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The Association between Ambulatory Blood Pressure Monitoring, Cerebrovascular Pulsatility, and Cognitive Performance in Young Adults

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Ambulatory blood pressure monitoring (ABPM) is the gold standard for blood pressure (BP) assessment. In older adults, ambulatory pulse pressure (PP), mean arterial pressure (MAP), and BP dipping have been associated with altered cerebrovascular blood flow, increased cerebrovascular disease, and cognitive decline. As rates of hypertension increase in young adults, cerebrovascular pulsatility may damage neuronal tissues and accelerate cerebral aging. **PURPOSE:** Determine if ABPM is associated with middle cerebral artery (MCA) pulsatility and cognitive performance in a group of young adults. **METHODS:** 68 young adults (age: 21±4 yrs; body fat: 26.6±8.0%; *n* = 53 women) underwent 24-hr ABPM. BP was measured every 20 min during the day (0700 – 2200 hr) and every 30 min at night (2200 – 0700 hr). Following a 12-hr fast, transcranial Doppler of the MCA was used to measure pulsatility at rest and during 3 min of a cognitive stress (Stroop task). One-tailed Pearson correlations were run between PP, PP variability, MAP, BP dipping, BP variability ratio (BPVR = standard deviation of systolic/standard deviation of diastolic pressure), and the ambulatory arterial stiffness index (AASI = 1 – regression slope of systolic and diastolic BP) with MCA pulsatility and cognitive performance (Stroop task accuracy). **RESULTS:** There was a trend for systolic and diastolic nighttime dipping to be inversely associated with resting MCA pulsatility (r = -0.21, $p = 0.057$ and r = -0.20, $p = 0.059$, respectively). No other measures from ABPM displayed a relationship with resting MCA pulsatility. Significant associations were noted between MCA pulsatility during the cognitive stress task and average daily PP (r = 0.25, $p = 0.027$) and systolic dipping (r = -0.25, $p = 0.028$). Accuracy during the cognitive stress task was not associated with any measure of BP variability (PP, PP variability, or BPVR), MAP, or AASI ($p \geq 0.174$). **CONCLUSION:** These data suggest that nighttime BP dipping may be related to reduced cerebrovascular pulsatility at rest and that greater reductions in systolic BP during sleep may relate to MCA pulsatility during cognitive stress. Additionally, greater daily PP may be associated with increased MCA pulsatility during cognitive stress. ABPM is associated with cerebral pulsatility but not cognitive performance in healthy, young adults.

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