International Journal of Advances in Medicine
*Ananth PV et al. Int J Adv Med. 2018 Jun;5(3):630-633*
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20182114

**Original Research Article**

# Clinical profile and treatment outcome of acute kidney injury (AKI) in a tertiary care hospital

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**Received:** 22 February 2018
**Accepted:** 26 March 2018

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## ABSTRACT

**Background:** Acute Kidney Injury (AKI) is one of the major cause of in-hospital mortality rates globally. The current study was conducted to study the etiological profile, severity and management of acute kidney injury.
**Methods:** The study was a prospective observational study, conducted in the department general medicine, Dhanalakshmi Srinivasan Medical college and Hospital, Permabalur, Tamil Nadu. The study population included all the patients admitted to Intensive Care Unit (ICU) with acute Kidney injury (AKI) between January 2015 to December 2016. All the study participants were recruited to the study by convenient sampling. Descriptive analysis was carried out by frequency and proportion for categorical variables.
**Results:** A total of 100 subjects were included. Participants were almost uniformly distributed in each of a decadal age group till above 60 years. Males (57%) were slightly higher than females (43%). Oliguria was present in 88% of the study population. The most common etiology was acute diarrhoeal disease (44%), followed by multiple infections in 12% and Sepsis in 10% of the subjects. As per RIFLE criteria 46% participants were at risk, 26.0% had injury, 28% had failure. All at risk people were treated conservatively, among injury category, 38.5% were treated by haemodialysis and 3.84% by peritoneal dialysis. In failure group, 60.71% and 3.57% were treated by haemodialysis and peritoneal dialysis respectively.
**Conclusions:** Acute kidney Injury (AKI) can be a consequence of varied aetiologies and all the age groups and both the genders at risk of developing it. RIFLE criteria may be a useful tool in guiding the management.

**Keywords:** AKI, Acute kidney injury, RIFLE criteria

## INTRODUCTION

Acute Kidney Injury (AKI) has a constant role in increased ICU admissions and in-hospital mortality rates.

Globally, the incidence of AKI in hospitalized patients is ridging and it occurs at a rate of 21.6% among adults and 33.7% in children, in addition to its association with cusping of in-hospital mortality rates among adults and children (23.9% and 13.8% respectively).[1] The tendency of the disease to manifest at a later stage added to the poor recognition of the same and inadequacy of resources in developing countries makes AKI a greatest challenge to the health system of this set-up.

Of all the organ dysfunctions, the rank held by that of kidneys is unique with evidences from Acute Physiology and Chronic Health Evaluation (APACHE) scoring system and the Sequential Organ Failure Assessment (SOFA) system where increased credentials to renal dysfunction (20% and 16.6% respectively) has been allotted.[2,3]

There is heterogeneity in the pattern of AKI across distinct geographical regions with wide variability in the contributing factors like infections, sepsis, poisoning, drug related and other conditions. In addition to this, the availability of data related to this morbidity in the developing countries are dehiscent.

Despite the disparity of explicitness in the definitions for AKI, this hospital based study was undertaken by applying the RIFLE criteria, for identification of the disease prognosis, in addition to the hunt for various etiological factors.[4] In this reign of scientific research, our study might help bridge the gaps in knowledge about AKI especially in a resource limited setting.

Present study was undertaken to investigate about the etiological profile of acute kidney injury presenting to a tertiary care teaching hospital, to apply the RIFLE criteria in acute kidney injury patients admitted to the medical wards and to the significance and to study about the prognosis and outcomes of acute kidney injury

## METHODS

The study was a prospective observational study. The study was conducted in the department general medicine, Dhanalakshmi Srinivasan Medical college and Hospital, which is a tertiary care teaching hospital, Permabalur district, Tamilnadu in South India.

The study population included all the patients admitted to Intensive Care Unit (ICU) with acute Kidney injury (AKI) between January 2015 to December 2016. All the study participants were recruited to the study by convenient sampling.

All the study participants were evaluated by thorough clinical examination and appropriate laboratory investigations. The AKI was diagnosed if the patients had satisfied the either increase in creatinine value or decline in the urine output or both as per second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group criteria.[5] RIFLE criteria 4 were used to classify the patients into Risk, Injury and Failure categories.

