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Income Persistence and Risk of Cardio-Cerebrovascular Disease and Mortality in Working-Age Adults with Chronic Kidney Disease: A Nationwide Cohort Study

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Objectives : Low socioeconomic status is associated with adverse cardiovascular outcomes in chronic kidney disease (CKD), but the impact of cumulative income exposure over time remains unclear. We evaluated the association between income persistence and risks of cardio-cerebrovascular diseases (CCVDs) and all-cause mortality in working-age adults with CKD.

Methods : Using the Korean National Health Insurance Service database, we identified 1,067,608 adults aged 30–64 years with CKD who underwent health screening between 2012 and 2017. Income persistence was assessed by calculating the cumulative number of years each participant was classified into the lowest (Q1) and highest (Q4) income quartiles during the five years preceding baseline, ranging from 0 to 5 years for each. Outcomes were incident CCVDs and all-cause mortality. Adjusted hazard ratios (aHRs) were estimated using Cox proportional hazards models controlling for demographic, lifestyle, and clinical factors.

Results : During a mean follow-up of 7.7 years, 47,078 CCVD events and 38,629 deaths occurred. Compared with individuals never classified in Q1, those with any Q1 exposure had higher risks of CCVDs and mortality (Figure). Elevated risks were evident even after one year of Q1 exposure (CCVDs: aHR 1.083, 95% CI 1.048–1.119) and remained increased with five years of exposure (aHR 1.124, 95% CI 1.072–1.178; P for trend <0.001). A similar graded pattern was observed for mortality (five years: aHR 1.252). In contrast, five years of Q4 exposure was associated with lower risks of CCVDs and mortality (aHR 0.766 and 0.637, respectively).

Conclusions : Cumulative exposure to low income is independently associated with elevated risks of CCVDs and mortality in working-age adults with CKD, whereas sustained high income shows



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protective associations. These findings highlight the importance of long-term socioeconomic context in CKD risk assessment.

figure_risk according income persistence.jpg

