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Clinical profile of birth asphyxia in Dhaka shishu (children) hospital: A retrospective study

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Abstract

Introduction: Birth asphyxia is defined by the World Health Organization "the failure to initiate and sustain breathing at 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%). 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 in Dhaka Shishu (Children) Hospital, Dhaka, Bangladesh.

Aim of the Study: The aim of this study was to find out the outcome of birth asphyxia, identify the common obstetric and neonatal risk factors, and study the cause of death.

Material & Methods: Between Jan 2018 and Dec 2018, there were 204 live births asphyxia neonates whose were clinically diagnosed and admitted in Dhaka Shishu (Children) Hospital come from different parts of Dhaka city and whole country as well. Clinical information was collected retrospectively from maternal records (maternal age, gravida, type of delivery, presence of Thick meconium stain, induced or spontaneous labour, and pregnancy complications). The DSH records provided additional information about new born infant (birth asphyxia, stages of birth asphyxia, birth weight, sex and subsequent mortality).

Results: 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%).

Conclusion: Birth asphyxia was one of the commonest causes of admission and mortality in NICU and others beds in Dhaka Shishu (Children) Hospital. 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, Thick meconium stain, APH, emergency caesarean section, term and male sex were the risk factors for birth asphyxia.

Keywords: birth asphyxia, HIE, neonatal sepsis

1. Introduction

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 countries2. 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 perenatal 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 under reported. 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 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 outcome of birth asphyxia and of avoidable risk factors for neonatal encephalopathy including mortality due to birth asphyxia. Risk factors for birth asphyxia in hospital-based setting in developing countries have been categorized into ante partum, intra-partum and post-natal characteristics. In this study, we identify risk factors for birth asphyxia among newborns who were admitted in Dhaka Shishu (Children) Hospital from data collected retrospective with all mothers from birth asphyxia babies.

2. Objectives

a. General objective

- To assess the outcome of birth asphyxia.

b. Specific objectives:

- Identify the common obstetric and neonatal risk factors
- Identify study the cause of death.

3. Methodology and Materials

This was a retrospective study on newborns with the diagnosis of birth asphyxia which was conducted in the Dhaka Shishu (Children) Hospital, Dhaka, Bangladesh in the mentioned hospital were finalized as the study population. We conducted this descriptive observational study from Jan 2018 to December 2018. A total of 204 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.

4. Results

Between Jan 2018 and Dec 2018, there were 204 live births asphyxia neonates who were clinically diagnosed previously and admitted in Dhaka Shishu (Children) Hospital come from different parts of Dhaka city and whole country as well. 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 16(14.04) 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 meconium stain 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 114(55.88%). 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%). In Table-4 the morbidity and mortality in cases of birth asphyxia the highest causes of death in stage 3(HIE III) was 10(4.90) Preterm with Hyaline membrane disease was 4(25%) and then the higher causes of death in stage II was Neonatal sepsis 3(18.75%).

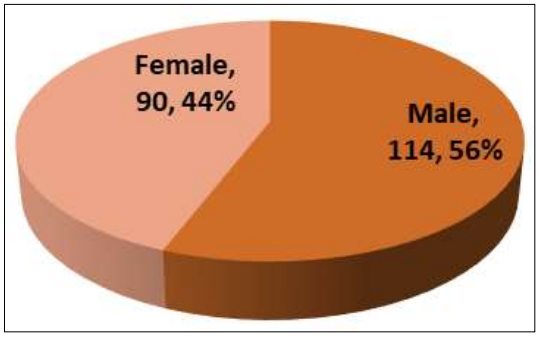

Fig 1: Gender distribution of participants (n=204)

Table 1: Total number of neonates with birth asphyxia (n=204)

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	16	14.04	4	4.44	20	9.8
Grand Total	114		90		204	

Table 2: Distribution of determinants associated factors with birth asphyxia (n=204)

Determinants	Category	Number (n=204)	Percent (%)
Maternal age	< 18 years	24	11.76
	18-35 years	160	78.43
	>35 years	20	9.8
Antenatal visit	Presentt	124	60.78
	Post	48	23.53
	None	32	15.69