The study was approved by Institutional ethics committee. Informed written consent was sought and obtained from all the participants and only those participants willing to provide written consent were included in the study. Descriptive analysis was carried out by frequency and proportion for categorical variables. IBM SPSS version 22 was used for statistical analysis.[6]

## RESULTS

The study had included a total of 100 patients diagnosed with AKI.

Among the study population, 17 (17.0%) participants were aged 13 to 20 years, 20 (20.0%) were aged 21 to 30 years, 12 (12.0%) were aged 31 to 40 years, 20 (20%) were aged 41to 50 years, 17 (17.0%) were aged 51 to 60, 14 (14.0%) were aged 60 and above. Among the study population male participants were 57 (57%) remaining 43 (43%) were female participants. Among the study population, 88 (88%) were oliguric remaining 12 (12%) were Non oliguric (Table 1).

**Table 1: Descriptive analysis of age group in study population (N=100).**

| Age | Frequency | Percentage |
|---|---|---|
| 13-20 | 17 | 17 |
| 21-30 | 20 | 20 |
| 31-40 | 12 | 12 |
| 41-50 | 20 | 20 |
| 51-60 | 17 | 17 |
| >60 | 14 | 14 |
| **Gender** | | |
| Male | 57 | 57 |
| Female | 43 | 43 |
| **Urine output** | | |
| Oliguric | 88 | 88 |
| Nonoilguric | 12 | 12 |

**Table 2: Etiology of acute kidney injury in study population (N=100).**

| Etiology | Males (N=55) | Females (N=45) | Total |
|---|---|---|---|
| Add | 23 (41.8%) | 21 (46.67%) | 44 (44%) |
| Sepsis | 6 (10.90%) | 4 (8.89%) | 10 (10%) |
| Malaria | 5 (9.09%) | 3 (6.67%) | 8 (8%) |
| Leptospirosis | 2 (3.63%) | 2 (4.44%) | 4 (4%) |
| Leptospirosis + Malaria+ Enteric fever | 8 (14.50%) | 4 (8.89%) | 12 (12%) |
| Poisoning | 6 (10.90%) | 2 (4.44%) | 8 (8%) |
| Glomerulonephritis | 0% | 5 (11.11%) | 5 (5%) |
| Snake bite | 2 (3.64%) | 3 (6.67%) | 5 (5%) |
| Drug induced | 1 (1.82%) | 1 (2.22%) | 2 (2%) |
| Post renal (BPH, Calculus) | 2 (3.64%) | 0% | 2 (2%) |

Among the study population Acute diarrhoeal disease (ADD) was the most common cause in 44% of the cases, followed by multiple infections (leptospirosis+ malaria+ enteric fever) in 12% of the subjects and Sepsis in 10% of the subjects. When gender wise etiological profile was

assessed, in male participants 23 (41.8%) were in ADD, 6 (10.90%) were in sepsis, 5 (9.09%) were Malaria, 2 (3.63%) were leptospirosis, 8 (14.50%) were LEPTO+ malaria+ enteric fever, 6 (10.90%) were Poisoning, 0% were glomerulonephritis, 2 (3.64%) were Snake bite, 1 (1.82%) were drug induced and 2 (3.64%) Post renal (BPH, Calculus). In female participants 21 (46.67%) were ADD, 4 (8.89%) were sepsis, 3 (6.67%) were Malaria, 2 (4.44%) were leptospirosis, 4 (8.89%) LEPTO+ malaria+ enteric fever, 2 (4.44%) were Poisoning, 5 (11.11%) were glomerulonephritis, 3 (6.67%) were snake bite, 1 (2.22%) were drug induced, 0% were post renal (BPH, Calculus) (Table 2).

**Table 3: Descriptive analysis of AKI risk category as per RELIEF score (N=100).**

| AKI risk category as per RIFLE score | Frequency | Percentage |
|---|---|---|
| Risk | 46 | 46 |
| Injury | 26 | 26 |
| Failure | 28 | 28 |

Among the study population, 46 (46%) participants were at risk, 26 (26.0%) had injury, 28 (28%) had failure (Table 3).

