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Original Research Paper

General Medicine

A STUDY OF ACUTE KIDNEY INJURY IN CRITICALLY ILL MEDICAL AND SURGICAL PATIENTS IN BUNDELKHAND REGION

Dr. N.S. Sengar	Professor, Department Of Nephrology, M.L.B. Medical College, Jhansi
Dr. Gopambuj Singh Rathod*	Junior Resident, Department Of Medicine, M.L.B. Medical College, Jhansi *Corresponding Author
Dr. Sudhir Kumar	Professor And Head, Department Of Plastic Surgery, M.L.B. Medical College, Jhansi
Dr. Shyam Mohan Yadav	Junior Resident, Department Of Medicine, M.L.B. Medical College, Jhansi
Dr. Mohd. Imran	Junior Resident, Department Of Medicine, M.L.B. Medical College, Jhansi

ABSTRACT

INTRODUCTION: Acute kidney injury (AKI), previously known as acute renal failure, is characterized by the sudden impairment of kidney function resulting in the retention of nitrogenous and other waste products normally cleared by the kidneys. The acute kidney injury (AKI) incidence in ICU patients varies widely from 3% to 30%, with mortality ranging from 36% to 90%, depending on the type of ICU, study population, the period during which the study is conducted, and the criteria used to define AKI.The present study was undertaken to study the clinical profile of AKI prospectively in various medical and surgical intensive care units in our hospital—a tertiary care center in north India.

AIMS AND OBJECTIVES: To assess the incidence of AKI among critically ill patients,determine the prevalence of AKI in Intensive Care Unit patients,characterize differences in etiology and severity of AKI and to determine the impact of AKI on patients outcomes alongwith a comparative study to know the epidemiological and clinical profiles of AKI in surgical & medical ICU units.

MATERIALS AND METHODS: The study included a total of 170 patients and was carried out in the Department of General Medicine, M.L.B. Medical College, Jhansi (U.P.) from March. 2018 to Oct. 2019.Patients with suspected Acute Kidney Injury (AKI) in Medical & Surgical ICU units,staying for a minimum of 48 hrs in ICU and with age more than 12 yrs were included in the study while those who remained in the ICU for less than 6 hrs,having preexisting end-stage kidney disease on chronic dialysis,with prior renal transplant and who already had developed CKD were excluded.

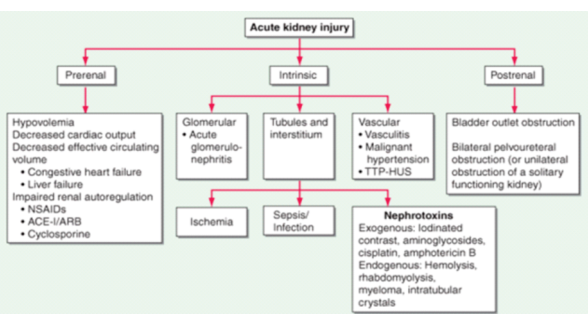
RESULTS: A total of 45.29% patients of the total critically ill patients developed AKI in our study from AKIN criteria out of which most of the patients were from medical ICU where AKIN grade III was the most common grade of AKI.Age >60, male gender were prevalent in the majority of AKI patients and represented 31.17% and 71.43% population respectively. Male to female ratio was around 2.5:1.Sepsis was the most common cause of AKI in the critically ill patients of our study and it was found in 35.06% of the patients which was followed by Acute gastroenteritis and various types of Poisoning that constituted 18.18% of patients.Of the 77 patients developing AKI, 40(51.94%) were having qSOFA score between 0 to 1 while rest 37(48.06%) were having qSOFA score of 2-3.Crude mortality rate among patients with AKI in our study group was 36.36%%.Almost half of the patients having AKI (49.35%) were improved.Majority of the patients did not require RRT and were treated conservatively. 72.72% of the total patients with AKI didn't require any RRT while it was given in 27.28% patients.the patients who received RRT were mostly from medical ICUs Among those who were put on RRT,57.14% expired while 23.81% patients improved.Anuria was the commonest factor warranting need of RRT and it was present in 90.48% of those patients while acidosis was present in 76.19% patients.

KEYWORDS : Acute Kidney Injury, Critically Ill Patients, Renal Replacement Therapy.

INTRODUCTION

Acute kidney injury (AKI), previously known as acute renal failure, is characterized by the sudden impairment of kidney function resulting in the retention of nitrogenous and other waste products normally cleared by the kidneys[1].

AKI is current define by a rise from base line of S.creatnine of at least 0.3mg/dl within 48 hrs or at least 50% higher than baseline within 1 week, or a reduction in urine output to less than 0.5ml / kg/hr for longer than 6 hrs.