Gestational Age	< 37 weeks	40	19.6
	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 Meconnium stain	72	37.25
	Maternal Infection	24	11.76
	Pre-eclampsia	14	6.8
	APH	30	14.71
	Placenta Previa	12	5.88
	PROM	40	19.61
Induction of Labour	Done	56	27.45
	Not Done	148	72.54
Mode of Delivery	Spontaneous	106	51.96
	Vaccum	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=204)

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=204)

HIE stages	Cases	Mortality	
		N	%
HIE I	Neonatal sepsis with nectrotizing enterocolitis.	1	6.25
	Preterm with hyline 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

5. 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 seen that for every early neonatal death, three disabled children survive. 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. Birth asphyxia was diagnosed if there was a history of delayed crying at birth for more than 1 minute or if the 5 minute APGAR score was less than 7. The incidence of the birth asphyxia in the present study was low in compare to the study conducted by Daga11 in Kathmandu (27%) and Azam in Pakistan (48%)12. However, the rate is quite high compared with the study by Lodakhi GM in India (4.18%)13. In this study the largest numbers of babies affected by birth asphyxia were to mothers of 18-35 years 160(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, Jordan15 in 2005 but different results from the study done by Rachalopantana Kerno *et al* at Paltani Hospital, Thailand16 showed that birth asphyxia was significantly related to maternal age greater than 30 years.Antenatal checkups were also studied. Only 32 women (15.69%) had no checkup during pregnancy, 124 women (60.70%) had regular Hospital and 48 (23.53%) were having Hospital visit in post. This study showed less than 100 of the women of asphyxiated babies had no checkup during pregnancy. Out of the 204 newborns, 40 babies (19.60%) were preterm 156 (78.47%) were full term and 8 (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 asphyxia12,17. This study is also different from the statement that term baby is a significant risk factor for birth asphyxia. When total deliveries were considered, preterm babies were quite less then term babies. So, if we consider only the term babies, birth asphyxia is common among them. Out of the 204 mothers of asphyxiated babies, 120(58.82%) were primi gravida, 72 (35.29%) had less than 4 children and 12 mothers (5.88%) were having more than 2 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 M12 in Multan where the incidence was 34%. Certain maternal risk factors were assessed by maternal self-report made during admission. Among 72(37.25%) 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 al*18 at Southern Nepal which showed meconium stained amniotic fluid had a non-significant greater risk for birth asphyxia (RR: 1.32, 95% Cl: 0.19 to 2.16). This study is comparable with the study done by Lalsclottir K *et al*19 in Iceland where 50% of the women of asphyxiated babies had meconium stain amniotic fluid. Among all the women of asphyxiated babies 40 (19.61%) 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 al*18 Southern Nepal and Azam M12 at Nishtar Hospital, Multan also showed that prolonged rupture of membrane was a significant risk factor for birth asphyxia. Ante partum haemmorrhage (APH) and maternal infection was accounted to be 30(14.71%) respectively and 24(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 56(27.45%) mothers of asphyxiated babies had induction of labour. The finding in this study did agree with the finding at Pattani Hospital, Thailand16. While most deliveries106(51.96%) were normal, some 80(39.21%) had caesarean delivery and some 18(8.82 %) by vacuum. Out of 204 babies, presenting with birth asphyxia 114(56%) were males and 56 (44%) were females. This result is similar to the study done by Azam M in Multan12. 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 Haidary14 in Rajshahi, Bangaladesh 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 India13. 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 28(13.73%), HIE stage II was 150(73.53%) and HIE stage III was 10(4.90 %).

6. Limitations of the Study

This was a Retrospective type of study in a single community with comparatively small number of sample size. So, the study result may not reflect the exact scenarios of the whole country.

7. Conclusion and Recommendations

Birth asphyxia is one of the commonest causes of admission and mortality in Dhaka Shishu (Children) Hospital. Among all stages of birth asphyxia, HIE stage II is the most common, then HIE stage I and finally HIE stage III. Babies with HIE Stage III had a very poor prognosis whereas HIE stage I had a very good prognosis. Sepsis is the commonest morbidity in cases of birth asphyxia. Maternal gravida, pregnancy complication with PROM, Thick meconium stain, APH, emergency caesarean section, term and male sex were the risk factors for birth asphyxia. Mortality and morbidity were more common in males than in females. All around the world, birth asphyxia is one of the commonest causes of neonatal deaths and also a major cause of neonatal admissions. 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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