**Table 4: Association of conservative, HD, PD with AKI outcome of study population (N=100).**

| AKI outcome | Conservative | HD | PD |
|---|---|---|---|
| Risk (N=46) | 46 (100%) | 0 | 0 |
| Injury (N=26) | 15 (57.7%) | 10 (38.5%) | 1 (3.84%) |
| Failure (N=28) | 10 (35.7%) | 17 (60.71%) | 1 (3.57% |

Out of 46 people with in risk category, all the 46 (100%) were treated conservatively. Out of 26 people in injury category AKI, 15 (57.7%) were treated by conservative, treatment 10 (38.5%) were treated by Haemodialysis andremaining 1 (3.84%) was treated by peritoneal dialysis. Out of 28 people in failure group, 10 (35.7%) had conservative treatment, 17 (60.71%) underwent haemodialysis and another 1 (3.57%) subject underwent peritoneal dialysis (Table 4).

## DISCUSSION

The age groups above and below forty years has been equally involved in contracting the disease though males are slightly at a higher risk as compared to females. Contrastingly one study have included patients with equal sex distribution with about more than four-fifths of them aged above forty years.[7]

Oliguria endured as a classical sign in these patients as about nine of every ten patients diagnosed with AKI exhibited reduced urinary output (<0.5 ml/kg/hour). Though its predictability of AKI is poor as only one tenth of the cases develop abnormal serum creatinine levels preceding renal injury.[8] Based on RIFLE classification, almost half of the patients in our study remained in class R and one-fourth persevered in class I and class F each. This indicates the progression of the disease outcome. Contrastingly, one study had AKI patients of whom 19%, 35% and 46% were categorized to class R, class I and class F respectively.[9] Bagshaw SM et al, have demonstrated the independent association of various RIFLE categories with in-hospital mortality and they found 33.2%, 27.7%, 17.9% of class F, class I, class R are respectively associated with hospital mortality.[10]

Of the diverse etiologies leading to AKI, the ADD topped the list by having 44% of patients and was followed by sepsis (10%). The results of Osman M et al, was also not dissimilar with our study as they found volume depletion, other than being common cause was also a significant predictor of mortality in AKI patients.[11] Sepsis pertained to be the commonest of causes for AKI (44.3%) and an independent predictor of mortality in AKI patients. One study have supported this finding and the results were not dissimilar.[12] In present study 8% of AKI were due to poisoning. Organophosphorus (OP) compounds being the commonest of poisoning cases induce oxidative stress, thereby damaging renal tubules and kidney dysfunction. Lee FY et al, have demonstrated six fold increased risk of AKI in patients with OP poisoning.[13]

In this study, 8% and 4% of AKI was associated with malaria and leptospirosis respectively. Increased parasitaemia have led to AKI in falciparum malaria cases.[14] The proximal convoluted tubule is the primary site of injury in leptospirosis that might explain the development of AKI in these patients.[15]

The contribution by snakebite cases and glomerulonephritis were comparable (5% each) in our study. There will be usual association of polymicrobial infections of skin and soft tissue (SSTI) post animal bites that may harvest pathogens which amplifies the sepsis pathway. Tigecycline have proven efficacy in these cases and can be advised.[16] One study has also the documented the efficacy of tigecycline use in SSTIs following animal bites.[17]

The risk posed by drug induced and post-renal causes (2% each) was also found to be comparable. The renal injury in drug users might be due to increased sympathomimetic activity leading to vasoconstriction and thereby ischemia related renal impairment. The HIV and HCV co-infection has also to be ruled out in the drug users as these conditions induce rhabdomyolysis. There are many more studies which supports the role of drug induced nephropathy and AKI.[18-20]

Timely diagnosis and management of this disease condition confer a favourable prognosis to the patient. The progression of AKI lead to increased hospital

mortality rates and increased length of stays that might prove a wastage of limited resources in a setting like India. Hence more number of studies has to be done to efficiently pinpoint the predictors of AKI and preventing its occurrence in the near future.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Ananth PV, Prakash V, Selvaraj D, Mathimaraiselvan T. Clinical profile and treatment outcome of acute kidney injury (AKI) in a tertiary care hospital. Int J Adv Med 2018;5:630-3.