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Blood Pressure Reactivity During Short-term Water Restriction in Older Adults

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Water restriction (WR) reduces plasma volume and concentrates blood electrolytes (e.g. sodium [Na⁺]), resulting in hyperosmolality. Animal models demonstrate an association between hyperosmolality and blood pressure (BP) dysregulation. In humans, BP dysregulation is associated with future cardiovascular disease risk. However, it is unknown if WR causes BP dysregulation in older adults, a population that frequently experiences dehydration in daily life. **PURPOSE:** Therefore, we tested the hypothesis that WR induces hyperosmolality and consequently augments BP reactivity in older adults. **METHODS:** Five older adults (4F/1M; age: 70±2 yrs; BMI: 24±1 kg/m²; BP: 122±6/79±3 mmHg) completed two hydration conditions in random order. A normal hydration (NH) and WR visit were separated by at least one week. Daily water intake for the NH condition was 23mL water/kg bodyweight/day for 3 days prior to testing. The WR condition included a stepwise reduction in water intake over 3 days followed by a 16hr WR prior to testing. Beat-to-beat BP was measured via finger photoplethysmography throughout a 10-min baseline, handgrip exercise (HG, 30% MVC, 2min), post-exercise ischemia (PEI, upper arm occlusion at 250mmHg, 3 min), and a cold pressor test (CPT, hand in ice-cold water, 2 min). Peak responses were calculated as the change in BP during the final minute of each perturbation compared to the respective baseline. **RESULTS:** Plasma volume, estimated by changes in hemoglobin and hematocrit, declined 4.6±2.4% following WR. Serum Na⁺ (140.7±1.0 vs. 142.3 ±1.0 mmol/L, p=0.01), plasma osmolality (296.6±1.9 vs. 300.6 ±2.0 mOsm/kg H₂O, p=0.04), and spot urine specific gravity (1.013±0.003 vs. 1.020±0.002, p=0.02) were higher for the WR condition, suggesting mild hypohydration. Mean BP responses were not different between conditions (HG: Δ11±6 vs. 12±2 mmHg, p=0.89; PEI: Δ18±5 vs. 11±3 mmHg, p=0.46; CPT: Δ22±2 vs. 17±2 mmHg, p=0.14; NH vs. WR for all). **CONCLUSION:** These preliminary findings suggest that short-term water restriction does not augment blood pressure responses during isometric handgrip exercise in older adults.

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