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Original Research

Evaluation of clinical profile and outcome of newborns with acute kidney injury

[1]Rohit Jain, [2]Bajrang Singh

[1]Associate Professor, Department of General Medicine, Venkateshwara Institute of Medical Sciences, Amroha, India;
[2]Associate Professor, Department of Paediatrics, N C Medical College & Hospital, Panipat, India

ABSTRACT:
Background: The inability of the kidneys to eliminate nitrogenous waste products and maintain fluid and electrolyte homeostasis is known as acute kidney injury (AKI), which is fairly common in the newborn population and a major cause of neonatal mortality and morbidity.The present study was conducted to evaluate clinical profile and outcome of newborns with acute kidney injury. **Materials & Methods:** 54 children with AKI of both genderswere divided into 2 groups. Group I had patients with AKI and group II were control. Parameters such as birth weight, gestational age, admission age, growth restriction, Apgar scores, electrolyte levels asphyxia, sepsis, meningitis, persistent pulmonary hypertension, Necrotizing Enterocolitis (NEC), mechanical ventilation, congenital heart disease were recorded. **Results:** Gestational age was pre- term in 9 and 12 and full term in 18 and 15 in group I and II respectively. Growth restriction was small for gestational age in 11 and 14 and large for gestational age in 16 and 13. Birth weight was normal in 12 and 10, low birth weight in 9 and 10 and very low birth weight in 6 and 7 in group I and II respectively. The difference was non- significant (P> 0.05).13 in group I and 17 in group II discharged, 7 in group I and 8 in group II showed LAMA and 7 in group I and 2 in group II expired. The difference was non- significant (P> 0.05). **Conclusion:** Most of children with acute kidney injury died.
Keywords: acute kidney injury, Gestational age, newborns

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Corresponding author: Bajrang Singh, Associate Professor, Department of Paediatrics, N C Medical College & Hospital, Panipat, India

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INTRODUCTION

The inability of the kidneys to eliminate nitrogenous waste products and maintain fluid and electrolyte homeostasis is known as acute kidney injury (AKI), which is fairly common in the newborn population and a major cause of neonatal mortality and morbidity.[1] The exact prevalence of AKI in the newborn population is still unknown, but the data that is currently available indicates that its incidence varies from 6 to 24% in neonatal intensive care units (NICUs) worldwide.[2] Various retrospective single center studies have demonstrated a higher incidence and a significant impact on mortality of AKI in various subgroups of the newborn population, including sick term/near term newborns, asphyxia, sepsis, and extremely low birth weight (ELBW and VLBW).[3]

The most straightforward and inaccurate way to diagnose AKI is to use serum creatinine. The plasma creatinine concentration decreases from 1.1 mg/dl at birth (1.3 mg/dl for preterm neonates) to 0.4 mg/dl throughout the first 14 days of life.[4] There is no agreed-upon definition for diagnosing AKI in infants, unlike in the pediatric and adult populations.[5] Even the major single site observational study that is now published did not evaluate different criteria of AKI for babies. There is a dearth of information on AKI from the Indian subcontinent.[6] The adoption of a suitable definition, risk factors, demographic profile, and relationship with other co-morbidities are among the more significant gaps that still need to be addressed.[7]The present study was conducted to evaluate clinical profile and outcome of newborns with acute kidney injury.

MATERIALS & METHODS

The study was carried out on 54 children admitted in pediatrics department of both genders. All parents

gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. Subjects were divided into 2 groups. Group I had patients with AKI and group II were control. Parameters such as birth weight, gestational age, admission age, growth restriction, Apgar scores, electrolyte levels asphyxia, sepsis, meningitis, persistent pulmonary hypertension, Necrotizing Enterocolitis (NEC), mechanical ventilation, congenital heart disease were recorded. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Assessment of parameters

Parameters	Variables	Group I	Group II	P value
Gestational age	Pre term	9	12	0.05
	Full term	18	15	
Growth restriction	SGA	11	14	0.94
	LGA	16	13	
Birth weight (gm)	Normal	12	10	0.63
	LBW	9	10	
	VLBW	6	7	

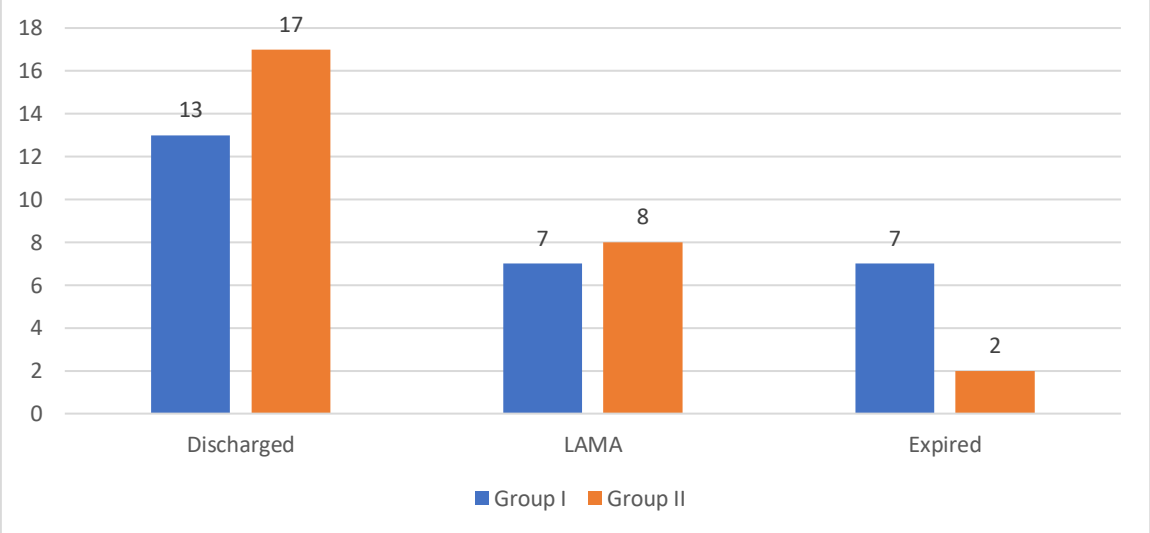
Table I shows that gestational age was pre- term in 9 and 12 and full term in 18 and 15 in group I and II respectively. Growth restriction was small for gestational age in 11 and 14 and large for gestational age in 16 and 13. Birth weight was normal in 12 and 10, low birth weight in 9 and 10 and very low birth weight in 6 and 7 in group I and II respectively. The difference was non- significant (P> 0.05).

