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General Medicine

"STUDY ON CLINICAL PROFILE AND OUTCOME IN CRITICALLY ILL PATIENTS WITH RENAL IMPAIRMENT IN A TERTIARY CARE CENTRE".

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ABSTRACT

BACKGROUND: Acute kidney injury (AKI) is a common clinical problem in intensive care unit (ICU) patients and independently predicts poor outcome and is one of the major cause of in-hospital mortality rates globally. The current study was conducted to study the etiological profile, severity and management of acute kidney injury.

Methods: The study was a prospective study, conducted in the department of General medicine, ASRAM Medical College during the period of November 2016 to November 2018. The study population included all the patients admitted to Intensive Care Unit (ICU) and having AKI. All the study participants were recruited to the study by convenient sampling. Descriptive analysis was carried out by frequency and proportion for categorical variables.

RESULTS: A total of 179 subjects were included. Participants were almost uniformly distributed in each of a decadal age group till above 60 years. Males (60.3%) were slightly higher than females (39.7%). Oliguria was present in 72.62% of the study population. The most common etiology were Sepsis, Acute diarrheal disease. Diabetes Mellitus was the major co morbidity associated with AKI. As per KDIGO criteria Stage 1 constitutes 46%, where as Stage 2,3 contributes to 32% and 22% respectively. Almost all the patients in stage 1 AKI were managed conservatively, most of the patients with Stage 2 were treated with Renal replacement therapy(RRT). All the patients in Stage 3 were treated with RRT. Mortality is more among patients with KDIGO stage 2,3.

CONCLUSIONS: Acute kidney Injury (AKI) can be a consequence of varied aetiologies and all the age groups and both the genders at risk of developing it. KDIGO criteria can be a useful tool in guiding the management and predicting the prognosis. Meticulous efforts to reduce AKI should be undertaken particularly in critically ill patients.

KEYWORDS : Renal impairment, Acute Kidney injury, Critically ill.

INTRODUCTION

Acute kidney injury (AKI) is an abrupt and usually reversible decline in the glomerular filtration rate (GFR). This results in an elevation of serum blood urea nitrogen (BUN), creatinine, and other metabolic waste products that are normally excreted by the kidney.

The definition for AKI used in clinical and epidemiologic studies is based on specific criteria that have been sequentially developed. The Kidney Disease: Improving Global Outcomes (KDIGO) definition and staging system is the most recent and preferred definition [1].

The first case report of fatal AKI is accredited to Hackradh, a German pathologist in 1917 and was based on soldiers who sustained severe traumatic injuries. The concept of AKI in a previously normal kidney was better understood during and after the Second World War. In 1941, Bywaters and Beall described crush injury syndrome in a victim from London [2]. Subsequent studies showed acute, potentially reversible failure of renal function with histological features of Acute Tubular Necrosis (ATN), and also due to other causes such as mismatched blood transfusion, abortion, cardiovascular collapse, sepsis and a variety of nephrotoxic substances.

Overall incidence of AKI is 200 cases /million. AKI complicates approximately 5-7% of hospital admissions and up to 30% of admission to ICU[3]. Retention of nitrogenous waste products, oliguria (urine output- 400ml/d) contributing to extra cellular fluid overload and electrolyte and acid base abnormality are frequent clinical features.

For the purpose of diagnosis and management, AKI has been divided into

Three categories:

1. Disease characterized by renal hypo perfusion in which integrity of renal Parenchyma is preserved (Pre-renal);
2. Diseases involving renal parenchyma tissue (Intra-renal);
3. Diseases involving acute obstruction of urinary tract (Post-renal).

