

# A Study on Clinical Profile of Acute Kidney Injury

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**Abstract-** Acute renal failure is a common clinical condition encountered in most of the hospitals.

This study is an attempt to evaluate the clinical profile of acute renal failure in 50 patients admitted in Osmania general hospital.

**Method-** This is a prospective study done in Osmania general hospital over a period of two years. It included 50 cases with clinical and laboratory evidence of acute renal failure.

**Results-** Out of 50 patients 32 were male and 18 female. Average age was 40.2 years. Oliguria and vomiting were common presenting features. Other common symptoms were fever, malaise, jaundice and diarrhoea. 42 cases had oliguric renal failure and 8 cases were non oliguric.

The aetiological factors are acute gastroenteritis, septicemia, malaria, leptospirosis, snake bite, toxic dye ingestion and congestive cardiac failure. Two patients had obstructive uropathy. In our study, 80% of the patients survived. 72% of patients were treated conservatively and 28% underwent dialysis.

**Index Terms-** Acute Kidney Injury; Pre Renal; Renal; Post Renal; Malaria; Septicemia.

## I. INTRODUCTION

Acute renal failure (ARF) is a protean syndrome of varied severity. It is characterized by a rapid (hours to weeks) decline in the glomerular filtration rate (GFR) and retention of nitrogenous waste products such as blood urea nitrogen (BUN) and creatinine.<sup>1,2</sup> ARF is not a single disease but, rather, a designation for a heterogeneous group of conditions that share common diagnostic features: specifically, an increase in the blood urea nitrogen (BUN) concentration and/or an increase in the plasma or serum creatinine (SCr) concentration, often associated with a reduction in urine volume. The alternative proposed term Acute kidney Injury (AKI) better captures the diverse nature of this syndrome.<sup>3,4,5,6,7</sup> In keeping with the spectrum of changes seen in AKI, a diagnostic classification scheme was developed. This scheme is referred to by the acronym RIFLE, and includes three levels of renal dysfunction of increasing severity, namely, Risk of renal dysfunction, Injury to the kidney and Failure of kidney function, and two outcome categories: Loss of function, and End stage kidney disease.

AKI complicates 5-7% of acute care hospital admissions and up to 30% of admissions to the intensive care unit. AKI is also a

major medical complication, particularly in the setting of diarrheal illnesses, infectious diseases like malaria and leptospirosis, and natural disasters such as earthquakes.<sup>8</sup>

## II. AETIOLOGY OF ACUTE KIDNEY INJURY<sup>9</sup>

- ❖ causes of ARF are generally divided into three major categories:
- ❖ Diseases that cause renal hypoperfusion, resulting in decreased function without frank parenchymal damage – **prerenal AKI**
- ❖ Diseases that directly involve the renal parenchyma – **intrinsic AKI**
- ❖ Diseases associated with urinary tract obstruction – **postrenal AKI**.

## III. PRERENAL ACUTE KIDNEY INJURY

Renal blood flow and glomerular filtration rate (GFR) are relatively constant over a wide range of renal perfusion pressures, a phenomenon termed autoregulation. This autoregulatory response normally renders an individual relatively resistant to prerenal forms of ARF; however, a marked decrease in renal perfusion pressure below the autoregulatory range can lead to an abrupt decrease in GFR and lead to AKI

## IV. POSTRENAL ACUTE KIDNEY INJURY

Obstruction of urine flow is generally considered a less common cause of ARF. In several series, obstructive uropathy is encountered in 2% to 10% of all cases in ARF.<sup>7,6,77</sup> The cause of obstruction of urine flow can be classified as intrarenal or extrarenal.

Analysis of urine and blood biochemistry is useful for differentiating between the major categories of oliguric AKI, namely prerenal AKI and intrinsic AKI caused by ischemia or nephrotoxins.

