

“Etiology of Acute Kidney Injury in a Tertiary Care Hospital”

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Abstract: Acute kidney injury is one of the significant causes of morbidity and mortality world wide. The present study was done in a tertiary care hospital in East Godavari District , Andhra Pradesh, India, among 100 patients of acute kidney injury with an objective to find out the most common causes of AKI in this particular area. Results showed that the major causes of AKI in this area are sepsis, gastroenteritis, heart failure and malaria.

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I. Introduction

Among the organs of the body, kidney is remarkable in its ability to recover from almost complete loss of its function and most of the acute kidney injury is potentially reversible, though with some subclinical residual defects in glomerular functions and tubules [1].

There is wide spread increase in the incidence of AKI, due to life style changes, irrational use of NSAIDS, particularly among the elderly population due to increased life expectancy leading to increased prevalence of comorbidities such as heart failure which predisposes to AKI and other factors.

Etiology of AKI differs from place to place. It is closely linked to the prevailing socioeconomic and environmental conditions in a geographic location.

There is paucity of data from this area of the country about the incidence, clinical course and the factors affecting the outcome in acute kidney injury. This study is being taken to study the etiology of acute kidney injury in our set up.

II. Material And Methods

This is a prospective clinical study of 100 patients admitted with or who developed AKI in General Medicine Department , Government General Hospital , Kakinada during the period of December 2016 to September 2018.

Methods of collection: Before commencement of study, permission was obtained from Ethics committee, Rangaraya Medical College, Kakinada. All enrolled patients are informed about the nature of study and their right to refuse. The informed written consent is taken before including them in the study.

Sample size: 100 patients

Study design: Observational study

Inclusion criteria:

1. Patients >15 yrs who satisfy any one of the following criteria were included in the study
2. Increase in serum creatinine by 0.3mg/dl within 48 hrs; or
3. Increase in serum creatinine 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days; or
4. Urine volume <0.5ml/kg/hr for 6 hrs

Exclusion criteria:

1. Patients aged < 15 yrs.
2. Patients with previous renal disease.
3. Patients with previous renal transplantation
4. Patients with evidence of contracted kidneys on ultrasound scan abdomen

Procedure methodology

A detailed pre structured proforma was prepared before doing this study, pertaining to history, clinical examination, investigations, management and outcome. Detailed history regarding every system was taken and

examination done. Patients were advised to undergo investigations related to Acute Kidney injury and few other investigations if necessary.

Tests routinely advised to every patient

1. Routine Blood examination
2. Routine Urine examination
3. Serum electrolytes
4. Electrocardiography
5. Renal function tests - including blood urea, serum creatinine
6. Daily fluid intake and output measurements
7. Ultrasound abdomen

The following tests were done only if indicated

1. Liver function tests
2. Chest X-ray PA view
3. Blood Culture and sensitivity
4. Arterial blood gas analysis
5. Blood for leptospiral antibody
6. Dengue NS1 antigen or IgM, IgG antibody assessment.

Patients were managed conservatively or by hemodialysis depending on indication. Indications for hemodialysis include hyperkalemia, anuria, fluid overload not responding to conservative therapy, pulmonary edema, metabolic acidosis and various uraemic conditions like uremic gastritis, uremic pericarditis and encephalopathy. Investigations were performed from day 1 to day 6. Day 1 indicates the tests done on the day of admission, Day 6 is on the day of discharge and remaining day 2 to day 5 include tests done during the hospital stay. Based on the outcome, AKI patients are divided as improved (I) whose renal function completely improved without any residual defects, (II) partially improved (PI) as those who didn't recover completely and are with residual defects in renal function without requiring any active intervention and lastly, (III) as died for those who didn't survive.