Acute kidney injury (AKI) is a common complication in hospitalized patients. With the changing definition, the epidemiology of AKI has changed[2]. AKI, particularly in hospitalized patients, is associated with significant morbidity and mortality. However, most epidemiologic studies on AKI were compartmentalized into 2 entities:

(i) Hospital-acquired AKI (HAAKI) and[3]

(ii) Community-acquired AKI (CAAKI)[4].

The acute kidney injury (AKI) incidence in ICU patients varies widely from 3% to 30%, with mortality ranging from 36% to 90%, depending on the type of ICU, study population, the period during which the study is conducted, and the criteria used to define AKI.

RIFLE classification scheme and acute kidney injury network (AKIN) classification scheme have been proposed to achieve early diagnosis of AKI. A new consensus definition merging the criteria has also emerged from the Kidney Disease Improving Global Outcomes[5].

In 2007, the Acute Kidney Injury Network (AKIN) group pro p

osed a modified version of the RIFLE criteria, which aimed to improve the sensitivity of AKI diagnostic criteria. There were several changes: an absolute increase in sCr of at least 0.3 mg/dL (26.5 mol/L) was added to stage 1; the GFR criterion was removed; patients starting RRT were classified as stage 3, irrespectively of sCr values[6-7].

Depending upon the type of surgical procedure that a patient undergoes, AKI complicates the perioperative hospital stay for up to 50% of surgical patients[8-9]. Yet AKI remains among the most under diagnosed postoperative complications despite increasing understanding of its epidemiology and outcomes. Reduced urine output despite adequate fluid administration is usually the first sign of acute renal failure. This will be followed by a rise in serum creatinine and urea concentrations. Early renal support (haemodialysis or haemofiltration) will control serum electrolytes and accommodate the large volumes of nutritional supplem en tation required in a major burn[10].

One of the life threatening complications of severe burns is acute renal (kidney) failure (AKI). AKI is a sudden loss of the kidney's ability to excrete waste, concentrate urine and conserve electrolytes[11].

AKI is treated with dialysis. As burns associated with AKI will worsen the prognosis, early preventive measures taken to reduce this complication include proper fluid replacement, infection prevention, early wound debridement, and excision of dead tissue.

There are few comparative studies on hospital-acquired AKI (HAAKI) in medical, surgical, and ICU patients. Studies on HAAKI were mostly centered around the critically ill ICU patients or only on some specific sub-groups of medical and surgical patients. There are few comparative studies of HAAKI in medical, surgical, and ICU patients. HAAKI is quite common in this part of the country. Therefore, this comparative study was conducted to know the epidemiological and clinical profiles of AKI in surgical, medical, and ICU units at our centre[2].

With the application of these criteria, prevalence of AKI in ICU setting is >40% if sepsis is present and the mortality rates varied from 15% to 60%[13-14]. Longer hospital stay and economic burden are inevitable. In contrast to western literature, few reliable statistics are available regarding AKI in India[15].

The last 20 years have seen the major changes in the practice of medicine; a particularly striking development has been arrival of intensive care units (ICUs). The evolution of the ICUs has had significant implications for clinical nephrologists especially in relation to the nature, epidemiology and management of acute renal failure (AKI). Acute renal failure seen in ICU patients population is different from non-ICU setting. Acute renal failure occurs frequently in the setting of critically ill patients in ICU. Despite major advances in the management of the critically ill and the renal replacement therapy, the mortality rate of AKI has not decreased appreciably over the past 30 years. This seems to be due to the changes inthe spectrum of AKI. The pattern of AKI varies from place to place. The present study was undertaken to study the clinical profile of AKI prospectively in various medical and surgical intensive care units in our hospital—a tertiary care center in north India[16].

AIMS AND OBJECTIVES

- To assess the incidence of AKI among critically ill patients.
- To determine the prevalence of AKI in Intensive Care Unit patients.
- To characterize differences in etiology and severity of AKI and to determine the impact of AKI on patients outcomes.
- Comparative study to know the epidemiological and clinical profiles of AKI in surgical & medical ICU units.

MATERIALS AND METHODS

The study includes Acute Kidney Injury (AKI) in medical and surgical ICU patients, M.L.B Medical College, Jhansi (U.P.). and a total of 170 patients were selected for the study. The study was carried out in the Department of General Medicine, M.L.B. Medical College, Jhansi (U.P.) from March. 2018 to Oct. 2019.

INCLUSION CRITERIA

- Patients with suspected Acute Kidney Injury (AKI) in Medical & Surgical ICU units.
- Patients staying for a minimum of 48 hrs in ICU.
- Age of patients more than 12 yrs.

