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Original Research Article

Study of causes and prognosis of acute kidney injury (AKI) in tertiary care institute

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ABSTRACT

Background: Acute kidney injury (AKI) is a common clinical syndrome with a broad aetiological profile. It is associated with major morbidity and significant mortality. This study is to determine the various causes of AKI, in our hospital and to find out the incidence of AKI by using renal failure indices and to analyze outcome of AKI pertaining to the aetiology.
Methods: Study is conducted on 100 AKI patients on haemodialysis admitted in various medical wards of the Mc Gann Hospital attached to Shimoga institute of medical sciences, Shimoga. From January 1st, 2017 to June 30th, 2017 detailed history was taken in all the patients and a through physical examination was done. Baseline and peak levels of serum Creatinine, urine output was documented. Data regarding laboratory investigations were collected to confirm the etiology of AKI.
Results: There were 65 males and 35 females. The highest number of cases are in age group 51 to 60 year (32%). Average age is 56±5.6 years. Fever, nausea and oliguria are the most common clinical features seen 66,66 and 64 percentage respectively, followed by edema (23%) and loses tools (17%). Blood urea (>100), serum Creatinine (>4) in 44% and 46% respectively. Hb <10 gm/dl in 54%. WBC count >12000 in 65%. Sepsis and gastroenteritis are leading medical causes 25% and 12% respectively. Surgical causes are 14% and obstetrics causes are 11%.
Conclusions: AKI remains a common disorder among critically ill patients Consistent with other studies from developing world; this study has also shown that infections, nephrotoxins and gastroenteritis are the primary causes of AKI at our institute. Most of these causes can be prevented with simple interventions such as health education on oral rehydration, quality prenatal and emergency obstetric care, appropriate management of infections and taking appropriate precautions when prescribing potentially nephrotoxic medications.

Keywords: AKI, Blood urea, Gastroenteritis, Oliguria, Sepsis

INTRODUCTION

AKI, previously known as Acute Renal Failure, is a clinical syndrome characterized by an abrupt decline in glomerular filtration rate sufficient to decrease the elimination of nitrogenous waste products (urea and creatinine) and other uremic toxins.[1]

Acute kidney injury (AKI) is a common clinical syndrome with a broad range of etiological profile. It is associated with major morbidity and significant mortality due to the severity of the causative illness. This study is to determine the various causes of AKI, in our hospital and to find out the incidence of AKI by using renal failure indices and to analyze outcome of AKI pertaining to the aetiology.

Acute kidney injury (AKI) affects one in five hospitalized patients.[2] The epidemiology of AKI in developing countries is unique in that certain causes, such as the infections, obstetric causes and nephrotoxins, which are largely obsolete in developed countries remain important causes[3]

In India, acute kidney injury constitutes 1.5% of all general hospital admissions, of which 60% are due to medical causes.[4] the most common causes of AKI are: acute diarrheal diseases, sepsis, infection (malaria, UTI, pneumonia, viral hepatitis), snake bite, cardiac failure, diabetes mellitus, nephrotoxic drug use, malignancy, SLE, hypertension etc. major surgery like exploratory laparotomy, Whipple's procedure etc. are also an important cause of AKI. Advanced age, liver diseases, underlying comorbid illness (DM, HTN, IHD, COPD, cirrhosis) have been implicated as risk factor for the development of AKI.[5] AKI constitutes approximately 5% of hospital admissions and up to 30% of admissions to intensive care units.[6] Detection of the incidence, etiological profile and outcome of AKI is important for commencement of preventive and therapeutic strategies, geographical, etiological, cultural and economic variations determine the dissimilarities among patterns of AKI in different regions of the world. Although reliable statistics on the prevalence of AKI are not available, statistics on referrals to dialysis units suggest that the condition is more common in India as compared to the West.[7] There is an increase in the incidence of surgical and sepsis-related AKI.[8,9] Hence we conducted a prospective study to look for pattern of AKI in our locality.

METHODS

Study is conducted on 100 consecutive patients admitted in various medical wards of the Mc Gann Hospital attached to Shimoga institute of medical sciences, Shimoga. From January 1st, 2017 to June 30th 2017.

Inclusion criteria

All AKI patients aged between 15 to 70 years on hemodialysis.

