS**: These data indicate that consuming a caffeinated soft drink during exercise in the heat worsens dehydration and elevates cardiovascular strain.