

Outcome Assessment of Birth Asphyxia in Children: A study in a tertiary care Hospital, Dinajpur, Bangladesh.

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Abstract:

Perinatal asphyxia (also known as neonatal asphyxia or birth asphyxia) is the medical condition resulting from deprivation of oxygen to a newborn infant that lasts long enough during the **birth** process to cause physical harm, usually to the brain. Birth asphyxia is defined by the World Health Organization "the failure to initiate and sustain breathing at birth." The aim of this study was to assess the outcome of birth asphyxia and its related factors. Two hundred (200) live births asphyxia neonates whose were clinically diagnosed previously admitted in the department of paediatrics, M Abdur Rahim Medical College, Dinajpur, Bangladesh during the period from January 2017 To December 2017. 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 new born infant (birth asphyxia, stages of birth asphyxia, birth weight, sex and subsequent mortality). The outcome of treatment in babies with birth asphyxia showing in (Table 3) Recovery rate in group one (HIE I) was 28(13.78%) , in group two (HIE II) was 150(97.40) and in group three (HIE III) was 10(4.9%) and Death ratio was in group one (HIE I) was 2(0.98%) , in group two (HIE II) was 4(1.96%) and in group three (HIE III) was 10(4.90%). The morbidity and mortality in cases of birth asphyxia the highest causes of death in stage 3(HIE III) Preterm with Hyaline membrane disease was 4(25%) and then the higher causes of death in stage II was Neonatal sepsis 3(18.75%). Birth asphyxia 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. Birth asphyxia combined with other morbidities was associated with a higher mortality. Sepsis is the commonest morbidity in cases of birth asphyxia. Maternal gravida, pregnancy complication with PROM, meconium, APH, emergency caesarean section, preterm and male sex were the risk factors for birth asphyxia.

Key Words: Birth asphyxia, Clinical Outcome, Children

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I. Introduction

Perinatal asphyxia (also known as neonatal asphyxia or birth asphyxia) is the medical condition resulting from deprivation of oxygen to a newborn infant that lasts long enough during the birth process to cause physical harm, usually to the brain. Birth asphyxia is defined by the World Health Organization "the failure to initiate and sustain breathing at birth."¹ The National Neonatology Forum of India has defined birth asphyxia as gasping and ineffective breathing or lack of breathing at one minute after birth. 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 countries. Three major causes account for over three quarters of these deaths, serious infection (28%) complication of preterm birth (26%) and birth asphyxia (23%).² This estimation implies that birth asphyxia is the cause of around one million neonatal deaths each year. One of the present challenges is the lack of a gold standard for accurately defining birth asphyxia. Because of same reason the incidence of birth asphyxia 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 birth asphyxia is much higher in developing countries⁶. Hospital based studies in Nepal⁷ and South Africa⁸ estimated that birth asphyxia accounted for 24% and 14% of perinatal mortality respectively. However, these may 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. There are many 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 may 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. Breathing may be irregular and the infant often requires ventilatory support. Generalized hypotonia and depressed deep tendon reflexes are common. Pupils may be dilated, 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 birth asphyxia and of avoidable risk factors for neonatal encephalopathy including mortality due to birth asphyxia.

II. Methodology And Materials

This was a retrospective study on newborns with the diagnosis of birth asphyxia which was conducted in the department of paediatrics, M Abdur Rahim Medical College, Dinajpur, Bangladesh during the period from January 2017 To December 2017. A total of 200 consecutive asphyxiated newborn who met the inclusion criteria were enrolled in the study. All newborn babies with a clinical diagnosis of birth asphyxia (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 birth asphyxia in respect of mortality in different stage of HIE were also determined.

