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Associations of Elevated Brachial-Ankle Pulse Wave Velocity and Short-Term Blood Pressure Variability with Incident Chronic Kidney Disease

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Objectives : While studies have demonstrated an association between arterial stiffness and prevalent chronic kidney disease (CKD), the relationship between incident CKD and arterial stiffness, particularly in conjunction with short-term blood pressure variability (BPV) — which may also be linked to incident CKD — has not been clearly defined. The objective of this study is to investigate the association between brachial-ankle pulse wave velocity (baPWV) and incident CKD in relation to short-term blood pressure variability.
Methods : A total of 1,363 patients with hypertension were enrolled from the prospective observational cohort of CMERC-HI (Cardiovascular and Metabolic Disease Etiology Research Center-High Risk). The patients were categorized into tertiles based on baPWV, classified as low, intermediate, high. BPV was evaluated through 24-h BP measurements; dipper (nighttime BP fall 10-20%), non-dipper (nighttime BP fall 0-10%), and reverse dipper (nighttime fall in BP <0%). The primary outcome was incident CKD, which was defined as decline in the estimated glomerular filtration rate to below 60.
Results : The mean age of study subjects was 60.5±11.2 years and 714 (52.4%) were male. The high baPWV group was associated with increased risk of reverse-dipping pattern (OR, 2.19; 95% CI, 1.05-4.70; P=0.04) compared to the low baPWV group. During a median follow-up of 4.8 years, incident CKD occurred in 325 (24.4%). In multivariable Cox analyses, high baPWV group was associated with increased risk of incident CKD (HR, 1.62; 95% CI, 1.09-2.41; P=0.02) after adjusting for confounding factors. The Kaplan-Meier analysis also showed statistically significant association between brachial-ankle PWV and incident CKD. Likewise, the Kaplan-Meier analysis also showed statistically significant association between non-dipping and reverse-dipping pattern and incident CKD.
Conclusions : The increased risk of incident CKD in patients with high brachial-ankle pulse wave velocity may be explained by an association with a reverse-dipping BP pattern.