AKI is often considered to be reversible, although a return to baseline serum creatinine concentration post injury might not be always possible. We should emphasize to detect clinically significant irreversible damage that may ultimately contribute to chronic kidney disease and AKI has a significant in-hospital morbidity and mortality, the latter in the range of 30-60 % depending on the clinical setting and presence or absence of non renal organ dysfunction.[4]

We used KDIGO criteria to diagnose and classify patients. [5]

STAGING CRITERIA — Using the Kidney Disease: Improving Global Outcomes (KDIGO) criteria, AKI is staged as follows:

- Stage 1 – Increase in serum creatinine to 1.5 to 1.9 times baseline, **or** increase in serum creatinine by ≥0.3 mg/dL (≥26.5 micromol/L), **or** reduction in urine output to <0.5 mL/kg/hour for 6 to 12 hours.
- Stage 2 – Increase in serum creatinine to 2.0 to 2.9 times baseline, **or** reduction in urine output to <0.5 mL/kg/hour for ≥12 hours.
- Stage 3 – Increase in serum creatinine to 3.0 times baseline, **or** increase in serum creatinine to ≥4.0 mg/dL (≥353.6 micromol/L), **or** reduction in urine output to <0.3 mL/kg/hour for ≥24 hours, **or** anuria for ≥12 hours, **or** the initiation of renal replacement therapy, **or**, in patients <18 years, decrease in estimated glomerular filtration rate (eGFR) to <35 mL/min/1.73 m^2.

AIMS AND OBJECTIVES

- Analysis of the clinical spectrum of AKI patients in ICU;
- Identify the cause, risk and prognostic factors for AKI;
- Analysis of the final outcome of the patients with AKI.

METHODOLOGY:

Current study is a prospective analytical study done at Medical intensive care unit(MICU) in Department of General Medicine during the period of November 2016 to November 2018 in a tertiary care centre (ASRAM Medical college), Eluru. Total 784 patients were admitted in MICU during this 2 year period. Out of them 179 cases had AKI. These cases were studied.

INCLUSION CRITERIA:

1. Age above 16 years.
2. patients admitted in Intensive care unit.
3. Increase in serum creatinine by ≥0.3 mg/dL (≥26.5 micromol/L) within 48 hours, or
4. Increase in serum creatinine to ≥1.5 times baseline, which is known or presumed to have occurred within the prior seven days, or Urine volume <0.5 mL/kg/hour for six hours

EXCLUSION CRITERIA:

1. Age below 16 years.
2. Patients with CKD.
3. Patients with abnormal kidney size and abnormal cortico medullary differentiation.

A thorough diagnostic evaluation was done by a detailed history, physical examination, urinary analysis, CBC, RFT, Renal USG.
In appropriate patients, serology of leptospirosis, enteric fever, peripheral smear for MP/MF, other related investigations were done.
The patients were started on appropriate therapy once the diagnosis was made. Wherever possible the etiological factors were treated.
RRT was given according to the clinical and biochemical indications.
Ethical committee approval obtained.

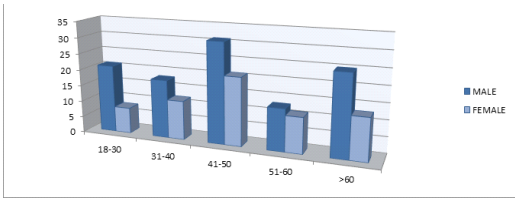
RESULTS

During two years period out of 784 patients who were admitted in Medical Intensive Care unit 179 patients developed some form of renal impairment in the form of AKI.

These patients were evaluated in detail, clinical profile ,etiology , treatment , outcome were derived.

A.AGE AND SEX DISTRIBUTION

AGE GROUP	MALE	FEMALE	TOTAL
18-30	21	8	29
31-40	18	12	30
41-50	31	21	52
51-60	13	11	24
>60	25	13	38
	108	71	179



Out of 179 patients 108 were male, 71 were female, contributing to 60.3% and 39.7% respectively. Youngest patient of our study is 18 year old male, oldest being 85 year female. Peak incidence was noted in fourth decade about 31.12%. Male outnumbered female in every age group in our study.

