Associations between daily steps, stepping cadence, and arterial stiffness in older adults

Leidys Gutiérrez-Martínez, Angelique G. Brellenthin, Duck-Chul Lee, FACSM

Iowa State University, Ames, IA.

Objective: Higher daily steps counts are associated with lower arterial stiffness (AS). Less is known about the effects of stepping cadence (steps/minutes) on this relationship. We examined the associations between objectively measured steps counts (SCo), stepping cadence (SCa), and AS among older adults.

Methods: This cross-sectional analysis included 394 older adults (mean age 72, 59% female) enrolled in the Physical Activity and Aging Study (PAAS). AS was derived from carotid-femoral pulse wave velocity (cfPWV) using the SphygmoCor device (AtCor). High AS was defined as cfPWV $\geq$10 m/s, an established risk factor of cardiovascular diseases. Average SCo and SCa over 7 days were measured with Omron accelerometer-based pedometers (HJ-321). Odds ratios (ORs) and 95% confidence intervals (CIs) for high AS were calculated among quintiles of daily SCo and SCa. Participants were dichotomized as fast/slow walkers (obtaining any steps at ≥60 steps/minute or not) or active/inactive (≥5,000 steps/day or not) for a joint analysis. Covariates were sex, age, body mass index, smoking, heavy alcohol intake, diabetes, hypertension, hyperlipidemia, medications, systolic blood pressure, and SCo or SCa in respective analyses.

Results: Participants walked 5,798 (SD=2,956) steps/day on average. There were 85 (22%) cases of high AS. Compared with the least active SCo quintile, the ORs (95% CIs) were 0.45 (0.19-1.07), 0.42 (0.17-1.03), 0.32 (0.12-0.87), and 0.51 (0.20-1.33) in quintiles 2, 3, 4, and 5 after adjusting for all covariates except SCa. There were no significant associations between SCo quintiles and AS after adjusting for SCa. Compared to the slowest SCa quintile, the ORs (95% CIs) for high AS were 0.29 (0.10-0.88), 0.31 (0.12-0.77), 0.58 (0.23-1.49), and 0.67 (0.21-2.09) after adjustment for covariates including SCo. In a joint analysis, compared to inactive and slow walkers, there were reduced odds of AS among fast walkers, regardless of whether they were inactive (0.35 [0.16-0.80]) or active (0.39 [0.18-0.81]), suggesting benefits of fast walking on AS regardless of daily SCo.

Conclusion: SCa (i.e., intensity of walking) rather than total daily SCo may be associated with reduced odds of high AS among older adults.