EXCLUSION CRITERIA

- Patients remained in the ICU for less than 6 hrs.
- Patients with preexisting end-stage kidney disease on chronic dialysis.
- Patients with prior renal transplant.
- Patients who already have developed CKD.

LOCATION AND PERIOD OF STUDY

The study was carried out in the Department of General Medicine, M.L.B. Medical College, Jhansi (U.P.) from March. 2018 to Oct. 2019.

DIAGNOSIS:

Serum creatinine and Urinary output is the key parameter in evaluating both renal function and the patient's circulatory state. In an oliguric state, however, it must be determined whether the reduced urine volume is due to functional renal (or pre-renal) failure or to organic (or renal) failure. Prolonged functional renal failure is often observed before organic failure develops. In non-oliguric renal failure, urine volume is of no value in the diagnosis. Urine and serum osmolality and electrolyte concentrations are useful in the differential diagnosis.

METHODOLOGY:

- A patient was considered to have AKI when he had an increase in serum creatinine of at least 50% from baseline or a reduction in urine output to <0.5 mL < kg per hour for more than 6 h.
- As suggested by the Acute Dialysis Quality Initiative working group , for patients whose preexisting renal function was not known, a normal GFR before admission to ICU was assumed.
- Patients were classified daily using the AKIN criteria.

TABLE 1

Definition and staging of acute kidney injury according to the AKIN criteria

Stage	Creatinine concentration	Urine output
1	1.5–1.9 × baseline or ≥ 0.3 mg/dL	<0.5 mL/kg/h for 6–12 h
2	2.0–2.9 × baseline	<0.5 mL/kg/h for >12 h
3	≥ 3.0 × baseline or ≥ 4 mg/dL or dialysis	<0.3 mL/kg/h for ≥ 24 h or anuria for ≥ 12 h

AKIN, Acute Kidney Injury Networks

- Patients are considered as having new AKI if they did not have AKI on ICU admission and subsequently reached at least class AKIN-GRADE 1 during their follow-up.
- Deterioration of AKI was diagnosed if the patient had increased in AKIN class compared to the initial classification.
- The most severe degree of AKI was recorded, that is, patients with injury to the kidney at admission to ICU who

later developed failure of kidney function were classified as having GRADE-III AKIN.

DATA COLLECTION:

DATA WERE COLLECTED INCLUDING THE FOLLOWING:

- Primary admission diagnostic categories.
- Co-morbidities.
- Need for mechanical ventilation.
- Presence of sepsis
- AKIN grades I,II and III.
- Renal replacement therapy for AKI.
- Emergency surgery; elective surgery; and nonsurgical admission.
- ICU stay.
- Mortality.

STATISTICAL ANALYSIS:

Categorical variables are presented as number (frequency) and analyzed using chi-square or Fischer exact test where appropriate test. Student's *t*-test or the Mann–Whitney *U*-test is used for quantitative data.

All variables significant in univariate analysis were analyzed by a multiple regression logistic model. The logistic regression forward method was used for multivariate analysis of the risk factors, and the results were tabulated as odds ratio and confidence interval.

The level of significance was set at $p < 0.05$. The relationships between different factors and mortality were evaluated using a Cox Proportional Hazards model, and survival curves were constructed. Variables with $p < 0.05$ were included in the model. The software SPSS v15.0 for Windows was used for statistical analysis.

RESULTS

The present study was carried out on 170 cases in the Department of Medicine, M.L.B. Medical College, Jhansi (U.P.) from March. 2018 to Oct. 2019. In this study we studied 170 patients of suspected Acute Kidney Injury and assessed the incidence of Acute Kidney Injury in such patients and various factors related to this disorder.

Table 1: Incidence of AKI in Study Population (From AKIN Criteria)

Total patients	AKI Patients	%
170	77	45.29%

Out of total 170 patients, 77 patients developed AKI that made 45.29% of the total.

Table 2: Severity of AKI with AKIN Scoring (on the basis of creatinine)

Grade	No. of Patients	%
Grade-I	25	32.47%
Grade-II	10	12.99%
Grade-III	42	54.54%
Total	77	100

Out of 77 patients who developed AKI, 25 patients (32.47%) had grade-I, 10 patients (12.99%) had grade-II and 42 patients (54.54%) had grade-III Acute Kidney Injury.

