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Metabolically Healthy Obesity is Not Healthy and Associates with the Progression of Chronic Kidney Disease

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Objectives : Obesity and metabolic abnormalities are risk factors of chronic kidney disease (CKD). Recent studies have identified distinct metabolic phenotypes; metabolically healthy and unhealthy obesity. However, it is unknown whether clinical outcomes are affected by different metabolic status in patients with CKD.

Methods : Between 2011 and 2016, 2,238 participants were enrolled from The KoreaN Cohort Study for Outcome in Patients with Chronic Kidney Disease (KNOW-CKD) dataset. A total of 1,940 participants were included in the study after excluding 298 participants who had no data for body mass index (BMI). We used four clinical parameters to define metabolic status; fasting glucose > 125 mg/dL, triglyceride > 150 mg/dL, HDL ≤ 40 mg/dl in men (≤ 50 mg/dl in women), or high sensitivity C-reactive protein > 1 mg/L. Patients who had ≥ 2 parameters were considered to have 'metabolic abnormality'. Obesity was defined as BMI ≥ 25.0 kg/m2. All participants were categorized into four subtypes according to obesity and metabolic status: (1) metabolically healthy non-obesity (MHNO), (2) MHO, (3) metabolically abnormal non-obesity (MANO), and (4) metabolically abnormal obesity (MAO). Primary outcome was a composite of a 50% decline in estimated glomerular filtration rate or end stage renal disease.

Results : The prevalence of MHNO, MANO, MHO and MAO was 677(34.9%), 451 (23.2%), 286 (14.7%) and 526 (27.1%), respectively. During a mean follow-up period of 34.5 months, primary outcome occurred in 286 patients. In a multivariate Cox regression after adjustment of confounding factors, MAO was associated with a 1.7-fold increased risk of the primary outcome as compared to MHNO [hazard ratio (HR), 1.792; 95% confidence interval (CI), 1.15-2.77; P=0.009]. The risk of developing CKD progression was also higher in the MHO group than in the MHNO group (HR, 1.611; 95% CI, 1.08-2.39; P=0.018). When adiponectin levels were compared, the MAO group had the lowest adiponectin levels, followed by the MHO group (P<0.001). In addition, echocardiographic study showed that left ventricular mass index (LVMI) was

significantly higher in the MAO, MHO, and MANO groups than in the MHNO group.

Conclusions : Here, we show MAO is associated with adverse outcomes in patients with CKD. In addition, MHO has also higher risk of the progression of kidney disease. This can be partly explained by lower adiponectin levels and higher LVMI in these groups.

Keywords : Chronic kidney Disease, Metabolic Abnormal Obesity, Composite Outcome, Adiponectin