Arterial Hemodynamics in Overweight Young Adult Males Following Maximal Exercise

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Objective: Overweight (OV), defined by body mass index (BMI), is related to increased cardiovascular risk and greater aortic stiffening. In contrast, enhanced cardiorespiratory fitness (CRF) is associated with reduced cardiovascular risk, and lower aortic stiffness. It is unknown whether CRF is related to aortic stiffness in young OV adult males. We hypothesized CRF would be inversely associated with aortic stiffness, and the post-exercise hemodynamic response would be impaired in OV males.

Methods: Thirty-four apparently healthy, young adult males (22.12 ± 0.09 years) were categorized based on BMI as healthy weight (H, ≤24.9 kg/m2), or OV (24.9-29.9 kg/m2). Resting measures of arterial stiffness (carotid-femoral pulse wave velocity, cfPWV), heart rate (HR), blood pressure (BP), pulse pressure (PP), mean arterial pressure (MAP), percent body fat (BF%), waist (WC) and hip circumference (HC), and waist-to-hip ratio (W:H) were obtained. Peak oxygen consumption (VO2peak), a measure of CRF, was assessed with a maximal exercise treadmill test (EX). cfPWV and BP were obtained at 2, 5, 10, 20, 30, 45 and 60 minutes following EX.

Results: Compared with H at rest, OV had greater cfPWV, BMI, BF%, systolic BP (SBP), PP, MAP, WC, HC, and W:H ($p<0.05$, all). VO2peak was greater in H compared with OV ($p<0.05$). A positive association was observed between resting cfPWV and SBP, whereas cfPWV was inversely related to VO2peak ($p<0.05$, both). Compared with H, post EX MAP was increased in OV at 10, 20, 30, 45 and 60 minutes ($p<0.05$). A main effect of weight was observed for cfPWV, SBP and DBP, and a main effect of time for PP, SBP and DBP ($p<0.05$, all).

Conclusion: Increased resting aortic stiffness in young OV adult males is, in part, attributable to lower levels of CRF and increased SBP. In addition, post EX arterial hemodynamics is impaired in young adult OV males.

Figure 1. Peak Volume of Oxygen Consumption (VO_2) vs. carotid-Femoral Pulse Wave Velocity (cfPWV) (n=34).

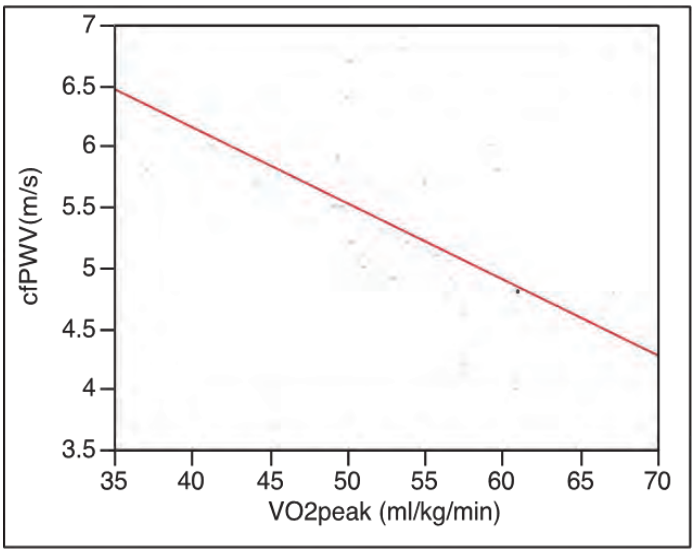
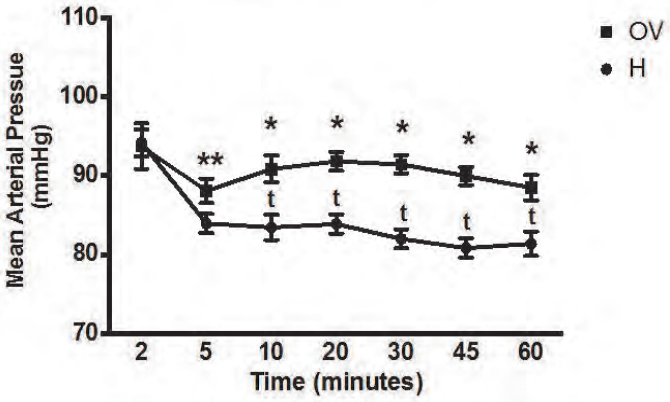


Figure 2. Post EX MAP



*** P< 0.05, H vs. OV at 10, 20, 30, 45, 60 minutes**
**** P<0.05, H and OV at 5 vs. 2 minutes**
t P<0.05, H at 10, 20, 30, 45, 60 vs. 2minutes