Original Article

Outcome of acute kidney injury in children at Nishtar Hospital, Multan, Pakistan

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Objective: To find the outcome of acute kidney injury (AKI) among children at Nishtar Hospital, Multan.

Methodology: This descriptive, cross-sectional study was conducted at the Department of Pediatric Medicine, Nishtar hospital, Multan, from October 2019 to March 2020. A total of 156 children, aged 1-12 years with AKI were enrolled. All were treated as per institutional protocol, and followed up for 14 days. Final outcome was noted in terms of complete recovery, partial recovery or death.

Results: Overall, mean age was 5.13±2.61 years. Out of the 156 patients, 105 (67.30%) were male and 51 (32.69%) were females. Mean body weight was 13.35±6.78 kg. We have found that 117 (75%) children had completed recovery, 33 (21.15%) partial recovery and deaths were noted in six (3.85%).

Conclusion: This study has shown the 75% patients had complete recovery, 21.15% had partial recovery and deaths in 3.85% patients of acute kidney injury. (Rawal Med J 202;45:598-601).

Keywords: Acute kidney injury, complete recovery, death.

INTRODUCTION

Acute kidney injury (AKI) is an acute and reversible increment in the levels of serum creatinine (SCr) which is either linked or not with the decline in urine output (UOP) to oliguria or anuria. AKI is known to be complex disorder and its clinical manifestations range from mild injury to complete kidney failure.[1] Globally, around 13.3 million cases of AKI are reported, out of which, 85% are from developing world.[2,3] Etiology of AKI can be categorized as prerenal (55%), intrinsic (40%) and post-renal. Etiology is impacted by age, geography and clinical settings.[4] In developed countries, majority of cases among children are due to severe illness linked with intensive care settings and hemolytic uremic syndrome while among developing countries, infection related etiologies like gastroenteritis and post streptococcal glomerulonephritis are most commonly noted.[5]

Outcome of AKI is dependent upon factors like etiology, healthcare facility, comorbid conditions and availability of dialysis. A study from India noted mortality rate of 28.57% among children admitted with AKI while 51.43% had complete recovery and 20.0% recovered partially.[6] AKI has been noted to be on the rise in Pakistan but not much data exists about the outcome of AKI in our local population.[7] We aimed to find the outcome of AKI in children at Nishtar Medical University Hospital, Multan. The findings of this study may provide us data about the problem and helping clinicians to give some estimates about the outcomes of AKI in our local population

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METHODOLOGY

This descriptive cross sectional study was conducted at Nishtar University Hospital, Multan, from October 2019 to March 2020. Approval from the Institutional Ethical Committee was sought and Informed consent was taken from all parents/guardians. A total of 156 children, aged one to 12 years of both gender with AKI of any stage having duration of AKI as <24 hours were included. All children with congenital kidney anomalies (assessed on ultrasonography and medical record) and those who had surgery in the past 24 hours were excluded.

AKI was labeled as per "Nelsons Text Book of Pediatrics".[8] Stage-I: increase in SCr as more than 150% of normal cut off values as per age and UOP

less than 0.5ml/kg/hour for 8 hours (reference values of SCr according to the age, we considered upper limit cut off value as per age). Stage-II: increase in SCr more than 200% of normal cut off values as per age and UOP less than 0.5ml/kg/hour for 16 hours. Stage-III as increase in SCr more than 300% of normal cut off values as per age and UOP less than 0.3ml/kg/hour for 24 hours or anuria (<50ml) for 12 hours.

In all cases, daily SCr levels and UOP (in the urine bag) were noted. Central institutional laboratory was used for all the investigations. After 2 weeks, final outcome was evaluated in terms of complete recovery, partial recovery or death. Complete recovery was SCr in normal range and UOP more than 0.5ml/kg/hour for 12 hours. For partial recovery in Stage-I patients, SCr was 100-150% of normal value and UOP more than 0.5ml/kg/hour for 12 hours. Partial recovery for Stage-II was SCr151-200% of normal value and UOP more than 0.5ml/kg/hour for 12 hours. Partial recovery for Stage-III was SCr>200% of normal value and UOP more than 0.5ml/kg/hour for 12 hours.

For treatment, intravenous (I/V) metronidazole & ciprofloxacin for gastroenteritis along with fluid therapy were administered. I/V Cefoperaze-Sulbactum & Ciprofloxacin was started as empirical therapy then changed according to urine culture and sensitivity report for acute pyelonephritis. For management of acute kidney injury in all patients, I/V calcium carbonate & sodium bicarbonate along with monitoring and treatment of hypertension, intake and urine output was done.

Statistical Analysis: SPSS version 22 was employed for data analysis. Chi square test was performed following stratification of study variables to note effect on the outcome considering $p<0.05$ as significant.

RESULTS

Out of the 156 patients, 105 (67.30%) were male and 51 (32.69%) females (male to female ratio 2.1:1). Age ranged was from 1 to 12 years (mean 5.13±2.61), 95 (60.89%) were between 1 to 6 years of age. Most, n=69 (44.23%) cases belonged to poor socioeconomic status while majority, n=89 (57.05%) were living in rural areas.