Exclusion criteria

Persons with CKD were excluded from study.

100 consecutive patients admitted in various medical wards of the Mc Gann Hospital attached to Shimoga institute of medical sciences, Shimoga with AKI All patients aged above 15 years with features of AKI as per AKIN (Acute Kidney Injury Network) criteria.[10] Which is defined as an increase in serum creatinine of 0.3 mg/dl or more within 48 hours of observation were taken into study after obtaining written informed consent. In all these patients, detailed clinical history and detailed clinical examination was carried out. Co-morbid conditions such as diabetes mellitus (DM), hypertension (HTN); Baseline and peak levels of serum creatinine, urine output was documented. Data regarding laboratory investigations were collected to confirm the etiology of AKI, which included complete urine analysis, metabolic panel, hematologic profile. coagulation profile and blood culture (wherever necessary). Radiological tests, ultrasonography, urinalysis or urine culture, Requirement of RRT was noted.

RESULTS

Demographic Data: 100 consecutive patients with AKI were studied from January 1st, 2017 to June 30th, 2017. There were 65 males and 35 females.

Table 1: Sex distribution.

Sex	No. of patients	Percentage
Male	65	65
Female	35	35

The male to female ratio is 1.3:1.

Table 2: Age distribution.

Age group	No. of patients	Percentage
15-20	2	2
21-30	5	5
31-40	12	12
41-50	27	27
51-60	32	32
61-70	22	22

The age distribution of these patients ranged from 15 years to 70 years. The highest number of cases in age group 51 to 60 year (32%). Average age is 56±5.6 years

The mean age among men was 55.22±8.72 years and in women was 56.45±4.61 years. The male to female ratio was 1.3:1.

Table 3: Clinical presentations.

Clinical features	No. of patients	Percentage
Oliguria	64	64
Loose stools	17	17
Vomiting	66	66
Fever	66	66
Burning micturition	6	6
Jaundice	4	4
Dyspnoea	10	10
Altered Sensorium	5	5
Edema	23	23

Fever, nausea and oliguria are the most common clinical features seen 66, 66 and 64 percentage respectively, followed by edema (23%) and loosestools (17%).

Table 4: Co-morbid conditions.

Diseases	No. of patients	Percentage
Diabetes mellitus	33	33
Hypertension	28	35
COPD	5	5
Coronary artery disease	8	8

Table 5: Biochemical tests.

Test	Value	Percentage
Urea (mg/dl)	<100	56
	>100	44
Creatinine(mg/dl)	<4	54
	>4	46
WBC count	<12000	35
	>12000	65
Potassium (mmol/l)	<5	58
	>5	42
Hb (g/dl)	<10	54
	>10	46

Blood urea (>100), serum Creatinine (>4) in 44% and 46% respectively. Hb <10 gm/dl in 54%. WBC count >12000 in 65%.

Table 6: Causes for AKI.

Etiology	Subgroup	Number of cases	Total
Medical	Sepsis	25	75
	Gastroenteritis	12	
	Cardiogenic/CCF	8	
	CVA	3	
	Chronic liver disease	6	
	Malaria	2	
	Nephrotoxic medications	7	
	Paraquet poisoning	6	
	Snake bite	6	
Surgical	Post-operative	5	14
	Orthopedic surgery	3	
	Obstructive uropathy	6	
Obstetrics	PPH	5	11
	Eclampsia	6	

Sepsis and gastroenteritis are leading medical causes 25% and 12% respectively. Surgical causes are 14% and obstetrics causes are 11%.

DISCUSSION

Study is conducted on 100 consecutive patients admitted in various medical wards of the Mc Gann Hospital attached to Shimoga institute of medical sciences, Shimoga. From January 1st, 2017 to June 30th, 2017. is discussed here and the results have been compared with other studies.

Sex

There were 65 males (65%) and 35 females (35%) in the present study. The male to female ratio was 1.3:1. This finding is consistent with that of Olaga B et al 60% males and 40% females with a ratio of 1.6:1 and in study by Kapadia MP et al.[11,12] It is 73% males and 27% females.

