ABSTRACT

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

Grazi Kalil1,2, Ana Recober3, William G. Haynes2, M. Bridget Zimmerman5, Gary L. Pierce1,4

1Department of Health and Human Physiology, 2Department of Internal Medicine, Division of Endocrinology and Metabolism, 3Department of Neurology, 4Fraternal Order of Eagles Diabetes Research Center, Carver College of Medicine, 5Department of Biostatistics and Institute for Clinical and Translational Science, University of Iowa, Iowa City, IA, USA

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/m², 67% female), tension-type headache (n=25; age 57 ± 6 yrs, BMI 37 ± 4 kg/m², 72% female) or no headache of any type (n=29; age 54 ± 7 yrs, BMI 37± 5, 37± 5 kg/m², 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.