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Outcome Assessment ofPerinatal Asphyxia in Neonates: Study in a District Hospital, Natore, Bangladesh

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Abstract:
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 birth process to cause physical harm, usually to the brain. Perinatal Asphyxia in children is defined by the World Health Organization "the failure to initiate and sustain breathing at birth*
Aim of the Study: *The aim of this study was to assess the outcome of perinatal asphyxia in children and neonatal risk factors, and study the cause of death.*
Material & Methods: *There were 127 live births asphyxiated neonates who were clinically diagnosed and admitted in the department of Pediatrics, Natore District Hospital, Natore, Bangladesh during the period from January 2018 to December 2018.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 Hospital records provided additional information about new born infant (birth asphyxia, stages of Perinatal Asphyxia in children, birth weight, sex and subsequent mortality).*
Results: *The outcome of treatment in babies with birth asphyxia showing the recovery rate in group one (HIE I) was 18(14.17%), in group two (HIE II) was 90(70.87%) and in group three (HIE III) was 7(5.51%) and Death ratio was in group one (HIE I) was 2(1.57%), in group two (HIE II) was 3(2.36%) and in group three (HIE III) was 7(5.51%). The morbidity and mortality in cases of birth asphyxia the highest causes of death in stage 3(HIE III) was 7(58.53%) Preterm with Hyaline membrane disease was 3(25%) and then the higher causes of death in stage II was Neonatal sepsis 2(16.67%).*
Conclusion: *Birth asphyxia was one of the commonest causes of admission and mortality in the department of Pediatrics, Natore District Hospital, Natore, Bangladesh l. 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.*
Key Words: *Birth asphyxia, HIE, Neonatal sepsis*

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I. 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 birth process to cause physical harm, usually to the brain. Perinatal Asphyxia in children is defined by the World Health Organization "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 incomecountries[2].Threemajorcausesaccountforover three quarters of these deaths were serious infection (28%), complication of preterm birth (26%) and Perinatal Asphyxia in children (23%) [2]. This estimation impliesthat Perinatal Asphyxia in children is the cause of around one million neonatal deaths each year. One of the present challenges is the lack of a gold standardforaccuratelydefiningPerinatal Asphyxia in children. Because ofsamereasontheincidenceofPerinatal Asphyxia in childrenisdifficult 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 Indianstudy.[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 much higher in developing countries[6]. Hospital based studies in Nepal[7] and South Africa[8] estimated that Perinatal Asphyxia in children accounted for 24% and 14% of perinatal

mortalityrespectively.However,thesemaysubstantially underestimate the burden in rural areas, where early deaths,mostofwhichoccurat home andmorelikelyto 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 mayoccur within 24 hrs of life. In severe HIE, stupor or coma is typical. The infant may not respond to any physical stimulus.Breathingmaybeirregularand theinfantoften requires ventilator support. Generalized hypotonia and depressed deep tendon reflexes are common. Pupils may be dilated, fixed or poorly reactive to light, seizures occur early and may be initially resistance to conventional treatments[9]. The aim of present study was to identify the prevalence ofPerinatal Asphyxia in children and of avoidable risk factors for neonatal encephalopathy including mortality due toPerinatal Asphyxia in children. Risk factors forPerinatal Asphyxia in children in hospital based setting in developing countries have been categorized into ante partum, intra-partumand post-natal characteristics.

II. Methodology and Materials

This was aretrospective study on newborns withthediagnosisofPerinatal Asphyxia in children, conducted in the department of paediatrics, Natore District Hospital, Natore, Bangladesh during the period from January 2018 to December 2018 in the mentioned hospital were finalized as the study population. A total of 127 consecutive asphyxiated newborns 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 APGARscoreoflessthan7in5minutes)were included in the study. The 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 inrespectofmortalityindifferentstages ofHIEwerealso determined. Statistical analysis was done using SPSS software version-22.

