

Original Research Article

To Study Clinical Profile of Acute Renal Failure - A Retrospective Analysis

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ABSTRACT

Background & objective: The purpose of this study was to study the epidemiological and clinical profile of patients with ARF along with morbidity and mortality and outcome with hemodialysis.

Materials & methods: A total of 100 patients were looked in our study. Patients were admitted to Krishna hospital in wards and ICU and having serum creatinine level more than 0.5MG/DL than the baseline level without any history of having chronic kidney disease, obstructive uropathy (calculi, tumours) hypertension, diabetes, congenital renal anomalies or on any known nephrotoxic drugs.

Results and conclusion: ARF most commonly occurs in the age group of more than 45 years. Pre-renal and renal types of ARF occur in majority (88%) of patients. Septicemia and Acute gastroenteritis constitute more than 50% causes of acute renal failure. Other causes of Acute renal failure are diverse and include post infectious glomerulonephritis malaria, hepatorenal syndrome, compound poisoning vasculotoxic snake bite etc. Vomiting and Oliguria are the predominant symptoms in acute renal failure. Symptoms are thus non specific, related to the existing medical condition and a high index of suspicion and early monitoring of blood urea and serum creatinine is important to identify ARF. The presence of fever indicates an infective condition predisposing to ARF. Hypotension, Encephalopathy, Hyperkalemia, Pulmonary edema, Metabolic acidosis and Multiorgan dysfunction are common complications encountered in acute renal failure. Mortality in ARF is 15%. Mortality is greatly influenced by the primary disease responsible for ARF. We observed that early diagnosis and early intervention were probably responsible for good survival rate. 78% of patients can be managed conservatively and 22% patients require hemodialysis. Patient requiring haemodialysis had a poor outcome as compared to those who were managed by conservative treatment.

Key words: Acute renal failure, Blood urea, creatinine, Septicemia, Dialysis, Chronic kidney disease

INTRODUCTION

Acute Renal Failure or acute kidney injury (AKI), is a syndrome characterized by rapid decline in glomerular filtration rate (hours - day) and retention of nitrogenous waste products such as blood urea, nitrogen and creatinine and perturbation of extra cellular fluid

volume and electrolyte and acid-base homeostasis.

It is a common complication of critical illness, which is associated with high mortality and is an independent risk factor for mortality other than the primary etiology.

A strict definition of ARF/AKI is yet lacking though the diagnostic criteria include-

1. Increase in serum creatinine level of 0.5mg/dl,
2. A 50 percent increase in serum creatine level above baseline,
3. A 50 percent decrease in glomerular filtration rate (GFR),
4. Urinary output of less than 400 ml in 24 hrs in a patient without any pre morbid conditions.

Acute renal failure can be present in 15-20 percent of all hospital admissions the mortality of which can be as high as 30-40 percent. Acute renal failure can be identified by an appropriate history, physical examination and few laboratory tests. ARF can be better classified into three types

- a) Prerenal b)Intrarenal c)Postrenal.

Out of which 60-70 percent accounts for prerenal causes. The most common causes of ARF are; volume depletion, hypotension, aminoglycoside antibiotics and radiocontrast agents. Major surgery is also an important cause of ARF. Advanced age, liver diseases, underlying renal insufficiency and diabetes have been implicated as risk factors for the development of ARF. [1]

Management of ARF includes appropriate fluid, electrolyte replacement, and use of appropriate drugs, avoidance of nephrotoxic drugs and toxins, haemodialysis and in rare cases may require renal transplant.

Aims and Objectives: This study is done to analyse the common causes and clinical manifestation of acute renal failure in hospitalized patient done at a teaching institute of Krishna Hospital, Karad.

1. To study the epidemiological profile of patients with acute renal failure.
2. To identify disease and conditions that result in acute renal failure.

3. To study the clinical profile and complications encountered in patients of ARF.
4. To study the incidence and need for haemodialysis.
5. To study mortality and morbidity due to acute renal failure.

MATERIALS AND METHODS

Those patient who were admitted to Krishna hospital in wards and ICU and having serum creatinine level more than 0.5MG/DL than the baseline level without any history of having chronic kidney disease, obstructive uropathy (calculi, tumours) hypertension, diabetes, congenital renal anomalies or on any known nephrotoxic drugs.

Inclusion Criteria:

Study Group-

1. Patients who were admitted in our hospitals and with serum creatinine level more than 0.5mg/dl than baseline level were included in this study.
2. Patients who had 50 percent increase in serum creatinine level above baseline.
3. Patients who had 50 percent decrease in glomerular filtration rate (GFR).
4. Also if there was Urinary output of less than 400 ml in 24 hrs in a patient without any premorbid conditions.

