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Increasing systolic blood pressure trend is associated with CKD development in subjects without hypertension: The results from the KoGES

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Objectives: A previous meta-analysis showed that systolic blood pressure (SBP) of 120-139 mmHg is a risk factor of chronic kidney disease (CKD). However, the association between temporal trend of SBP and kidney function in people without hypertension has not yet been extensively studied. In this study, we aimed to evaluate whether changes in SBP over time could impact on incident CKD in Korean healthy adults.

Methods: We analyzed a total of 5,029 participants from the Korean Genome and Epidemiology Study (KoGES), a prospective community-based cohort study. Key exclusion criteria were 1) prior hypertension, 2) SBP ≥ 140 mmHg at baseline, 3) less than 2 follow-up visits, and 4) missing data for BP. We identified three distinct SBP trajectories using latent mixed model; decreasing, stable, and increasing SBP. Primary outcome was the development of incident CKD, defined as estimated glomerular filtration rate (eGFR) $< 60 \text{ mL} \cdot \text{min}^{-1} \cdot 1.73 \text{ m}^{-2}$ and $\geq 30\%$ decline compared to baseline value.

Results: During 55,057 person-years of follow-up (median 11.7 years), incident CKD occurred in 553 (11.0%) participants. There were 133 (10.2%), 317 (10.3%), and 103 (15.8%) CKD events in decreasing, stable, and increasing SBP trajectories, respectively. In multivariable Cox analysis after adjustment of confounders, hazard ratio for incident CKD was 1.33 (confidence interval [CI], 1.04–1.71; $P=0.023$) in participants with increasing SBP trajectory compared with those with stable SBP trajectory. This association was consistent across subgroups by age, sex, presence of diabetes, and BMI (< 25 vs. $\geq 25 \text{ kg/m}^2$). There was interaction between baseline SBP (< 120 vs. ≥ 120 mmHg) and SBP trajectory pattern, participants in increasing SBP trajectory were higher risk for incident CKD compared to stable SBP trajectory participants in < 120 mmHg subgroup.

Conclusions: This study showed that even in prehypertension stage, increasing SBP trend was associated with increased risk of incident CKD in healthy adults with preserved renal function.