B.PRESENTING FEATURES

AKI	MALE	FEMALE	TOTAL	PERCENTAGE
OLIGURIC	83	47	130	72.62%
NON OLIGURIC	25	24	49	27.37%

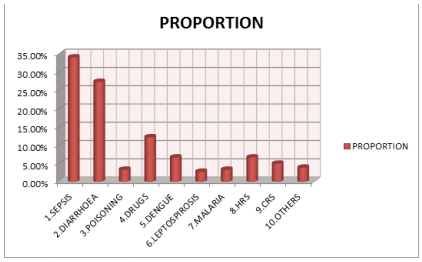
Oliguric AKI is more common than non oliguric AKI (72% VS 27%). Oliguric AKI is predominant among sepsis patients. Non Oliguric AKI is more common among poisoning cases and drug induced AKI.

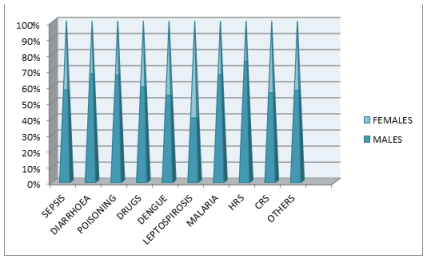
C.ETIOLOGICAL PROFILE OF AKI

	MALE	FEMALE	TOTAL	PERCENT
1.SEPSIS	35	26	61	34.07%
2.DIARRHOEA	33	16	49	27.38%
3.POISONING	4	2	6	3.36%
4.DRUGS	13	9	22	12.23%
5.DENGUE	7	5	12	6.7%
6.LEPTOSPIROSIS	2	3	5	2.79%
7.MALARIA	4	2	6	3.36%
8.HRS*	9	3	12	6.7%
9.CRS#	5	4	9	5%
10.VIPERBITE	4	3	7	3.91%

* HRS- Hepato Renal Syndrome,# CRS- Cardio Renal Syndrome
In our study most common cause of AKI in critically ill patients was sepsis which is around 37% of patients. Most of the patients that were having severe sepsis are having diabetes as a major comorbidity. Acute diarrheal diseases are the second most common cause of AKI.

Most of these patients have mild to moderate AKI. Failure of adequate fluid resuscitation during initial period leads to more severe form of AKI. Among the poisonings Organophosphate Poison is more common in this belt.Poisonings constitute 3.36%.





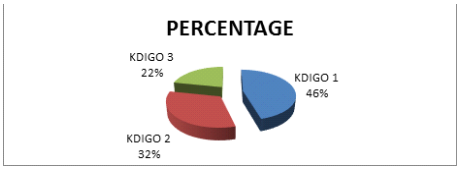
Drugs such as NSAIDS, Aminoglycosides cause AKI. Drugs constitute about 12.23%. Among 5 cases of Leptospirosis all the patients has some form of renal compromise.

Dengue shock syndrome and Dengue Hemorrhagic Fever constitute 6.67%.In severe malaria 80% of the patients had AKI.

All these patients were infected with plasmodium.falciparum. Hepato-renal syndrome is seen in 12 patients. Renal impairment decreased once hepatic improvement is evident in these cases. Cardio-renal syndrome is seen in 5% of the patients.

D.KDIGO STAGING

STAGING	NO.OF CASES	CONSERVATIVE	H.D	P.D
KDIGO 1	82	81	1	-
KDIGO 2	58	21	34	3
KDIGO 3	39	-	31	8
	179	102	66	11



Patients were categorized based on KDIGO criteria which contains 3 stages based on severity.Stage 1 constitues around 45.82%. [5] patients were treated conservatively.Only one patient was treated with Renal replacement therapy due to uremic pericarditis. Stage 2 constitues 32%. Most of these patients underwent hemodialysis, 3 patients underwent peritoneal dialysis. Stage 3 constitues aroung 22%.all these patients were treated with renal replacement therapy only.

E.COMORBIDITIES ASSOCIATED WITH AKI

COMORBIDITY	NO. OF PATIENTS(%)	SURVIVED	EXPIRED
1.DM	118 (65.92%)	97	21
2.HTN	81 (45.25%)	63	18

3.CAD	16	(8.93%)	13	3
4.MODS	32	(17.8%)	4	28
5.CLD	21	(11.7%)	15	6
6.NSAID ABUSE	18	(10%)	16	2

Diabetes mellitus is the most common comorbidity associated with AKI in critically ill patients.65.9% of the studied patients were diabetic. This is followed by Hypertension in about 45% .Multi-organ Dysfunction .NSAID abuse was seen in 10% of these patients.CLD and CAD were about 21% and 16% respectively.

