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Relationships between BSA-adjusted total kidney volume and estimated glomerular filtration rate in pediatric chronic kidney disease: data from the KNOW-Ped CKD study

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Objectives: The purpose of this study was to investigate the relationship between the estimated glomerular filtration rate (eGFR) and the total kidney volume (TKV) adjusted for the body surface area through kidney ultrasound in pediatric chronic kidney disease (CKD) in Korea.

Methods: Among the subjects enrolled in the KoreaN cohort study for Outcome in patients With Pediatric Chronic Kidney Disease (KNOW-Ped CKD) cohort, 316 patients (240 were non-glomerulopathy, 76 were glomerulopathy) who underwent kidney ultrasonography were investigated for kidney lengths and widths on the longitudinal plane and the depth on the transverse plane. The formula to calculate the KTV was used with 0.523*length*width*depth and was corrected for the body surface area (BSA). The relationship between the TKV and the eGFR at the time of ultrasound measurement was analyzed in both univariate and multivariate analysis using spearman, partial correlation, and linear regression analysis. A survival analysis between the TKV and composite renal outcome (a 2-fold increase of serum creatinine or medical events of kidney replacement therapy) or end-stage kidney failure (ESKF) was performed using the Kaplan-Meier method and the log-rank statistics.

Results: The eGFR and BSA-adjusted TKV showed a significant correlation in pediatric CKD (overall (R^2=0.048, P<0.001), non-glomerulopathy (R^2=0.097, P<0.001), and glomerulopathy (R^2=0.088, P=0.009)) (Figure 1) and also valid in multivariate analysis. In multiple regression analysis, eGFR was the only significantly associated factor with TKV in the overall (R=0.046, P<0.001) and non-glomerulopathy (R=0.034, P=0.005). Kaplan-Meier analysis showed a significant difference in the composite renal outcome and ESKF according to BSA-adjusted TKV in the overall (P=0.026 and P=0.023, respectively) and non-glomerulopathy (P=0.003 and P<0.001, respectively (Figure 2)).