

A Study of Correlation Between Protein-bound Uremic Toxins and Renal function in patients with Chronic Kidney Disease

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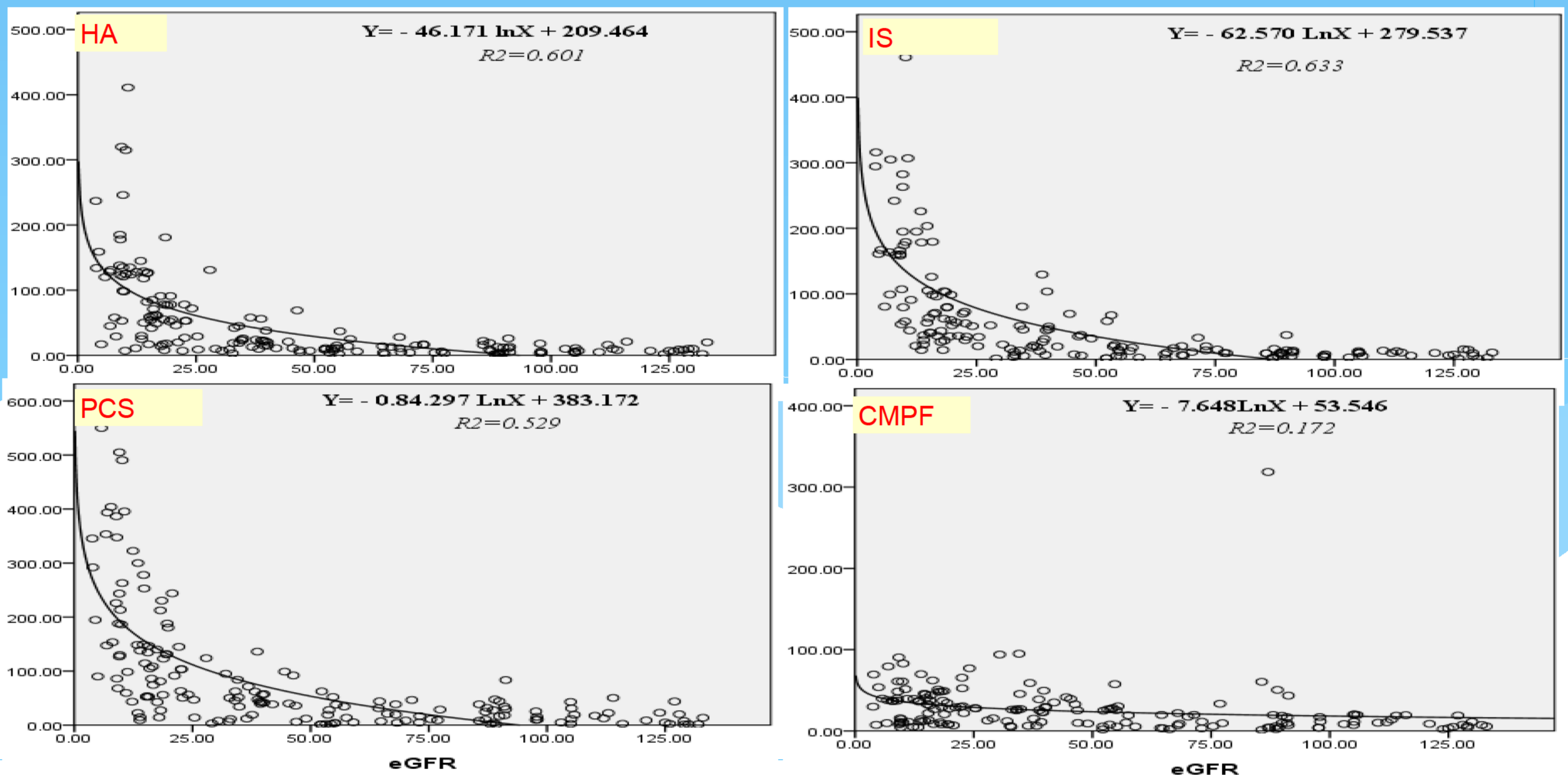
Background/Aim To investigate the serum concentrations of the protein-bound uremic toxins of hippuric acid (HA), indoxyl sulfate (IS), p-cresyl sulfate (PCS), 3-carboxy-4-methyl-5-propyl-2-furanpropionic acid (CMPF) in patients with chronic kidney disease (CKD) 3-5 stages. This study was to assess the correlation between renal function and protein-bound uremic toxin concentrations with CKD 3-5 stages patients.

Methods Serum concentrations of HA, IS, PCS, and CMPF from 60 healthy volunteers and 112 CKD patients which divided into CKD3-5 stage were measured by liquid chromatography-mass spectrometry/mass spectrometry (HPLC-MS/MS). And give some related analysis in the level of HA, IS, PCS and CMPF with eGFR.

Results Compared with healthy subjects, serum concentrations of these four solutes were significantly increased in CKD3-5 stages patients (all $P < 0.01$). The serum levels of HA, IS and PCS in CKD3-5 stages were significantly increased (all $P < 0.05$), in contrast, CMPF was no significant change ($P > 0.05$). Linear correlation analysis showed that HA, IS, PCS and CMPF was significantly negative correlation between eGFR. Curve regression analysis showed that the curvilinear regression fitting equation of HA and eGFR is $Y = -46.171 \ln X + 209.464$ ($R^2 = 0.601, P < 0.01$), curvilinear regression fitting equation of IS and eGFR is $Y = -62.570 \ln X + 279.537$ ($R^2 = 0.633, P < 0.01$), curvilinear regression fitting equation of PCS and eGFR is $Y = -84.297 \ln X + 383.172$ ($R^2 = 0.529, P < 0.01$), curvilinear regression fitting equation of CMPF and eGFR is $Y = -7.648 \ln X + 53.546$ ($R^2 = 0.172, P < 0.01$).

Conclusion The levels of the 4 kinds of protein-bound toxins in CKD3-5 stages patients increased significantly compared to healthy subjects. The serum level of HA, IS and PCS were increased when the renal function decreased, but the level of CMPF was little change. Renal dysfunction can lead to elevated the levels of HA, IS, PCS in CKD3-5 stages patients significantly, but little effect on the CMPF.

Curvilinear regression analysing between the uremic retention solute concentrations and the eGFR .



HA, hippuric acid; IS, indoxyl sulfate; PCS, p-cresyl sulfate; CMPF: 3-carboxy-4-methyl-5-propyl-2-furanpropionic acid