Control Group-

1. Patients who had serum creatinine level within normal limits with no premorbidities.

Exclusion Criteria: Patients who had following diseases were excluded

1. Chronic kidney disease (CKD).
2. Hypertension.
3. Diabetes mellitus type ii.
4. Obstructive uropathy.
5. Renal calculi, renal malignancies, tumours.
6. Patients on known nephrotoxic drugs.

7. Patients with congenital renal anomalies.

Methodology

Detail history of the concerned subject was taken either from the patient or nearby relative. The complete procedure was explained, all doubts if any were cleared. Subject was then completely examined and all the inclusion criteria were carefully watched. Patient was evaluated after laboratory investigations and all the deranged parameters if any were carefully monitored. Patient serum creatinine levels were then look for on the day of admission, which was measured by modified “Jaffe method” in our institution, which is equivalent to criteria met by international standards, while serum urea was measured by modified G-LDH method in an automated analyser as per the international standards. [1] Ethical clearance was obtained from institution.

RESULTS AND ANALYSIS

A total number of 100 cases of acute renal failure patients, admitted to Krishna institute of Medical Science, Karad, who met the inclusion criteria, were studied.

In table no 1 and 2 showed male to female distribution of 56% and 46% with mean age of 59.2 years with maximum number of patients in > 65 years

Table number 3 shows maximal mortality in patients with age of more than >65 years that is 40%.

Table number 4 shows oliguria(50%) as the most common sign and vomiting(65%) as the most common symptom.

Table 5 shows that septicemia(34%) is the most common cause of ARF in ours study.

Table 6 shows that hypotension (52%) was the commonest complication of ARF.

Table 7 shows that 78 % patients were managed conservatively while 22% required dialysis.

Table 8 and 9 showed that out of 78 patients managed conservatively only 6(6.6%) had mortality. In contrast out of 22 patients with hemodialysis 9 (39.5%) patients succumbed to illness.

Table 1: Demographic distribution

Study series	MALES %	FEMALES%	MEANage group
Present study	56%	44%	59.2

Table 2: Age Incidence in the study :

Age group	No. of patients	% of total
<24	2	2%
25-34	3	3%
35-44	9	9%
45-54	12	12%
55-64	26	26%
>65	48	48%
Total	100	100%

Table 3: Comparison of Mortality with age

Age group	No. of patients	% of total
<24	0	0%
25-34	0	0%
35-44	2	14%
45-54	3	20%
55-64	4	26%
>65	6	40%
Total	15	100%

Table 4: Clinical presentation of cases

Symptoms and signs	Number of cases	Percentage
Vomiting	65	65%
Oliguria	50	50%
Fatigue	42	42%
Fever	53	53%
Loose stools	28	28%
Jaundice	24	24%
Polyuria	4	4%
Dyspnea	46	46%

Table 5: Medical causes in present study

Cause	Number of cases	Percentage
Septicemia	34	34%
AGE	28	28%
Glomerulonephritis	11	11%
Ascites and hepatorenal	9	9%
Malaria	7	7%
Snake bite	5	5%
Compound poisoning	5	5%
Dengue/ Leptospirosis	1	1%

Table 6: Complications of acute renal failure in the study

Complications :	No. of patients	Percent %
Hypotension	52	52%
Encephalopathy	30	30%
Pulm. Oedema	30	30%
Mods	24	24%
Metaboloic Acidosis	22	22%
Hyperkalemia	20	20%

Table 7: Management of acute renal failure in present study

Total patients	Conservative management	Haemodialysis
100	78	22

Table 8: Outcome of patient managed conservatively in this study

	Conservative management	Percentage
Survived	72	93.5%
Mortality	6	6.5%
Total	78	100%

Table 9: Outcome of patients managed by hemodialysis in this study

	Hemodialysis	Percentage
Survive	13	59.5%
Mortality	9	39.5%
Total	22	100%

Table 10: Total Outcome

Outcome	No.of patients	Percentage
Survived	85	85 %
Expired	15	15 %

DISCUSSION

A total number of 100 cases of acute renal failure patients, admitted to Krishna institute of Medical Science, Karad, who met the inclusion criteria were studied.

1. Sex incidence: Out of 100 cases studied, 56 (56%) patients were males and 44(44%) were females. Out of these 44 females 2 females had ARF due to post partum hemorrhage & aseptic abortion. In males most of the patient had ARF due to septicemia, secondary to primary diseases. Multifactorial etiologies are seen in some patient. Our study does show any sex preponderance.

