

Outcome Assessment of Perinatal Asphyxia in Neonates: Study in a district hospital

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Abstract

Perinatal asphyxia (also known as neonatal asphyxia or Perinatal Asphyxia in children) is the medical condition resulting from deprivation of oxygen to a newborn infant that lasts long enough during the delivery process to cause physical harm, usually to the brain. Perinatal Asphyxia in children is defined by the World Health Organization (WHO) "the failure to initiate and sustain breathing at birth". There were 102 live births asphyxia neonates who were clinically diagnosed and admitted in several private clinics in Jamalpur, Bangladesh during January 2017 to December 2017 were selected as study subjects. The aim of this study was to assess the outcome of perinatal asphyxia in neonates. Clinical information was collected retrospectively from maternal records (maternal age, gravida, type of delivery, presence of meconium, induced or spontaneous labour, and pregnancy complications. The NICU records provided additional information about newborn infant. The outcome of treatment in babies with Perinatal Asphyxia in children showing in (Table 3) Recovery rate in group one (HIE I) was 14(13.78%), in group two (HIE II) was 75(73.52) and in group three (HIE III) was 05(4.9%) and Death ratio was in group one (HIE I) was 1(0.98%), in group two (HIE II) was 2(1.96%) and in group three (HIE III) was 05(4.90%). The morbidity and mortality in cases of Perinatal Asphyxia in children the highest causes of death in stage 3(HIE III). Preterm with Hyaline membrane disease was 4(3.92%) and then the higher causes of death in stage II was Neonatal sepsis 3(2.94%). Perinatal Asphyxia in children was one of the commonest causes of admission and mortality in NICU and others beds. Babies with HIE Stage III had a very poor prognosis. Perinatal Asphyxia in children combined with other morbidities was associated with a higher mortality. Sepsis is the commonest morbidity in cases of Perinatal Asphyxia in children. Maternal gravida, pregnancy complication with PROM, meconium, APH, emergency caesarean section, preterm and in addition male sex were the risk factors for Perinatal Asphyxia in neonates.

Key words: Perinatal asphyxia, Clinical Outcome, Neonates

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INTRODUCTION

Perinatal asphyxia (also known as neonatal asphyxia or Perinatal Asphyxia in children) is the medical condition resulting from deprivation of oxygen to a newborn infant that lasts long enough during the delivery process to cause physical harm, usually to the brain. Perinatal Asphyxia in children is defined by the World Health Organization (WHO) "the failure to initiate and sustain breathing at birth."¹ . The WHO has estimated that 4 million babies die during the neonatal period every year and 99% of these deaths occur in low-income and middle income countries². Three major causes account for over three quarters of these deaths, serious infection (28%) complication of preterm birth (26%) and perinatal asphyxia in children (23%)². It implies that Perinatal Asphyxia in children is the cause of around one million neonatal deaths each year. Present challenges is the lack of a gold standard for accurately defining Perinatal Asphyxia in children. Because of same reason the incidence of perinatal asphyxia in children is difficult to quantify. This is demonstrated by the difference in occurrence according to different studies, where the incidence ranges from 5.4/1000 live births in a Swedish study³ to 22/100 live hospital births in an Indian study.^{4,5} The incidence of asphyxia in full term infants varies between 2.9-9.0 cases per thousand in industrial countries. The incidence for Perinatal Asphyxia in children is higher in developing countries⁶. Hospital based studies in Nepal⁷ and South Africa⁸ estimated that Perinatal Asphyxia in children accounted for 24% and 14% of perinatal mortality respectively. It is a substantially underestimate the burden in rural areas, where early deaths, Most of which occur at home, and more likely to be underreported. Asphyxia, a lack of oxygen or an excess of carbon dioxide caused by the interruption in breathing, is the result of the failure of the gas exchange organ. For several reasons a baby may not be able to take oxygen before, during or just after birth. A mother may have medical conditions that can lower her oxygen levels, there may be problem with the placenta that prevents

enough oxygen from circulating to the fetus or the baby may be unable to breath after delivery. In mild HIE, muscle tone may be increased slightly and deep tendon reflexes may be brisk during first few days. Transient behavioral abnormalities such as poor feeding, irritability excessive crying or sleepiness may be observed. In moderately severe HIE, the infant is lethargic with significant hypotonia, and diminished deep tendon reflexes. The grasping, Moro and sucking reflexes can be sluggish or absent, seizures may occur within 24 hrs of life. In severe HIE, stupor or coma is typical. The infant may not respond to any physical stimulus. Having with irregular Breathing the infant often requires ventilatory support. Generalized hypotonia and depressed deep tendon reflexes are common. Pupils may be diluted, fixed or poorly reactive to light, seizures occurs early and may be initially resistance to conventional treatments⁹. The aim of present study was to identify the prevalence of Perinatal Asphyxia in children and of avoidable risk factors for neonatal encephalopathy including mortality due to Perinatal Asphyxia in children. Risk factors for Perinatal Asphyxia in children in hospital based setting in developing countries have been categorized into ante partum, intra-partum and post natal characteristics.

