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The Effect of Salt Loading on Arterial Stiffness: Potential Role of Aerobic Capacity

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Dietary sodium intake is positively associated with arterial stiffness, and both are known risk factors for cardiovascular disease (CVD). High aerobic capacity is associated with lower arterial stiffness and reduced CVD risk. Therefore, we sought to examine the acute effect of high sodium intake on arterial stiffness and whether this effect is associated with aerobic capacity. **PURPOSE:** To test the hypotheses that (1) short-term salt loading (SL) would increase arterial stiffness and (2) aerobic capacity would be inversely related to the effect of SL on arterial stiffness. **METHODS:** Peak oxygen consumption (VO_2peak) was determined via a graded exercise test on a cycle ergometer in 26 healthy adults (14F/12M; 27±4yrs). Participants were studied twice, following 10 days of SL (10g of sodium chloride capsules) or placebo (PL) capsules, in random order. Participants were instructed to maintain their typical diet throughout the study. At each visit, carotid-femoral pulse wave velocity (cf-PWV) was determined via tonometry to provide an index of arterial stiffness and 24-hour urinary sodium excretion was assessed to confirm compliance. Mean arterial pressure (MAP) was measured via brachial sphygmomanometer to account for the influence of blood pressure on cf-PWV. Differences in urinary sodium excretion and cf-PWV across conditions were analyzed via paired sample t-tests. Pearson's correlations were performed to examine the effects of aerobic capacity and changes in MAP on cf-PWV during acute salt loading. **RESULTS:** VO_2peak ranged from 20.1 – 69.1 ml/kg/min (mean±SD: 37.2±11.7 ml/kg/min). Urinary sodium excretion was greater after SL compared to the PL condition (SL: 286±109; PL:165±73 mmol/24 hr., $p < 0.001$). Cf-PWV was not different between conditions (SL: 5.4±0.9; PL: 5.3±0.6 m/s; $p = 0.47$). The change in cf-PWV between conditions was not associated with VO_2peak ($r = -0.001$, $p = 0.996$). Notably, the change in cf-PWV was positively associated with the change in MAP between visits ($p = 0.05$). However, the association between VO_2peak and cf-PWV remained non-significant after controlling for the change in MAP, via partial correlation ($r = 0.062$, $p = 0.77$). **CONCLUSION:** Contrary to our hypothesis, increased sodium intake in healthy young adults did not increase arterial stiffness and aerobic capacity was not associated with the effect of increased sodium on arterial stiffness. **SIGNIFICANCE:** Our findings are notable as the influence of aerobic capacity on the effects of high sodium diets is not well studied. Although high aerobic capacity is cardioprotective and reduces arterial stiffness, we found that aerobic capacity did not impact the effect of acute salt loading on cf-PWV in young adults; however, this should be tested in older and clinical populations.

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