

Original Research Article

ACUTE KIDNEY INJURY IN NEONATES WITH PERINATAL ASPHYXIA: A CLINICAL OBSERVATIONAL STUDY

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ABSTRACT

Background: Perinatal asphyxia is a major contributor to neonatal morbidity and mortality, often affecting multiple organ systems. The kidney, due to its high metabolic activity and sensitivity to hypoxia, is frequently involved. Acute kidney injury (AKI) is a serious but potentially reversible complication that requires early detection and management. The objective is to study the incidence, staging, and clinical correlation of acute kidney injury in neonates with perinatal asphyxia using KDIGO criteria.

Materials and Methods: This observational study was conducted in the neonatal intensive care unit (NICU) of a tertiary care hospital. Neonates with perinatal asphyxia were included based on standard definitions. AKI was defined and staged according to Kidney Disease: Improving Global Outcomes (KDIGO) guidelines using serum creatinine and urine output measurements. Clinical parameters including Apgar scores, need for resuscitation, and severity of hypoxic-ischemic encephalopathy (HIE) were correlated with AKI staging.

Results: Among 100 neonates with perinatal asphyxia, 38% developed AKI. Stage I was observed in 18%, Stage II in 12%, and Stage III in 8% of cases. The incidence of AKI was significantly higher in neonates with moderate to severe HIE. A lower Apgar score (<5 at 5 minutes) and prolonged resuscitation were strongly associated with higher stages of AKI. Oliguria was observed in 26% of AKI cases. The mortality rate among neonates with AKI was 21% compared to 6% in those without AKI.

Conclusion: AKI is a common complication in neonates with perinatal asphyxia and correlates with the severity of hypoxic injury. Early identification using KDIGO staging and supportive care can improve outcomes.

Keywords: Acute kidney injury, perinatal asphyxia, neonates, KDIGO, hypoxic ischemic encephalopathy.

INTRODUCTION

Perinatal asphyxia remains a significant cause of neonatal morbidity and mortality, particularly in developing countries. It affects multiple organs including the brain, heart, lungs, and kidneys. The kidneys are particularly vulnerable due to their high oxygen demand and immature autoregulatory mechanisms in neonates.^[1,2]

Acute kidney injury (AKI), previously termed acute renal failure, is an increasingly recognized complication of perinatal asphyxia. It can range from subtle decreases in urine output to complete anuria

and may significantly influence the prognosis of affected neonates.^[1]

The early diagnosis and staging of AKI are essential for timely intervention and prognostication. The KDIGO (Kidney Disease: Improving Global Outcomes) guidelines provide a standardized framework for diagnosing and staging AKI based on serum creatinine and urine output.^[3]

This study aims to assess the incidence of AKI in neonates with perinatal asphyxia, classify its severity, and correlate it with clinical indicators such as Apgar score, need for resuscitation, and stages of hypoxic-ischemic encephalopathy (HIE).

MATERIALS AND METHODS

This prospective observational study was conducted in the NICU of a tertiary care teaching hospital over a period of 12 months.

Inclusion Criteria

- Neonates ≥ 35 weeks gestation
- Diagnosed with perinatal asphyxia as per WHO definition (Apgar score < 7 at 5 minutes, need for resuscitation, and evidence of metabolic acidosis or HIE)
- Admitted within the first 6 hours of life

Exclusion Criteria

- Congenital renal anomalies
- Sepsis or other systemic illness not primarily related to asphyxia
- Preterm neonates (< 35 weeks)

Data Collection

- Clinical details: Birth weight, gestational age, mode of delivery, Apgar scores
- HIE grading: Based on Sarnat and Sarnat staging
- AKI diagnosis: As per KDIGO guidelines using both serum creatinine and urine output.^[3]
- Outcome parameters: Duration of hospital stay, ventilator requirement, survival status

Serum creatinine was measured on days 1, 3, and 7. Urine output was monitored hourly. Statistical analysis was performed using SPSS.

RESULTS

Among the 100 neonates enrolled, 62 were males and 38 were females. The mean gestational age was 37.8 weeks, and the mean birth weight was 2.7 kg.

Incidence of AKI

- AKI was detected in 38 neonates
- Stage I: 18 cases
- Stage II: 12 cases
- Stage III: 8 cases

Clinical Correlation

- Apgar score < 5 at 5 minutes: 84% in AKI group vs. 42% in non-AKI.^[5]
- Moderate-to-severe HIE: 71% of AKI cases
- Oliguria (< 1 mL/kg/hr): 26% of AKI cases
- Prolonged resuscitation (> 1 min): Significantly more common in AKI group ($p < 0.01$)

Outcomes

- - Mortality: 8 deaths (21%) in AKI group vs. 4 deaths (6%) in non-AKI group
- - Ventilator requirement and hospital stay were longer in higher-stage AKI.

DISCUSSION

This study highlights the significant burden of AKI among neonates with perinatal asphyxia. The incidence (38%) is consistent with prior studies.^[1,4] The use of KDIGO criteria enabled accurate staging and correlation with outcomes.^[3]

The association of AKI with low Apgar scores, severe HIE, and prolonged resuscitation underscores its role as a marker of multisystem hypoxic injury.^[2] While Stage I AKI often resolved with conservative management, Stage III was associated with higher mortality and longer NICU stay.

These findings emphasize the importance of renal monitoring in neonates with perinatal asphyxia. Serum creatinine and urine output should be routinely tracked to detect AKI early and guide management.^[1,3]

CONCLUSION

AKI is a frequent and serious complication of perinatal asphyxia. Its incidence correlates with the severity of hypoxia. Early identification using KDIGO guidelines and comprehensive supportive care are vital for improving neonatal outcomes. Routine renal monitoring should be integrated into the care of asphyxiated neonates.^[2,5]

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