METHODOLOGY AND MATERIALS

This was a retrospective study with the diagnosis of Perinatal Asphyxia in neonate which was conducted in several private clinics in Jamalpur, Bangladesh during January 2017 to December 2017 were selected as study subjects. A total of 102 consecutive asphyxiated newborn who met the inclusion criteria were enrolled in the study. All newborn babies with a clinical diagnosis of Perinatal Asphyxia in children (newborn with history of delayed cry or APGAR score of less than 7 in 5 minutes) were included in the study. The four categorical determinants that were considered were as follows: pregnancy complications, use of induction of labour (none, oxytocin, misoprostol or both), type of delivery

(normal, caesarean and vaccum) and sex of baby. In addition, five continuous determinants were measured which were as follows: age, number of antenatal (ANC) visits, gestational age, gravida and birth weight. The outcome of Perinatal Asphyxia in children in respect to mortality in different stage of HIE were also determined.

RESULTS

In Table-1 shows there have three groups in neonates with Perinatal Asphyxia in group one (HIE I) male was 07(12.28%) and female was 08(17.77) total was 15(14.70%), in group two (HIE II) male was 42(73.68%) and female was 35(77.77%) total was 77(75.49%) and in group three (HIE III) male was 08(14.04) and female was 02(4.44) total was 10(9.80%).

Table 1: Total number of neonates with Perinatal Asphyxia in children (n=102)

Presentation	Male		Female		Total	
	n	%	n	%	n	%
HIE I	7	12.28	08	17.77	15	14.70
HIE II	42	73.68	35	77.77	77	75.49
HIE III	08	14.04	02	4.44	10	9.80
Grand Total	57		45		102	

In Table 2 showing that the distribution of determinants associated factors with Perinatal Asphyxia in children the highest Maternal age(18- 35 years) was 80(78.43),in Gestational Age (37-42 weeks) was 78(78.47%), in Gravida (1-2) was 60(58.82) in Pregnancy Complications Thick was 36(37.25%), in Induction of Labour not Done was 74(72.54%),in Mode of Delivery Spontaneous was 53(51.96%),in Birth weight(2500-3000 kg) was 51(50%) and finally the highest range of participant was male 57(55.88%). The outcome of treatment in babies with Perinatal Asphyxia in children showing in (Table 3) Recovery rate in group one (HIE I) was 14(13.72%) , in group two (HIE II) was 75(73.52%) and in group three (HIE III) was 05(4.90%) and Death

ratio was in group one (HIE I) was 1(0.98%) , in group two (HIE II) was 2(1.96%)and in group three (HIE III) was 05(4.90%). The morbidity and mortality in cases of Perinatal Asphyxia in children the highest.

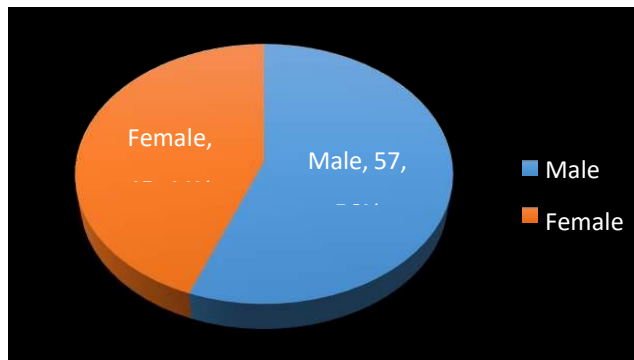


Figure: Gender distribution of participants (n=204)

DISCUSSION

In spite of major advances in monitoring technology and knowledge of fetal and neonatal pathologies, perinatal asphyxia or more appropriately, hypoxic ischemic encephalopathy (HIE) remain a serious condition, causing significant mortality and long term morbidity. It is a tragedy for a normally developed fetus to sustain cerebral injury during the last hours of intrauterine life and to exist for many years with major handicap. It is found that for every early neonatal death, three disabled children survive. Perinatal Asphyxia in children and the hypoxic ischemic encephalopathy are one of the common neonatal problems in our country.