The fractional excretion of Na<sup>+</sup> (FENa) is the most sensitive index for this purpose. The FENa relates Na<sup>+</sup> clearance to creatinine clearance. The renal failure index provides comparable information, because clinical variations in serum Na<sup>+</sup> concentration are relatively small.<sup>10,11</sup>

Diagnostic Index	Prerenal Azotemia	Ischemic Intrinsic Azotemia
Fractional excretion of Na+ (%)	< 1	> 1
Urinary Na+ concentration (mEq/L)	< 10	> 20
Urinary creatinine/plasma creatinine ratio	> 40	< 20
Urinary urea nitrogen/plasma urea nitrogen Ratio	> 8	< 3
Urine specific gravity	> 1.018	< 1.012
Urine osmolality (mOsm/kg H <sub>2</sub> O)	> 500	< 250
Plasma BUN/creatinine ratio	> 20	< 10-15
Renal failure index,[*] UNa/Ucr/Pcr	< 1	>1
Urine sediment	Hyaline Casts	Muddy brown granular casts

### V. DIALYSIS<sup>9,15</sup>

In patients with acute renal failure, dialysis is used as an extension of the supportive measures. There is no evidence that dialysis shortens the course in acute renal failure. Dialysis may be hazardous because of the episode of hypotension and arrhythmias.

Dialysis is indicated if medical measures fail to prevent the following: @ Pulmonary oedema,Hyperkalemia,Metabolic Acidosis,Signs and Symptoms of uraemia,Pericarditis

### VI. MATERIALS AND METHODS

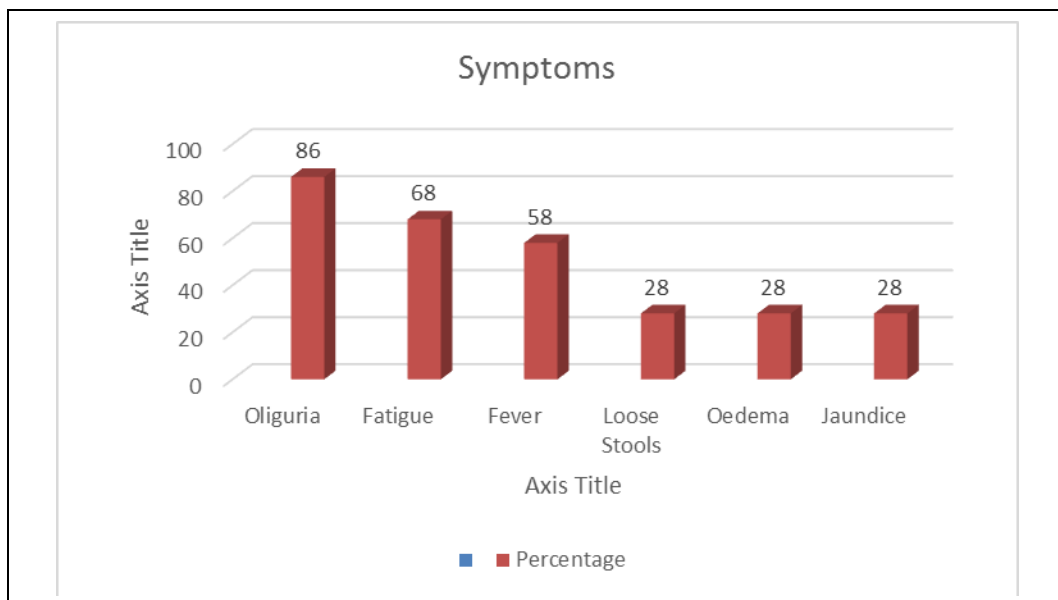
This a prospective study of 50 patients of acute renal failure admitted to Osmania General Hospital from October 2009 to October 2011. All patients with clinical and biochemical evidence of acute renal failure according to RIFLE criteria were

included in the study. Patients with chronic renal disease and aged below 12 years were excluded. Detailed history was recorded, general physical examination, systemic examination was done and necessary investigations were done. All the patients were followed up till time of discharge.

