Higher Central Augmentation Pressure/Index Is Associated with Tension-Type Headache but Not Migraine in Middle-Aged/Older Obese Humans

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Objectives: Obesity is associated with a five-fold increased risk of developing chronic daily headache, especially chronic migraine. Migraine attacks are more frequent and more severe among obese migraineurs and they improve with weight loss; however, the underlying mechanisms are unknown. Given that elevated aortic stiffness and central pulse pressure are associated with cerebral microvascular dysfunction/damage, we hypothesized that obese middle-aged/older adults with history of migraine would demonstrate higher aortic stiffness, central blood pressure (BP) and augmentation index (AI) /pressure (AP) compared with those without a history of migraine.

Methods: Middle-aged/older obese adults who were stratified (via detailed survey and physical exam by a neurologist) by presence of migraine (n=39; age 54 ± 8 yrs, BMI 38 ± 6 kg/m^2, 67% female), tension-type headache (n=25; age 57 ± 6 yrs, BMI 37 ± 4 kg/m^2, 72% female) or no headache of any type (n=29; age 54 ± 7 yrs, BMI 37± 5, 37± 5 kg/m^2, 48% female) had aortic stiffness (carotid-femoral pulse wave velocity, CFPWV), brachial and central BP, and central AI and AP assessed by applanation tonometry (SphygmoCor).

Results: Obese adults with tension-type headache, but not migraine (P=0.29), demonstrated higher AI (25.4 ± 9.6 vs. 17.8 ± 6.9%, P=0.02) and AP (11.7 ± 9.6 vs. 6.8 ± 6.9 mmHg, P=0.01) compared with no headache controls, but no difference in CFPWV between the 3 groups (P=0.47). After adjusting for age, mean BP, female sex, weight, height, and antihypertensive medication, higher AP (b=2.95, p=0.04) and AI (b=4.41, P=0.07) remained associated with greater frequency of tension-type headache.

Conclusions: Higher central AI and AP, but not aortic stiffness, is associated with tension-type headache but not migraine in obese middle-aged/older adults. Whether excessive penetration of pulsatile pressure into cerebral microcirculation contributes to the development of tension-type or migraine headache in obesity requires further study.