Table 3: Age wise distribution of patients having AKI (Akin criteria)

Age (years)	No. of Patients	Percentage
18-30	17	22.08%
31-45	16	20.78%
46-60	20	25.97%
> 60	24	31.17%
Total	**77**	**100%**

Out of total 77 patients who developed AKI according to AKIN criteria, patients with age >60 were most common and constituted 31.17% while the 2nd most common age group was between 46-60 yrs in which 20 patients developed AKI that was 25.97% of the total. The least common group consisted of the patients having age between 31-45 yrs where a total of 16 patients developed AKI that constituted 20.78%.

Table 4: Distribution of patients having AKI according to their Sex. (AKIN criteria)

Sex	No. of Patients (Total)	%	No. of Patients (AKI)	%
Male	109	64.11%	55	71.43%
Female	61	35.88%	22	28.57%
Total	**170**	**100**	**77**	**100%**

Patients were divided on the basis of their sexes. There were 109 males (64.11%) and rest 61 were females (35.88%). Of the 77 patients developing AKI,55 were males that made 71.43% while rest 22 were females that was 28.57%.

Table 5: Distribution according to qSOFA Score.

qSOFA Score	Total No. of Patients	%	No. of Patients having AKI	%
0 – 1	115	67.65%	40	51.94%
2 – 3	55	32.35%	37	48.06%
Total	**170**	**100**	**77**	**100**

On the basis of qSOFA score, patients were put into two categories. 1st category with qSOFA 0-1 had 115 patients (67.65%) while the 2nd category with qSOFA 2-3 had 55 patients (32.35%). Of the 77 patients developing AKI, 40(51.94%) were having q SOFA score between 0 to 1 while rest 37(48.06%) were having qsofa score of 2-3 and this difference was statistically significant (p-value : 0.018).

Table 6: Distribution of total patients on the basis of Outcome

Outcome	Total No. of Patients	%	No. of Patients having AKI	%
Improved	124	72.94%	38	49.35%
Expired	35	20.59%	28	36.36%
Lama	9	5.29%	9	11.69%
Referred	2	1.18%	2	2.60%
TOTAL	**170**	**100%**	**77**	**100**

Patients were divided on the basis of their outcomes. Out of 170 patients, 124 patients (72.94%) were improved, 35(20.59%) were expired, 9 patients(5.29%) were left against medical advice and 2 were referred(1.18%). 38 patients (49.35%) who developed AKI were improved, 28(36.36%) were expired and 9 (11.69%)left against the medical advised while 2 patients(2.60%) were referred and this difference was statistically significant (p-value : 0.004).

Table 7: Electrolyte abnormalities

Electrolyte abnormalities	Patients with electrolyte abnormalities without AKI (n=93)	%	Patients with electrolyte abnormalities (n=77)	%
Hyponatremia (< 135)	13	13.98%	25	32.47%
Hypernatremia (>150)	5	5.38%	3	3.90%
Hypokalemia (< 3.5)	5	5.38%	20	25.97%
Hyperkalemia (> 5)	6	6.45%	1	1.30%

Hyponatremia was the most common electrolyte abnormality in patients with AKI which was present in 25 (32.47%) patients followed by hypokalemia which was present in 20 (25.97%) patients and minimum patients were found with

Hyperkalemia is 1 (1.30%). For hyponatremia (< 135) and Hyp okalemia (<3.5), the data was found statistically significant i.e. P-value 0.02 and 0.001 respectively.

Table 8: Etiology of AKI

Etiology variables	No. of Patients with AKI	%	No. of Patients with without AKI	%	p-value
Age	14	18.18%	34	36.56%	0.045
Sepsis	27	35.06%	16	17.20%	0.040
Poisoning	14	18.18%	10	10.75%	>0.05
Obstructive Uropathy	4	5.19%	16	17.20%	0.030
Burn	3	3.90%	8	8.60%	>0.05
Cellulitis	7	9.09%	4	4.30%	>0.05
Heart failure	5	6.49%	2	2.15%	>0.05
Acute pancreatitis	2	2.60%	2	2.15%	>0.05
Malaria	1	1.30%	1	1.08%	>0.05
TOTAL	**77**	**100%**	**93**	**100%**	

Majority of patients with AKI were found having Sepsis,27 out of 77 which was 35.06% and 2nd most common cause was Acute gastroenteritis and Poisoning which was the cause in 14 patients i.e. 18.18% and lowest patients were found having AKI due to malaria i.e. 1 patient(1.30%). Study was FOUND SIGNIFICANT for Acute Gastroenteritis, Sepsis and Obstructive uropathy with p-values <0.05 for each of them.

Table 9: Department wise distribution AKI patients.

AKI Patients	No. of Patients (n=77)	%
Medical ICU (n=117)	55	71.43
Surgical ICU (n=53)	22	28.57
Total	77	100

Out of 77 patients who developed AKI, 55 were from medical ICU (71.43%) and rest 22 (28.57%) were from surgical ICU.