This sex ratio is similar to *Baslov and Jorgensen et al* [2] whose study showed a prevalence of ARF in males to be 5% greater than females.

2. Age Incidence: Age ranged from 20 to 65 years with mean age of 52.4. These patients are divided into six age groups. In this study maximum patients were >65 age group.

There were 2 cases in the age group of <24 (2%).

There were 3 cases in the age group of 25-34 (3%).

There were 9 cases in the age group of 35-44 (7%).

There were 12 cases in the age group of 45-54 (12%).

There were 26 cases in the age group of 55-64 (26%).

There were 48 cases in the age group of >65 (48%).

In review of 499 cases, *Baslov and Jorgensen* [2] have observed that maximum cases 60% were above 60 years.

3. Mortality and age: In our present study it has shown that mortality increases as age progresses. In our study higher mortality was observed in patients with age group above 65 years.

In a review of 499 cases *Baslov and Jorgensen* [2] has observed that mortality increase in older age.

Swann and Merrill [3] have found mortality of 60% in patients above 60 years of age.

Turney et al [4] has also similar findings.

Table comparing mortality percent of different studies above 65 yrs of age:

Mortality percentage above 65 years of age

STUDY	PERCENT
PRESENT STUDY	40 %
BASLOV JORGENSEN et .al	52 %
SWANN MERILL et.al	60%

4. Clinical presentation of patients of ARF:

Out of 100 cases we observed 65% have vomiting, 50% were oliguric, 42% patients give history of fatigue, fever was seen in 53% of cases, dyspnea was one of the common symptoms observed in 46% of patients.

A study of common symptoms and signs were made, we noted that vomiting and oliguria were most common symptoms comprising of 65% and 50% respectively.

Findings are comparable other studies done by *Singhal AS et al* [5] which also showed that oliguria was seen in 85.2% of patients and that 80% patients had vomiting.

J. Prakash et al [6] has 65.2% patients who were oliguric. In the present study, fever was seen in 53% of patients. However, this symptom was not observed in other studies. This could be explained by higher incidence of ARF associated

with septicemia, malaria, leptospirosis in the present study. Dyspnea was seen in 46% of cases which is not seen any other studies, it is because of pulmonary edema and other associated illness like COPD, pneumonitis, anemia, sepsis, and associated premorbid conditions of primary illness.

Comparative studies showing signs and symptoms:

Signs and symptoms	Present Study	Singhal AS et al
Vomiting	65%	85.2%
Oliguria	50%	80%
Fever	53%	-
Fatigue	42%	46%
Loose stools	28%	24%
Jaundice	24%	20%
Dyspnea	46%	-

Medical causes of acute renal failure:

The following are comparable studies tabulated below:

Medical cause	Present study	Singhal AS et al
Septicaemia	34%	16%
Acute GE	28%	12%
Glomerulonephritis	11%	-
Hepatorenal syndrome & Ascites	9%	-
Malaria	7%	34%
Snake bite	5%	20%
Toxins and poisons	5%	-
Lepto/dengue	1%	-

In our present study -

- 1) Septicemia was the dominant cause of ARF. Out of 100 cases 34 cases were diagnosed to be in septicemia. Out of the 34 cases 16 cases were associated with GI sepsis (acute appendicitis, pancreatitis, subacute intestinal obstruction, peritonitis, cholecystitis), 10 cases were associated with extension pneumonitis, 2 cases associated with meningitis, 2 cases were associated with postpartum hemorrhage and abortions. The rest 4 cases were associated with hepatorenal dysfunction. In our study there were 2 cases of postpartum hemorrhage with aseptic abortion both the patients were treated conservatively. *Goplani et al* [7] in their study shows mean age of patient with pregnancy related ARF was 25.6 years. The youngest patient was 20

years old and eldest was 35 year old. In 61.42% patients puerperal sepsis was the most common etiological factor leading to ARF, while 32.85% of patients had DIC. Hemorrhage as an etiology for ARF was present in 38.5% of patients. APH in 14.28% and PPH in 24.28% of patients. Preeclampsia, eclampsia and HELLP syndrome accounted for 28.57% of patients with pregnancy related ARF. Post abortal sepsis as a precipitating event for ARF was present in 20% of the patients.