III. Results

In Table-1 shows there have three groups in neonates with birth asphyxia in group one (HIE I) male was 14(12.28%) and female was 16(17.78) total was 30(14.71%), in group two (HIE II) male was 84(73.68%) and female was 70(77.78%) total was 154(14.71%) and in group three (HIE III) male was 12(10.90) and female was 4(4.44) total was 20(9.8%). In Table 2 showing that the distribution of determinants associated factors with birth asphyxia the highest Maternal age(18-35 years) was 160(78.43), in Gestational Age(37-42 weeks) was 156(78.47%), in Gravida (1-2) was 120(58.82), in Pregnancy Complications Thick was 72(37.25%), in Induction of Labour not Done was 148(72.54%), in Mode of Delivery Spontaneous was 106(51.96%), in Birth weight(2500-3000 kg) was 102(50) and finally the highest range of participant was male 110(55%). The outcome of treatment in babies with birth asphyxia showing in (Table 3) Recovery rate in group one (HIE I) was 28(13.78%) , in group two (HIE II) was 150(97.40) and in group three (HIE III) was 10(4.9%) and Death ratio was in group one (HIE I) was 2(0.98%) , in group two (HIE II) was 4(1.96%) and in group three (HIE III) was 10(4.90%). The morbidity and mortality in cases of birth asphyxia the highest causes of death in stage 3(HIE III) Preterm with Hyaline membrane disease was 4(25%) and then the higher causes of death in stage II was Neonatal sepsis 3(18.75%).

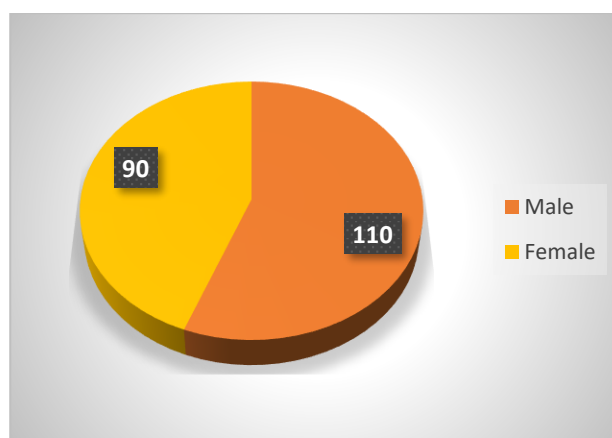


Figure: Gender distribution of participants (n=200)

Table 1: Total number of neonates with birth asphyxia (n=200)

Presentation	Male	%	Female	%	Total	%
HIE I	14	12.28	16	77.78	30	75.49
HIE II	84	73.68	70	17.78	154	14.71
HIE III	12	10.90	4	4.44	20	9.8
Grand Total	110		90		200	

Table 2: Distribution of determinants associated factors with birth asphyxia (n=200)

Determinants	Category	Number (n=200)	Percent (%)
Maternal age	< 18 years	20	10.00
	18-35 years	160	78.43
	>35 years	20	9.8
Gestational Age	< 37 weeks	36	18.00
	37-42 weeks	156	78.47
	>42 weeks	8	3.92
Gravida	1-2	120	58.82
	2-4	72	35.29
	>4	12	5.88
Pregnancy Complications	Prolapsed	2	0.98
	Heart disease	6	2.94
	Fetal anomaly	4	1.96
	Thick	72	37.25
	Meconium Infection	24	11.76
	Pre-eclampsia	14	6.8
	APN	30	15.68
	Placenta	8	3.92
	Previa	4	1.96
	Hypertension From	40	20.58
Induction of Labour	Done	56	27.45
	Not Done	148	72.54
	Mode of Delivery		
Mode of Delivery	Spontaneous	106	51.96
	Vacuum	18	8.82
	c-section	80	39.21
Birth weight	<2500 kg	62	30.39
	2500-3000 kg	102	50
	>3000 kg	40	19.6
Sex	Male	114	55.88
	Female	90	44.11

Table 3: Showing the outcome of treatment in babies with birth asphyxia (n=200)

Stages	HIE I (30)		HIE II (154)		HIE III (20)	
	N	%	N	%	N	%
Recovery	28	13.73	150	73.53	10	4.90
Death	2	0.98	4	1.96	10	4.90

Table 4: Showing morbidity and mortality in cases of birth asphyxia (n=200)