Table 10: Need for Renal Replacement Therapy in AKI patients

AKI patients	No. of Patients (n=77)	%
RRT done	21	27.27%
RRT not done	56	72.73%
Total	**77**	**100%**

Out of 77 patients who developed AKI, in 21 (27.27%) patients RRT was done while in 56 (72.73%) RRT was not used and they were managed conservatively, when compared to the group where AKI was not found, study was found statistically significant with P-value < 0.01.

Table 11: Presence of causative factors in patients under went RRT

AKI Patients	No. of Patients (n=21)	%
Anuria	19	90.48%
Oliguria	2	9.52%
Acidosis	16	76.19%
Hyperkalemia	2	9.52%

Out of 21 patients, who underwent RRT, Anuria 19 (90.48%) was the most common factor followed by Acidosis 16 (76.19%).

Table 12: Outcome of patients On RRT

AKI Patients	No. of Patients (n=21)	%
Improved	5	23.81%
Expired	12	57.14%
Lama	4	19.05%
Total	**21**	**100%**

Out of 21 patients, who underwent RRT, 5 (23.81%) were improved, 12 were expired and 4 (19.05%) left against medical advice.

DISCUSSION

The present study was carried out on 170 cases in the Department of Medicine, M.L.B. Medical College, Jhansi (U.P.) from March. 2018 to Oct. 2019. In this study we studied 170 patients of suspected Acute Kidney Injury and assessed the incidence of Acute Kidney Injury in such patients and various factors related to this disorder.

In a large multinational cross-sectional study where the epidemiology of AKI in ICU patients was explored it was found that AKI occurred in more than half of the patients, precisely in 57.3%.(Hoste, E.A.J.*et al* (2015). other studies evaluated incidences of AKI in critically ill patients and found proportions varying from 29% to 77% using AKIN definition. In our study the incidence of AKI using AKIN definition was found in 45.29% patients. out of all the patients who developed AKI on the basis of AKIN, most were from grade-III. This might be due to the fact that our hospital is a tertiary referral center where most of the referred patients presented in more severe stages of renal injury[17].

In another study, Data from 582 critically ill patients were collected and retrospectively reviewed. Patients were divided into two groups: without AKI development and with AKI development. Baseline characteristics, laboratory, and other clinical data were compared between these two groups, and correlations between the characteristics and AKI development were examined. Patients with AKI development were further divided into two groups according to the survival outcome, and variables associated with the outcome were determined. *Results*: AKI was developed in 54.12% (n = 315) of patients. (De-Yuan Zhi et al, China, 2017)[18]

In our study AKI was more common in males (71.43%) than in females while it was more common in individuals with age more than 60 years (31.17%). A prospective observational study by Korula S et al[19] in 2016 had mean age of 59.17±14.01 and males were 64.3%. In another study of AKI, The mean age was 60 years and 63% of patients were male. (Incidence, timing and outcome of AKI in critically ill patients varies with the definition used and the addition of urine output criteria J. Koeze *et al* 2017[20]) A study based in United Kingdom showed 16% of the AKI patients were older than 65 years while a study in United States showed that 12.4% of the patients were above the age of 65. In accordance with previous literature, our study highlights the potential risk of AKI in critically ill, elderly patients especially above the age of 60 years. Several large scale studies conducted world-wide have established that AKI in critically ill patients is associated with statistically significant increase in mortality.

Sepsis was the most common cause of AKI in the critically ill patients of our study and it was found in 35.06% of the patients which was followed by acute gastroenteritis and various types of Poisoning that constituted 18.18% of patients. The role of sepsis in AKI has been well documented in western literature, causing nearly 50% of the AKI cases in few studies. A recent Indian study by Singh *et al.*found that although nephrotoxic drugs were the most common cause of AKI in the medical ward, sepsis was the most common cause in surgical ward and ICU. A study by Sandeep *et al.*,., which evaluated acute renal failure in ICU, found sepsis to be more common than nephrotoxic drugs. Kaul *et al.*,., in their study have reported acute diarrhea as the most common cause. Acute GE was the second most common cause of AKI in our study. The higher number might be attributed to the fact that our institution is a tertiary care center, managing patients referred after developing renal complications.

A study conducted by Rubina Naqvi et al[21] 2017 on acute

kidney injury from different poisonous substances.

In our study we divided the whole study population on the basis of qSOFA score. Most of the patients with suspected AKI had qSOFA score less than 2(67.65%). The same trend continued in patients with confirmed AKI also where more than half of the patients (51.94%) had qSOFA score less than 2.

