

# Clinical Profile and Outcome of Asphyxiated Newborn in a Medical College Teaching Hospital

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## ABSTRACT:

**Introduction:** Perinatal asphyxia, a major topic in neonatology, is a severe condition which has a high impact on neonatal mortality and morbidity and neurological and intellectual development of the infant. It is defined by WHO as "failure to initiate and sustain breathing at birth". It is estimated that around four million babies are born asphyxiated and among those one million die and an equal number of babies develop serious neurological consequences ranging from cerebral palsy and mental retardation to epilepsy. This study was done to identify the occurrence, clinical profile and, immediate outcome of perinatal asphyxia in Lumbini Medical College Teaching Hospital. **Methods:** It was a retrospective study where 82 cases who fulfilled the inclusion criteria were included between December 2014 to November 2015. Inclusion criteria included newborns with: a) APGAR score equal to or less than six at five minutes, b) requirement of more than one minute of positive pressure ventilation, c) signs of fetal distress (heart rate of less than 100 beats per minute, late decelerations). **Results:** Out of total 425 neonatal intensive care unit (NICU) admissions, 82 (19.3%) cases were of asphyxia among which 56 were inborn and 26 were referred from outside. Of those 82 cases, 47 (57.3%) cases developed hypoxic ischemic encephalopathy (HIE); HIE stage I had good outcome with survival rate of 95% and HIE stage III had poor outcome with survival rate of only 25%. **Conclusion:** Despite advances in management of neonates, perinatal asphyxia is still the leading cause of neonatal intensive care unit admission and mortality and morbidity in neonates.

**Keywords:** asphyxia neonatorum • brain hypoxia-ischemia • mortality • newborn • treatment outcome

## INTRODUCTION:

Perinatal asphyxia, a major topic in neonatology, is a severe condition which has a high impact on neonatal mortality and morbidity and neurological and intellectual development of the infant, despite many advances in perinatal care.<sup>1</sup> Hypoxemia may be defined as the "diminished amount of oxygen in the blood supply", while cerebral ischemia is defined as the "diminished amount of

blood perfusing the brain".<sup>2</sup> In term infants, 90% of insults occur in the antepartum or intrapartum periods as a result of placental insufficiency and the remaining occur in the postpartum period which may be secondary to pulmonary, cardiovascular or neurological abnormalities.

The standard for defining an intrapartum hypoxic-ischemic event (HIE) sufficient enough to produce moderate to severe neonatal encephalopathy which subsequently leads to cerebral palsy has been established in three consensus statements. The cornerstone of all these three statements is the presence of severe metabolic acidosis (pH < seven and base deficit equal to or more than 12 mmol/L) at birth in a newborn exhibiting early signs of moderate or severe encephalopathy.<sup>1</sup>

According to Penela-Velez de Guevara et al., 703 cases, over 10 years' period, of perinatal asphyxia, 45% presented with evidence of hypoxic-ischemic encephalopathy on neonatal period. During the period of two years, 36% present neurologic sequelae, being psychomotor retardation the most

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common.<sup>3</sup> It is estimated that around four million babies are born asphyxiated per year among which 900,000 die and similar number i.e. one million develop serious neurological consequences like cerebral palsy, mental retardation, and epilepsy.<sup>4</sup> Perinatal asphyxia remains a major cause of global mortality which contributes to almost one quarter of the world's three million neonatal deaths and almost half of 2.6 million third trimester stillbirths. Developing countries have the highest incidences of asphyxia, where sub-Saharan Africa and South Asia, together, account for nearly 70% of worldwide stillbirths.<sup>5</sup>

Outcome of birth asphyxia depends on APGAR score at five minutes, heart rate at 90 seconds, time to first breath, duration of resuscitation, arterial blood gases, and acid-base status at 10 and 30 minutes of age.<sup>6</sup> The neonatal mortality has decreased but morbidity after birth asphyxia in the form of neuro-developmental sequelae is same or even increased due to survival of asphyxiated babies.<sup>7</sup>

The aim of this study was to know the clinical profile and outcome of asphyxiated newborn in a tertiary center of Nepal where patient are mainly from rural area.

## METHODS:

This was a retrospective study done in Lumbini Medical College Teaching Hospital (LMCTH) where 82 cases who fulfilled the criteria were included in the study between December 2014 to November 2015. Inclusion criteria included newborns (term and preterm, hospital born or referred from outside within one hour) with: a) APGAR score equal to or less than six at five minutes, b) requirement of more than one minute of positive pressure ventilation, c) signs of fetal distress (heart rate of less than 100 beats per minute, late decelerations).

Newborns with any congenital neuromuscular, cardiovascular, pulmonary, or central nervous system disorder were excluded from the study.

