Outcome of newborn with birth asphyxia in tertiary care hospital - a retrospective study

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Abstract

Introduction: Birth asphyxia is the cause of death of 0.92 million newborn annually. During neonatal period 4 million babies die yearly. Over three quarters of these deaths are due to three major causes like serious infection (28%), complication of preterm birth (26%) and birth asphyxia (23%).

Objective: To study the outcome of newborn with birth asphyxia and also the factors responsible for outcome of asphyxiated newborns.

Materials and Methods: This is a retrospective study on newborns with the diagnosis of birth asphyxia at SNMC and HSK hospital and research centre, Bagalkot. We studied 163 consecutive asphyxiated neonates who were admitted in our neonatal unit and fulfilled the inclusion criteria. Clinical information was collected retrospectively from maternal records, NICU records and referral notes.

Results: Of the total 1842 admissions, 163 (8.8%) babies were asphyxiated. There were more males than females 106(65%) and 57(35%) respectively. In our study, 72.39% of babies were admitted to neonatal ward within 4 hours, 17.17% between 4 to 24 hours and 10.42% between 24 to 72 hours of delivery. Early admission to NICU had better outcome compared to late admission. Among the total 163 newborns of birth asphyxia that fulfilled the inclusion criteria, 33(20.24%) newborns died. Of which, there was no mortality in HIE stage I, mortality in HIE stage II were 3(1.84%) and HIE stage III were 30(18.4%). The recovery rate of HIE stage I, HIE stage II and HIE stage III were 98.36%, 75% and 32.85% respectively. Mortality and morbidity were more common in outborn babies compared to inborn babies.

Conclusion: It is the commonest cause of hospital admission of a newborn to NICU. Early referral has better outcome.

Key words: Birth asphyxia, Outcome, Risk factors.

Introduction

Birth asphyxia is the cause of death of 0.92 million newborn annually. It is the fifth largest cause of death of children under 5years of age and exerts a great pressure on the health system[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 countries. Three major causes account for over three quarters of these deaths, serious infection (28%), complication of preterm birth (26%) and birth asphyxia (23%). These estimation imply that birth asphyxia is the cause of around one million neonatal deaths each year[2].

According to the World Health Organization (WHO), around four million develop birth asphyxia, and asphyxiated newborn depending on severity develop severe consequences, such as epilepsy, cerebral palsy and developmental delay[3]. So not only mortality, even morbidity is also very significant and worrisome. The aim of present study was to know the outcome, factors affecting birth asphyxia and importance of early referral of birth asphyxia.

Objectives

To study the outcome of newborn with birth asphyxia.

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To study the factors responsible for outcome of asphyxiated newborns.

Materials and Methods

This is a retrospective study on newborns with the diagnosis of birth asphyxia at SNMC and HSK hospital and research centre, Bagalkot. Duration of the study was for three years from January 2009 to December 2011. We studied 163 consecutive asphyxiated neonates who were admitted in our neonatal unit and fulfilled the inclusion criteria. Total number of admissions during this period was 1842.

Inclusion criteria

1. History of delayed cry at birth
2. Apgar score <7 at 5 minutes of life.
3. Babies with gestational age >34 weeks and weighing >1.5 kg were included.
4. Both inborn and outborn babies were included.

Exclusion criteria

1. Preterm with <34 weeks of gestation and/or birth weight <1.5kg.
2. Respiratory depression due to intracranial bleeding.
3. Neonates with major congenital malformations of cardiovascular, central nervous system, respiratory system or dysmorphic babies. Clinical information was collected retrospectively from maternal records such as maternal age, antenatal check up, place of delivery, gravida, person who conducted delivery, type of delivery, presence of meconeum, induced or spontaneous labour, pregnancy complications, type of resuscitation, mode of transport and time period between birth and referral to tertiary care centre. Referral notes were considered.

The NICU records provided additional information about newborn like age at presentation, gestational age, birth weight, sex, clinical features, stages of birth asphyxia and subsequent outcome. Newborns were categorized into stages of HIE according to Sarnat and Sarnat staging. According to which HIE is categorized into stage I (mild), stage II (moderate) and stage III (severe).

Statistical analysis

Statistical methods used were descriptive statistics means, percentages and test of significance like chi square test.

Results

Total number of newborn enrolled in the index study was 163. Total NICU admissions during January 2009 and December 2011 were 1842. Among total admissions 8.8%were asphyxiated newborns. There were more males than females 106(65%) and 57(35%) respectively.

In our study, inborn babies were more than outborn babies accounting 85(52%) and 78(48%) respectively. Among outborn babies maximum number of deliveries occurred in private hospital 37(47.4%), which is followed by PHC 26(33%).