Protocol for a prospective observational study on the association of variables obtained by contrast-enhanced ultrasonography and sepsis-associated acute kidney injury by Ning Liu *et al.*, in 2017[22]. The importance of acute kidney injury in suspected community acquired infection by James Tollitt *et al.*, in 2019 also correlated q SOFA score with acute kidney injury.

In our study there were four outcomes of the patients. Most of the patients who developed AKI were improved (49.35%)and the 2nd most common outcome was death as 36.36% patients expired during the ICU stay. Outcome of Critically ill Patients with Acute Kidney Injury using the AKIN Criteria by Tal Mandelbaum, *et al*[23] in 2011 showed a clear and significant increase in the risk for mortality in patients who developed acute kidney injury compared with patients who did not. The increased risk was found to be proportional to the stage of AKI although there is no clear risk difference between the patients with AKI 1 and AKI 2 compared to a large increase in mortality risk in patients with AKI 3. Epidemiology and outcomes of acute kidney injury in critically ill: Experience from a tertiary care center by PS Priyamvada *et al*[24] 2018 showed that in the initial 48 h, 12 patients (5.08%) recovered from AKI. Of 126 patients with CAAKI, 26.98% (n = 34) showed complete recovery (CR) at the end of the 30 days, whereas 16.67% (n = 21) showed partial recovery (PR). Among 110 patients with HAAKI, 32.73% (n = 36) had CR and 18.18% (n = 20) had PR. One patient continued to remain dialysis-dependent at the end of the 1st month. Joaniddis *et al*[25] in their study of ICU patients showed that the mortality rate among patients classified to have AKI by RIFLE criteria was 36.5%.] In the study by Ali *et al.*, involving 474 patients with AKI, the in hospital mortality was found to be 32.7%. However, this study involved AKI patients irrespective of the hospital setting. Two Indian studies, one using RIFLE criteria and other using AKIN criteria to diagnose AKI patients in ICU, found the mortality rate to be as high as 73.5% (n = 25) and 93.9% (n = 31) respectively.

From the total study population 38.82% patients had hypoalbuminemia while the same trend continued for patients with AKI where 45.15% patients had hypoalbuminemia. Seventeen clinical studies with 3,917 total patients were included: 11 studies (6 in surgical or intensive care unit patients and 5 in other hospital settings) evaluating the influence of serum albumin on AKI incidence and 6 studies describing the relationship between serum albumin and mortality among patients who had developed AKI. Lower serum albumin was an independent predictor both of AKI and of death after AKI development. (Christian J. Wiedermann *et al*[26], 2009) Another study proved Hypoalbuminemia as a predictor of acute kidney injury (Daniele Roberto Giacobbe *et al*[27]2018).

In our study, majority of the patients did not require RRT and were treated conservatively. 72.72% of the total patients with AKI didn't require any RRT while it was given in 27.28% patients. The patients who received RRT were mostly from medical ICUs Among those who were put on RRT,57.14% expired while 23.81% patients improved. Anuria was the commonest factor warranting need of RRT and it was present in 90.48% of those patients while acidosis was present in 76.19% patients. Previous Indian studies by J Prakash *et al*[2] and Singh *et al.*, reported that 34% (n = 28) and 20.58% (n = 7) of the cases respectively, required RRT. However, these studies did not specifically evaluate AKI patients in ICU but studied them irrespective of the hospital setting. Intermittent hemodialysis and slow low efficiency dialysis were the most commonly used modalities of RRT in our hospital. Mahajan *et al*[28] who evaluated ARF in ICU, reported that 71.1% required RRT and that intermittent RRT was the most common mode used.

In our study, although the mortality rate was higher among patients receiving RRT (57.14%). *Chertow et al*[29] previously demonstrated that among critically ill patients, acute renal failure requiring dialysis is an ominous condition with a high risk of in-hospital mortality.

CONCLUSIONS

The present study was carried out on 170 cases in the Department of Medicine, M.L.B. Medical College, Jhansi (U.P.) from March. 2018 to Oct. 2019.. In this study we studied 170 patients of suspected Acute Kidney Injury and assessed the incidence of Acute Kidney Injury in such patients and various factors related to this disorder.