HIE stages	Cases	Mortality	
		N	%
HIE I	Neonatal sepsis with necrotizing enterocolitis.	1	6.25
	Preterm with hyaline membrane disease and neonatal sepsis.	1	6.25
HIE II	Neonatal sepsis	2	12.5
	Hydrocephalus	2	12.5
HIE III	Neonatal Sepsis	3	18.75
	NNS with Pneumothorax	2	11.54
	Preterm with Hyaline membrane disease	4	25
	Meconium aspiration syndrome	1	6.25

IV. Discussion

Birth asphyxia and the hypoxic ischemic encephalopathy are one of the common neonatal problems in our country. It is the commonest cause of hospital admission of a newborn¹⁰. Our reported incidence of birth asphyxia (14%) is almost similar to the incidence in the study carried out by Emmanuel Dzodeyan in Africa (40%)¹¹. The incidence of the birth asphyxia in the present study was low in compare to the study conducted by Daga¹² in Kathmandu (27%) and Azamin Pakistan(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. This result is high in number as compared with 5.4/1000 live hospital-born infant in Sweden. This result is similar to 22/1000 live hospital-born infants in a study from India and 12 college hospitals where the incidence

was 21.92%¹⁵. In this study several maternal and fetal risk factors were also studied but as there was no control group of newborns without asphyxia born in Dhulikhel Hospital, we could not identify risk factors which were more prevalent in the study group than in pregnancies and deliveries of healthy infants.

In this study the largest numbers of babies affected by birth asphyxia 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 birth asphyxia 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 birth asphyxia. 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 birth asphyxia was significantly related to maternal age greater than 30 years. Antenatal checkups were also studied. Only 16 women (15.68%) had no checkup during pregnancy, 62 women (60.70%) had regular ANC in Dhulikhel Hospital and 24 (23.52%) were having ANC in health post. This study showed 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 birth asphyxia cases were term babies. This study is different from the statement that post maturity is an important risk factor of birth asphyxia¹⁸. This study is also different from the statement that prematurity is a significant risk factor for birth asphyxia. When total deliveries were considered, preterm babies were quite less than term babies. So if we consider only the preterm babies, birth asphyxia 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 birth asphyxia 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 birth asphyxia with grand multipara which is different from the study done by Azam M 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 stain liquor showed increase risk factor for birth asphyxia. 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 birth asphyxia (RR: 1.32, 95% CI: 0.19 to 2.16). This study is comparable with the study done by Lalscott 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 M at Nishtar Hospital, Multan also showed that prolonged rupture of membrane was a significant risk factor for birth asphyxia. Ante partum haemorrhage (APH) and maternal infection was accounted to be 5.68% and 11.76% respectively. In this study birth asphyxia was commonly seen in those 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 did agree 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 birth asphyxia 57 (55.88%) were males and 45 (44.11%) were females. This result is similar to the study done by Azam M in Multan¹³. Among the all 102 birth asphyxiated case 30.39% were < 2500 gm, 50% were between 2500-3500 gm and 19.60% were > 3000 gm. Among the total 102 cases of birth asphyxia 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 birth asphyxia (15.6%) was similar to the study done by S. J Etukandi. 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 ($p < 0.001$). In this study 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 India. This result was also higher than another study done by Mullign and Chawdhary where mortality due to severe birth asphyxia 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%.

V. 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 exact scenarios of the whole country.

VI. Conclusion And Recommendations

Sepsis is the commonest morbidity in cases of birth asphyxia. Low birth weight and preterm babies

more commonly suffered from birth asphyxia. Maternal gravida, pregnancy complication with PROM, meconium, APH, emergency caesarean section, preterm and male sex were the risk factors for birth asphyxia. Mortality and morbidity were more common in males than in females. Without proper understanding of the various risk factors and other associated factors related to birth asphyxia, it will be difficult to develop strategies for its prevention and management. Prospective and case control studies will be necessary in future to get more scientific ideas about birth asphyxia in the context of Bangladesh.

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