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A STUDY OF CLINICAL SPECTRUM AND OUTCOME IN PATIENTS OF BIRTH ASPHYXIA

Neonatology

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ABSTRACT

Background - The condition Perinatal asphyxia, a crucial issue in neonatology, is a fatal condition that has a significant impact on the infant's neurological and intellectual development, as well as new-born mortality and morbidity. This study focusses on clinical outcome in neonates with Birth Asphyxia. **Aim of study –** To study the clinical spectrum and short-term outcome of babies with birth asphyxia.

Objectives –

1. To study the maternal and fatal risk factors responsible for the occurrence of birth asphyxia.
2. To study the clinical presentation of babies with birth asphyxia.
3. To study the short-term outcome of the affected babies.

Method –Hospital Based Prospective Observational Study where 60 cases fulfilling inclusion criteria were included in the study. Inclusion criteria included new-borns with 1. APGAR score < 7 at 1 min of life. 2.Requiring resuscitative measures. & 3. Metabolic acidosis with pH <7.0. **Result –** 60 cases with birth asphyxia (APGAR score < 7 at 1 min) were reported from the total admitted to neonatal intensive care unit. 55 cases were in – born. 63.33 %. were female & 36.66 % were male, the mean birth weight was 2991.5 ± 382.5 g, and the mean gestational age was 39.5 ± 2.3 weeks. 66.66 % patients were born by normal vaginal delivery. 70 % pregnancies were Multigravida. The mortality death reported was 11.66%. 55 % cases required nasal prongs, 33.33 % supplied with Oxygen through CPAP & 11.66 % cases were on ventilation. **Conclusion –** In the present study higher rate of induced Vaginal Delivery, Multigravida and irregular ANC was reported among patients with perinatal asphyxia. In neonatal care, perinatal asphyxia continues to be the primary factor in neonatal ICU admissions, mortality, and morbidity. A therapeutic hypothermia therapy with a long-term follow-up component would be advantageous given the high incidence of HIE.

KEYWORDS

Perinatal asphyxia, mortality, clinical spectrum, neonatal intensive care unit, new – born.

INTRODUCTION

The condition Perinatal asphyxia, a crucial issue in neonatology, is a fatal condition that has a significant impact on the infant's neurological and intellectual development, as well as newborn mortality and morbidity. WHO has defined Perinatal asphyxia as "failure to initiate and sustain breathing at birth". Four million babies are thought to be born asphyxiated, of which one million die and an equal number suffer from severe neurological problems such as cerebral palsy, mental retardation, or epilepsy.

The most crucial time for the fetus during the whole pregnancy period is labor. Labour poses physiological stress to all fetuses during the transition from the intrauterine to the extrauterine environment. A normal fetus throughout pregnancy, too, may sustain hypoxia during labor. In labor, fetal distress is quite common and is the main cause of concern for the obstetrician. Intrapartum fetal asphyxia is a major risk for neonatal morbidity and mortality. Intrapartum fetal asphyxia with significant metabolic acidosis at delivery was shown to occur in approximately 20-25 infants per 1000 births. Most of these were of the mild type with no cerebral dysfunction or brain damage. In 3-4 infants per 1000 births, moderate or severe fetal asphyxia was seen with neonatal encephalopathy and other organ system complications [1-3].

The major consequence of fetal asphyxia is hypoxic ischaemic encephalopathy (HIE). Diagnosis of HIE requires abnormal findings on neurological examination the day after birth. The clinical spectrum of HIE is described as mild, moderate, or severe according to the Sarnat stages of HIE. Infants can progress from mild to moderate and/or severe encephalopathy over the 72 hours following the hypoxic-ischaemic insult [4]. Three consensus declarations have set the criteria for what constitutes an intrapartum hypoxic-ischemic event (HIE) that causes moderate to severe newborn encephalopathy and ultimately causes cerebral palsy. All three of these claims are predicated on the newborn displaying early indicators of moderate or severe encephalopathy having severe metabolic acidosis (pH seven and base deficit equivalent to or greater than 12 mmol/L) at birth.[5]