DISCUSSION

Acute kidney injury (AKI) is a common clinical problem in intensive care unit (ICU) patients and independently predicts poor outcome.[6-9] AKI is a potentially fatal, but often reversible renal disease if adequately treated.

The etiology, course, outcome differ in various parts of the world and also within India due to its climatic and geographic diversity and the variable standards of medical care. Recently, two large multi-centre cohort studies[10]reported the occurrence of AKI in an estimated 36% of all patients admitted to the ICU.

In our study out of 784 patients 179 patients had AKI i.e. about 22.83% There was clear male preponderance with 108 males and 71 females. Mean age of occurrence was 39.32 years. Maximum number of cases occurred in fourth to fifth decade. In our study oliguric AKI was predominant (72.62%). This is in concordance with a previous study by M.A. Muthusethupathi et al[11] in 1999.

Sepsis is the leading cause in our study 34.07%.This is in concordance with most of the multicenter trials. In the study conducted by M.A.Muthusethupathi et al [11] Sepsis accounts for 19 cases (38%) of the cases70.

Prevalence of diarrhea in our study is 27.38%.Males outnumbered females due to outside food intake which is more common among males. In our study there is no mortality among ADD, when compared with the report from M.A.Muthusethupathi et al [11] (34.7%). S. K. Agarwal et al [12] studied to find 11% of the AKI was due to ADD in North India. Awareness due to early dehydration therapy and early referral contribute to the decline in mortality.

There were 7 cases (3.91%) of snake bite all of which were Russell's viper with hematotoxicity. There were 4 deaths due to snake bite of which two complicated by hyperkalemia on presentation ,two patients succumbed to death due to MODS.

There were 6 cases (3.36%) of Malarial AKI. There was no death from malarial AKI as against the 42.5% mortality in the study by Zinna et al[13]. A study by Prakash et al from eastern India reported 4.2% of Malarial AKI[14]. Mortality is decreased mainly due to early diagnosis of malaria and early use of HD.

We had 5 patients (2.79%) with Leptospirosis in contrast to 41% cases in M.A.Muthusethupathi et al study[11]. We confirmed the cases based on Modified Faines criteria. Out of the 5 patients, 2 were treated with dialysis and the other 3 conservatively. There was no mortality in our study. In the study of M.A. Muthusethupathi et al 20.8% mortality was present[11]. Low mortality in our study was due to awareness of leptospirosis, its standard diagnostic criteria, therapy, and early referral.

Ostermann M Chang RW 2007 detected the following RIFLE class F has a mortality of 57%, RIFLE class I has 45%, RIFLE class has 21%.[15] our study was based on KDIGO criteria .Prevalance of KDIGO 1 was predmominant i.e 45.82%.Where as KDIGO 2,3 were 32.4%, 21.78% respectively. Mortality in our study is 43.5%. Mortality associated with Diabetes is predominant in our study.

There is an association between AKI and hospital outcome but associated organ failure had a greater impact on the prognosis than the severity of AKI.

CONCLUSION:

The presentation of AKI is predominantly oliguric. But non-oliguric AKI should be borne in mind. Sepsis is the most common cause of AKI in critically ill patients. It has the highest mortality rate too. It is highly essential to prevent the emergence of multi-organ failure in any case of sepsis. Similarly, multi-organ failure in the setting of sepsis should be treated aggressively to decrease the high mortality associated with sepsis.

Our patients were managed equally with dialysis whenever indicated and conservatively. Hemodialysis is the preferred mode of dialysis. Peritoneal dialysis is begun only when HD is not available or when it is contraindicated. Delayed diagnosis and treatment, pulmonary and other infections, the frequent presence of complications and multi organ dysfunction is the chief reason of high mortality. There is an association between AKI and hospital outcome but, an organ failure has a greater impact on the prognosis of severity of AKI.

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