- 2) AGE – Acute gastroenteritis was seen in 28% of patients. Most of these patients had severe dehydration on admission and hypotension was present in most of the patients. All these patients were treated conservatively and resume normal renal function.
- 3) Acute glomerulonephritis was seen in 11% of the patients. It was proved with urine routine microscopy, urine culture and sensitivity, routine abdominal ultrasound, as well as low serum complement along with ASO title. Out of the 11 cases 4 were associated with septicemia out of which 2 were recovered by conservative management while 2 required haemodialysis and higher antibiotic cover.
- 4) Malaria - Out of the 100 patients 7 were diagnosed to be suffering from malaria. Out of which 2 cases of mixed malaria (P.vivax+P.falciparum) 1 case of P. vivax and 4 cases of P.falciparum. Prakash J et al [7] in their study of acute renal failure 15% of patients had P.vivax, 11% were having mixed picture and 80% had P.falciparum.

- 5) *Singhal AS et al* in their study had found 16% patients of mixed malaria 4% had *P.falciparum*.

Studies	Malaria	Falciparum Malaria	Vivax malaria	Both
Present study	7%	70%	10%	20%
Prakash Jet al	15%	80%	11.7%	-
SinghalAS etal	16%	80%	20%	-

- 6) Hepatorenal syndrome and alcohol liver disease: It can be defined as sudden deterioration of renal functions secondary to liver pathology (cirrhosis, fulminant hepatic failure). In our study about 9 cases were of acute renal failure secondarily to hepatic derangement. Out of the 9 cases, 4 patient expired which were also accompanied by sepsis 2 required haemodialysis while 3 were managed by conservative treatment like diuretics, IV albumin and paracentesis.
- 7) Compound poison and toxins: In our study of 100 patients 5 cases were found in ARF secondarily to compound poisoning and toxins consumption. Of the 5 cases, 3 cases were managed conservatively, 1 patient expired

while 1 patient required haemodialysis. Out of the 5 cases 4 cases were of organophosphorus poisoning, while 1 case was related with 2, 4 diaminoether (herbicidal).

- 8) Vasculotoxic snake bite: Snake bite is a common cause of hospital admissions in our hospital. Out of the many cases admitted 5 of them were observed to be in renal failure. All of them were given antsnake venom while 3 of them were managed conservatively, 2 of them required haemodialysis.
- 9) Leptospirosis: In our study of 100 cases, 1 patient was found to be having ARF secondary to leptospirosis. Patient was oligouric since presentation, however responded well to conservative management. Non oliguric ARF more common in leptospirosis than oliguric.

Rasmussen et al [8] also had equal incidence of oliguric and non oliguric renal failure.

J.Prakash et al studied had showed that almost 66% of patients with ARF were oliguric while the rest 34% were non oliguric.

Complications of acute renal failure:

Complications	Present study	<i>J Prakash et al</i>	<i>Rasmussen et al</i> ⁸
Hypotension	52%	65.2%	56%
Encephalopathy	30%	28%	33%
Pulm. Oedema	30%	-	-
Mods	24%	32%	29%
Metaboloic Acidosis	22%	-	-
Hyperkalemia	20%	26%	18%

Hypotension was present in 52 patients of our study. Out of which 26 patients were in sepsis, 16 patients were in AGE, 5 patients in hepatorenal syndrome, 2 were of snake bite and malaria and 1 of leptospirosis.

Encephalopathy was seen in about 30 patients.

Hyperkalemia was seen in 20 %of patients. It was defined as serum

potassium above 5.5 mEq/L. Anemia was seen in 30% of patients.

Multiorgan dysfunction syndrome can (MODS) defined as failure of more than one organ requiring intervention to maintain homeostasis was seen in 24% of patients.

Myer et al [9] reported mortality rates of almost 89% when more than 2 systems are involved.

J. Prakash et al reported mortality of 100% when more than 3 systems are involved.

Metabolic acidosis was seen in 22 % of patients.

Pulmonary oedema and signs of fluid overload were seen in 30% of patient .Other signs of fluid overload were raised J.V.P., dependent oedema, weight gain. Convulsions were noted in 2 patients due to hyponatremia which was treated with normal saline.

Management of acute renal failure

	Conservatively management	Haemodialysis
Present study	78 %	22 %
Hakim et al	74 %	26 %
Bernieh et al	58 %	42 %

Among 100 cases, 78 patients were managed conservatively while 22 patients underwent haemodialysis. Among 78 patients managed conservatively 6 patients died, whereas 9 patients died who had undergone haemodialysis. The survival rate among patients managed conservatively was 93.58%. The survival rate among patient underwent haemodialysis was 60.33% .Conservative management includes early detection and prompt initiation of treatment. It includes fluid replacement, diuretics, good antibiotic cover.

