

Central Hemodynamics and Arterial Stiffness in Young Obese Adults: the Preliminary Finding

Bunsawat, K, Grigoriadis, G, Hilgenkamp, T, Fernhall B, and Baynard, T.

Integrative Physiology Laboratory. Department of Kinesiology and Nutrition, University of Illinois at Chicago, Chicago, IL, United States

Changes in central hemodynamics and arterial stiffness are associated with augmented cardiovascular risks and have been reported in obese adults with metabolic syndrome. It is unclear whether this observation may also be present in young healthy obese adults with normal metabolic profile. **Objectives:** To compare measures of central hemodynamics and arterial stiffness in young normal-weight vs. obese adults. **Methods:** There were 11 normal-weight (female=6; age 25±2 yrs; BMI 22.4±0.6 kg/m²) and 13 obese adults (female=6; age 27±1 yrs; BMI 32.7±0.6 kg/m²). Central hemodynamics were measured using SphygmoCor and wave separation analysis. Ultrasonography was used to measure carotid intima-media thickness (cIMT) and arterial stiffness (beta stiffness (β), elastic modulus (Ep), arterial compliance (AC)). Cardio-ankle vascular index (CAVI) was measured using VaSera and is another index reflecting the stiffness of the artery from the heart to ankles. Percent fat was determined using DEXA. **Results:** Obese adults exhibited higher percent body fat and cIMT than normal-weight adults (P<0.05), with no group differences in metabolic profile. No group differences were observed for brachial and aortic blood pressures, heart rate, arterial stiffness, and wave separation variables. **Conclusion:** The larger carotid intima-media thickness in young obese adults suggest early remodeling of the vasculature as a result of obesity. However, young obese adults with normal metabolic profile still exhibited comparable central hemodynamics and arterial stiffness as normal-weight adults, suggesting preserved vascular health despite initial carotid vascular remodeling.

Table 1. Comparisons of central hemodynamics and arterial stiffness in normal-weight and obese adults.

	Normal-Weight (n=11)	Obese (n=13)
Percent body fat (%) *	31.1±1.7	41.9±1.7
Total cholesterol	180±14	176±11
High density lipoprotein (mg/dL)	62±3	51±5
Low density lipoprotein (mg/dL)	103±14	110±12
Triglycerides (mg/dL)	100±19	85±11
Glucose (mg/dL)	96±4	98±5
Brachial SBP (mmHg)	109±1	109±3
Brachial DBP (mmHg)	70±2	73±2
Aortic SBP (mmHg)	93 ±3	96±3
Aortic DBP (mmHg)	65±2	69±2
HR (bpm)	62±2	58±3
cIMT (mm) *	0.37±0.01	0.44±0.02
CAVI	6.0±0.2	6.0±0.2
β-Stiffness	5.5±0.4	5.2±0.4
Ep (kPA)	66.3±5.3	62.8±5.3
AC (%)	1.02±0.07	1.20±0.09
AIx (%)	7±4	6±3
AIx@75 (%)	0±3	-2±3
AP (mmHg)	2±1	2±1
FPH (mmHg)	25±1	25±1
RPH (mmHg)	38±6	34±6
RI (%)	19±4	24±9

Data are mean±SE. BMI, body mass index; cIMT, carotid intima-media thickness; CAVI, cardio-ankle vascular index; β-stiffness, beta stiffness; Ep, elastic modulus; AC, arterial compliance; SBP, systolic blood pressure; DBP, diastolic blood pressure; MAP, mean arterial pressure; HR, heart rate; AIx, augmentation index; AIx@75, augmentation index normalized to heart rate of 75 bpm; FPH, forward pulse height; RPH, reflected pulse height; RI, reflection index. *significant group difference based on an independent *t*-test (P<0.05).