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OUTCOME AND CLINICO-ETIOLOGICAL PROFILE OF PATIENTS WITH ACUTE KIDNEY INJURY REQUIRING DIALYSIS

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ABSTRACT **Background:** Despite advances in critical care nephrology, the outcome of acute kidney injury (AKI) among hospitalized patient is poor in developing countries. Data on the outcome of hemodialysis requiring AKI is limited from India. We studied the epidemiology, clinical profile and outcome of haemodialysis requiring AKI in a tertiary care centre from South India. **Methods:** This is a prospective observational study among patients aged above 12 years admitted with dialysis requiring AKI . Diagnosis and staging of AKI was done based on KDIGO AKI guidelines. Patients were dialyzed if they had any of the following indications.-1.Refractory metabolic acidosis 2.Refractory hyperkalemia 3.Uremic encephalopathy 4.Uremic Pericarditis 5.Refractory pulmonary edema 6.Anuric renal failure irrespective of duration of AKI .Our primary objective was to study the outcome at the end of 3 months of follow up and the risk factors association with poor outcome. Outcome was assessed as mortality percentage, recovery (defined as normalization of serum creatinine/ improvement in eGFR to more than 60 ml/min/1.73 m2) percentage and CKD (defined as eGFR <60 ml/min/1.73 m2) percentage. **Results:** The mean age of 100 patients included in our study was 45 ± 20 years, and there was a male preponderance (n =63, 63 %). The most common co morbidities were diabetes mellitus (n= 32, 32 %) and hypertension (n=28, 28 %).The stage of AKI at the time of admission was, AKI stage 1(n= 2,2%),AKI stage 2 (n=18,18%) and AKI stage (n=80,80%) .The mean serum creatinine was 5.14 ± 2.2 mg/dl on admission. The mean number of dialysis sessions given was (9.75±5.8) .The most common aetiologies for dialysis requiring AKI were acute diarrheal disease (n= 43,43%) ,urinary tract system (n=14,14%) and burns (n=9%). At the end of 3 months of follow up, 63% (n=63) of patients had recovery,24%(n=24) expired and 13%)(n=13) had CKD. Male sex (p=0.018), elderly age 61yrs-70yrs(p=0.014) , stage 2 (18%) (p=0.043)stage 3 AKI (80%) at the time of admission(p=0.013), low serum albumin (<3.5 gm/dl) at the time of admission(p=0.00001), were the risk factors significantly associated with mortality. Low serum albumin (< 3.5 gm/dl (p=0.00014), and stage 3 AKI at the time of admission (p=0.04), were the risk factors significantly high among those who progressed to CKD. **Conclusion:** Our study highlights that dialysis requiring AKI is associated with high mortality and high risk of CKD/ESRD, reinforcing the importance of long term follow up of these patients. Also since majority of the patients in our study had preventable causes of AKI, it is of prime importance, to focus on the prevention of AKI to reduce the CKD burden.

KEYWORDS : Acute kidney injury, Hemodialysis, Chronic kidney disease, Serum albumin

INTRODUCTION-

Multiple etiologies contribute to acute kidney injury (AKI), which is largely preventable and may be reversible if detected and treated early. Significant adverse effects frequently result from failing to recognize and treat in a timely and/or adequate manner. It causes a serious morbidity and irreversible kidney function loss. Significantly high, short- and long-term mortality is linked to all stages of AKI. AKI-related kidney damage, however, can be partially or completely reversed with early detection and treatment.. The incidence can range from 1% to 31%, according to the literature that is currently available. In light of the foregoing, this study was conducted in a tertiary care facility to explore the aetiology and clinical characteristics of individuals with AKI and its outcome.

MATERIALS AND METHOD

This is a Prospective observational study of 100 patients with acute kidney injury requiring HD the study included patients admitted with acute kidney injury aged above 12yrs requiring HD and excluded patients with pre-existing chronic kidney disease, newly detected chronic kidney disease and transplant. This study was done over a period of one year with a minimal follow up of 3 months.