Most of the patients who had died were in septicemia along with associated complications like respiratory failure, multiple organ dysfunctions.

In our present study, good results were obtained with conservative management of the 6 patients who died on conservative management , 4 patients belonged to sepsis with associated complications, 1 patient was of organophosphorus poisoning, 1 patient was an elderly patient with severe dehydration and acute gastroenteritis.

Our studies were comparable to the study done by **HAKIM AL et al**,^[10] which observed that out of 100 cases 74 % were managed conservatively while 26% required haemodialysis.

However Hakim AL et al, in his study also observed that patient managed conservatively had survival rate of 58 % while those on haemodialysis had a survival rate of 48 %.

The major risk factors affecting prognosis of the patients were presence of multiorgan failure, high baseline serum creatinine level and complications developed during the course of illness. In the present study mortality was seen among the patients with high serum creatinine levels as compared to survived patients. Mortality was also comparatively lower in patients who were managed conservatively than in those patients requiring haemodialysis.

Overall mortality in our study was around 15%. The most important cause among which was septicemia with its related complications. As compared to other studies mortality in our study was significantly low because of prompt diagnosis and treatment, while death in our study was importantly because of the primary illness and associated complications.

Outcome of the disease:

Outcome	No. of patients	Percentage
Survived	85	85 %
Expired	15	15 %

Follow up was done for all patients of ARF till their serum creatinine became normal or they were symptomatically better. Course of stay in hospital and outcome was variable.

In our present study of 100 cases, 85 patients survived while 15 patients expired. Out of the 15 patients who survived 9 cases were males while 6 were females.

Age group which had the highest mortality was all above 65 yrs of age. Mean age of the recovered patients was 48.33 while mean age of expired patients was 59.33.

Out of the 15 cases which expired 9 cases (60%) were in septicemia. Out of the 9 cases, 4 cases were associated with

respiratory complications, 3 cases were associated with G.I. complications (pancreatitis, peritonitis, subacute intestinal obstruction), 2 cases were complicated with hepatorenal syndrome. However all the patients of septicemia were finally associated with multiorgan dysfunction (MODS).

Out of the other cases 4 belonged to Hepatorenal syndrome (26.6%). In this patients there was sudden deterioration of renal functions secondarily to primary pathology of liver i.e. cirrhosis, fulminant hepatic failure, infective hepatitis etc. These patients rarely responded to our conservative management and often required haemodialysis. Even after aggressive treatment outcome of these patients was very poor.

Out of the remaining cases one patient expired because of consumption of organophosphorus toxin. The patient had history of consumption of organophosphorus compound and although ARF part was managed conservatively patient succumbed to cardiorespiratory complications of the toxins.

There was one patient diagnosed with P.falciparum and had presented with thrombocytopenia, neurological complications as well deranged renal functions. Although the patient renal functions were significantly improved with haemodialysis the patient died because of the multi organ involvement and predominantly the respiratory pathology (ARDS).

Thus in our study 60 % of mortality was due to septicemia.

Prakash et al also reported evidence of septicemia to be as high as 69.2%.

SUMMARY & CONCLUSIONS

Following conclusions can be drawn from this prospective study of 100 patients with ARF diagnosed and managed in a Krishna hospital;

1. ARF most commonly occurs in the age group of more than 45 years.
2. Pre-renal and renal types of ARF occur in majority (88%) of patients.
3. Septicemia and Acute gastroenteritis constitute more than 50% causes of acute renal failure. Other causes of acute renal failure are diverse and include post infectious glomerulonephritis malaria, hepatorenal syndrome, compound poisoning vasculotoxic snake bite etc.
4. Vomiting and Oliguria are the predominant symptoms in acute renal failure. Symptoms are thus non specific, related to the existing medical condition and a high index of suspicion and early monitoring of blood urea and serum creatinine is important to identify ARF. The presence of fever indicates an infective condition predisposing to ARF.
5. Hypotension, Encephalopathy, Hyperkalemia, Pulmonary edema, Metabolic acidosis and Multiorgan dysfunction are common complications encountered in acute renal failure.
6. Mortality in ARF is 15%. Mortality is greatly influenced by the primary disease responsible for ARF. We observed that early diagnosis and early intervention were probably responsible for good survival rate.
7. 78% of patients can be managed conservatively and 22% patients require hemodialysis. Patient requiring haemodialysis had a poor outcome as compared to those who were managed by conservative treatment.

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