III. Results

In Table-1 shows there have three groups in neonates with birth asphyxia in group one (HIE I) male was 61(75.31%) and female was 34(73.91%) total was 95(74.80%), in group two (HIE II) male was 11(13.58%) and female was 9(19.57) total was 20(15.75%) and in group three (HIE III) male was 9(11.11%) and female was 3(6.52%) total was 12(9.45%). In Table 2 showing that the distribution of determinants associated factors with birth asphyxia the highest Maternal age (18-35 years) was 99(77.95%), in Gestational Age (37-42 weeks) was 98(77.16%),in Gravida 1-2 was 74(58.27%),in Pregnancy Complications Thick meconium stain was 47(37.0%),in Induction of labour not Done was 92(72.44%),in Mode of Delivery Spontaneous was 66(51.97%), in Birth weight 2500-3000 kg was 64(50.39%) and finally the highest range of participant was male 81(63.78%). The outcome of treatment in babies with birth asphyxia showing in (Table 3) Recovery rate in group one (HIE I) was 18(14.17%), in group two (HIE II) was 90(70.87%), and in group three (HIE III) was 7(5.51%) and Death ratio was in group one (HIE I) was 2(1.57%), in group two (HIE II) was 3(2.36%) and in group three (HIE III) was 7(5.51%). In Table-4 the morbidity and mortality in cases of birth asphyxia the highest causes of death in stage 3(HIE III) was 7(58.53%), Preterm with Hyaline membrane disease was 3(25%) and then the higher causes of death in stage II was Neonatal sepsis 2(16.67%).

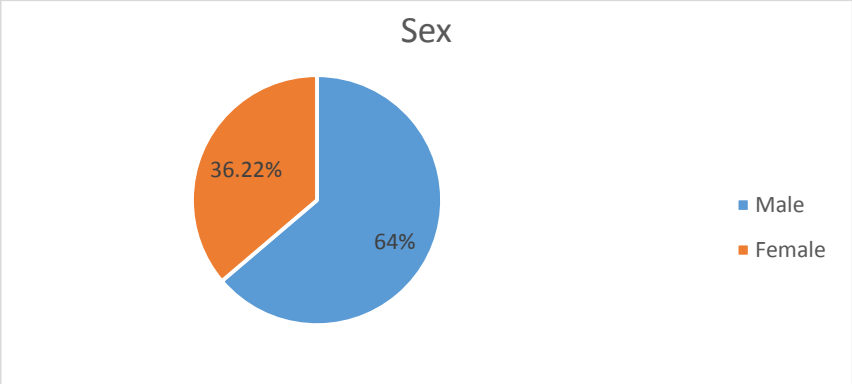

Figure: Gender distribution of participants (n=127)

Table 1: Total number of neonates withPerinatal Asphyxia in children (n=127)

Presentation	Male	%	Female	%	Total	%
HIE I	61	75.31	34	73.91	95	74.80
HIE II	11	13.58	9	19.57	20	15.75
HIE III	9	11.11	3	6.52	12	9.45
Grand Total	**81**		**46**		**127**	

Table 2: Distribution of determinants associated factors withPerinatal Asphyxia in children (n=127)

Determinants	Category	Number (n=127)	Percent (%)
Maternal age	< 18 years	16	12.60
	18-35 years	99	77.95
	>35 years	12	9.45
Antenatal visit	Present	77	60.63
	Post	31	24.41
	None	19	14.96
Gestational Age	< 37 weeks	24	18.90
	37-42 weeks	98	77.16
	>42 weeks	5	3.94
Gravida	1-2	74	58.27
	3-4	45	35.43
	>4	8	6.30
Pregnancy complication	Prolapsed	1	0.8
	Heart disease	4	3.15
	Fetal anomaly	2	1.6
	Thick Meconnium stain	47	37.0
	Maternal Infection	15	11.81
	Pre-eclampsia	8	6.3
	APH	18	14.2
	Placenta Previa	7	5.51
	PROM	25	19.7
Induction of Labour	Done	35	27.56
	Not Done	92	72.44
Mode of Delivery	Spontaneous	66	51.97
	Vaccum	12	9.45
	c-section	49	38.58
Birth weight	<2500 kg	38	29.92
	2500-3000 kg	64	50.39

	>3000 kg	25	19.69
Sex	Male	81	63.78
	Female	46	36.22

Table 3: Showing the outcome of treatment in babies withPerinatal Asphyxia in children (n=127)

Stages	HIE I (20)		HIE II (93)		HIE III (14)	
	N	%	N	%	N	%
Recovery	18	14.17	90	70.87	7	5.51
Death	2	1.57	3	2.36	7	5.51
Total	20.00	15.75	93.00	73.23	14.00	11.02

Table 4: Showing morbidity and mortality in cases ofPerinatal Asphyxia in children (n=12)

HIE stages	Cases	Mortality	
		N	%
HIE I	Neonatal sepsis with nectrotizing enterocolitis.	1	8.33
	Preterm with hyline membrane disease and neonatal sepsis.	1	8.33
HIE II	Neonatal sepsis	2	16.67
	Hydrocephalus	1	8.33
HIE III	Neonatal Sepsis	2	16.67
	NNS with Pneumothorax	1	8.33
	Preterm with Hyaline membrane disease	3	25.00
	Meconium aspiration syndrome	1	8.33

