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Glomerular disease

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The association of visceral fat area with renal and cardiac function in a population with normal or mildly impaired renal function

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Background: Previous studies have shown that obesity is a risk factor for decrease in estimated glomerular filtration rate (eGFR), chronic kidney disease (CKD) and cardiovascular disease. However, there is limited data on the association of visceral fat area (VFA) with both renal and cardiac function. Our study was performed to determine whether VFA is associated with eGFR and echocardiographic parameters in subjects with normal to mildly impaired renal function.

Methods: This was a cross-sectional study of 1028 patients with eGFR \geq 60 ml/min/1.73m² at baseline, aged 40 - 64 years, and who underwent routine health check-ups including echocardiography and body composition analysis at Incheon St. Mary's Hospital from January 2012 to December 2014. Subjects were divided into tertiles based on their VFA: tertile 1 (n = 344 ; \leq 102.6 cm²), tertile 2 (n = 342 ; 102.6 - 127.1 cm²) and tertile 3 (n = 342 ; $>$ 127.1 cm²). We compared the baseline characteristics, laboratory measurements, brachial-ankle pulse wave velocity (baPWV), a measure of arterial stiffness, and echocardiographic parameters according to their VFA tertiles. The associations of VFA with eGFR and echocardiographic parameters were determined using multivariate linear regression analysis.

Results: Patients in the highest VFA tertile group were older, more likely to be male and hypertensive, and showed higher glucose, lipids, baPWV and homeostasis model assessment of insulin resistance (HOMA-IR) compared to the lower tertile groups. Patients in the highest VFA tertile group showed lower eGFR, and ratio of early to late mitral inflow peak velocities (E/A ratio) and higher left ventricular mass index (LVMI), relative wall thickness (RWT), left atrium diameter (LA diameter) and ratio of early mitral inflow velocity to peak mitral annulus velocity (E/E') compared to the other groups. VFA showed significant positive correlations with blood pressure, glucose, lipid levels, HOMA-IR, baPWV, LVMI, RWT, LA diameter and E/E' and showed significant negative correlations with eGFR and E/A ratio after age and sex-adjustment. In multivariate linear regression analysis, VFA was significantly negatively associated with eGFR and E/A ratio, while it was significantly

positively associated with LVMI, RWT, LA diameter, and E/E'. However, VFA was not associated with ejection fraction.

Conclusion: VFA was associated with renal and cardiac function, in terms of left ventricular hypertrophy and diastolic dysfunction, in middle-aged adults with normal or mildly impaired renal function. Measuring VFA may predict risks of future renal and cardiac diseases in this population.

Keywords: echocardiography, glomerular filtration rate, Obesity, visceral fat