### VII. RESULTS AND ANALYSIS

Out of 50 cases studied, 32(64%) patient were male and 18(36%) were female.Their age ranged from 16-80 years with mean age of 40.72 years. The ratio of Male: Female was 1.8:1. The maximum incidence was seen in the age group between 21 to 30 years.

Out of 50 cases, 43(86%) patients had oliguria, 40(80%) had vomiting, 34(68%) patients had history of fatigue. Fever was seen in 29(58%) cases and 14(28%) patient had loose stools.



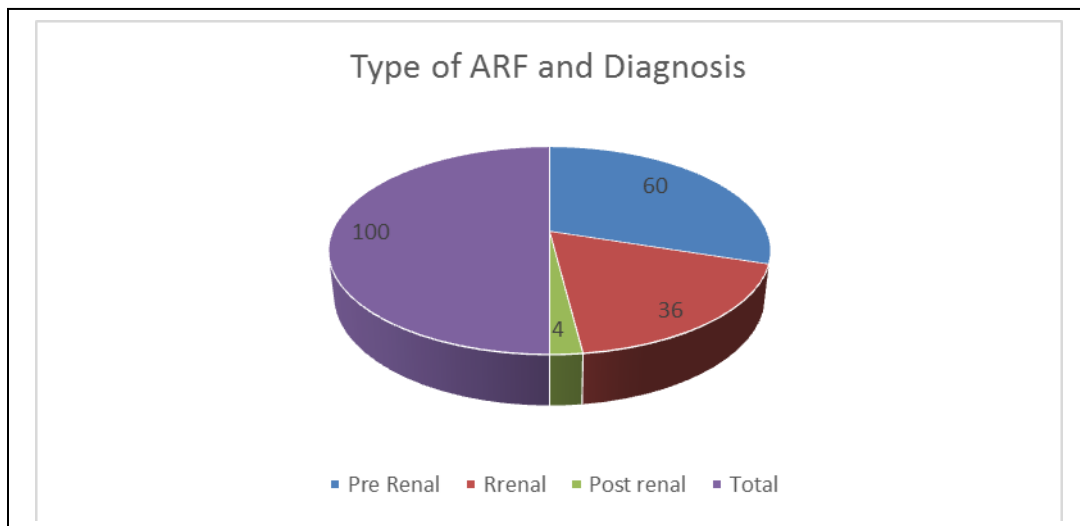
Out of total number of patients studied 15(30%) patients had hypotension, 14(28%) patients had oedema, 14(28%) had icterus.

84% had oliguria and 16% were non-oliguric on general physical examination. Out of 50 patients, 6(12%) patients had history of diabetes mellitus and 8(16%) patients had hypertension.

### VIII. TYPE OF ACUTE KIDNEY INJURY

Out of 50 cases. Prerenal ARF was seen in 30(60%) patients, 18(36%) patients had renal ARF and 2(4%) had post renal ARF.

Type of ARF	Number	Percentage
Pre Renal	30	60
Renal	18	36
Post renal	2	4
Total	50	100



Out of 50 patients studied, 30 had pre renal AKI, of which 14(28%) patients had acute Gastro enteritis, 5(10%) had Malaria and 3(6%) had AKI following septicaemia. One patient had congestive heart failure and one had acute pancreatitis.

Out of 50 cases, 38 cases had renal cause of which, Malaria was seen in 3(6%), 2(4%) had nephrotoxic AKI (herbal medicine induced), 3(6%) had septicemia, 1(2%) had acute glomerulonephritis, 2(4%) had snakebite and 1(2%) had RPGN and 3(6%) patients had toxic hair dye (super vasmol) ingestion. Out of 50 cases 2(4%) patients had AKI following bladder outlet obstruction.

Out of 50 cases, 36(72%) patients were managed conservatively and 14(28%) patients underwent haemodialysis

Out of 50 cases studied, 40(80%) patients survived. Mortality was seen in 10(20%) patients. Among the patients managed conservatively 3 patient died and of those who underwent haemodialysis, seven patients died. The major risk factors affecting prognosis of the patients were presence of multi organ failure, high baseline serum creatinine level, and complications developed during the course of illness.

