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Serum NGAL in critically ill children in ICU, single center in Egypt

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Introduction: Unfortunately, the mortality and morbidity associated with AKI remain unacceptably high (up to 80% mortality in critically ill children and adults with multiple organ dysfunction syndrome, or MODS). While this dismal prognosis is partly attributable to other co-morbid conditions, recent studies have revealed that AKI may be an independent risk factor for mortality in both critically ill children. The aim of the present work was to assess serum levels of NGAL in critically ill children affected by (AKI) and to evaluate its clinical significance in diagnosis as well as assessment of disease severity in comparison with other markers as serum creatinine and urea ratio in critically ill children.

Subjects and Methods: This study had been carried out in the Clinical pathology department and intensive care Unit of pediatric medicine department, Faculty of medicine, Zagazig University hospital in period from (2010-2011). This study included (75) subjects that include (15) healthy volunteers as a control and (60) critically ill children. They were classified in to two groups: Group I: This group comprised (15) apparently healthy volunteers. Their ages ranged between (1-29) weeks with the median age of 6 weeks. Routine investigations as liver function, kidney function and complete blood count were done to confirm their healthy state. Group II: This group comprised (60) children who were admitted at intensive care Unit of pediatric medicine department, Faculty of medicine, Zagazig University. Their ages ranged between (1-108) weeks with the median age of 9 weeks, serum creatinine was measured in the first day of admission, then another sample was measured in the 3rd day of admission to the PICU. This group of patients are further sub divided according to rifle criteria in to two other categories: Group A: patients who developed AKI (AKI) Group B: patients who didn't developed AKI (NAKI). Then the patients who developed AKI are further divided to other two groups according to the severity (dialysis dependence) as follow: AKI with dialysis(AKI+D),AKI with out dialysis(AKI-D) All studied subjects included in this study were subjected to the following: Full history taking: Including family history of underlying kidney disease, Complete clinical examination, Routine laboratory investigations including, Specific laboratory investigations including: Serum neutrophil gelatinase-associated lipocalin assay.

Results: There was significant correlation between serum NGAL, urea, creatinine at 0 day (1st day of admission) and 3rd day ($p < 0.05$). There was significant increase in the level of NGAL among patients group when compared with control group ($P = 0.01$). There was positive correlation between serum NGAL at 0 day and urea, creatinine at 0 day ($r = 0.47, p < 0.001$); 21.7% of children's admitted to PICU develop AKI from which 8.3% need dialysis. There was no statistical significant difference between 3 groups (NAKI, AKI-D, AKI+D) as regarding NGAL at admission and urea at 3rd day ($p > 0.05$), while there was statistical significant increase as regarding NGAL at 3rd day, urea at admission ($p < 0.05$), creatinine at admission and at 3rd day ($p < 0.001$). The receiver operating characteristic curve of NGAL at 0 day revealed AUC of 0.63 with 95% CI of 0.50-0.77. At a cutoff value of 89.5 ng/ml, the sensitivity of NGAL was 84.6%, while specificity was 59.6%, positive predictive value was 36.7%, negative predictive value was 68.4% and accuracy was 93.3% in diagnosis of AKI.

Conclusion: In conclusion, serum NGAL is a highly sensitive predictor of acute kidney injury (AKI) in critically ill children with septic shock. The ability of biomarkers, such as NGAL to discern both the onset and resolution of AKI will further validate their use in the clinical setting and greatly enhance our understanding of AKI in the pediatric population.