



A STUDY ON THE INCIDENCE OF ACUTE KIDNEY INJURY (AKI) USING P-RIFLE CRITERIA IN CRITICALLY ILL PATIENTS AT TERTIARY CARE CENTRE

Paediatrics

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ABSTRACT

Introduction: Acute kidney injury (AKI) is one of the most common conditions in Paediatric Intensive Care Unit (PICU) care. AKI occurs in 20–30% of the general paediatric intensive care (PICU) population. Compared to children who do not develop AKI in the PICU, children who develop AKI are at a higher risk of poor outcomes, including mortality and a longer duration of mechanical ventilation. P-RIFLE (Paediatric Risk, Injury, Failure, Loss, End-stage renal disease) the score is a useful instrument for identifying critically ill children for early intervention. **Material and Method:** A sample size of 190 cases was studied, from which 50 cases were with AKI. The study was conducted for 8 months, aged from 1 month to 12 years. Data in the form of clinical characteristics, and laboratory investigations including serum creatinine and urine output were collected with the p-rifle scoring system, treatment was given and outcomes were collected. **Result:** Acute kidney injury was diagnosed in 50 (26.3%) patients, of these, 6 (12%) patients presented with P-RIFLE staging of Risk, 17 (34%) patients with Injury, and 27 (54%) patients with Failure. we have 32 (64%) males and 18 (36%) females. Out of the 64% are in the 1 month to 4 years of age, 22% the age of 5-8 years, and 14% are in the age group of 9-12 years. Sepsis was the most common cause of AKI. **Conclusion:** A higher incidence of AKI was seen in the male gender, and patients with septicemia, on vasopressor support, require mechanical ventilation. AKI is associated with longer PICU and hospital stays, with higher mortality imposing a significant burden on the healthcare system.

KEYWORDS

Acute kidney injury (AKI), Children, PICU, P-RIFLE criteria, Sepsis.

INTRODUCTION

Acute Kidney Injury (AKI), previously known as Acute Renal failure, is an abrupt decline in renal excretory function characterized by a reversible increase in serum creatinine and nitrogenous waste products. The underlying pathophysiology includes decreased renal perfusion due to various causes resulting in decreased urine output, rising serum creatinine, deranged fluid and electrolyte homeostasis, and reduced immunity, affecting various organ systems. AKI has become a major healthcare challenge with an estimated 13.3 million cases per year (of which 85% are in developing countries) leading to estimated mortality of 1.7 million deaths per year all over the world.[1] Most of the pediatric studies on the incidence of AKI, are limited to developed countries and are often retrospective. We have very limited data about the clinical profile of pediatric AKI from Indian children and regional variations in the profile of AKI, which makes it important to study the incidence and outcome of AKI in pediatric patients.

MATERIAL AND METHOD

AIMS AND OBJECTIVES:

- To Study the incidence of acute kidney injury among all subjects admitted to PICU.
- To compare the outcome between AKI patients and NON-AKI patients admitted to PICU.
- To interpret clinical presentation with p-RIFLE criteria.
- To study the clinical course of AKI, the length of stay, mortality, and the risk factors associated with poor outcomes.

Sample Size: - 50 patients.

Type of Study: - Retrospective-prospective observational study.

Study Period: - January 2022 to August 2022.

Inclusion Criteria

All Critically ill Children aged 1 month to 12 years admitted to Paediatric Intensive Care Unit.

Exclusion Criteria

- Less than 1 month of age
- More than 12 years of age
- Chronic kidney disease
- Death within 24 Hours of admission

Investigation

Modified Jaffe method was used to measure serum creatinine levels. Serum creatinine was estimated on the first day of admission and then every alternate day till discharge. Serum creatinine was repeated frequently in children who developed shock, sepsis or need for mechanical ventilation. Urine output was measured every 8 hours and recorded as ml/kg/hour. Urine output criteria was used only for

patients who were catheterized. The Pediatric RIFLE classification was used to diagnose and stage AKI. Either eCrCl or urine output was used to diagnose and stage AKI.

Table 1: Pediatric RIFLE criteria [2]

	Estimated CrCl	Urine output
Risk	eCrCl decrease by 25%	<0.5 ml/kg/h for 8 h
Injury	eCrC decrease by 50%	<0.5 ml/kg/h for 16 h
Failure	eCrC decrease by 75% or eCrCl<35 ml/min/1.73 m ²	<0.3 ml/kg/h for 24 h or anuric for 12 h
Loss	Persistent failure >4 weeks	
End stage	End-stage renal disease (persistent failure >3 months)	

RESULT

In this study out of the total 240 consecutive admissions, 190 children were enrolled after fulfilling the inclusion criteria. AKI was diagnosed in 50 children (26%).