### IX. DISCUSSION

In the present study, age of the patients ranged from 16 to 80 years with mean age of 40.72 years. There were 32(64%) were males and 18(36%) were females. Bernich B et al., in their study of pattern of acute renal failure, found that 58% were males and 36% were females. Mean age of these patients was 56.2 years.<sup>12</sup> Ravindra L Mehta et al., in their study had 41% females and 59% males. Mean age of these patients was 59.5 years.<sup>16</sup>

We noted that, vomiting and oliguria were most common symptoms comprising 86% and 80% respectively. This finding is comparable with other studies done by Singhal AS et al<sup>22</sup>, which showed that oliguria was seen in 85.2% patients and 80% had vomiting. In the present study, hypotension was seen in 30% of patients. This was comparable with other studies done by Liano F et al.<sup>23</sup>, where hypotension was seen in 32.8% of patients

In the present study, 30(60%) had AKI due to pre renal cause. Majority of patients had gastroenteritis 14(28%). Other common presentation were malaria 7(14%), sepsis 9(18%), snakebite 3(6%), obstetric causes 4(8%), toxic hair dye ingestion 3(6%) and congestive cardiac failure 1(2%).

In the present study, acute gastroenteritis is the dominant cause of AKI. Most of these patients had severe dehydration. Hypotension was seen in some of the patients. Most of these patients were treated conservatively and resumed normal function. One patient required haemodialysis.

This is comparable to a study done by Ghayas Khan et al, where acute gastroenteritis was found to be the commonest cause of AKI accounting for 58.97% of cases in their study.<sup>24</sup>

Malaria is an important cause of ARF in the present study, of 50 cases 7(14%) patients had Malaria. Among this, falciparum malaria was seen in 5(71%) of patients and vivax malaria was seen in 2(29%) of patients. In the study of ARF by Prakash J et al., 15% patients had Malaria. Falciparum malaria and vivax malaria were responsible for ARF in 76(80.9%) and 11(11.7%) of the patients.

In the present study, about 2(4%) patients had obstructive uropathy. This was comparable to a study done by Singhal AS et al., in which 5% of patients had obstructive uropathy.<sup>22</sup>

Among 36 patients who were managed conservatively 3 died. In the present study, good results were obtained with conservative management. This was comparable to a study done by Hakim AL et al., in which 74% of patients were managed conservatively and 26% of patients underwent dialysis.

## X. CONCLUSIONS

It was observed that clinical features were almost in accordance with studies conducted earlier.

Oliguria and vomiting were found to be the predominant symptoms in acute renal failure.

Acute gastroenteritis was the predominant cause of acute renal failure and these patients were recovered with conservative management.

Other causes of renal failure in our study were similar to other studies like malaria and septicemia.

About 80% patients were survived. 20% of patients were treated conservatively and 28% patients underwent haemodialysis. We observed that early diagnosis and early intervention were probably responsible for good survival rate

## REFERENCES

- [1] Brady HR, Singer GG: Acute renal failure. *Lancet* 1995; 346:1533-1540.
- [2] Lameire N, Van Biesen W, Vanholder R: Acute renal failure. *Lancet* 2005; 365:417-430.
- [3] Lassnigg A, Schmidlin D, Mouhieddine M, et al: Minimal changes of serum creatinine predict prognosis in patients after cardiothoracic surgery: a prospective cohort study. *J Am Soc Nephrol* 2004; 15:1597-1605.
- [4] Thakar CV, Worley S, Arrigain S, et al: Influence of renal dysfunction on mortality after cardiac surgery: modifying effect of preoperative renal function. *Kidney Int* 2005; 67:1112-1119.
- [5] Hoste EA, Kellum JA: Acute renal failure in the critically ill: impact on morbidity and mortality. *Contrib Nephrol* 2004; 144:1-11.
- [6] Chertow GM, Levy EM, Hammermeister KE, et al: Independent association between acute renal failure and mortality following cardiac surgery. *Am J Med* 1998; 104:343-348.
- [7] Levy EM, Viscoli CM, Horwitz R: The effect of acute renal failure on mortality. A cohort analysis. *JAMA* 1996; 275:1489-1494.
- [8] Kasper DL, Braunwald E, Fauci AS, Hauser SL, Longo DL, Jameson JL, Loscalzo J. (2008). *Harrison's principles of internal medicine* (17th ed.).