- A total of 45.29% patients of the total critically ill patients developed AKI in our study from AKIN criteria. In AKIN, 54.54% were grade-III.
- Most of the patients were from medical ICU where AKIN grade III was the most common grade of AKI.
- Age >60, male gender were prevalent in the majority of AKI patients and represented 31.17% and 71.43% population respectively. Male to female ratio was around 2.5:1.
- Sepsis was the most common cause of AKI in the critically ill patients of our study and it was found in 35.06% of the patients which was followed by acute gastroenteritis and various types of Poisoning that constituted 18.18% of patients.
- Of the 77 patients developing AKI, 40(51.94%) were having qSOFA score between 0 to 1 while rest 37 (48.06%) were having qSOFA score of 2-3.
- Crude mortality rate among patients with AKI in our study group was 36.36%%.
- Almost half of the patients having AKI (49.35%) were improved.
- Hyponatremia was the most common electrolyte abnor mality in AKI in our study population with 32.47% develo ping it while 20 patients developed Hypokalemia which was 25.97%
- Majority of the patients did not require RRT and were treated conservatively. 72.72% of the total patients with AKI didn't require any RRT while it was given in 27.28% patients.the patients who received RRT were mostly from medical ICUs Among those who were put on RRT,57.14% expired while 23.81% patients improved.
- Anuria was the commonest factor warranting need of RRT and it was present in 90.48% of those patients while acidosis was present in 76.19% patients.
- Leucocytosis was found in around 84.42% patients while 44.15% patients had hypoalbunimeia and 72.73% patients had acidosis.

LIMITATIONS AND THE FINAL WORDS:

Our study has both strengths and weakness. A limitation of our study was that we could not find the incidence of AKI in the patients who have already developed chronic kidney disease. There were many patients in whom 48 hr creatinine level could not be obtained and they couldn't be categorized according to AKIN grading. Few patients went against the medical advise and couldn't be studied till their final outcome.

Our centre being a major tertiary care hospital in Bunde lkh and region,it caters to a large population. With the help of our study we can focus on the major cause that predispose to a

patient to AKI like sepsis, acute gastroenteritis, poisoning, cellulitis etc. and timely intervention in these causative factors can prevent the occurrence of AKI.

REFERENCES:

1. Sushrut S. Waikar; Joseph V. Bonventre.334: Acute Kidney Injury
2. T. B. Singh, S. S. Rathore, T. A. Choudhury, V. K. Shukla,1 D. K. Singh,2 and J. Prakash.Hospital-acquired acute kidney injury in medical, surgical, and intensive care unit: A comparative study.Indian J Nephrol. 2013 Jan-Feb; 23(1): 24–29.
3. Brivet FG, Kleinknecht DJ, Loirat P, Landais PJ. Acute renal failure in intensive care units–causes, outcome, and prognostic factors of hospital mortality; a prospective, multicenter study. French Study Group on Acute Renal Failure. Crit Care Med. 1996;24:192–8.
4. Hou SH, Bushinsky DA, Wish JB, Cohen JJ, Harrington JT. Hospital-acquired renal insufficiency: A prospective study. Am J Med. 1983;74:243–8.
5. Cruz DN, Bolgan I, Perazella MA, Bonello M, de Cal M, Corradi V, et al. North East Italian Prospective Hospital Renal Outcome Survey on Acute Kidney Injury (NEiPHROS-AKI): Targeting the problem with the RIFLE Criteria. Clin J Am Soc Nephrol. 2007;2:418–25.
6. Bellomo R, Ronco C, Kellum JA, Mehta RL, Palevsky P, Acute Dialysis Quality Initiative workgroup Acute renal failure - definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group. Crit Care. 2004;8:R204–12.
7. Mehta RL, Kellum JA, Shah SV, Molitoris BA, Ronco C, Warnock DG, et al. Acute Kidney Injury Network Acute Kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. Crit Care. 2007;11:R31.
8. Hobson C, Ozrazgat-Baslanti T, Kuxhausen A, et al. Cost and Morality Associated With Postoperative Acute Kidney Injury. Ann Surg. 2014
9. Bihorac A, Delano MJ, Schold JD, et al. Incidence, clinical predictors, genomics, and outcome of acute kidney injury among trauma patients. Ann Surg. 2010;252:158–65.
10. Ansermino M, Hemsley C. Intensive care management and control of infection in burned patients. BMJ. 2004;329:220–3.
11. Robert W. Schrier, Wei Wang, Brian Poole, and Amit Mitra.Acute renal failure: definitions, diagnosis, pathogenesis, and therap.J Clin Invest. 2004 Jul 1; 114(1): 5–14.
12. Bagshaw SM, George C, Bellomo R ANZICS Database Management Committee. Early acute kidney injury and sepsis: A multicentre evaluation. Crit Care. 2008;12:R47.
13. Kellum JA, Bellomo R, Ronco C. Definition and classification of acute kidney injury. Nephron Clin Pract. 2008;109:c182–7.
14. Sakhuja V, Sud K. Acute renal failure in the tropics. Saudi J Kidney Dis Transpl. 1998;9:247–60.
15. Sakhuja V, Sud K. Acute renal failure in the tropics. Saudi J Kidney Dis Transpl. 1998;9:247–60.
16. Gurcharan Avasthi, M.D.,1 Jasvinder Singh Sandhu, D.M.,2,* and Kavita Mohindra, M.D.1.Acute Renal Failure in Medical and Surgical Intensive Care Units—A One Year Prospective Study.RENAL FAILURE Vol. 25, No. 1, pp. 105–113, 2003
17. Hoste EA1, Bagshaw SM, Bellomo R, Cely CM, Colman R, Cruz DN, Edipidis K, Forni LG, Gomersall CD, Govil D, Honoré PM, Joannes-Boyau O, Joannidis M, Korhonen AM, Lavrentieva A, Mehta RL, Palevsky P, Roessler E, Ronco C, Uchino S, Vazquez JA, Vidal Andrade E, Webb S, Kellum JA..Epidemiology of acute kidney injury in critically ill patients: the multinational AKI-EPI study.Intensive Care Med. 2015 Aug;41(8):1411-23. doi: 10.1007/s00134-015-3934-7. Epub 2015 Jul 11.
18. Zhi DY, Lin J, Zhuang HZ, Dong L, Ji XJ, Guo DC, Yang XW, Liu S, Yue Z, Yu SJ, Duan ML. Acute Kidney Injury in Critically Ill Patients with Sepsis: Clinical Characteristics and Outcomes. J Invest Surg. 2019 Dec;32(8):689-696. doi: 10.1080/08941939.2018.1453891. Epub 2018 Apr 25. PubMed PMID: 29693474.
19. Korula S, Balakrishnan S, Sundar S, Paul V, Balagopal A. Acute kidney injury-incidence, prognostic factors, and outcome of patients in an Intensive Care Unit in a tertiary center: A prospective observational study. Indian J Crit Care Med 2016;20:332-6.
20. Koeze et al.,. Incidence, timing and outcome of AKI in critically ill patients varies with the definition used and the addition of urine output criteria. BMC Nephrology (2017) 18:70
21. Rubina Naqvi.Acute kidney injury from different poisonous substances.World J Nephrol. 2017 May 6; 6(3): 162–167.
22. Ning Liu Zhongheng Zhang, Yucai Hong ,Bing Li.Protocol for a prospective observational study on the association of variables obtained by contrast-enhanced ultrasonography and sepsis-associated acute kidney injury.Article (PDF Available) in BMJ Open 9(7):e023981 • July 2019
23. Tal Mandelbaum, MD,1,2 Daniel J Scott, PhD,2 Joon Lee, PhD,2 Roger G. Mark, MD PhD,2 Atul Malhotra, MD,3 Sushrut S. Waikar, MD MPH,4 Michael D. Howell, MD MPH,5 and Daniel Talmor, MD MPH1.Outcome of Critically ill Patients with Acute Kidney Injury using the AKIN Criteria.Crit Care Med. Author manuscript; available in PMC 2012 Dec 1.
24. P. S. Priyamvada, R. Jayasurya, Vijay Shankar, and S. Parameswaran. Epide miology and Outcomes of Acute Kidney Injury in Critically Ill: Experience from a Tertiary Care Center.Indian J Nephrol. 2018 Nov-Dec; 28(6): 413–420.
25. Joannidis M, Metnitz B, Bauer P, Schusterschitz N, Moreno R, Druml W, Metnitz PG. Acute kidney injury in critically ill patients classified by AKIN versus RIFLE using the SAPS 3 database. Intensive Care Med. 2009 Oct;35(10):1692-702. doi: 10.1007/s00134-009-1530-4. Epub 2009 Jun 23. PubMed PMID: 19547955.
26. Wiedermann CJ, Wiedermann W, Joannidis M. Causal relationship between hypoalbuminemia and acute kidney injury. World J Nephrol. 2017 Jul 6;6(4):176-187. doi: 10.5527/wjn.v6.i4.176. Review. PubMed PMID: 28729966; PubMed Central PMCID: PMC5500455.
27. Daniele Roberto Giacobbe.Hypoalbuminemia as a predictor of acute kidney injury during colistin treatment.Article Open Access Published: 10 August 2018.
28. Mahajan S, Tiwari S, Bharani R, Bhowmik D, Ravi S, Agarwal SK, et al. Spectrum of acute renal failure and factors predicting its outcome in an intensive care unit in India. Ren Fail. 2006;28:119–24.
29. Chertow GM, Christiansen CL, Cleary PD, Munro C, Lazarus JM. Prognostic stratification in critically ill patients with acute renal failure requiring dialysis. Arch Intern Med. 1995;155:1505–11.