In our study, 72.39% of babies were admitted to neonatal ward within 4 hours, 17.17% between 4 to 24 hours and 10.42% between 24 to 72 hours. Correlation between the time of arrival of newborn babies to the hospital and stage of HIE was statistically significant (P value=0.00004086).

Among all 163 asphyxiated newborn, 80 (49.07%) babies weighed between 1.5 to 2.5kg, 83 (50.09%) were >2.5kg, full term babies were 148 (90.8%) and preterm babies were 15(9.2%).

The total NICU admissions during this study period were 1842. Among them 294 (16%) expired. Among the total 163 newborns of birth asphyxia, 33 (20.24%) newborns expired. There was no mortality in HIE stage I. Mortality in HIE stage II were 3 and HIE stage III were 30. The recovery rate of HIE stage I, HIE stage II and HIE stage III were 98.36%, 75% and 32.85% respectively.

Among inborn babies, HIE stage I, HIE stage II and HIE stage III were 48(56.47%), 11(6.74%) and 26(30.58%) respectively. Among inborn, 10 (11.76%) babies expired. Among outborn babies HIE stage I, HIE stage II and HIE stage III were 15(19.23%), 18(23.07%) and 46 (58.97%) respectively. Among outborn babies 23 (29.48%) babies expired.

Factors affecting the outcome studied were weight, sex, gestational age, maternal age, gravida, mode of delivery, place of delivery, age at arrival, stage of hypoxic ischemic encephalopathy and duration of stay in the hospital and these are mentioned in Table 1 and 2. Late referral and severe birth asphyxia had poor outcome.

Table 1. Factors responsible for the development of HIE (n=163)

Determinants	Category	HIE Stage I	Stage II	Stage III	Statistical significance
Maternal Age	<20 years	1	2	2	P value=0.4449
	20-30 years	61	27	68	
	>30 years-35 years	-	1	1	
ANC visit	No ANC visit	-	1	2	P value=0.2868
	Partial	37	23	52	
	Complete	23	8	17	
Gravida	1	39	20	52	P value=0.1908
	2-4	23	9	19	
	>4	-	1	-	
Place of delivery	Home delivery	-	2	8	P value= 0.004833
	PHC	6	7	13	
	FRU	2	1	2	
	Delivery at private hospital	7	7	19	
	Delivery at tertiary care centre	47	13	29	
Mode of delivery	Induced	2	-	-	P value=0.3137
	Spontaneous	37	23	51	
	LSCS	21	6	16	
	Instrumental	2	1	4	
Birth weight	1.5 – 2.5 kg	34	13	33	P value=0.4938
	>2.5 kg	28	17	38	
Sex	Male	34	19	53	P value= 0.06738
	Female	27	12	18	
Age at arrival	0 - <4 hours	58	17	43	P value= 0.00004086
	>4 – 24 hours	4	6	18	
	>24 hours	-	7	10	
Duration of stay	<24 hours	-	1	5	P value= 0.000006223
	24 – 48 hours	1	4	22	
	>2 – 7 days	36	8	25	
	>7 days	26	17	18	
Mode of transport	Car	9	7	17	P value= 0.5330
	Bus	4	8	15	
	Ambulance	2	2	4	
	Jeep	-	1	7	
	Auto	-	-	2	

Table 2. Factors affecting the outcome (n=163)

	Discharged	Expired	DAMA	Statistical significance
Age at arrival				
0-<4hours	89	15	14	P value = 0.0002312
>4-24hours	11	12	4	
>24hours	7	6	5	
Sex				
Male	65	28	13	P value = 0.02465
Female	45	5	7	
Weight				
1.5-2.5kg	53	15	12	P value = 0.8961
>2.5kg	53	18	12	
Maternal age				
<20years	2	1	2	P value = 0.003680
20-30years	106	31	19	
>30-35years	0	0	2	
Gestational age				
Full term	96	30	22	P value= 0.6710
Preterm	11	3	1	
Mode of delivery				
Vaginal Delivery	68	25	18	P value = 0.2765
Caesarian	34	6	3	
Instrumental	5	2	2	
Gravida				
1	71	24	16	P value = 0.4708
2-4	36	9	5	
>4	-	-	1	
Place of delivery				
Home delivery	3	5	2	P value = 0.0121
PHC	12	7	7	
FRU	3	1	1	
Delivery at private hospital	19	8	6	
Delivery at tertiary care centre	70	12	7	
Stage of HIE				
I	60	0	1	P value = 0.0000001
II	24	3	5	
III	23	30	17	
Duration of stay				
<24hours	0	6	1	P value = 0.0000001
24-48hours	1	17	10	
>2-7 days	47	9	10	
>7 days	60	1	1	
Inborn				
HIE stage I	48	00	00	P value = 0.000001
HIE stage II	07	01	03	
HIE stage III	13	09	04	
Outborn				
HIE stage I	14	00	01	P value = 0.000007840
HIE stage II	14	02	02	
HIE stage III	11	21	13	

Discussion

Birth asphyxia is defined by the WHO "the failure to initiate and sustain breathing at birth"[4]. The National Neonatology Forum of India has defined birth asphyxia as "gasping and ineffective breathing or lack of breathing at one minute after birth"[2].

