What is the optimal blood pressure level for kidney in the general population?

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Background/Introduction: Hypertension induces kidney dysfunction, and vice versa. Furthermore, kidney dysfunction can be a risk factor for cardiovascular diseases as well as end-stage of kidney disease. Although blood pressure (BP) control is necessary to prevent deterioration of kidney function, strict BP control may deteriorate kidney function.

Purpose: The present observational study investigated effects of BP levels on the incidence of chronic kidney disease (CKD) in the general population.

Methods: A total of 12,753 subjects with normal kidney function (estimated glomerular filtration rate [eGFR] $\geq$60 mL/min per 1.73 m^2) (male 7,707, mean age 51.8 years) who visited our hospital for an annual physical check-up from April 2010 to March 2018 were enrolled. After baseline examination, subjects were followed up until March 2019 (median 1769 days) with the endpoint being the development of CKD (eGFR<60 mL/min per 1.73 m^2). The modified MDRD formula for Japanese was used to calculate eGFR. Hypertension was defined as BP $\geq$140/90mmHg or the use of antihypertensive medication.

Results: During the follow-up period, 1,604 subjects developed CKD (26.9 per 1,000 person-years) with the incidence being more frequent in hypertensive (n=3,098) than normotensive (n=9,655) subjects at enrollment (44.2 vs. 21.5 per 1,000 person-years, respectively; hazard ratio [95% confidence interval] from multivariate Cox proportional analysis 1.205 [1.061–1.369]). Hazard ratio of systolic BP at baseline was 1.006 [1.002–1.010] in a multivariate Cox proportional hazard regression model adjusted for possible risk factors. The incidence was lower in subjects without hypertension throughout the follow-up period (normotension group, n=7,866) than those who were diagnosed as having hypertension at least once during the period (hypertension group, n=4,887) (23.1 vs. 32.3 per 1,000 person-years, $p<0.001$). In the normotension group, subjects with average BP <120/80mmHg had lower incidence of CKD than in those with BP $\geq$120/80mmHg (17.2 vs. 36.1 per 1,000 person-years, $p<0.001$). In contrast, in the hypertension group, the incidences of CKD in subjects with average BP <120/80, 120–139/80–89 and $\geq$140/90mmHg were 34.3, 25.8, and 54.4 per 1,000 person-years, respectively ($p<0.001$). Moreover, in hypertensive subjects under medication (n=2,002) with average BP <120/80, 120–139/80–89 and $\geq$140/90mmHg, the incidence of CKD was 65.5, 41.3, and 64.3 per 1,000 person-years, respectively ($p<0.01$).

Conclusions: The incidence of CKD was higher in hypertensive than in normotensive subjects. The lower BP was associated with the lower incidence of CKD in normotensive subjects, while strict BP control may increase the risk of CKD in hypertensive subjects.