KSN 2019
Seoul, Korea · May 23 - 26

Abstract Type : Oral
Abstract Submission No. : OR-1301

Systolic Blood Pressure and Risk of Incident Chronic Kidney Disease: A Nationwide Cohort Study of Ten Million Adults in South Korea

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Objectives: In the general population, guidelines recommend a target blood pressure (BP) <120/80 mmHg in order to reduce cardiovascular risk. However, the optimal BP to prevent chronic kidney disease (CKD) is unknown. We examined the association between systolic BP (SBP) and incident CKD in healthy adults with normal kidney function.

Methods: We analyzed a total of 10.5 million adults with preserved renal function who participated in the National Health Insurance Service National Health Checkup Program between 2009 and 2015. The outcome of interest was incident CKD, defined as *de novo* development of eGFR <60 mL/min per 1.73m^2 or a ≥30% decline in eGFR for at least two consecutive measurements. We used marginal structural models (MSMs) to examine time-updated SBP and Cox models for baseline SBP.

Results: During 49,169,311 person-years of follow-up, incident CKD developed in 289,293 (2.76%) subjects with a crude event rate of 5.86 (95% CI, 5.84-5.88) per 1,000 person-years. Using MSMs, we found a graded association between incrementally higher time-updated SBP levels ≥130 mmHg and risk of incident CKD, whereas SBP levels <120 mmHg were associated with lower risk (reference: 120-129 mmHg): HRs (95% CIs) were 0.76 (0.75-0.77), 0.89 (0.88-0.90), 1.21 (1.20-1.22), and 1.59 (1.57-1.61) for SBP <110, 110-119, 130-139, and ≥140 mmHg, respectively. Using Cox models, the corresponding HRs for the noted SBP range were 0.89 (0.88-0.90), 0.93 (0.92-0.94), 1.06 (1.05-1.07), and 1.23 (1.22-1.25), respectively. Among subjects receiving antihypertensive medications, SBP of <110 mmHg was associated with higher risk of CKD: HR (95% CI) 1.06 (1.00-1.12).

Conclusions: In healthy people without kidney disease, higher SBP ≥130 mmHg was associated with higher risk of incident CKD. However, among those receiving antihypertensive therapy, low SBP <110 mmHg was also associated with incident CKD risk, suggesting that excessive BP control may contribute to adverse renal outcomes.