Higher Central And Brachial Systolic Blood Pressure Is Selectively Associated With Weaker Cognitive Performance In Postmenopausal Women But Not Older Men

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Introduction: Higher aortic stiffness and central blood pressure (BP) are associated with reduced cognitive performance in older adults. Cognitive performance tends to be higher in older women compared with older men, unexplained by differences in years of formal education and/or presence of atherosclerotic vascular disease (AVD). However, whether gender-related differences in cognitive function are explained by alterations in aortic stiffness or central blood pressure (BP) is unclear. We hypothesized that higher aortic stiffness and central systolic BP would be associated with weaker cognitive performance in middle-aged/older (MA/O) men but not postmenopausal women.

Methods/Results: A total of 135 MA/O men and postmenopausal women (age 55-85 yrs) were recruited. Brachial systolic BP was higher in men, however, there were no differences in aortic stiffness (carotid-femoral pulse wave velocity, cfPWV), central systolic BP or pulse pressure (PP) (Table 1). Women scored higher than men on the RBANS Total Scale Score and Delayed Memory Index (both $P<0.05$) (Table 1). In the entire cohort, higher central and brachial systolic BP were associated with weaker Stroop Color Naming ($r=-0.24$, $P<0.05$, $r=-0.25$, $P<0.05$) and Stroop Interference ($r=-0.30$, $P<0.01$, $r=-0.32$, $P<0.01$) performance. Interestingly, years of education was associated with RBANS Total Scale Score ($r=0.64$, $P<0.001$) and WRAT-3 Reading ($r=0.63$, $P<0.001$) scores in men but not women ($P>0.05$). Adjusting for age, AVD status, BMI, insulin, estrogen therapy and medications, higher Stroop Interference scores were associated with lower central systolic ($r=-0.52$, $P=0.001$), brachial systolic ($r=-0.50$, $P=0.001$) BPs and central PP ($r=-0.31$, $P=0.05$) in women but not men. Lower WRAT-3 Reading scores were associated with higher central ($r=-0.44$, $P<0.01$) and brachial PP ($r=-0.50$, $P<0.01$) in women only.

Conclusion: Higher central and brachial systolic BP and PP is selectively associated with weaker cognitive performance in postmenopausal women but not MA/O men independent of aortic stiffness and AVD.

Mean ± SE	Men (n=68)	Women (n=67)	*p-value*
Demographics:			
Age (yrs)	66.3 ± 1.0	68.3 ± 1.0	0.14
Atherosclerosis Vascular Disease, no. (%)	46 (67.6)	27 (40.3)	**0.001**
Education (yrs)	15.1 ± 0.3	14.3 ± 0.3	0.08
Body Mass Index (kg/m^2)	29.9 ± 0.7	28.7 ± 0.8	0.25
Total cholesterol (mg/dL)	145 ± 3.8	177 ± 4.4	**<0.001**
HDL cholesterol (mg/dL)	47.5 ± 1.6	57.3 ± 2.2	**<0.001**
Triglycerides (mg/dL)	100 ± 5.7	117 ± 8.0	0.09
Glucose (mg/dL)	109 ± 3.3	95 ± 2.8	**0.002**
Total insulin uU/mL	10.9 ± 1.2	8.9 ± 1.0	0.22
Statins, no. (%)	38 (55.9)	29 (43.3)	0.15
Anti-hypertensives, no. (%)	48 (70.6)	38 (56.7)	0.10
Aspirin, no. (%)	46 (67.6)	39 (58.2)	0.12
Estrogen therapy at baseline, no (%)	-	7 (10.4)	**<0.001**
Vascular:			
Brachial systolic blood pressure (mmHg)	140 ± 2.1	133 ± 2.4	**0.032**
Brachial diastolic blood pressure (mmHg)	78 ± 1.2	68 ±1.4	**<0.001**
Brachial pulse pressure (mmHg)	62 ± 2.4	65 ± 2.1	0.37
Mean arterial pressure (mmHg)	98 ± 1.1	89 ± 1.5	**<0.001**
Aortic systolic blood pressure (mmHg)	129 ± 2.2	125 ± 2.3	0.16
Aortic pulse pressure (mmHg)	51 ± 2	56 ± 2	0.13
cfPWV (m/sec)	10.5 ± 0.3	10.3 ± 0.24	0.54
Cognitive:			
Global Cognitive Function:			
RBANS Total Scale Score	98.6 ± 1.6	104.7 ± 1.5	**0.007**
WRAT-3 Reading Standard Score	103.6 ± 9.5	110.8 ± 4.1	0.09
Memory:			
RBANS Immediate Memory	96.6 ± 1.7	101.6 ± 1.9	0.06
RBANS Delayed Memory	99.3 ± 1.6	106.0 ± 1.4	**0.002**
Processing speed:			
Stroop Color Naming	67.0 ± 1.3	69.5 ± 1.8	
Stroop Word Reading	87.4 ± 1.7	91.1 ± 2.1	0.26
Executive function/working memory:			
Stroop Interference	33.1 ± 0.9	35.2 ± 0.9	0.11

Table 1; displays demographic, vascular rand cognitive performance data. All data are presented as mean ± SE. HDL, High density lipoprotein, cfPWV, carotid femoral pulse wave velocity; RBANS, Repeatable Battery for the Assessment of Neuropsychological Status; WRAT, Wide Range Achievement Test.