A common consensus regarding the gold standard definition of Birth Asphyxia does not exist. It is thus appropriate to use the term Perinatal Asphyxia as asphyxia may occur in utero, during the process of labor, at birth, or in the postnatal period. Various definitions and criteria to define birth asphyxia were given by World Health Organization (WHO), the National Neonatal-Perinatal Database (NNPD), the American Academy of Paediatrics (AAP), and the American College of Obstetrician and Gynaecologists (ACOG). But, definitions given by WHO and the National Neonatology Forum NNPD Network of India are used widely to define birth asphyxia [8-10].

Diagnosing perinatal asphyxia is important because of the potentially avoidable nature of the lesions, but due to the complex pathophysiological mechanisms involved in causing perinatal asphyxia, an early diagnosis becomes difficult. A wide variety of clinical parameters and laboratory tests are employed to diagnose perinatal asphyxia, like Apgar score, umbilical arterial acidemia/ base excess, intrapartum electronic fetal monitoring, fetal scalp pH measurement, and presence of meconium in amniotic fluid.

The 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 [11]. Neonatal mortality has decreased but morbidity after birth asphyxia in the form of neuro-developmental sequelae is the same or even increased due to the survival of asphyxiated babies[12].

In the present study, we aim to evaluate the clinical profile, and maternal and fetal risk factors for the occurrence of birth asphyxia and also to see the short-term outcome of the affected babies.

METHODS:

This is a prospective observational study conducted at the NICU of a tertiary care center, in Nashik, 60 cases of term neonates with evidence of birth asphyxia admitted in the Neonatal Intensive Care Unit (NICU) studied the clinical spectrum and short-term outcome of babies with birth asphyxia.

Inclusion criteria included Term new-borns (≥37 weeks) with:

1. APGAR score < 7 at 1 min of life.
2. Requiring resuscitative measures (Mechanical Ventilation/ IPPV)
3. Metabolic acidosis with pH <7.0 (in umbilical cord or infant blood sample).

1. Asphyxiated newborns who are preterm, IUGR, with severe congenital malformations, chromosomal abnormalities, chorioamnionitis, Rh incompatibility, and a history of maternal drug addiction cases were excluded.

Detailed history and examination of babies were performed at the time of admission. The demographic data, maternal information, APGAR score at 1, 5, and 10 minutes, mode of delivery, details of resuscitation, duration of IPPR, birth weight, gestational age, gender, need for mechanical ventilation, presence and details of seizures, grades of HIE, mortality, duration of hospital stay, clinical profile, morbidities during NICU stay, the requirement of inotropes, etc. Gestational age will be assigned by ultrasound dating, if this is not available, by date of last menstrual period, and if that also was unavailable then by New Ballard scoring system. All the babies will be treated as per our NICU protocols. New-borns who had asphyxia were given a thorough neurological examination, poor prognostic factors will be taken as repeated seizures, difficult-to-control seizures, multi-organ dysfunction, requirements of inotropes, abnormal neurological findings after 7th day or at discharge (like hypotonia, rigidity, weakness), APGAR score of ≤ 4 at 10 minutes or later, assisted ventilation for >24 hours, hypoglycemia, polycythemia which included HIE staging. HIE was staged as light (HIE stage I), moderate (HIE stage II), and severe (Sarnat and Sarnat staging) (HIE stage III).[4]

On discharge, babies will be assessed for abnormal neurological signs like tone abnormalities, Moros reflex, feeding difficulty, etc. head circumference and weight at birth will be noted and monitored monthly till 3 months follow up. Deep tendon reflexes, abnormal persistence of primitive reflexes, like ATNR; Moro reflex, automatic walking, fisting, cortical thumb, etc. will also be recorded. Neurosensory evaluation will be done in form of hearing and vision assessment. Head circumference and weight gain will be monitored and compared with standard WHO charts. The outcome is classified as favorable (normal neurodevelopment) or adverse (death or abnormal neurological findings). All newborns will be periodically and regularly re-evaluated.