Our reported incidence of Perinatal Asphyxia in children (14%) is almost similar to the incidence in the study carried out by Emmaneul Dzodeyan in Africa (40%)¹¹. The incidence of the Perinatal Asphyxia in children in the present study was low in compare to the study conducted by Daga¹² in Kathmandu (27%) and Azamin akistan(48%)¹³. However the rate is quite high compared with the study by Lodakhi GM in India (4.18%)¹⁴. The asphyxia rate in this study was 26.95/1000 live births.

Table 2: Distribution of determinants associated factors with Perinatal Asphyxia in children (n=102)

Determinants	Category	Number	Percent (%) (n=102)
Maternal age	< 18 years	12	11.76
	18-35 years	80	78.43
	>35 years	10	9.8
Gestational Age	< 37 weeks	20	19.6
	37-42 weeks	78	76.47
	>42 weeks	04	3.92
Gravida	1-2	60	58.82
	2-4	36	35.29
	>4	06	5.88
Pregnancy Complications	Prolapsed	01	0.98
	Heart disease	03	2.94
	Fetal anomaly	02	1.96
	Thick	36	37.25
	Meconium Infection	12	11.76
	Preclampsia	07	6.8
	APN	15	15.68
	Placenta	04	3.92
	Previa	02	1.96
	Hypertension From	20	20.58
Induction of Labour	Done	28	27.45
	Not Done	74	72.54
Mode of Delivery	Spontaneous	53	51.96
	Vaccum	09	8.82
	c-section	40	39.21
Birth weight	<2500 kg	31	30.39
	2500-3000 kg	51	50
	>3000 kg	20	19.6
Sex	Male	57	55.88
	Female	45	44.11

Table 3: Showing the outcome of treatment in babies with Perinatal Asphyxia in children (n=102)

Stages	HIE I (15)		HIE II (77)		HIE III (10)	
	N	%	N	%	N	%
Recovery	14	13.72	75	73.52	05	4.90
Death	01	0.98	02	1.96	05	4.90

Table 4: Showing morbidity and mortality in cases of Perinatal Asphyxia in children (n=102)

HIE stages	Cases	Mortality	
		N	%
HIE I	Neonatal sepsis with nectrotizing enterocolitis.	1	0.98
	Preterm with hyline membrane disease and neonatal sepsis.	1	0.98
HIE II	Neonatal sepsis	3	2.94
	Hydrocephalus	2	1.96
HIE III	Neonatal Sepsis	2	1.96
	NNS with Pneumothorax	2	1.96
	Preterm with Hyaline membrane disease	4	3.92
	Meconium aspiration syndrome	1	1.96

This result is high in number as compared with 5.4/1000 live hospital- born infant in Sweden 3. This result is similar to 22/1000 live hospital-born infants in a study from India⁵ and 12 college hospitals where the incidence was 21.92%¹⁵. In this study the largest numbers of babies affected by Perinatal Asphyxia in children were to mothers of 18-35 years (78.43%)

but this reflected the fact that this aged group represented as the most number of mothers in our obstetric service. So, this study showed that incidence of Perinatal Asphyxia in children was more common between 18-35 years and also shows that an increase or decrease in maternal age was not associated with any risk for Perinatal Asphyxia in children. This result was similar with another study done by Wael Hayel Kreisa and Zeiad Habaheh in Prince Ali Ben Al Hussein Hospital, Jordan¹⁶ in 2005 but different results from the study done by Rachalopantana Kerno et al at Paltani Hospital, Thailand¹⁷ showed that Perinatal Asphyxia in children was significantly related to maternal age greater than 30 years. Antenatal check-ups were also studied. Only 16 women (15.68%) had no checkup during pregnancy, 62 women (60.70%) had regular ANC in selected Hospital and 24 (23.52%) were having ANC in health post. This study finding were less than one-fifth of the women of asphyxiated babies had no ANC checkup during pregnancy. Out of the 102 newborns, 20 babies (19.60%) were preterm 78 (48.47%) were full term and 4 (3.92%) were post term. The most of the Perinatal Asphyxia in children cases were term babies. This study is different from the statement that post maturity is an important risk factor of Perinatal Asphyxia in children^{13,18}. This study is also different from the statement that prematurity is a significant risk factor for Perinatal Asphyxia in children. When total deliveries were considered, preterm babies were quite less than term babies. So if we consider only the preterm babies, Perinatal Asphyxia in children is common among them. Out of the 102 mothers of asphyxiated babies, 60 (58.82%) were primi gravida, 36 (35.29%) had less than 5 children and 6 mothers (5.88%) were having more than 5 children. So these figures show that Perinatal Asphyxia in children was more common in babies delivered by primi gravida. Similar result was shown by Azam M study done in Nishtar Medical College, Multan where the primigravida was shown to be 47%. But this study didn't show increase incidence of Perinatal Asphyxia in children with grand multipara which is different from the study done by Azam M¹³ in Multan where the incidence