Aim

- To study adverse renal outcome

1. Progression to CKD

- Secondary objective

2. To study the etiological profile of AKI patients requiring HD
3. To compare serum albumin with patient mortality

Blood sample was collected at baseline for renal function tests and at discharge, along with urine sample for albuminuria and culture. Abdomen ultrasound was done to look for kidney size and echogenicity .Relevant imaging was done based on aetiology.AKI staging was done based on KDIGO guidelines. Staging was assessed at admission and at discharge. Patients were dialyzed as per standard indications.HD was started using temporary IJV or femoral vein as site for catheter insertion .Renal biopsy was done if patient fails to recover after 2 weeks of kidney injury. Those patients who survived S. Creatinine was followed after 3 months. Outcome was assessed as mortality percentage, recovery (defined as normalization of serum creatinine/ improvement in eGFR to more than 60 ml/min/1.73 m2) percentage and CKD (defined as eGFR <60 ml/min/1.73 m2) percentage at the end of 3 months. Statistical significance was considered at a $P < 0.05$. The data was entered and analyzed by using SPSS software

RESULTS –

Table-1

DIAGNOSIS	Frequency	Percent
BURNS	9	9.0
CA OROPHARYNX	1	1.0
HEART FAILURE	3	3.0
CONTRAST INDUCED NEPHROPATHY	3	3.0
DRUG INDUED AKI	1	1.0
DIABETIC KETOACIDOSIS	3	3.0
ACUTE DIARRHOEAL DISEASE	43	43.0
TROPICAL DISEASE RELATED	5	5.0
SEPSIS /MODS	7	7.0
RHABDOMYOLYSIS /NECROTIZING FASCITIS	7	7.0
POISONING(PARAQUAT)	2	2.0

PREGNANCY AKI	2	2.0
URINARY TRACT SYSTEM	14	14.0
Total	100	100.0

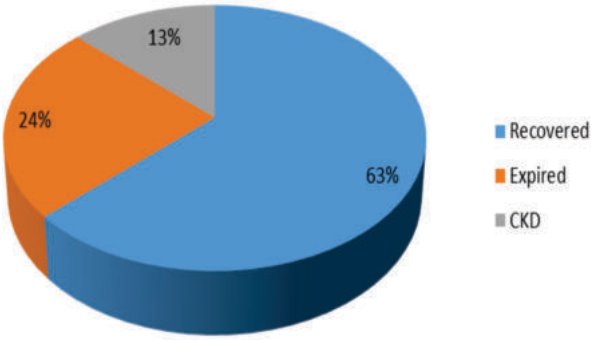

Chart -1

Table-2

Parameters	Outcome		P-value
	Survived (N)	Expired (N)	
Male sex	43	20	0.018
Age(61yrs-70yrs)	7	7	0.014
Stage 2 AKI	8	9	0.04
Stage 3 AKI	53	15	0.013

Table-3

Albumin	Recovered	Expired	Total
<3.5	20	16	36
>3.5	49	2	51
Total	69	18	87(Grand total)

P value-0.00001

The mean age of 100 patients included in our study was 45 ± 20 years, and there was a male preponderance (n =63, 63 %).The most common co morbidities were diabetes mellitus (n= 32, 32 %) and hypertension (n=28, 28 %). the percentage of AKI stage 1(n= 2,2%),AKI stage 2 (n=18,18%) and AKI stage 3 (n=80,80%) at admission. .The mean serum creatinine was 5.14 ± 2.2 on admission and mean no .of dialysis sessions were (9.75±5.8) .The most common aetiologies for dialysis requiring AKI were acute diarrheal disease (n= 43,43%) ,urinary tract system (n=14,14%) and burns (n=9%) (**Table-1).** At the end of 3 months of follow up, 63% (n=63) of patients had recovery,24%(n=24) expired and 13%)(n=13) had progressed to CKD(**Chart-1**).Male sex (p=0.018),(**Table-2)** elderly age 61yrs-70yrs(p=0.014) , stage 2 (18%) (p=0.043)stage 3 AKI (80%) at the time of admission(p=0.013) (**Table-2**)and Low serum albumin at the time of admission(p=0.00001), were the risk factors significantly associated with mortality. (**Table-3)**

Low serum albumin of less than 3.5 gm/dl (p=0.00014), and stage 3 AKI at the time of admission (p=0.04), were the risk factors significantly high among those who progressed to CKD.