Detailed history and examination of babies was performed at the time of admission. Detailed neurological examination of asphyxiated newborns including staging of hypoxic ischemic encephalopathy (HIE) was done. HIE was assessed according to Sarnat and Sarnat staging i.e. mild (HIE stage I), moderate (HIE stage II), and severe (HIE stage III). Neonates with HIE show alteration in the level of consciousness and in the behavior

ranging from irritability, hyperalertness to lethargy, obtundation, or coma. Disorders of tone ranges from markedly increased to markedly decreased and a spectrum of abnormal movements ranges from tremors and jitteriness to frank seizures.<sup>8</sup>

## RESULTS:

There were 1972 live births at LMCTH during the study period. A total of 425 neonates (including those referred from outside) were admitted in NICU. Out of 425 admissions, 82 had perinatal asphyxia, 15 (3.5%) died and 6 (1.4%) left against medical advice.

Eighty-two (19.3%) of 425 NICU admissions were cases of perinatal asphyxia. Of those 82 cases, 51 (62.2%) were male and 31 (37.8%) were female; inborn were 56 (68.3%) and the rest 26 (31.7%) were referred from outside. Similarly, 54 (65.85%) were delivered via normal vaginal delivery, 19 (23.17%) by cesarean section, and remaining nine (10.97%) by instrumental delivery. Most common indication for cesarean section was meconium stained amniotic fluid ( $n=9$ ) followed by fetal distress ( $n=7$ ). Of those 82 cases, 17 (20.7%) were preterm and 65 (79.3%) were term baby; 24 (29.3%) required ventilatory support. Similarly, of these 82 cases, 47 cases (57.3%) developed HIE of which 20 cases (24.4%) developed HIE I, 19 (23.17%) developed HIE II and the remaining eight (9.75%) cases developed HIE III. One case of HIE I died resulting in 95% survival rate of that group, two of HIE II died with survival rate of 89.5% and six died of HIE III resulting in survival rate of 25%. Profile of asphyxiated babies is given in Table 1.

## DISCUSSION:

In last decade, neonatal mortality rate in

Table 1: Clinical profile of asphyxiated babies.

Variables	n (%)
Male	51 (62.3)
Female	31 (37.7)
Inborn	56 (68.2)
Outborn	26 (31.7)
Normal vaginal delivery	54 (65.8)
Instrumental delivery	09 (10.9)
Cesarean section	19 (23.1)
Meconium stained fluid	28 (34.1)
Ventilator requirement	24 (29.3)
Term baby	65 (79.2)

Nepal has decreased from 33 to 23 per thousand live births.<sup>9</sup> However, it has failed to meet the millennium development goal. Birth asphyxia is major cause of NICU admission and neonatal mortality.<sup>4</sup> Any decrease in asphyxia related events would significantly decrease the overall neonatal mortality. Recent advancements in neonatal care at delivery room and both invasive and non-invasive mechanical ventilations have revolutionized the outcome of asphyxiated newborns.

In our study, 425 cases were admitted in NICU. Of those, 82 cases (19.25%) were of perinatal asphyxia, which is similar to the study carried at Dhulikhel hospital in which total asphyxiated babies were 14% of the total NICU admission.<sup>10</sup> The rate of birth asphyxia in the present study was low in comparison to the study conducted by Daga AS et al. (27%) and Azam in Pakistan (48%).<sup>11,12</sup> Our study shows, male newborn ( $n=51$ ) were admitted more frequently than female newborn ( $n=31$ ). This may be because of the fact that male get more attention, in our region, and seek health services. This fact also explains the lower rate of asphyxiated babies admitted in NICU.

Asphyxia rate in this study was 28.4/1000 live births which was higher as compared to 5.4/1000 live births in the study conducted by Thornberg E. et al. but similar to 26.9/1000 live births in the study conducted in Dhulikhel hospital and a study from India which showed 22/1000 live births.<sup>10,13,14</sup> This reflects the similar rate in developing countries like

Nepal and India.

The majority of the babies were born via spontaneous vaginal deliveries. The major indications of cesarean section was fetal distress. Timely recognition and intervention with caesarean section could be helpful in decreasing Asphyxia related morbidity and mortality.

In our study, out of the total 82 cases, 47 cases developed HIE (57.31%). Twenty babies (24.39%) developed HIE stage I and one baby (5%) among them expired, 19 babies (23.17%) developed HIE stage II and two babies (10.52%) among them expired, and eight babies (9.75%) developed HIE stage III and six babies (75%) among them expired. Overall mortality in our study in case of birth asphyxia is 10.9% which was similar to the study done by Dongol S. and Etuk SJ.<sup>10,15</sup>

## CONCLUSION:

Despite advances in management of neonate, perinatal asphyxia is still the leading cause of NICU admission and mortality and morbidity. Further prospective and case control studies are required to develop strategies for the prevention and management of asphyxiated babies and also to minimize the neuro-developmental sequelae.

### *Limitation of the study:*

Lack of arterial blood gas (ABG) analysis, which is essential to define asphyxia, due to financial problem and technical difficulty.

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