New York: McGraw-Hill Medical Publishing Division. ISBN 9780071466332.

- [9] Brenner BM, Rector FC (2008), *Brenner & Rector's the kidney*, 8th Edition. University of Michigan, Saunders Elsevier; ISBN1416031057, 9781416031055
- [10] Miller TR, Anderson RJ, Linas SL, et al. Urinary diagnostic indices in acute renal failure: a prospective study. *Ann Intern Med.* 1978;89:47-50. [PubMed]
- [11] Espinel CH. The FENa test. Use in the differential diagnosis of acute renal failure. *Jama.* 1976;236:579-81. [PubMed]
- [12] Benrich B, et al Pattern of acute renal failure/Transplantations proceeding 2003;36:1780-9307-0.
- [13] Hou SH, Bushinsky DA, Wish JB, et al. Hospital-acquired renal insufficiency: a prospective study. *Am J Med* 1983;74:243.
- [14] Chapman ME, Reid JH. Use of percutaneous nephrostomy in malignant ureteric obstruction. *Br J Radiol* 1991;64:318.
- [15] Schrier, RW. *Diseases of the Kidney & Urinary Tract*, 8th Edition. Philadelphia, Pa, Lippincott Williams & Wilkins, 2006. ISBN-13 978-0-7817-9307-0.
- [16] Ravindra L Mehta, Maria T Pascual, Sharon Soroko, Brandon R Savage, Jonathan Himmelfarb, T Alp Ikizler, Emil P Paganini, Glenn M Chertow and for the program to improve care in Acute Renal Disease (Picard) *Kidney International* (2004) 66,1613-1621; doi:10.1111/j.1523-1755.2004.00927.x
- [17] Samimagham HR, Kheirkhah S, Haghighi A, Najmi Z. Acute kidney injury in intensive care unit: Incidence, risk factors and mortality rate. *Saudi J Kidney Dis Transpl* 2011;22:464-70
- [18] Rashed A, Abboud O, Addasi A, Taha M, El Sayed M, Ashour A. Acute Renal Failure: Six Months Pilot Study in Qatar. *Saudi J Kidney Dis Transpl* 1998;9:298-300
- [19] Issue Year : 2010, Issue Number: 4, Issue Month : December Written By : Ghayas Khan, Karamat Hussian, Shakeel Ahmed Mirza\*, Kamran Aziz, Abdul Rehman Belongs To : CMH Pano Aqil, \*MH Rawalpindi DISEASES CAUSING ACUTE RENAL FAILURE IN A TERTIARY CARE HOSPITAL
- [20] Prakash J, Zachee P. Acute renal failure in falciparum malaria. *Nephrology dialysis transplant* 1996; 11: 2414 - 2416.
- [21] *Transplant Proc.* 2004 Jul-Aug;36(6):1780-3. Pattern of acute renal failure in a tertiary hospital in the United Arab Emirates. Bernieh B, Al Hakim M, Boobes Y, Abuchacra S, Dastoor H.
- [22] Singal et al; clinical profile of acute renal failure *JAPI* 2002;50:71-73.
- [23] Lianof et al; Acute renal failure, *Kidney international* 1996 ;50:820-824.
- [24] Ghayas Khan, Karamat Hussian, Shakeel Ahmed Mirza\*, Kamran Aziz, Abdul Rehman diseases causing acute renal failure in tertiary care centre.

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