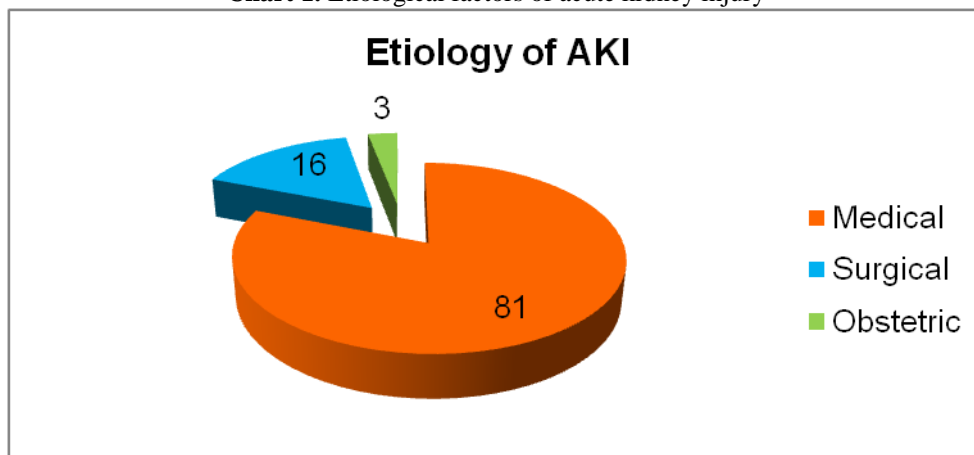
Statistical analysis: Statistical analysis was done as number, percentages, mean, standard deviation. The statistical software GraphpadInstat was used. The qualitative variables were compared using chi-square test. The p value < 0.05 was considered as significant.

III. Result

This study has been conducted on 100 Acute Kidney Injury patients, in government General Hospital, Rangaraya Medical College, Kakinada for a period of one and half year.

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Chart 1. Etiological factors of acute kidney injury



Among Medical etiologies, sepsis, acute gastroenteritis and heart failure were predominantly diagnosed. 17% were sepsis, 10% Acute gastroenteritis, 10% heart failure, 7% were malaria. Dengue, pyleonephritis and UTI constituted of 6% of the cases each, followed by pneumonia with sepsis that constituted

5% . 3% of the cases are snake bite related AKI, Leptospirosis and Hepatorenal syndrome, each. The remaining cases are due to viral fever, Systemic Lupus Erythematosus, Liver abscess, Acute pancreatitis and meningitis, constituting 1 case each.

Out of 16 cases related to surgical aetiology, 7 cases were cellulitis with septicaemia, 4 cases were due to calculus related obstructive uropathy, 1 case was due to intestinal perforation, 1 was due to intestinal obstruction, 1 was due to gangrene, 1 was due to Psoas Abscess, 1 was due to gangrene and 1 was due to scrotal abscess.

3 patients of AKI were caused by obstetric aetiology, among them 1 patient was due to post partum sepsis, 1 was Carcinoma cervix with obstructive uropathy and 1 was due to postpartum hemorrhage with shock (Table 3 & Chart.1,2,3,4).

Table 3. Etiological factors of Acute Kidney Injury patients

S.No.	Etiologies	No. of patients	Percentage
Medical causes			
1	Septicemia	17	17%
2	Acute Gastroenteritis	10	10%
3	Heart failure	10	10%
4	Malaria	7	7%
5	Dengue	6	6%
6	Pyelonephritis	6	6%
7	UTI	6	6%
8	Pneumonia with sepsis	5	5%
9	Snake bite	3	3%
10	Leptospirosis	3	3%
11	Hepato renal syndrome	3	3%
12	SLE	1	1%
13	Viral Fever	1	1%
14	Acute Pancreatitis	1	1%
15	Meningitis	1	1%
16	Liver abscess	1	1%
Surgical causes			
1	Cellulitis	7	7%
2	Calculus obstructive uropathy	4	4%
3	Gangrene	1	1%
4	Psoas abscess	1	1%
5	Scrotal abscess	1	1%
6	Intestinal obstruction	1	1%
7	Intestinal perforation	1	1%
Obstetric causes			
1	Post partum sepsis	1	1%
2	CA cervix with obstructive uropathy	1	1%
3	PPH with shock	1	1%

