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Adolescence arterial stiffness precedes elevated blood pressure in young adulthood: The ALSPAC birth cohort

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Abstract

Background: In 2015, the American Heart Association's scientific statement on the importance of arterial stiffness recommended investigating the natural history of arterial stiffness and blood pressure (BP). However, prospective evidence among adolescence and young adults are limited.

Objective: To examine the temporal associations of carotid-femoral pulse wave velocity (cfPWV), a measure of arterial stiffness, with systolic and diastolic BP at 17.7 through 24.5 years.

Methods: We studied 3862 participants (56% females) from the Avon Longitudinal Study of Parents and Children, England, UK. cfPWV was measured by ultrasound, body composition by dual-energy Xray absorptiometry, and BP by Omron monitor. We conducted cross-lagged structural equation models and adjusted for baseline covariates such as age, sex, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglyceride, high sensitivity C-reactive protein, fasting blood glucose, fasting insulin concentration, heart rate, moderate to vigorous physical activity, smoking status, family history of cardiometabolic diseases, total fat mass, and lean mass. All variables were measured both at age 17.7 and 24.5 years.

Results: The prevalence of elevated systolic BP/hypertension (>120 mmHg) at 17.7 and 24.5 years was 26% and 33%, respectively. cfPWV at 17.7 years was directly associated with systolic BP at 24.5 years [Regression coefficient 12 mmHg (standard error 3.76); p=0.002], but systolic BP at 17.7 years was not associated with cfPWV at 24.5 years [0.00 (0.00); p=0.168]. Similarly, baseline cfPWV was directly associated with follow-up diastolic BP but not vice-versa.

Conclusion: Adolescence arterial stiffness appears to precede elevated systolic/diastolic BP in young adulthood.

Keywords: Hypertension, atherosclerosis, cardiovascular disease, early adulthood

Abbreviations: BP- Blood pressure; cfPWV- Carotid-femoral pulse wave velocity.

Funding and Conflicts of Interest

The authors have no conflict of interest.

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