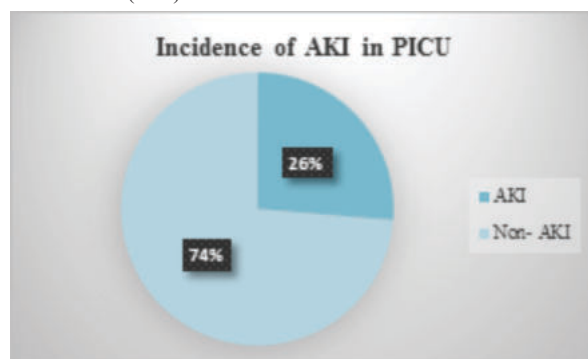


Figure 1: Incidence of AKI in PICU patient

Among the children with AKI, 32 were Males and 18 were Females. Male to Female ratio was 1.77:1. AKI was predominantly seen in the age group of 1 month to 4 years (62%) followed by 5-8 years (24%), and was least in the age group of 9–12 years (14%). According to S. Creatinine criteria 'FAILURE' comprised the maximum number of cases with 27 (54%), followed by 'INJURY' comprised 17 (34%)

cases, and 'RISK' comprised 6 (12%) cases compared to urine output criteria, 9 (18%) cases comprised of 'RISK', and 10 (20%) and 27 (54%) cases comprised of 'INJURY' and 'FAILURE' of p-RIFLE criteria respectively.

Table 2: - Association Of Mortality Concerning The Stage Of AKI.

STAGE	NO. OF PATIENT (n=50)	MORTALITY	
		YES	NO
R	6	3	3
I	17	11	6
F	27	18	9
TOTAL	50	32	18

The median Length of stay of children in PICU was 5 days with an inter quartile range (IQR) of 2 to 8 days. Total 58% of AKI cases were due to pre-renal causes and 42% were due to Renal causes.

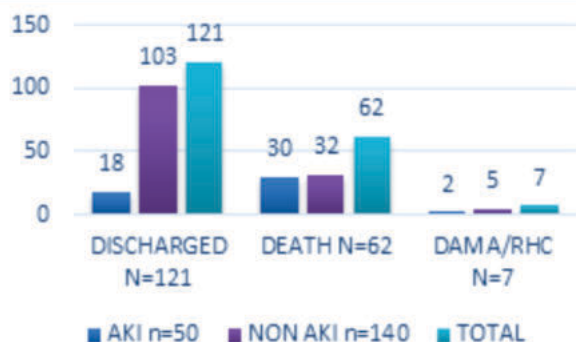


Figure 2: Outcome between AKI and NON-AKI.

Amongst the children diagnosed with AKI, Sepsis (66%) remained the predominant Risk factor followed by Hypotension (64%), Nephrotoxic drugs (48%), Cardiac Failure (14%), and other miscellaneous causes. The incidence of vasopressor use in AKI was 64% (32) while in non-AKI cases was 54.3% (76).

DISCUSSION

AKI in intensive care setup in children is a significant complication that further aggravates the already high case mortality rate.

This study was single-center, a retrospective prospective observational study done on PICU patients in a tertiary care hospital, GGH Jamnagar to know the proportion of Acute Kidney Injury and the evaluation of associated risk factors, progression of the disease, and its outcome associated with it.

Several studies from India and other countries showed incidence ranging from 25.1% to 82% depending on various inclusion criteria and clinical profile of patients. [2,3,4] This study was comparable to Krishnamurthy et al. where incidence was 25.1% and Mehta et al. where it was 38%. Akcan - Arican et al. study shows the highest incidence of AKI (82%).

Severity grading of AKI cases according to PRIFLE criteria showed that 12%, 34%, and 54% patients were in "R" category, "I" category, and "F" category, respectively, in this study. In a study by Mehta et al., maximum cases of AKI had Stage 1 (65.8%), followed by Stage 2 (17.8%) and Stage 3 (16.4%). [3] Similar pattern of AKI level (R, I, F) was reported by Akcan-Arkan et al., i.e., 48.8%, 26%, 25.2%. [2]

The duration of hospital stay was significantly longer in AKI patients than in non-AKI patients. The mean length of stay for AKI patients was 6.60 days and for non-AKI patients was 5.06 days. Mehta et al. and Akcan-Arkan et al. also reported longer PICU and hospital stay in AKI patients. [2,3]

The rate of mortality in AKI patients was 60% and in non-AKI patients was 23%. A statistically significant difference was noted between mortality in AKI and non-AKI patients. According to Mehta et al. and Krishnamurthy et al., mortality in AKI was 37% and 46.3%, respectively. [3,4]

CONCLUSION

This study addresses the current lack of data on the burden of AKI in sick children. A higher incidence of AKI was seen in the male gender,

and patients with septicemia, on vasopressor support, require mechanical ventilation. These risk factors support in early identification of AKI. AKI is associated with longer PICU and hospital stays, with higher mortality imposing a significant burden on the healthcare system. Proper monitoring and Early detection of AKI and timely treatment reduces the mortality of patients.

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