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Original Article

Study of patients with acute kidney injury in tertiary rural hospital

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ABSTRACT

Introduction: Acute Renal Failure (ARF) refers to a damage that has already occurred and does not leave any capacity for early detection of "injury" or intervention, to prevent failure. The term ARF was replaced by AKI to provide uniform definition, classification and standardize patient care.

Objectives: The aim was to study etiology and outcome of patients with AKI, to study association of AKI with other diseases with and utility of pRIFLE and AKIN as prognostic indicators.

Material & Methods: Patients aged one month to 17 years admitted to pediatric intensive care unit were included in the study; patients with known chronic kidney disease & congenital anomaly were excluded. **Result:** The commonest etiology for patients with AKI was sepsis 15 (30%) of which 5(33.3%) patients had pneumonia. Overall Outcome of patients was 26 (52%) discharged, 12 (24%) tookDAMA, 8(16%) referred,4(8%) expired.

Conclusion: Commonest cause for AKI was sepsis, next to it was acute tropical illness. Perhaps good control on vector borne disease may significantly reduce burden of AKI.

Keywords: Etiology, Kidney injury, Outcome, Pediatric, Staging

INTRODUCTION

"**Acute Renal Failure (ARF)**" refers to a damage that has already occurred and does not leave any capacity for early detection of "injury" or intervention, to prevent failure, hence the term ARF was replaced by AKI to provide uniform definition and classification and standardize patient care.[1,2]

AKI may now be defined objectively by the criteria proposed by the AKIN[1] (Acute Kidney Injury Network) as an abrupt (within 48 hours) reduction in kidney function, involving:

- an absolute increase in serum creatinine> 0.3 mg/dL from baseline OR
- an increase in serum creatinine> 50%(1.5-fold from baseline) OR
- a reduction in urine output < 0.5 mL/kg/hrfor more than 6 hours).

The RIFLE criteria for Acute Kidney Injury (AKI) were proposed by the Acute Dialysis Quality Initiative (ADQI) Group[2] in 2004 and modified for pediatric use (pRIFLE)[3] (pediatric Risk, Injury, Failure, Loss, End stage) in 2007. The etiology of AKI over past decades has shifted from primary renal disease to multifactorial causes like neonatal hypoxic ischemic injury, post cardiac surgery, increasing use of nephrotoxic agents,

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septicemia etc. AKI is frequent in picu,affects children who have sepsis and multiorgan failure and is independently associated with high mortality. In developing world ,AKI is a disease of the young and secondary to a single predominant illness such as dengue with complications, malaria with complications, pneumonia etc. There are very few studies in rural settings to study etiology of AKI.

METHODOLOGY

This prospective observational study was conducted in Pediatric intensive care unit of Department of Pediatrics of SBKS medical college and Dhiraj hospital Baroda, a tertiary level rural hospital. Over a period of 18 months patients aged one month to 17 years were admitted to PICU out of which 50 patients were diagnosed with AKI. Patients with known chronic kidney disease and congenital anomaly were excluded. Following a well informed parental consent, patients detailed history and examination was carried out and recorded in pre-structured proforma.

In consultation with chief of PICU etiological diagnosis was considered. All 50 patients developing AKI were investigated in detail and further statistically analysed as per AKIN and pRIFLE criteria. Serum creatinine was estimated on ERBA XL systems by creatinine enzymatic method.

Data of the patients were reviewed and assigned to AKIN staging based on serum creatinine and pRIFLE as per eCrcl during stay in PICU.

RESULT

Total 393 critically ill patients were admitted in PICU during study period and 50 were diagnosed with AKI, suggesting incidence of 12.72%. Of 50 patients included in the study, 33 were males and 17 were females.

Table 1.Etiology versus outcome of AKI

ETIOLOGY	OUTCOME				TOTAL
	Expired	Dama	Discharged	Referred	
ARDS	1 (25%)	3 (75.0%)	0 (0%)	0 (0%)	4 (100.0%)
Calculi with pujobs	0 (0%)	1 (33.3%)	2 (66.7%)	0 (0%)	3 (100.0%)
Dengue with complication	1 (16.7%)	0 (0%)	5 (83.3%)	0 (0%)	6 (100.0%)
HTN	0 (0%)	0 (0%)	1 (50.0%)	1 (50.0%)	2 (100.0%)
PSGN	0 (0%)	0 (0%)	2 (50.0%)	2 (50.0%)	4 (100.0%)
Pneumonia	0 (0%)	3 (60.0%)	1 (20.0%)	1 (20.0%)	5 (100.0%)
SCD with interstitial nephritis	0 (0%)	0 (0%)	3 (100.0%)	0 (0%)	3 (100.0%)
Severe dehydration	0 (0%)	0 (0%)	2 (66.7%)	1 (33.3%)	3 (100.0%)
Sepsis with shock	2 (20.0%)	3 (30.0%)	3 (30.0%)	2 (20.0%)	10 (100.0%)
Renal parenchyma disease	0 (0%)	1 (20.0%)	3 (60.0%)	1 (20.0%)	5 (100.0%)