Statistical Analysis

The results obtained were statistically formatted and entered in an excel sheet & analyzed by SPPU 25 software. Qualitative data will be represented in the form of frequency and percentage.

RESULTS

The present prospective observational study was conducted at the NICU of a tertiary care center where 60 babies who met inclusion criteria were studied. 60 cases of perinatal asphyxia were admitted to NICU and screened.

Table 1 illustrates the demographic study in which 38 (63.33 %) were female and 22 (36.66 %) were male, inborn was 55 (91.66 %) and the rest 5 (8 .33 %) were referred from outside. Birth weight reported as ≤ 2000 gms were 7 (11.66 %) cases & ≥ 2000gms were 53 (88.33 %) with a mean & SD 2991.5 ± 382.5 g.

Table 1 - Demographic Study		
Sex		
Variable	n	%
Female	38	63.33
Male	22	36.66
Delivery Place		
Inborn	55	91.66
Out - born	5	8.33
Weight		
≤ 2000 gms	7	11.66
≥ 2000gms	53	88.33
Mean	2991.5	
SD	± 382.5	

Table 2 illustrates the Baseline study in which Antenatal care (ANC) was needed for 24 (40 %) cases. The intermittent positive pressure respiration (IPPR) was maximum **≤ 30 sec & >120 sec.** In our study group, 10 (16.66 %) had an APGAR score of < 7 at 5 minutes, and 5 (8.33 %) had an APGAR < 7 at 10 minutes of age.

Table 2 - Baseline Study		
ANC taken		
Variable %		
Yes	24	40
No	36	60
Duration of IPPR		
≤30 sec	24	40
30 sec-60 sec	5	8.33
60sec-120 sec	7	11.66
>120 sec	24	40
APGAR < 7		
At 1 minute	1	1.66
At 5 minute	10	16.66
At 10 minute	5	8.33

Table 3 illustrates the cases according to parity in which 18(30 %) cases were primigravida & 42 (70 %) were multigravida.

Table 3 - Distribution of cases according to the parity		
Parity	No. of cases	%
Primigravida	18	30
Multigravida	42	70
Total	60	100

Table 4 illustrates the mode of Delivery in which it was reported that 40 (66.66 %) cases were delivered by normal vaginal Delivery mode, 9 (15 %) had instrumental delivery & 11 (18.33 %) by cesarean section

Table 4 - Distribution of cases according to the mode of delivery		
Mode of Delivery	No. of cases	%
Vaginal Delivery	40	66.66
Instrumental Delivery	9	15
C-Section Delivery	11	18.33
Total	60	100

Table 5 illustrates the mortality rate in birth asphyxia cases 7(11.66 %) neonates were reported dead.

Table 5 -Neonatal mortality in birth asphyxia		
Mortality Status	**No. of cases with meconium aspiration**	**%**
Survival	53	88.33
Death	7	11.66
Total	60	100

Table 6 illustrates the distribution of cases according to the treatment required which 33 (55 %) required an Oxygen hood or nasal prongs, 20 (33.33 %) needed continuous positive oxygen pressure & 7 (11.66 %) were on the ventilator.

Table 6 - Distribution of cases according to the treatment required:		
Treatment required	**No. of cases**	**%**
Oxygen required by the hood or nasal prongs	33	55
Oxygen through CPAP	20	33.33
Ventilator	7	11.66
Total	60	100

DISCUSSION

India has the highest neonatal mortality rate in the world at 0.75 million per year[6] Neonatal death and NICU hospitalization are primarily caused by birth asphyxia.