IV. Discussion

Inspiteofmajoradvancesinmonitoringtechnology 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 hypoxicischemicencephalopathyareoneofthecommon neonatal problems in our country. It is the commonest cause of hospital admission of anewborn.[10]In this study 127 live births asphyxiated neonates admitted in the department of Pediatrics, Natore District Hospital, Natore, Bangladeshwith birth asphyxia during 2 years and 9 months, were included. Birth asphyxia was diagnosed if there was a history of delayed crying atbirthformorethan1minuteorifthe5minuteAPGAR score was less thanseven.The incidence of birth asphyxia was observed almost 14% in the study carried out by Emmaneul Dzodeyan in Africa (40%).[11] In this study several maternal and fetal risk factor were also studied but as there was no control group of newborns without asphyxia born in Natore District Hospital we could not identify risk factors which were more prevalent in the study group than in pregnancies and deliveries of healthy infants.Inthisstudythelargestnumbersofbabiesaffected by birth asphyxia were to mothers of 18-35 years (77.95%) but this reflected the fact that this aged group represented as the most number of mothers in our obstetricservice.So,thisstudyshowedthatincidenceof birth asphyxia was more common between 18-35 years andalsoshowsthatanincreaseordecreaseinmaternal age was not associated with any risk for birth asphyxia. This result was similar with another study done by Wael Hayel Kreisa and Zeiad Hababeh in Prince Ali Ben Al Hussein Hospital, Jordan[12]but differs from the study done by Rachalopantana Kerno et al at Paltani Hospital, Thailand[13]showed that birth asphyxia was significantly related to maternal age greater than 30years.Antenatal checkups were also studied. Only 16 women (14.96%) hadnocheck-updduringpregnancy,77 women (60.63%) had regular ANC. Observing all the mothers of asphyxiated babies, 74(58.27%) had 1-2 children, 45 (35.43%) had lessthan 4 children and 8 mothers (6.30%) were having more than 4 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[14]in Multan where the incidence was 34%.Certain maternal risk factors were assessed by maternal self-report made during admission. Among all the women of asphyxiated babies 25 (19.7%) had premature rupture of membrane (PROM). Study done by Anne CC Lee etal[15]SouthernNepalandAzam M[14]atNishtarHospital, Multanalsoshowedthatprolongedruptureofmembrane was a

significant risk factor for birth asphyxia. Ante partum haemmorrhage (APH) and maternal infection was accounted to be 14.2% and 11.81%respectively. In this study birth asphyxia was commonly seen in those mothers who had no induction of labour (72.44%)than in those who had induction of labour (27.56%). The finding in this study did agree with the finding at Pattani Hospital, Thailand[13] While mostdeliveries (51.96%) were normal, some (39.21%) had caesarean delivery and some (8.82 %) by vacuum. Out of 127 babies, presenting with birth asphyxia male was 61(75.31%) and female was 34(73.91%). This result is similar to the study done by Azam M in Multan.[14] Among the all 127 birth asphyxiatedcase29.92%were<2500gm, 50.39%werebetween2500-3500 gm and 19.69% were > 3000 gm. Only 2 (1.57%)ofHIEstageI, 3 (2.36%) cases of HIE stage II and 7 (5.51%) cases of HIE stage IIIdied. Overallmortality in cases ofbirthasphyxia(15.6%) wassimilartothestudydonebyS.JEtukand I.S.Etak[16]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 wasquitesimilarwiththestudydonebyM.H Haidary[17]in Rajshahi,BangaladeshbutmortalityinHIEstageIIIwas 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.[18]This result was also higher than another study done by Mullign and Chawdhary where mortality due to severe birthasphyxiawas25.87%.Inthisstudyrecoveryratein HIE stage I was 14.17 %, HIE stage II was 70.87% and HIE stage III was 5.51%.

LIMITATIONS OF THE STUDY

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

V. Conclusion and Recommendations

Among all stages ofPerinatal Asphyxia in children, HIE stage II is the most common, then HIE stage I and finally HIE stageIII. 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 ofPerinatal Asphyxia in children. Low birth weight and preterm babies more commonly suffered fromPerinatal Asphyxia in children. Maternal gravida, pregnancy complication with PROM, meconium, APH, emergency caesarean section, preterm and male sex were the risk factors forPerinatal Asphyxia in children. Mortality and morbidity were more common in males than infemales.Prospectiveandcasecontrol studies will be necessary in future to get more scientific ideas about Perinatal Asphyxia in children in the context ofBangladesh.

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