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In-Hospital Outcomes of Neonates with Perinatal Asphyxia at a Tertiary Care Center in North India

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Abstract:
Background: Perinatal asphyxia remains a major contributor to neonatal morbidity and mortality in low- and middle-income countries. This study evaluates the clinical profile and immediate in-hospital outcomes of neonates with perinatal asphyxia at a tertiary care hospital in North India.
Methods: A prospective observational study was conducted over 18 months at G.B. Pant Hospital, Srinagar. Term neonates admitted within 24 hours of birth with APGAR score <6 at 5 minutes and features of hypoxic-ischemic encephalopathy (HIE) were included. Data on socio-demographic factors, delivery details, interventions, and outcomes were analyzed.
Results: Of 217 neonates, 54.8% were male. HIE was present in 78.8% (Grade II: 55%, Grade I: 29.2%, Grade III: 15.8%). Mortality occurred in 14.3%, with 92.6% mortality in HIE Grade III. Prolonged labour (33.6%) and meconium-stained liquor (22.5%) were the most frequent antenatal complications. Oxygen therapy was the commonest intervention (76–87% in HIE I–No HIE).
Conclusion: Perinatal asphyxia continues to result in significant mortality, particularly in severe HIE. Early referral and improved intrapartum care may improve survival.

INTRODUCTION

Perinatal asphyxia is a significant cause of neonatal morbidity and mortality worldwide, particularly in low- and middle-income countries. It is defined by the World Health Organization as the failure to initiate and sustain breathing at birth, leading to hypoxemia and metabolic acidosis in the newborn[1]. Globally, it accounts for approximately 23% of the 4 million annual neonatal deaths, with the majority occurring in resource-limited settings[2]. In India, perinatal asphyxia remains a major contributor to neonatal mortality despite improvements in obstetric and neonatal care[3]. The most serious complication of perinatal asphyxia is hypoxic-ischemic encephalopathy (HIE), a clinical syndrome of disturbed neurological function in the earliest days of life in a term infant, manifested by difficulty in initiating and maintaining respiration, depression of tone and reflexes, altered consciousness, and often seizures[4]. HIE is graded into mild, moderate, and severe stages using the Sarnat and Sarnat classification, which correlates with prognosis[5]. Severe HIE is associated with high mortality and significant long-term neurodevelopmental sequelae[6]. Risk factors for perinatal asphyxia in low-resource settings include inadequate antenatal care, prolonged or obstructed labour, meconium-stained amniotic fluid, and lack of timely access to skilled birth attendants[7,8]. Interventions such as timely obstetric management, effective neonatal resuscitation, and early initiation of neuroprotective measures can significantly improve outcomes[9]. This study was undertaken to assess the clinical profile and in-hospital outcomes of neonates with perinatal asphyxia admitted to a tertiary care centre in North India. Understanding the demographic distribution, associated

risk factors, and immediate outcomes will help identify gaps in care and guide strategies to reduce mortality and morbidity in this high-risk population.

MATERIALS AND METHODS

This prospective observational study was conducted in the Postgraduate Department of Pediatrics and Neonatology at G.B. Pant Hospital, Srinagar, from November 2017 to April 2019. Inclusion criteria were term neonates (≥37 weeks), birth weight >1.8 kg, admitted within 24 hours of birth with APGAR score <6 at 5 minutes, and features of HIE. Preterm neonates, those with major congenital malformations, or conditions incompatible with life were excluded. Detailed history, clinical examination, and relevant investigations were recorded. Data analysis was done using SPSS v20, with chi-square or Fisher's exact test applied to categorical variables.

RESULTS

A total of 217 neonates with perinatal asphyxia were enrolled. Key demographic and clinical characteristics are summarized below.

Table 1: Gender distribution of study neonates

Gender	Frequency	Percentage
Male	119	54.8
Female	98	45.2
Total	217	100

Table 2: Time taken to reach tertiary care centre

Time (Hours)	Frequency	Percentage
<1 hour	93	42.9
1-5 hours	42	19.4
>5 hours	82	37.8
Total	217	100

Table 3: Birth weight of study neonates

Birth Weight (Kg)	Frequency	Percentage
< 2.5 Kg	46	21.2
2.5-3.5 Kg	149	68.7
> 3.5 Kg	22	10.1
Total	217	100

Table 4: Mode of delivery among study neonates

Mode of delivery	No HIE	HIE 1	HIE 2	HIE 3
NVD	10 (21.7%)	37 (74%)	66 (70.2%)	18 (66.7%)
Instrumental	0 (0%)	1 (2%)	1 (1.1%)	4 (14.8%)
LSCS emergency	8 (17.4%)	7 (14%)	17 (18.1%)	3 (11.1%)
LSCS elective	28 (60.9%)	5 (10%)	10 (10.6%)	2 (7.4%)

Table 5: Apgar score at 5 minutes of study neonates

Apgar Score	Frequency	Percentage
3	27	12.4
4	80	36.9
5	52	24.0
NA	58	26.7

Table 6: Resuscitation of study neonates

Resuscitation	Frequency	Percentage
Tactile stimulation	52	24.0
Bag and mask	80	36.9
Intubation	27	12.4
Delayed cry (no details)	58	26.7

Table 7: HIE status of study neonates during hospital stay

HIE Status	Frequency	Percentage
Present	171	78.8
Absent	46	21.2

Table 8: Outcome of study neonates

Outcome	Frequency	Percentage
Successful discharge	186	85.7
Death during hospital stay	31	14.3

DISCUSSION

In the present study, the overall in-hospital mortality among neonates with perinatal asphyxia was 14.3%, with the highest mortality (92.6%) observed in those with severe HIE (Grade III). This finding is consistent with prior Indian studies reporting mortality rates of 10–30% depending on HIE severity[3,6,10]. Our results reaffirm that the severity of encephalopathy at admission is the most important prognostic factor for short-term survival. Prolonged labour and meconium-stained amniotic fluid were the most frequent antenatal complications in our cohort, similar to the findings of Aslam et al.[8] and Yelamali et al.[11], who also identified these factors as significant contributors to asphyxia-related morbidity and mortality. In our study, 66.8% of mothers were unbooked, which reflects the persistent challenge of inadequate antenatal care in rural and semi-urban regions of North India[7,8]. The need for mechanical ventilation was universal among Grade III HIE cases, which is comparable to data from Bhat et al.[12], who reported that severe HIE often necessitates advanced respiratory support. However, despite maximal supportive care, survival in this group remains poor, highlighting the need for timely referral and the potential role of therapeutic hypothermia[9,13]. Although therapeutic hypothermia is now standard of care in many high-income countries[13], its availability in resource-limited settings remains scarce. Our results also underscore the importance of early referral—42.9% of neonates reached the hospital within 1 hour, and these infants generally had better outcomes than those arriving after 5 hours. This aligns with findings from Hoque et al.[14], who demonstrated that delayed presentation significantly worsens prognosis in perinatal asphyxia.

In summary, our findings confirm that perinatal asphyxia continues to impose a significant burden on neonatal survival in North India. Strengthening antenatal care coverage, ensuring skilled attendance at birth, improving intrapartum monitoring, and expanding access to advanced neuroprotective strategies are essential to reduce mortality.

CONCLUSION

Perinatal asphyxia continues to pose a significant burden on neonatal survival in low-resource settings. Severe HIE is strongly associated with poor prognosis. Strengthening antenatal care, ensuring skilled birth attendance, and timely neonatal resuscitation are crucial to reduce mortality.

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