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Visceral Abdominal Fat and the Risk of Progression to Chronic Kidney Disease

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Objectives: Visceral abdominal adipose tissue is closely associated with the increases prevalence of chronic kidney disease (CKD). We aimed to evaluate the impact of visceral and subcutaneous abdominal adipose tissue area measured by computed tomography (CT) on the risk of subsequent CKD development using longitudinal health examination follow-up cohort.

Methods: The study included 11,050 adult participants who underwent abdominal CT as part of a health check-up and re-evaluated the follow-up medical examination at a single university-affiliated healthcare center. Abdominal adipose tissue areas were measured at the level of the umbilicus using a 16-detector CT scanner, and the cross-sectional area was calculated using Rapidia 2.8 CT software. The primary outcome was progression to CKD, defined as estimated glomerular filtration rate (eGFR) less than 60 ml/min/1.73 m².

Results: During the mean of 5.6 follow-up years, 104 incident CKD cases were identified. Areas of visceral adipose tissue was significantly higher among progressors to CKD when compared with non-progressors (158.4 ± 52.3 vs. 117.0 ± 54.8 cm², $P < 0.001$). In the analysis of probability on CKD progression according to abdominal adiposity, increase of visceral adipose tissue was significantly associated with CKD progression (log-rank $P < 0.001$), however, subcutaneous adipose tissue was not (log-rank $P = 0.209$). In multivariable Cox analysis, hazard ratio for CKD progression is significantly increased in 3rd and 4th quartile ranges of visceral adipose tissue (HR 4.108 [1.327-12.716] and 7.183 [2.242-23.010], respectively). When we compared the diagnostic performance of various obesity indicator for CKD progression, AUC of visceral adipose tissue was 0.71 (0.67-0.76) and superior to body mass index or total abdominal adipose tissue area ($P < 0.001$).

Conclusions: Visceral adipose tissue measured by CT at routine health check-up among Asian population is significant risk factor for subsequent CKD progression.