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Urine concentration ratio as an evidence of vasopressin activation is associated with renal progression in selective chronic kidney diseases: Analysis of KNOW-CKD study

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Objectives: In recent study, elevated urine osmolality was reported as a good prognosticator of renal survival. Because vasopressin activation is a target of treatment in autosomal dominant polycystic kidney disease (ADPKD), the finding was difficult to interpret.

Methods: Total 2,007 patients in KNOW-CKD cohort were analyzed. Baseline characteristics were used as prognosticator in the regression model. Urine concentration ratio was calculated as the random urine osmolality divided by plasma osmolality. For grouping, urine concentration ratio was divided by tertiles. Nonlinear modelling based on multivariable fractional polynomials were used to study the impact of urine concentration ratio to the renal survival.

Results: In high urine concentration ratio (HUC) group, mean age was younger (51.9 ± 12.8 vs 53.7 ± 12.3 yrs old, HUC vs. total population, $p < 0.001$) Female gender was less prevalent (34% vs. 39%, $p < 0.001$). Estimated glomerular filtration rate (eGFR) was higher in HUC group (73.6 ± 27.8 vs 52.4 ± 30.6 ml/min/1.73m², $p < 0.001$) Random urine osmole was higher in HUC group (665.0 ± 111.1 vs 484.8 ± 160.2 mOsm/L, $p < 0.001$) Urine concentration ratio had inverse relationship with FEurea (beta -7.920, 95% C.I. -8.862 - -6.979, $p < 0.001$), consistent with intrarenal urea recirculation in vasopressin activated situation. FEurea showed U-shape relationship with eGFR, which is consistent with the glomerular adaptation to reduced urea excretion. Although urine concentration ratio is associated with eGFR, elevated urine concentration ratio was associated with increased hazard ratio to end stage renal disease in either diabetic nephropathy or ADPKD subgroups. (exp(B) of multivariable adjusted fractional polynomial 2 degree; H.R. 0.279 (95% C.I. 0.046 - 1.707) and H.R. 4.899 (95% C.I. 1.503 - 15.973))

Conclusions: In diabetic nephropathy or ADPKD CKD population, elevated urinary concentration ratio was associated with increased hazard ratio of end stage renal disease. Urinary concentration ratio might be used as a prognosticator in this population.

Figure 1. Adjusted hazard ratio of urine concentration ratio among diverse chronic kidney disease subgroups.

