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Greater Muscle Strength Is Associated with Lower Risk of Chronic Kidney Disease

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Objectives: Frailty is a known risk factor for chronic disease and mortality. However, the association between frailty assessed by hand grip strength (HGS) and chronic kidney disease (CKD) among adults has not been elucidated. This study evaluated the association between muscle strength and the risk of CKD.

Methods: Data were retrieved from a Korean National Health and Nutrition Examination Surveys (VI-VII) and participants aged 40 to 80 years were included in the analysis (n=14,855). HGS was measured using digital hand dynamometer and normalized to body mass index (BMI). Study endpoint was risk of CKD (eGFR <60 mL/min/1.73 m^2 or the presence of proteinuria).

Results: The mean levels of HGS per BMI were 1.5 ± 0.3 and 0.9 ± 0.2 in male and female subjects. Those in higher quartile of HGS per BMI showed lower prevalences of advanced CKD stages than lowest quartile among both male and female. When univariable logistic regression analysis for the risk of CKD was performed, higher quartile of HGS per BMI was associated with lower risk of CKD in both male and female. After adjustment for confounding factors, the higher quartile of HGS per BMI were associated with lower risk of CKD in both male and female (OR, 0.66; 95% CI, 0.49-0.88 in Q4; OR, 0.64; 95% CI 0.49-0.83 in Q3 in male; OR, 0.59; 95% CI, 0.43-0.81 in Q4; OR, 0.61; 95% CI, 0.47-0.80 in Q3; OR, 0.70;95% CI, 0.55-0.90 in Q2 in female, Q1 as reference group). These associations were consistent when the HGS per BMI was treated as continuous variable that 34% and 54% of risk was reduced as 1 m^2 increase in male and female.

Conclusions: Greater muscle strength normalized to BMI is associated with lower risk of CKD in adults. These findings suggest that frailty in adults is an important risk factor for CKD development.