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Assessment of urinary netrin-1 as a marker for progression of acute kidney injury in critically ill patients: Prospective cohort study

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Introduction: The incidence of AKI ranges from 20-60% in critically ill patients, in whom it is associated with adverse outcomes including increased length of ICU and hospital stay, development of CKD and increased short- and long-term mortality risk. Recently, several candidate biomarkers of AKI have been identified including netrin-1 which has been shown to be excreted in urine as early as 1 h after injury and reach a dramatic 30-40 fold increase by 3 h and a peak by 6 h after the insult.

Objective: This study aimed to identify risk factors for progression of AKI in critically ill adult patients in the medical ICU in Alexandria Main University Hospitals and to assess urinary netrin-1 as a marker for progression of AKI.

Design & Methodology: The study included 80 AKI patients who were followed during their ICU stay for primary outcome (progression to severe AKI; KDIGO stage 2 or 3) and secondary outcomes (need for RRT, ICU mortality, length of ICU stay and SCr at the time of discharge from the ICU). All participants were subjected to history taking, full clinical examination and laboratory investigations. Urine samples were collected from all patients at the time of ICU admission and urinary netrin-1 was measured.

Results: Almost one third (33.75%) of the study patients were identified as progressors. Progression was significantly more common among patients with history of CKD ($p<0.001$), hypotensive patients ($p=0.002$), septic patients ($p=0.041$), those who needed RRT ($p<0.001$) and those who died ($p=0.003$). Progressors had lower MBP and serum albumin level ($p=0.007$, 0.008, respectively). They had higher APACHE II score and longer ICU stay ($p=0.037$, 0.020, respectively). They also had higher basal blood urea, basal SCr. SCr levels at the time of presentation and discharge ($p<0.001$ for all). Urinary netrin-1 levels were not significantly different in progressors and non-progressors, those who needed RRT and those who did not, and in survivors and non-survivors. Results of the multivariate analysis revealed that CVD, hypotension and higher basal blood urea level were independent risk factors for AKI progression.

Conclusions: The results of this study suggest that history of CKD, hypotension and sepsis are associated with progression of AKI in critically ill patients and that urinary netrin-1 has a poor sensitivity and a poor specificity as a predictor of AKI progression, the need for RRT and ICU mortality.

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