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Urine hydroxyproline as a marker of renal dysfunction in patients with chronic kidney disease

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Objectives:

Hydroxyproline (Hyp) is major component of the protein collagen in the tissues. Most of the Hyp released by the breakdown of collagen is degraded to free amino acid that circulates in plasma, is filtered, and is almost entirely reabsorbed by the kidney while some of the Hyp circulates in the peptide-bound form and are excreted in urine without further metabolism. This study was designed to examine whether the measurement of urinary Hyp could be useful for assessing renal function in the patients with chronic kidney disease (CKD).

Methods:

A total of 298 patients with various stages of non-dialytic CKD were included in this study. Values of total and free Hyp were measured from 24 hours urine and urinary free-to-total Hyp ratio was calculated to compare with known renal functional parameters.

Results:

Median levels of urinary free Hyp and total Hyp are 0.70 mg/day (IQR 0.30-2.10 mg/day) and 125.00 μ mol/day (IQR 80.00-196.00 μ mol/day), respectively. Univariate linear regression analysis showed that urinary free-to-total Hyp ratio was correlated with creatinine ($\beta=0.399$, $P<0.001$), estimated glomerular filtration rate (eGFR; $\beta=-0.213$, $P=0.001$), cystatin C ($\beta=0.338$, $P<0.001$), proteinuria ($\beta=0.181$, $P=0.004$) and fractional excretion of sodium ($\beta=0.141$, $P=0.023$). Results of multiple linear regression analysis showed that beta-coefficient of eGFR was -0.155 ($P=0.084$) for urinary free Hyp, 0.134 ($P=0.091$) for urinary total Hyp and -0.172 ($P=0.042$) for urinary free-to-total Hyp ratio, even after controlling for covariates, including age, gender and proteinuria.

Conclusions:

Our results suggest that urinary free-to-total Hyp ratio would be used as a novel endogenous marker of renal dysfunction.