In spite of major advances in monitoring technology and knowledge of fetal and neonatal pathologies, perinatal asphyxia or more appropriately, HIE remain a serious condition causing significant mortality and long term morbidity. It is the commonest cause of hospital admission of a newborn[5].

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 study[6] to 22/100 live hospital births in Indian studies[7,8]. In our study, the incidence is 8.8%.

Hospital based studies in Nepal[9] and South Africa[10] estimated that birth asphyxia accounted for 24% and 14% of perinatal mortality rate respectively, which is similar to our study (20.24%). However these may substantially underestimate the burden in rural areas, where early deaths, most of which occur at home, are more likely to be under reported.

In our study male to female ratio was 1.8:1, other studies have also shown similar ratio[11,12,13]. In this study, largest numbers of babies affected by birth asphyxia were to mothers of aged between 20-30 years. This shows the fact that, this aged group represented as the most number of mothers in our study. Correlation between maternal age and outcome of birth asphyxia was statistically significant. This result was similar with other studies[14,15] but different results from another studies[16] which showed that birth asphyxia was significantly related to maternal age greater than 30 years.

Antenatal checkups were studied in both inborn and outborn. Among inborn, 26 mothers had complete antenatal visit. This was not statistically significant and there was no much difference between inborn and outborn. This is because most of the deliveries which occurred in our hospital were referred cases from periphery and came here during delivery.

Out of 163 mothers of asphyxiated babies 111 (68.1%) were primigravida, 50(30.7%) had less than 4 children and 2 (1.2%) mothers were having 4 or more than 4 children. This indicates that birth asphyxia was more common in babies delivered by primigravida. Correlation between gravida and outcome of birth asphyxia was not statistically significant. Similar result was shown by Dongol S et al[14] Dhulikhel hospital,Nepal where primigravida was shown to be 58.8% but the study done by Azam M[17] in Multan shows that incidence of birth asphyxia with grand multipara was 34%.

In our study, inborn babies were more than out born babies accounting 85(52%) and 78(48%) respectively. Among outborn babies with birth asphyxia, the maximum number of deliveries occurred in private hospital 37(47.4%) which is followed by PHC 26(33%) and home delivery 12.8%. In our study, maximum number of babies with birth asphyxia was delivered in our hospital which was followed by private hospital and PHC. Same findings are seen in a study done by Rana et al[18] where 90.5% babies were delivered at the same hospital where study was conducted. But the study done by Majeed et al[19] showed that only 12% were delivered at a tertiary care hospital. Among inborn, 10 (11.76%) babies expired. Among outborn babies 23 (29.48%) babies expired. This suggests timely and early referral to the hospital reduces the mortality and morbidity.

Regarding the mode of delivery 68.71% babies were delivered by spontaneous vaginal delivery, 25.76% by caesarean section and 5.52% by instrumental delivery. This is similar to study done by Memon et al[11], while other studies have shown 76%[12] and 51%[6,13] deliveries by caesarian section.

In our study 90.8% of babies admitted to neonatal ward within 24 hours, 5.5% between 24-48 hours and 3.7% between 48-72 hours. This is similar to study done by Sehgal et al[20].

Out of 163 newborns presnting with birth asphyxia, 106 (65%) were males and 57(35%) were females. This result was similar to study done by Dongol S et al[14] in Dhulikhel. Among all 163 asphyxiated newborn 49.07% were between 1.5 to 2.5kg. Among the total 163 newborns of birth asphyxia 33 (20.24%) newborns died. This result is similar with the result shown in one study done by Ladakhi GM in India[21].

In this study mortality in HIE stage I is nil and mortality in HIE stage II and III was 4.5% and 45.5%. The recovery rate in HIE stage I was 98.4%, stage II 75% and stage III was 32.8%. These findings are similar to the study done by Dongol S et al[14] at Dhulikhel.

Conclusion

Birth asphyxia is the commonest cause of admission of a newborn to NICU. Deliveries at peripheries and home i.e. outborn babies had poor outcome and early admission to NICU and early intervention had better outcome. Babies with HIE stage II and III had poor outcome.

So, early referral of mother with complicated labour to the hospital can minimize the birth asphyxia and its complications.

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