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Prevalence and risk factors for chronic kidney disease in a population based sample of elderly

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Chronic kidney disease (CKD) is increasingly recognized as a global public health problem. Population-based studies about early stages of CKD remain few, and currently no data are available from Germany. The primary objective of the present study was to estimate the prevalence of CKD according to the standardized definition according to K/DOQI practice guideline, and to detect the potential determinants for CKD in an elderly population from Saarland, Germany. We were additionally interested in the performance of serum creatinine-based equation for GFR estimation including the MDRD equation and the CG/BSA equation, and the role of cystatin C in the assessment of kidney function among the elderly.

The present study was carried out using the baseline examination of a large-scale, population based cohort study among study subjects aged from 50 years to 75 years. Final data in this cross-sectional analysis was composed of 9806 subjects after excluding subjects with missing serum creatinine measurements. Comprehensive information on sociodemographic background, health related characteristics, lifestyles, physician diagnosed disease history and use of medication were obtained by self-administered questionnaire and from the physicians questionnaire.

Overall, the prevalence of CKD was 17.4% using the MDRD equation and 15.9% using the CG/BSA equation, increased with age, and peaked in the group aged 70-75 years with an overall prevalence of 23.9% using the MDRD equation and 31.9% using the CG/BSA equation. Notably 11.9% of subjects showed signs of kidney damage indicated as a urinary albumin concentration of ≥ 20 mg/L.

Prevalences of CKD by various covariates of interest were estimated by the MDRD equation and the CG/BSA equation, separately. In both equations for eGFR, subjects with CKD were more likely to be older, German citizens, less educated in school, with a history of starving during childhood, widowed, reported to have never smoked cigarettes and never drank alcohol, and less slight and sweaty physical activity than subjects without CKD, but the all differences did not achieve statistical significance.

The MDRD and the CG/BSA equations performed differently in GFR estimation, which resulted the different prevalences of CKD. Because the MDRD equation is becoming more acceptable in practice and is currently commonly used in the epidemiological studies, the present study used it as the estimating equation in the multivariate analysis to determine the association between the prevalence of CKD and risk factors. The multivariate analysis

determined age, gender, history of CVD, history of diabetes and statin usage as risk factors for CKD. Subjects in the 70-75 years age group increased odds of CKD by 79% (OR=1.79, 95% CI: 1.44-2.22), and male gender decreased the odds by 31% (OR=0.69, 95% CI: 0.60-0.78). CVD increased the odds of CKD by 17% (OR=1.17, 95% CI: 1.03-1.35), and treatment with statins increased the odds by 34% (OR=1.34, 95% CI: 1.10-1.65). Interestingly, subjects with a history of diabetes had low risk for CKD as compared to subjects without diabetes (OR= 0.78, 95% CI: 0.62-0.99), probably as a result of hyperfiltration, a condition present in the early stage of diabetic.

Additionally, the association between eGFR and cystatin C, C-reactive protein, glucose, HbA1c, total cholesterol and triglyceride, separately, were significant even after adjustment for other covariates. Coefficients for association between eGFR and cystatin C ($r = -0.28$), fasting glucose ($r=1.12$) and total cholesterol ($r=-0.32$) were higher than coefficients for other biomarkers. The Kappa test showed that a weak agreement between the creatinine-based equation and the cystatin C-based equation.

Our data indicated a complex profile of prevalence of CKD in study subjects, the different performance between the MDRD equation and the CG/BSA equation, and showed a considerable proportion of persons with laboratory evidence of kidney damage at normal and mildly decreased eGFR level. It highlights the association of eGFR with history of cardiovascular disease, blood lipid markers, and cardiovascular risk factors pointing to possible target in the early prevention of CKD. Some directions of association were inversely to the other studies, which might be due to nature of cross-sectional analysis. The cystatin-C based equation indicates a way to improve the accuracy of kidney function assessment in the elderly and subjects with diabetes and should be investigated in further studies.