ABSTRACT

TITLE OF THE STUDY   : A Study on Urinary Neutrophil Gelatinase Associated Lipocalin (NGAL) and Clinical Profile of Patients with Acute Kidney Injury (AKI) in Medical ICU

DEPARTMENT   : Nephrology

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INTRODUCTION: Acute Kidney Injury occurs in 30 -50 % of patients in ICU .AKI in ICU represents a significant risk factor for morbidity and can be associated with mortality greater than 50%.An understanding of factors affecting renal recovery might improve overall outcome.

AIMS AND OBJECTIVES: To study the clinical profile and outcome at 7 days of incident and prevalent Acute Kidney Injury (AKI) patients in a Medical ICU at a tertiary care centre. Also to study the utility of urinary Neutrophil Gelatinase associated Lipocalin in predicting the severity and outcome of acute kidney injury.

MATERIAL AND METHODS : One hundred and two consecutive patients who had AKI at the time of ICU admission or who developed AKI during ICU stay were recruited in the study over a period of 6 months. Urine sample for NGAL and FeNa was collected in selected patients at the time of recruitment.Patients were followed up daily for next 7 days with daily record of their Clinico-Biochemical parameters and SOFA score.

RESULTS: The study population (n=103) consisted of 69 (67%) males and 34 (33%) females with a Male: Female ratio of 2: 1. The mean population age was 48.2 ± 16.4 years .Mean age in both the sexes was similar being 48.6 ± 16.5 for females and 48.0 ± 16.5 for males. At inclusion 38 patients (37 %) were in AKIN 1, 31 (30%) in AKIN 2 and 34 (33%) patients were already in AKIN 3. Urinary NGAL (UNGAL) values were significantly different between AKIN stage 1 and AKIN stage 2 (P= 0.024) and highly significant on comparing AKIN 1 and AKIN 3 (P=0.001) but not between AKIN2 and AKIN3.Sepsis (58.3%) followed by drugs (17.5%), Pigment nephropathy due to hemolysis/rhabdomyolysis (15.5%),Scrub Typhus (15.5%), Cardio-renal syndrome (11.7%) and snake envenomenation (5.8%) were the important causes of AKI.

Urinary NGAL levels were significantly lower in the group who recovered renal function by day 7, being 1797.6 ±2589.4 ng/ml as compared to 4180.1 ± 4775.4 ng/ml in those who did not recover (P=0.037). Urinary NGAL significantly predicted renal outcome at day 7 with an area under ROC curve of 0.713.In multivariate analysis Diabetes Mellitus, SOFA score at day 2 and absence of pre-existing CKD significantly predicted renal outcome. Twenty nine patients (28.2%) required hemodialytic support within 7 days of inclusion. Urinary NGAL was a good predictor of RRT requirement in ICU patients with AKI with an area under the ROC curve of 0.71.

Excluding 2 DAMA patients 34 (34%) out of the remaining 101 patients expired within next 7 days of follow up. Urinary NGAL was also found to be significantly associated with mortality with area under the ROC curve of 0.81. In a Logistic regression model

SOFA score at day 2 was the most powerful independent predictor of mortality (P = 0.006), followed by pH at presentation (p=0.015) and SOFA score at day 1 (P=0.026) .Although urinary NGAL was significantly associated with mortality in univariate analysis ,in multivariate model it had a borderline significance in prediction of mortality (P= 0.078).

CONCLUSIONS: Sepsis is the most common cause of AKI followed by drug induced AKI in medical ICU. Recovery from AKI at day 3 was 25% while 52% of surviving patients recovered fully by day 7. Diabetes, SOFA score at day 2 and normal baseline renal function significantly predicted renal recovery at day 7. 28.2% patients required renal replacement therapy within 7 days of diagnosis of AKI. Urinary NGAL levels significantly predicted renal outcome , requirement of RRT and mortality in 7 days of follow up. Overall mortality at day 7 was 34% with SOFA at day 1 and 2 , pH at admission and Urinary NGAL significantly predicting mortality.