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Intermittent Hypoxia Decreases Carotid Artery Stiffness in Men But Not Women

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Sleep apnea (OSA) is linked to an increased risk for dementia. In healthy individuals, both acute and chronic exposure to low oxygen (hypoxic) air increases central aortic stiffness, increases carotid artery lumen size, and decreases carotid artery intima media thickness. In contrast, acute cyclic exposures to low oxygen (intermittent hypoxia, IH) increase blood flow and shear rate in the carotid artery, thereby increasing shear-mediated dilation. IH also causes cerebrovascular vasodilation, suggesting the cerebral vasculature and critical feed arteries are particularly sensitive to IH. However, data come from a primarily male cohort. Thus, the sex-specific effect of IH on carotid artery stiffness, carotid artery hemodynamics, and central aortic stiffness is unknown. **PURPOSE:** To evaluate carotid artery stiffness, carotid artery hemodynamics, and central aortic stiffness before and after IH in young men and women. **METHODS**: In a study of 18 young, healthy participants (10M/8F; 23 ± 5y)**,** carotid artery b-stiffness, arterial compliance (AC), forward wave energy (W1) and carotid-femoral pulse wave velocity (cfPWV) were measured before (BL) and 30 minutes (30P) after IH. IH consisted of 16 cycles of 25 seconds (s) of low oxygen air followed by 90s of room air for 30 minutes. **RESULTS:** Participants achieved an average nadir pulse oxygen saturation (SpO_2) of 92±3% during IH. There was no effect of sex or IH on AC (Women 0.99±0.22 vs 1.06±0.18mm^2/kPa; Men 1.05±0.30 vs 1.06±0.27mm^2/kPa; p>0.05). Further, cfPWV was unaffected by IH in either sex (Women 5.3±0.2 vs 5.6±0.4m/s; Men 5.7±0.5 vs 5.9±0.7m/s; p>0.05). Men exhibited higher W1 than women at 30P (BL: Women 6,571±1,081mmHg/m/s^3, Men 10,000±3,641mmHg/m/s^3; 30P: Women 6,057±1,597mmHg/m/s^3, Men 9,857±3,799mmHg/m/s^3; BL: p=0.06, 30P: p=0.004). Men (5.8±2.5 vs 4.5±1.1 mmHg/m/s^3, p=0.046), but not women (5.9±1.5 vs 4.8±0.8 mmHg/m/s^3, p>0.05), exhibited a significant decrease in carotid artery b-stiffness after IH. **CONCLUSION:** Whereas acute IH does not impact AC, cfPWV, or W1, we observed a reduction in b-stiffness following IH in men only, suggesting sex influences the relationship between IH and carotid artery stiffness. **SIGNIFICANCE/NOVELTY:** Acute IH is a novel, non-invasive technique capable of influencing cerebrovascular and carotid artery function, both of which are particularly sensitive to hypoxia and are deleteriously impacted by OSA. Further, both IH and OSA exhibit sex differences yet IH is largely conducted in primarily male cohorts. Thus, studying the impact of acute IH on carotid artery stiffness, carotid hemodynamics, or central aortic stiffness and the potential influence of sex on these relationships is critical.

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