Biopsy was done in 16%(n=16) of the patients who had unresolving AKI and most common biopsy findings was Acute tubular injury 43.75%(n=7), Glomerular disease 25% (n=4) Acute pyelonephritis 18.75%(n=3) and Myoglobin pigment nephropathy12.5% (n=2).

DISCUSSION

Studies have shown that AKI occurs frequently among hospitalized patients and contributes significantly to increased morbidity and mortality, prolonged hospital stay, and healthcare costs including increased needs for critical care [1]. Understanding the proximate causes of AKI and potentially modifiable aetiologies continues to be the focus of research [2]. Our study showed that acute kidney injury requiring hemodialysis (AKI-D) primarily affected elderly (median age 50+ years), a finding that is similar to reports from Western countries where the most frequently affected people are the elderly [3]. On the other hand, studies from other sub-Saharan African countries unlike our findings, show that AKI impacts younger individuals with mean age of occurrence of AKI being 37 and 44 years in Uganda and South Africa, respectively [4, 5]. Males preponderance were more than females in our study, as has been observed in other study done in similar geographical area[6].

The etiology of AKI was multifactorial. The most common aetiologies for dialysis requiring AKI were acute diarrheal disease (n= 43,43%) ,urinary tract system (n=14,14%) and burns (n=9%). Inadequate, delayed restoration of diarrheal losses and late referral to higher centers resulted in diarrheal disease as a major cause of AKI. A significant number of burns are also noticed due to our hospital serving as a referral facility for burns cases. In contrast to study done at a tertiary hospital in India were sepsis was the most common etiology of AKI [7]. Our explanation for why diarrheal disease was the most common cause was owing to an outbreak of contagious diarrheal disease amid the local community's floods at the time. On classification of AKI as per the KDIGO criteria, (2%) were in Stage 1, whereas 18% and 80% were in Stage 2 and Stage 3, respectively. These results are inconsistent with results from a large retrospective cohort study from seven American ICUs enrolling 14,524 patients with AKI which showed that AKI Stage 1 was the most frequent (38.5%) followed by AKI Stage 2 (14.1%) and AKI Stage 3 (4.3%)[8].As regard outcome of patients, we found that 63% patients had complete recovery, 13% progressed to CKD and 24% succumbed .Progression to CKD was more compared to the study done in same geographical area where 5.5% AKI patients developed CKD at the end of 90 days [6]. In the present study, the in-hospital mortality was 24%. A previous Indian study from the state of Uttar Pradesh has shown the overall in-hospital mortality in AKI as 26.2%[9].Male sex,older age group and higher Stage of AKI at admission were the risk factors significantly associated with mortality higher mortality rate in patients and was similar to the Austrian study [10]. The current study found that associated comorbidities in our patients presented with AKI were as following: 32% were diabetic, 28% were hypertensive. These comorbidities directly contributed to patient morbidity and mortality. Need for hemodialysis was significantly associated with increased mortality as well as progression to CKD. Evidence suggest serum albumin has a protective role in kidney. Reno protective action of albumin is mediated by its capabilities for scavenging reactive oxygen species, preventing oxidative damage, and binding and delivering protective lysophosphatidic acid [11]. Low serum albumin at the time of admission (p=0.00001) and Low serum albumin of less than 3.5 gm/dl (p=0.00014) were the risk factors significantly associated with mortality and progressed to CKD respectively. Similar finding was noted in the meta-analysis which provided evidence that hypoalbuminemia was an independent predictor both of AKI and of death after AKI development [12].

CONCLUSION –

Our study highlights that dialysis requiring AKI is associated with high mortality and high risk for progression to CKD .Also hypoalbuminemia as an independent marker for AKI and death Post AKI development .It is of prime importance to focus on the prevention of AKI to reduce the CKD burden as majority of our patients in study had preventable and easily reversible cause of a AKI which was acute diarrheal disease.

Conflict Of Interest-None.

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