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Onset of Diabetes And Hypertension And Risk of End-stage Kidney Disease in Nationwide Adult Cohort With Coexisting Diabetes And Hypertension

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Objectives : Diabetes and hypertension are well-known risk factors for chronic kidney disease(CKD) and end-stage kidney disease(ESKD). Diabetes and hypertension often coexist with possible bidirectional mechanisms. Prognostic difference between diabetes-preceding hypertension and vice versa is unknown. We aimed to evaluate whether diabetes onset before or after hypertension is differentially associated with ESKD risk.
Methods : We identified all adult patients with diabetes and hypertension who underwent a national health screening program provided by National Health Insurance Service(NHIS) between 2015 and 2016 in Korea. Patients were categorized into two groups per their order of onset of diabetes and hypertension: diabetes-preceding hypertension(termed "diabetes first") vs. diabetes-preceded by hypertension(termed "hypertension first"). Demographic and laboratory data were collected using NHIS database. COX proportional hazard analyses were performed for ESKD.
Results : Among 995,484 patients, 468,072(47%) and 527,412(53%) patients developed diabetes first and hypertension first, respectively. Incident rates for ESKD were 4.53 for diabetes first and 1.46 for hypertension first(1,000 person-years, log-rank P<0.001). Diabetes first was associated with a 3.10-fold(95% confidence interval[CI] 2.99–3.22) greater risk for EKSD in unadjusted analysis. After adjusting multiple covariates, including demographics, lifestyle, dyslipidemia, eGFR, blood pressure, blood glucose level, proteinuria, and each duration of diabetes and hypertension, an adjusted hazard ratio for ESKD was 1.55(95%CI 1.49–1.61) for diabetes first. Stratified analyses by glucose and blood pressure status revealed consistently increased risk in the diabetes first group. Subgroup analyses showed significant interactions with age, smoking, and CKD status(stronger risks in; younger patients, current smokers, non-CKD).
Conclusions : In patients with coexisting hypertension and diabetes, the order of onset of diabetes and hypertension has a prognostic role in predicting the risk for ESKD. Earlier onset of diabetes than hypertension possesses higher risk. Considering the order of onset of each condition could be a practical way to improve renally focused prognostication.