In our study 60 cases were admitted to NICU with perinatal asphyxia. A similar study done by Panthee K et al at Lumbini Medical College Teaching Hospital (LMCTH) had 82 cases in his study with perinatal asphyxia. In our study 38 (63.33 %) were female cases which vary with the studies. The study conducted by Panthee K et al reported a higher percentage of male cases there study. In the present study maximum number of patients were in–born. Birth weight reported as ≤ 2000 gms were 7 (11.66 %) cases & ≥ 2000gms were 53 (88.33 %) with a mean & SD 2991.5 ± 382.5 g. It has been observed in many studies that birth weight of less than those babies who were reported dead.

The irregular attendance to ANC appeared to play a part as well, in the present study 60 % of cases reported irregular attendance to ANC. In a similar study conducted by Aslam H et al, Majeed R et al also reported a lack of ANC attendance.

In the present study, intermittent positive pressure respiration (IPPR) was maximum of ≤ 30 sec & >120 sec which was 24 (40 %) cases. The study conducted by Paresh Kumar A [17] reported similar findings for IPRP.

The present study reported 10 (16.66 %) had an APGAR score of < 7 at 5 minutes, and 5 (8.33 %) had an APGAR < 7 at 10 minutes of age. The study by Hayakawa[18] et al found low APGAR scores at 5 minutes, and the need for adrenaline during resuscitation was associated with poor outcomes.

In the present study parity in which 18(30 %) cases were primigravida & 42 (70 %) were multigravida. In terms of parity, the majority of patient group mothers were multipara, whereas the majority of control group mothers were primipara. Many studies have reported this parameter. A study done by Dalal E, and Bodar [19] also studied this parameter with similar findings. A study done by Reddy S[20] et al and Khriesat WH[21] et al states that there is no association between birth asphyxia and the parity of the mother.

In the present study the mode of Delivery in which it was reported that 40 (66.66 %) cases were delivered by normal vaginal Delivery mode, 9 (15 %) had instrumental delivery & 11 (18.33 %) by cesarean section.

Between individuals who underwent natural labor and those who did not, there is a clear correlation between the presence of asphyxia. Others who experienced natural labor are more likely to have asphyxia than people who did not. This can be explained by the prolonged hypoxia associated with natural labor and the delay in delivery. LSCS can immediately halt this asphyxia by performing a rapid delivery. The bulk of the babies was delivered naturally through vaginal birth. Fetal distress was one of the main indicators for a cesarean section. The morbidity and mortality associated with asphyxia could be reduced with prompt detection and cesarean section intervention. The present study reported 40 (66.66 %) cases were delivered by normal vaginal Delivery mode, 9 (15 %) had instrumental delivery & 11 (18.33 %) by cesarean section. A study done by Reddy S[20] et al and Khriesat WH[21] et al has reported many such cases in their study.

The present study reported a mortality rate in birth asphyxia cases 7 (11.66 %) neonates were dead. In the present study, HIE occurred in patients 55 (91.77 %). Twenty neonates (33.33 %) acquired HIE stage I, of which 2 neonates (3.33 %) died; 25 infants (41.66 %) developed HIE stage II, of which 2 infants (3.33 %) died; and 15 neonates (25 %) had HIE stage III, of which 3 neonates (5 %) died. Our study's overall fatality rate in cases of birth asphyxia was 11.66 %, which was comparable to the findings of Dongol S.[21]

The present study distributed cases according to the treatment required in which 33 (55 %) required an Oxygen hood or nasal prongs, 20 (33.33 %) needed continuous positive oxygen pressure & 7 (11.66 %) were on the ventilator. Proper intervention is an important part of the case of asphyxia.

CONCLUSION

In the present study higher rate of induced vaginal Delivery, Multigravida, and irregular ANC was reported among patients with perinatal asphyxia. In neonatal care, perinatal asphyxia continues to be the primary factor in neonatal ICU admissions, mortality, and morbidity. The high rates of overall survival and post-ICU survival serve as a baseline for clinical services. Routine monitoring of asphyxiated babies will significantly help to detect myocardial dysfunction and hence the identification of shock. A therapeutic hypothermia therapy with a long-term follow-up component would be advantageous given the high incidence of HIE.

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