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Elevated Serum Triglyceride to High-Density Lipoprotein Cholesterol Ratio is associated with an Increased Risk of Chronic Kidney Disease Development: A Nationwide Cohort Study

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Objectives : Elevated serum triglyceride to high-density lipoprotein cholesterol (TG/HDL-C) ratio has been reported to be a risk factor for cardiovascular disease and mortality in the general population. However, there is a lack of studies on the association between TG/HDL-C ratio and the development of chronic kidney disease (CKD).

Methods : We evaluated whether TG/HDL-C ratio is associated with incident CKD in a nationwide representative sample of 181,447 adults from the National Health Insurance Service National Health Checkup Cohort between 2009 and 2013. We selected individuals who had an estimated glomerular filtration rate (eGFR) of ≥60 mL/min per 1.73m2 and available TG/HDL-C data at baseline (cohort entry), and underwent at least ≥3 measurements of eGFR during follow-up period. TG/HDL-C ratios were categorized into quintiles; <1.28, 1.28 to <1.87, 1.87 to <2.64 (reference), 2.64 to <3.98, and ≥3.98. CKD was defined as de novo development in eGFR of < 60 mL/min per 1.73m2 for at least two consecutive measurements or a ≥30 % decline in eGFR from the baseline. All data that were repeatedly measured throughout the follow-up were incorporated as time-varying covariates in Cox proportional hazard regression models.

Results : During a median (inter-quartile range) follow-up of 3.9 (3.3-4.1) years, 4,776 (2.6%) individuals developed CKD with a crude rate of 7.2 (95% confidence intervals, 7.0-7.4) incident CKD per 1,000 patient-years. In a fully adjusted model that included age, gender, comorbidities, baseline eGFR, body mass index, systolic blood pressure, and laboratory parameters (total cholesterol, hemoglobin, and proteinuria), there was a graded linear association between TG/HDL-C ratio and risk of incident CKD. Hazard ratios (95% confidence intervals) from the lowest to highest quintiles were 0.90 (0.81-0.99), 0.97 (0.88-1.06), 1.10 (1.01-1.20), and 1.12 (1.02-1.22) in a baseline model. A time-varying model yielded similar results; HRs of the respective quintiles

were 0.90 (0.82–1.00), 1.00 (0.91–1.09), 1.12 (1.03–1.23), and 1.17 (1.07–1.28). In analyses using cubic spline models with TG/HDL-C ratio being treated as a continuous variable, similar trends were found.

Conclusions : In this large-scale nationwide cohort study, we found that an incremental increase in TG/HDL-C ratio was significantly associated with a higher risk of developing CKD. Our findings suggest that TG/HDL-C ratio can be useful for risk stratification of CKD.

Keywords : Triglyceride, high-density lipoprotein cholesterol, chronic kidney disease