Chart 2. Showing Medical causes of AKI

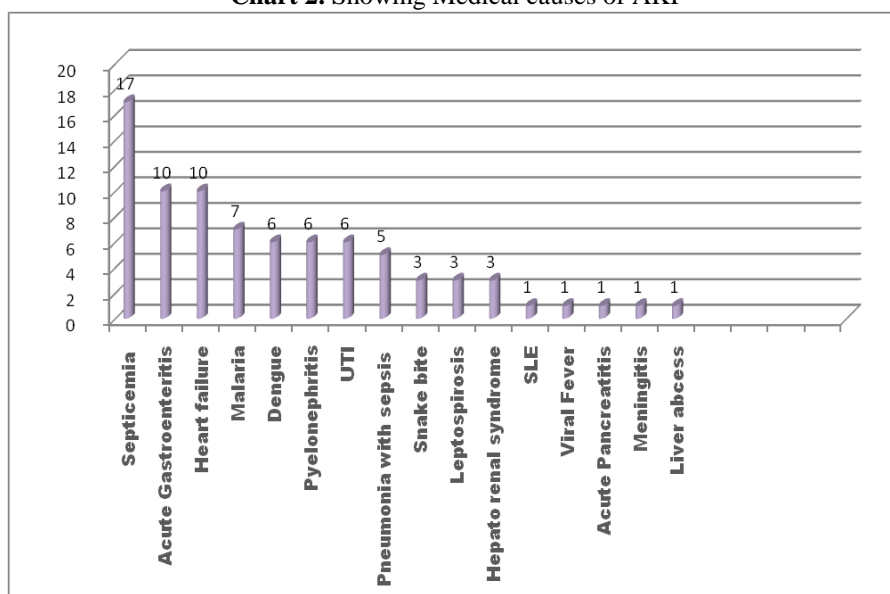


Chart 3. Surgical causes of AKI

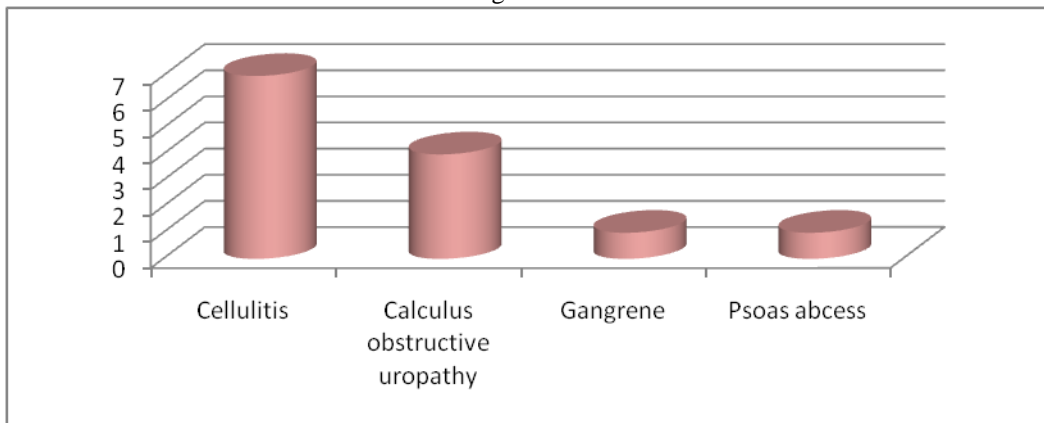
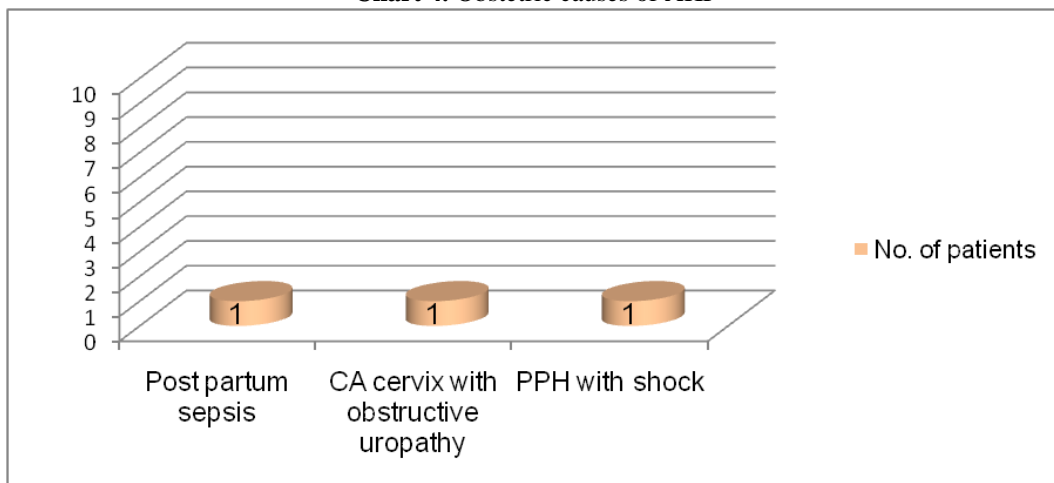
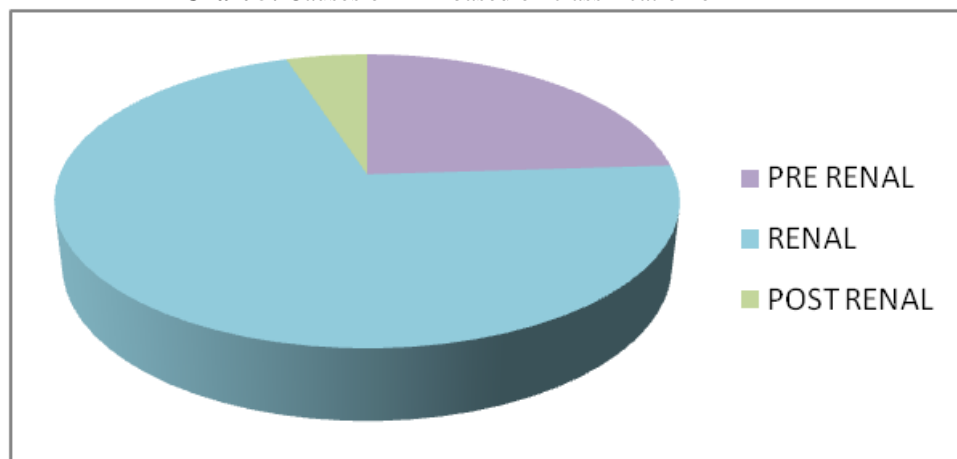


Chart 4. Obstetric causes of AKI



Among all the 100 cases, 24% were pre renal causes, 5% were post renal causes and the remaining 71% of the cases are due to intrinsic renal causes.(Chart 5)

Chart 5: Causes of AKI based on classification of AKI



IV. Discussion

This study conducted for a period of one and half year (December 2016 to September 2018) at Department of General Medicine, Government General Hospital, Kakinada, Andhra Pradesh among acute kidney injury patients. In this study etiological factors of Acute Kidney Injury patients were assessed. The results obtained during the study were analyzed and compared with other studies.

In the present study, predominantly medical conditions caused AKI among patients. Out of 100 AKI patients, 81 were due to medical etiologies, 16 were surgical and remaining 3 cases were due to obstetrical causes.

Among Medical aetiologies, sepsis was most common (17%) , followed by Acute gastroenteritis(10%), heart failure(10%), malaria(7%), dengue(6%), pyelonephritis(6%), UTI(6%), pneumonia(5%), snake bite(3%), leptospirosis(3%), Hepatorenalsyndrome(3%), viral fever(1%), meningitis(1%), acute pancreatitis(1%), SLE(1%), Liver abcess(1%) as per this study.