Mean weight of patient was 13.35±6.78 kg whereas 123 (78.84%) were having body weight as less than or equal to 20 kg. There were 61 (39.10%) patients who were having Stage-I, 42 (26.92%) Stage-II and 53 (33.97%) Stage-III AKI. Causes of AKI were gastroenteritis in 84 (53.8%) cases, acute pyelonephritis 35 (22.4%), acute post streptococcal glomerulonephritis (APGN) in 26 (16.7%) and hemolytic uremic syndrome (HUS) in 11 (7.1%) cases. 117 (75%) children had complete recovery, 33 (21.15%) with partial recovery and deaths noted in 06 (3.85%) (Figure).

Figure. Outcome of AKI in Children.

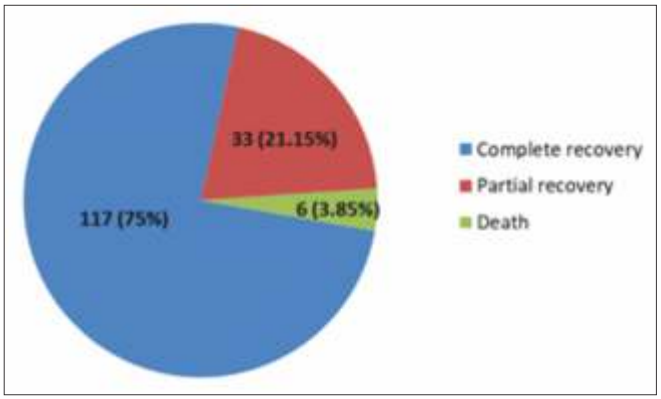

Table. Stratification of study variables with respect to outcome.

Study Variable		Outcome			P-Value
		Complete Recovery (n=117)	Partial Recovery (n=33)	Death (n=6)	
Age Groups (Years)	1-6	65 (55.55%)	28 (84.84%)	2 (33.33%)	0.042
	7-12	52 (44.44%)	5 (15.15%)	4 (66.67%)	
Gender	Male	83 (70.94%)	18 (54.54%)	4 (66.67%)	0.524
	Female	34 (29.05%)	15 (45.45%)	2 (33.33%)	
Socioeconomic Status	Poor	55 (47%)	14 (42.42%)	2 (33.33%)	0.368
	Middle	40 (34.18%)	10 (30.30%)	0	
	Upper	22 (18.80%)	9 (27.27%)	4 (66.67%)	
Place of Living	Rural	67 (57.26%)	20 (60.60%)	2 (33.33%)	0.644
	Urban	50 (42.73%)	13 (39.39%)	4 (66.67%)	
Body Weight (kg)	≤20	97 (82.90%)	22 (66.66%)	4 (66.67%)	0.388
	>20	20 (17.09%)	11 (33.33%)	2 (33.33%)	
Stage of AKI	I	53 (45.29%)	8 (24.24%)	0	0.073
	II	30 (25.64%)	12 (36.36%)	0	
	III	34 (29.05%)	13 (39.39%)	6 (100.0%)	

Death was seen in one case with acute post streptococcal glomerulonephritis with rapidly progressive glomerulonephritis and sepsis whereas all other cases (n=5) who died were of HUS. Stratification of outcome with respect to age groups,

gender, socio-economic status, place of living, body weight and stage of AKI are shown in the Table.

DISCUSSION

The International Society of Nephrology suggested replacement of traditional term "acute renal failure" (ARF) with AKI as the latter one more thoroughly reflected pathophysiology and clinical course of disease.[9] There has been an increase in the AKI in the recent decades while etiology of AKI has somewhat shifted from primary kidney disease to multifactorial proportions. Vachvanichsanong et al[10] in a 25 year (1980-2004) survey from Thailand noted a 9 fold increase in AKI among children hospitalized in the last 22 year period of their research.

In another study spanning 10 years, researchers noted that HUS, primary renal disease and sepsis were some of the commonest reasons for AKI among pediatric population.[11] Researchers in the last couple of decades have demonstrated that epidemiology of AKI is changing and etiologies like renal ischemia, sepsis and usage of nephrotoxic drugs have come up as some of the commonest causes of AKI.[12,13]

Tresa et al in a local study from Karachi[14] noted mean age of their patients to be 7.5±4.4 years while 60.3% were male. Studies from other developing countries reveal majority of children presenting with AKI to be in the younger age groups; while our findings are different from those which could be due to the reason that healthcare facilities are not able to manage younger children with AKI.[15,16] Later presentation and diagnosis of children in our population could be other reasons for this difference.

Studies from India[16,17] have reported higher rates of mortality among children with AKI ranging from 28.5% to 46.3% whereas researchers from Nigeria[18] also reported high rates of mortality (50%). Our results are more aligned with the local findings[14] while a multicenter study from China[15] also noted low rates of mortality among children with AKI. In another study on 659 children with AKI, recovery was achieved in 68.9% children, 5.7% went into chronic kidney disease (CKD) while 29.7% died.[19] In another study, 63 patients out of 103 (61%) with AKI had complete renal recovery before discharge.[20]

Gheissari et al[21] sharing their 10 years' experience of a tertiary care hospital reported that children were found to have reverse correlation with age and first GFR as older children were noted to have worst outcomes (p=0.009). Some researchers have also noted younger age group of children to have worst outcomes (death) but most of those studies enrolled newborns.[22,23] Future studies involving long term follow ups and evaluating impact of various treatment options will further add to what is known to date.

CONCLUSION

This study has showed that 75.0% patients with AKI had complete recovery while 21.15% partial recovery and deaths in 3.85% patients. Public awareness programs should be arranged to enhance our public for early consultation with pediatrician in order to improve the outcome of AKI.

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