Table II Assessment of outcome

Outcome	Group I	Group II	P value
Discharged	13	17	0.58
LAMA	7	8	
Expired	7	2	

Table II, graph I shows that 13 in group I and 17 in group II discharged, 7 in group I and 8 in group II showed LAMA and 7 in group I and 2 in group II expired. The difference was non- significant (P> 0.05).

Graph I Assessment of outcome



DISCUSSION

In ill newborns, acute renal failure (ARF) is frequently observed. While urogenital abnormalities, respiratory distress syndrome (RDS), and hypoxia are frequently listed causes of ARF in the West, preliminary findings from India show that sepsis is the main cause of ARF.[8,9] However, there is a dearth of information regarding ARF in neonatal sepsis, and previous research has concentrated on perinatal hypoxia as the source of ARF.[10] In newborns, a high blood urea nitrogen (BUN) concentration (>20 mg/dl) is typically one of the criteria for ARF.Because of the high levels of renal vascular resistance and plasma renin activity, the newborn kidney is especially susceptible to the effects of hypoperfusion. As a result, newborns have a correspondingly lower renal blood flow.[11] Numerous physiological traits of the newborn kidney, including as the low glomerular filtration rate (GFR), decreased intercortical perfusion, decreased proximal reabsorption of salt,

and elevated plasma renin activity, are similar to acute tubular necrosis (ATN). It has been said that the newborn kidney is "halfway to acute renal failure."[12]The present study was conducted to evaluate clinical profile and outcome of newborns with acute kidney injury.

We found that gestational age was pre- term in 9 and 12 and full term in 18 and 15 in group I and II respectively. Growth restriction was small for gestational age in 11 and 14 and large for gestational age in 16 and 13. Birth weight was normal in 12 and 10, low birth weight in 9 and 10 and very low birth weight in 6 and 7 in group I and II respectively. Bansal et al[13]evaluated clinical profile, identify associated and prognostic factors in newborns with AKI. Total 1745 newborns were admitted, of which 74 babies had AKI. It was defined as serum creatinine >1.5mg/dl. Control group was selected randomly from the hospital numbers of the newborns derived from the electronic registry with serum creatinine below 1.5 mg/ dl. Demographic variables like birth weight, gender, gestational age, admission age, growth restriction, Apgar scores, electrolyte levels; and common clinical conditions like asphyxia, sepsis, meningitis, persistent pulmonary hypertension, Necrotizing Enterocolitis (NEC), mechanical ventilation, congenital heart disease; were compared amongst the two groups. The incidence of AKI in our study was 4.24%. Demographic variables more common in AKI group were inborn (p=0.011), male gender (p=0.032), term gestation (p=0.001), Appropriate for gestational age (0.001), higher birth weight.

We found that 13 in group I and 17 in group II discharged, 7 in group I and 8 in group II showed LAMA and 7 in group I and 2 in group II expired. Mathur et al[14] found that 52 out of 200 (26%) neonates with sepsis had ARF; only 15% of ARF was oliguric. The mean gestation of neonateswith ARF was similar to those without ARF (36.1_+4.1 wks vs. 36.6+3.5 wk; p= 0.41). A significantly higher number of babieswith ARF weighed less than 2500 gm as compared to those without ARF (86.5% vs 67.6%; p= 0.008). The association ofmeningitis, disseminated intravascular coagulation (DIC) and shock was also significantly higher in neonates with ARF (46.8%vs 26.2%, p=0.01; 65.4% vs 20.3%, p<0.001; 71.2% vs 27.0%, p<0.001 respectively). Mortality in neonates who developed. ARF was significantly higher (70.2% vs 25%, p<0.001). Factors including gestational age, weight, onset of sepsis, culturepositivity, associated meningitis, asphyxia, shock, prior administration of nephrotoxic drugs were subjected to univariate analysisfor prediction of fatality in neonates with sepsis and ARF; only shock was found to be a significant predictor of fatality (p<0.001). ARF had recovered in 22 out of 49 neonates in whom data was available; three patients had left against medical advice. Themean duration of recovery in these 22 neonates was 5.5 days (range 1-14 days). Presence of co-existing morbidities (perinatalasphyxia/congestive heart failure (CHF)/necrotising enterocolitis (NEC)) or nephrotoxic drugs did not alter the frequency ofrecovery of ARF in septic neonates (45.5% vs 44.4%,p=0.944; 41% vs 52%, p=0.308 respectively). The shortcoming of the study is small sample size.

CONCLUSION

Authors found that most of children with acute kidney injury died.

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