Out of 16 cases related to surgical aetiology, 7 cases were cellulitis with septicaemia, 4 cases are due to calculus obstructive uropathy, 1 case is due to gangrene, 1 case due to psoas abcess, 1 case due to scrotal abcess, 1 case due to intestinal obstruction and 1 case due to intestinal perforation in this study.

3 patients of AKI were caused by obstetric aetiology, among them 1 was due to postpartum sepsis, 1 was Carcinoma cervix with obstructive uropathy and 1 was due to postpartum hemorrhage with shock in this study.

Javier Enrique Cely et al [11] reported bacterial infection in 35.9% of AKI patients, 34.4% of sepsis, 3.1% nephrotic syndrome, 26.6% cardiovascular disease, 9.4% of COPD, endocrine disease, venous thromboembolism each as the primary diagnosis at admission.

Yong Mao et al [12] documented most of the patients were diagnosed with sepsis (40.2%) on ICU admission and AKI was found to be significantly associated with sepsis. Moreover, gastrointestinal and malignancies diagnosis on ICU admission were prominent among patients with AKI.

Table 20.AKI etiologies observed by various studies

Studies	Medical causes	Surgical causes	Obstetric causes
Prakash et al [13]	72%	28%	0
Sirwal IA et al [14]	78.6%	14.4%	7%
Chug KS et al [10]	61%	30%	9%
Ramachandran et al [15]	74%	15%	6%
James Kaufmann et al [16]	83%	17%	0
Present study	81%	16%	3%

Sirwal IA et al [14] documented 78.6% of medical etiologies, 14.4% of surgical etiologies and 7% of obstetric etiologies responsible for Acute Kidney injury which is similar to this study.

James Kaufman et al [16] didn't observe any of obstetric etiologies related to Acute Kidney Injury, reported 83% of medical etiologies and 17% surgical causes, similar to this study.

Prakash et al [13] reported 72% of medical causes and 28% of obstetric causes in similar to the present study.

Chug KS et al [10] observed AKI etiologies - medical causes as 61%, surgical causes 30% and obstetric causes 9%.

Ramachandran et al [15] stated etiological factors responsible for AKI as 74% Medical causes, 15% surgical causes and 6% obstetric causes.

Sirwal IA et al [14], James Kaufman et al [16] documented acute gastroenteritis was the leading cause among medical etiologies.

Hui-Stickle S at al [17] documented that nephrotoxic drugs were the most common cause of AKI in older children and adolescents, while ischemic was the most common etiology in ≤ 5 years patients.

Prakash et al [18] and Jayakumar et al [19] did a study on AKI from eastern India & South India respectively, documented that among the medical causes of AKI acute diarrhoeal disease was the most common.

V. Conclusion

This is a Prospective study which was done at Department of General Medicine, Rangaraya Medical College, Kakinada, included a total of 100 patients admitted with acute kidney injury.

Out of 100 AKI patients, 81 were due to medical etiologies, 16 were surgical and remaining 3 cases were due to obstetrical causes.

- Among medical aetiologies, sepsis, acute gastroenteritis and heart failure were predominantly diagnosed.
- Out of 16 cases related to surgical aetiology, 7 cases were due to cellulitis, 4 cases were due to obstructive uropathy due to calculus and 1 case was due to intestinal perforation, intestinal obstruction, gangrene, psoas and scrotal abcess,each.
- 3 patients of AKI were caused by obstetric aetiology, among them 1 patient was due to post partum sepsis, 1 was CA cervix with obstructive uropathy and 1 was due to postpartum hemorrhage with shock.

Out of 100 AKI patients, 81 were due to medical etiologies, 16 were surgical and remaining 3 cases were due to obstetrical causes. AKI was predominantly caused by sepsis , heart failure and acute gastroenteritis

AKI is a common condition in the hospitalized patients which is reversible. Early diagnosis of AKI helps to halt its progression during an early stage and to start appropriate therapeutic interventions to improve the patient outcome.

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