The commonest etiology for patients with AKI was sepsis seen in 15 (30%) of which 5 (33.3%) patients had pneumonia. 2ndmost common etiology resulting in AKI was acute tropical illness accounting for total 7 (14%) of which (85.7%) were of dengue febrile illness and 14.3% (1) had complicated malaria. (Table 1)

Of total 50 patients in our study 26(52%) were dischaged without any complication, 12 (24%) were dischaged against medical advice, 8 (16%) were referred to higher center and 4(8%) expired in 4 patients expired following were the diagnosis, ARDS with AKI, sepsis with AKI, Subacute intestinal obstruction post op with sepsis, dengue with septic shock with AKI. Of 4 patients 2 were in **I** and 2 were in **F** category as per pRIFLE where as AKIN staging showed stage

100% mortality in stage 3. (Table 2)

Table 2. Overall outcome of AKI in study population

Outcome	Frequency	Percent (%)
Expired	4	8.0
Dama	12	24.0
Discharged	26	52.0
Referred	8	16.0
Total	50	100.0

Maximum stage of AKI was found in pRIFLE: **F**:27 patients (54%),**I**: 21 patients (42%) :**R**: 2 patients (4%) and in AKIN staging stage 3:36 patients (72%) stage 2:19 patients (8%) and stage 1:5 patients (10%) within 48hours of admission (Table 3).

Table 3. Staging of AKI with pRIFLE

STAGING	Frequency
RISK-**R**	2 (4%)
INJURY-**I**	21 (42%)
FAILURE-**F**	27 (54%)
TOTAL	50 (100%)

As per AKIN 4 (8%) patients were in Stage 1, 9(18%) were in stage 2 and 37(74%) were in stage 3 category. Staging of patients suggested that PRIFLE is more rapid in diagosing patients of AKI in **I** category in comparison to stage 2 of AKIN staging. (Table 4)

Table 4. Staging of AKI with AKIN

AKIN (staging)	Frequency
Stage 1	4 (8%)
Stage 2	9 (18%)
Stage 3	37 (74%)
Total	50 (100%)

DISCUSSION

Of 50 patients included in the study 33 were males and 17 were females.

The commonest etiology for patients with AKI was sepsis seen in 15 patients of which 5(33.3%) patients had pneumonia. 2nd most common etiology resulting in AKI was acute tropical illness accounting for total 7 (14%) of which (85.7%) were of dengue febrile illness and 14.3% (1) had complicated malaria. 32 (64%)

Overall Outcome of patients was 26 (52%) discharged, 12 (24%) took DAMA, 8 (16%) referred, 4 (8%) expired in 4 patient expired following were the diagnosis, ARDS with AKI, sepsis with AKI, Subacute intestinal obstruction post op with sepsis, dengue with septic shock with AKI. Of 4 patients 2 were in **I** and 2 were in **F** category as per pRIFLE where as AKIN staging showed stage 100% mortality in stage 3.

Staging of AKI was done with pRIFLE and AKIN staging suggesting PRIFLE is more rapid in diagnosing patients of AKI in **I** category in comparison to stage 2 of AKIN staging. Mortality risk increased with progression of staging of AKI.[5] Two recently proposed classifications, the RIFLE[1] and AKIN[2] criteria have been validated as diagnostic and prognostic tools in critically ill adult patients with AKI[6,7]. Studies in critically sick children, using the RIFLE [8] or its pediatric modification, pRIFLE[9, 6] show that the incidence of AKI varies from 10% to 58%.Based on the former, Schneider, et al[8]

Aackran[10]stated ninety-seven patients (81.5%) fulfilled pRIFLEcr criteria and 65 (54.6%) fulfilled pRIFLEuop criteria at some time during the study period. All patients requiring dialysis attained their pRIFLEcr max before initiation of dialysis. Patients with pRIFLEmax I or F during admission had over twice the mortality than patients with pRIFLEmax R or controls (21 vs 8%, respectively, **Po**0.05). Patients with pRIFLEmax F also had over twice the mortality rate of the rest of the cohort (25.8% for PRIFLEmax F vs 10.9% for all others, **P.** 0.03).

CONCLUSION

There is paucity of AKI related literature and studies in Indian scenario. AKI is a common occurence in patients in pediatric ICU. The two

most common causes were sepsis and acute tropical illness. pRIFLE may be a faster way of diagnosing AKI but there is paucity. More studies are required to prove benefits of pRIFLE or AKIN staging.

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