was 34%. Certain maternal risk factors were assessed by maternal self-report made during admission. Among 60 mothers who had complications during pregnancy more than half of them had thick meconium stain. So, thick meconium showed increase risk factor for Perinatal Asphyxia in children. This result was in contrast with the study done by Anne CC Lee et al¹⁹ at Southern Nepal which showed meconium stained amniotic fluid had a non-significant greater risk for Perinatal Asphyxia in children (RR: 1.32, 95%CI: 0.19 to 2.16). This study is comparable with the study done by Lalsclottir K et al²⁰ in Iceland where 50% of the women of asphyxiated babies had meconium stain amniotic fluid. Among all the women of asphyxiated babies 21 (20.58%) had premature rupture of membrane (PROM). Among the women with complicated pregnancy, more than one third had PROM. Study done by Anne CC Lee et al¹⁹ Southern Nepal and Azam M¹³ at Nishtar Hospital, Multan also showed that prolonged rupture of membrane was a significant risk factor for Perinatal Asphyxia in children. Ante partum haemorrhage (APH) and maternal infection was accounted to be 5.68% and 11.76% respectively. In this study Perinatal Asphyxia in children was commonly seen in mothers who had no induction of labour than in those who had induction of labour. Only 28 (27.45%) mothers of asphyxiated babies had induction of labour. The finding in this study were similar with the finding at Pattani Hospital, Thailand¹⁷. While most deliveries (51.96%) were normal, some (39.21%) had caesarean delivery and some (8.82%) by vacuum. Out of 102 babies, presenting with Perinatal Asphyxia in children 57 (55.88%) were males and 45 (44.11%) were females. This result is similar to other study done by Azam M in Multan¹³. Among the all 102 Perinatal Asphyxia in children case 30.39% were <2500 gm, 50% were between 2500-3500 gm and 19.60% were > 3000 gm. Among the total 102 cases of Perinatal Asphyxia in children 16 (15.68%) cases died. This result is similar with the result shown in one study done by Lodakhi G Min India¹⁴. Only 2 (2.60%) of HIE stage I, 5 (33.33%) cases of HIE stage II and 9 (90%) cases of HIE stage III died. Overall

mortality in cases of Perinatal Asphyxia in children (15.6%) was similar to the study done by S. J Etukand, I.S.Etak21 in Nigra where mortality rate was 14.3%. The mortality rate in this study was quite high as compare to the study done in University of Calabar Teaching Hospital ($p < 0.001$). Mortality in HIE stage I and stage II was quite similar with the study done by M. H Haidary¹⁵ in Rajshahi, Bangladesh but mortality in HIE stage III was higher than other studies like M.H Haidary in Rajshahi where the mortality was only 60%. The result regarding incidence of mortality in different stages of HIE was similar with one study done by Lodakhi GM in India¹⁴. This result was also higher than another study done by Mullign and Chawdhary where mortality due to severe Perinatal Asphyxia in children was 25.87%. In this study recovery rate in HIE stage I was 97.40 %, HIE stage II was 66.66% and HIE stage III was 10%.

LIMITATIONS OF THE STUDY

This was a prospective type of study with small number of sample size. So, the study result may not reflect the scenarios of the whole country.

CONCLUSION AND RECOMMENDATIONS

Among all stages of Perinatal Asphyxia in children, HIE stage II is the most common, then HIE stage I and finally HIE stage III. Babies with HIE Stage III had a poor prognosis whereas HIE stage I had a very good prognosis. Sepsis is the commonest morbidity in cases of perinatal asphyxia in children. Low birth weight and preterm babies more commonly suffered from perinatal asphyxia in children. Maternal gravida, pregnancy complication with PROM, meconium, APH, emergency caesarean section, preterm and in addition male sex were the risk factors for perinatal asphyxia in children. Mortality and morbidity were more common in males than in females. Prospective and case control studies will be necessary in future to get more scientific ideas about Perinatal Asphyxia in children in the context of Bangladesh.

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