Age

The age distribution of these patients ranged from 15 years to 70 years with 2/3rd being in between 41 to 70 years. The maximum number of cases in age group 51 to 60 year i.e 32%. Average age is 56±5.6 years. This is with Mataloun et al mean age is 55.3 years and In Picard study it is 59.5 years.[13,14] In Ibrahim A et al study mean age is 36.7±14.5 years.[1]

Symptomatology

Table 7: Clinical presentations.

Clinical features (percentage)	Present study	Kapadia MP et al[12]	Eswarappa M et al[15]	Ibrahim A et al[1]
Oliguria	64	63	67	86.1
Loose stools	17	-	-	-
Vomiting	66	81	-	-
Fever	66	61	52	-
Burning micturition	6	-	-	-
Jaundice	4	5	21	-
Dyspnoea	10	13	-	-
Altered sensorium	5	8	-	49
edema	23	37	28	58.9

Clinical features are comparable with other studies particularly in relation to fever and oliguria.

Incidence of sepsis and gastroenteritis were comparable to many other Indian studies.

A large proportion of medical causes in our study are due to a high incidence of infections, especially gastrointestinal diseases, malaria with multi organ dysfunction. The other conditions were snake bite, paraquet poisoning and chronic liver diseases. The obstetrics and surgical causes are similar to other studies.

Medical causes contributed most to AKI it is 75%, surgical causes in 14% and obstetric causes in 11% of patients. In Umesh L et al it is 73.7%, 6.4% and 19.8% respectively.[16] Low incidence of surgical causes in our setup can be attributed to non-performance of cardiac surgery and transplant surgery in our institute.

Table 7: Co-morbid conditions.

Percentage	Present study	Kapadia MP et al[12]	Umesh L et al[16]
Diabetes mellitus	33	41.82	10.42
Hypertension	28	24.09	7.5
COPD	5	5.45	6.4
Coronary artery disease	8	16.36	4.8

There is higher incidence of renal failure due to paraquet poisoning in our institute because of increased incidence of paraquet poisoning in our locality and it causes renal failure and multiorgan dysfunction.

Table 8: Etiology compared with different studies.

Diagnosis (percentage)	Present study	Kapadia MP et al[12]	Umesh L et al[16]	Kashinkunti MD et al[17]
Sepsis	25	48	30	31.6
Gastroenteritis	12	11	15.5	11.6
Cardiogenic/CCF	8	7	-	5
CVA	3	-	-	4
Chronic liver disease	6	7	-	4
Malaria	2	9	-	3
Nephrotoxic medications	7	6	11.03	-
Paraquet poisoning	6	-	-	-
Snake bite	6	2	-	-
Post-operative	5	-	6.4	9
Orthopedic surgery	3	-		7.5
Obstructive uropathy	6	-		-
PPH	5	2	19.8	5
Eclampsia	6			4

Only 20% of our patients required hemodialysis for recovery. Remaining were treated conservatively. Mortality was around 25% mainly due to co morbid conditions sepsis, cardiac, liver and CNS disorder rather than due to renal failure itself. It is comparable to study done by Kashinkunti MD et al which is 28.3%. In Umesh L et al study it is 9.61%.[16,17]

ARF in the setting of ICU is characterized by increasing mortality, high incidence sepsis, multi-organ failure and mortality. Sepsis and multi-organ failure are the major causes of mortality in these patients. These findings alarm for early detection and aggressive management of sepsis and its associated complications so as to bring down the mortality in patients admitted to intensive care unit. It is important for preventive measures such as restoration of intravascular volume status, maintenance of adequate renal perfusion pressures, and limiting exposure to nephrotoxins.

Present study has shown some light into causes, prognosis and outcome of AKI in our setup. The prognosis of AKI depends on the cause, underlying co-morbid conditions and severity of the disease.

CONCLUSION

AKI remains a common disorder among critically ill patients Consistent with other studies from developing world; this study has also shown that infections, nephrotoxins and gastroenteritis are the primary causes of AKI at our institute. Most of these causes can be prevented with simple interventions such as health education on oral rehydration, quality prenatal and emergency obstetric care, appropriate management of infections and taking appropriate precautions when prescribing potentially nephrotoxic medications.

Future studies may also benefit by better identifying modifiable risk factors to prevent the development of AKI from the outset. The timely and aggressive management will certainly reduce the incidence of AKI.

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