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To Study the Incidence of Birth Asphyxia and its Relation to Material and Neonatal Factors

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Abstract: Birth asphyxia is an insult to the fetus or newborn due to failure to breath or breathing poorly, leads to decrease oxygen perfusion to various organs. Our goal was to find the incidence of birth asphyxia and to correlate it with neonatal and maternal factors. The present study reaffirms that the incidence of birth asphyxia is strongly correlated with various neonatal and maternal factors.

Key Words: Birth Asphyxia, Neonatal, Maternal, APGAR Score, Placenta Praevia, Abruptio Placentae, Obstructed labour, Oligamnios.

Introduction

Birth Asphyxia is an insult to the fetus or newborn because of failure to breathe or poor breathing implying poor oxygen perfusion to various organs and is a significant contributor to neonatal morbidity and mortality and is characterised by long term neurological deficits. According to WHO, 4 million deaths yearly occur due to birth asphyxia, representing 38% of all deaths of children fewer than 5 years of age. In Low income countries, 23% of all neonatal deaths occurred due to birth asphyxia[1].

WHO defines Birth Asphyxia as "the failure to initiate and sustain breathing at birth"[2]. ICD 10 definition of birth asphyxia is dependent on APGAR score at 1 min of birth where an APGAR score of 0-3 defines severe birth asphyxia and an APGAR score of 4 – 7 defines moderate birth asphyxia [3]. According to Virginia APGAR, birth asphyxia is defined on the basis of APGAR score at 1 min into MILD (APGAR score 5,6,7), MODERATE (APGAR score 3,4) and SEVERE (APGAR score 0,1,2)

The incidence of birth asphyxia may be intricately dependent on many maternal and neonatal factors. Various maternal and neonatal factors affecting the occurrence of birth asphyxia include Mode of delivery, maternal age, parity, Antenatal visits, pregnancy related maternal illnesses, Sex of the baby, Gestational Age, Birth Weight, 0Weight for Gestational Age and presentation.

The present study was conducted with an objective to assess the incidence of birth asphyxia in a referral centre (Rajindra Hospital, Patiala) and to evaluate its relation with various maternal and neonatal factors so that interventions can be done to educate and guide people about the risk factors and management strategies.

Material and Methods:

The present study is a cross sectional study done over a period of one year (January 2015 – December 2015) where the newborns delivered at the Obstetrics and Neonatology department and handled by Neonatology Section of Paediatrics Department of Rajindra Hospital, Patiala were assessed. All Asphyxiated newborns having APGAR score of 7 or less at 1 min of life (irrespective of the weight or gestational age) became the study group.

Newborns with congenital malformations hindering resuscitation were excluded. Relevant data including demographics and Maternal and

Neonatal factors affecting birth asphyxia {mode of delivery, maternal age, parity, Antenatal visits, Maternal illnesses related to pregnancy, Sex of the baby, Gestational Age, Birth Weight, Weight for Gestational Age and presentation was collected on pretested Performa after informed consent. The collected data was then put to statistical analysis to arrive at the aforementioned observations and results.

Total number of deliveries	Birth asphyxia N (%)
3238	248 (7.6%)

During the observation period of one year, there were, in total, 3238 deliveries out of which 248 suffered from Birth Asphyxia, making the incidence of birth asphyxia as 7.6%.

Incidence of Birth Asphyxia in Relation to Neonatal Factors

S.No.	FACTOR	SUBGROUP	TOTAL NO OF CASES	BIRTH ASPHYXIA	p-value
1.	SEX	MALE	1739(53.7%)	167(9.6%)	0.000
		FEMALE	1499(46.3%)	81(5.4%)	
2.	GESTATION	PRETERM	954(29.4%)	127(13.3)	0.000
		TERM	2243(69.3%)	116(5.2%)	
		POSTTERM	41(1.3%)	5(12.2%)	
3.	WEIGHT FOR GESTATION	AGA	2612(80.6%)	170(6.5%)	0.000
		SGA	567(17.5%)	75(13.2%)	
		LGA	59(1.8%)	3(5.1%)	
4.	BIRTH WEIGHT	<1000g	36(1.1%)	25(69.4%)	0.000
		1000-1499g	118(118(3.7%)	37(31.4%)	
		1500-2499g	1091(33.7%)	99(9.1%)	
		>=2500g	1993(61.5%)	87(4.4%)	

Incidence of birth asphyxia in male newborns (9.6%) was significantly higher than in female newborns (5.4%) ($p < 0.05$). Preterm babies suffered from birth asphyxia much more commonly (incidence 13.3%), followed by post term newborns (12.2 %) than term newborns (5.2%) ($p = 0.000$). The incidence of birth asphyxia was significantly higher in SGA babies (13.2%) as against 6.5% and 5.1% in AGA and LGA babies ($p = 0.000$). The incidence of birth asphyxia was 69.4% in ELBW babies while 4.4% in babies with birth weight =2500 grams implying Birth weight to be a significant determinant of birth asphyxia.

Incidence of Birth Asphyxia in Relation to Maternal Factors

S.No.	FACTOR	SUBGROUP	TOTAL NO. OF CASES	BIRTH ASPHYXIA	p-value
1.	PRESENTATION	VERTEX	2922	201(6.9%)	0.000
		BREECH	293	42(14.4%)	
		FOOTLING	1	1(100%)	
		HAND PROLAPSE	3	1(33.3%)	
		FACE	11	2(18.2%)	
		TRANSVERSE	8	1(12.5%)	
2.	MODE OF DELIVERY	NVD	2033(62.8%)	177(8.7%)	0.00360
		LSCS	1205(37.2%)	71(5.9%)	
		ELECTIVE	621	32(5.2%)	
3.	MATERNAL AGE(YEARS)	<20	17	12(70.6%)	0.000
		20-24	432	93(21.5%)	
		24-28	1501	104(6.9%)	
		28-32	1062	34(3.2%)	
		32-36	173	3(1.7%)	
		>36	53	2(3.8%)	
4.	PARITY	PRIMIPAROUS	612	57(9.3%)	0.2138
		MULTIPARA	2491	178(7.1%)	
		GRANDMULTIPARA	135	13(9.2%)	
5.	ANC VISIT	ABSENT	261	66(25.3%)	0.000
		PRESENT	2977	182(6.1%)	
6.	MATERNAL ILLNESS DURING PREGNANCY	PIH	459	48(10.4%)	0.0087
		OBSTRUCTED LABOR	46	12(26%)	0.0000
		MSAF	466	71(15.2%)	0.0000
		OLIGOHYDRAMNIOS	384	52(13.5%)	0.0000
		LPV	323	35(10.8%)	0.1300
		ABRUPTIO PLACENTAE	65	6(9.2%)	0.0000
		PLACENTA PREVIA	128	24(18.7%)	0.0000

The incidence of birth asphyxia was 6.9% in Vertex presentation while it was 14.4% in breech, 18.2% in face, 33.3% in hand prolapsed while 100% in Footling presentation. The presenting part of the baby, thus, is a significant determinant of the incidence of birth asphyxia ($p = 0.000$). Birth Asphyxia was significantly more common in vaginal deliveries (8.7%) than LSCS (5.9%) ($p = 0.00360$). Birth asphyxia was significantly more common in newborns with maternal age < 20 years (70.6%) than when the maternal age was > 20 years (7.3%) ($p = 0.000$). However, the parity of the mother did not significantly affect the incidence of birth asphyxia as the difference in the incidence of birth asphyxia in primipara (9.3%), multipara (7.1%) and Grandmultipara (9.2%) was not significant ($p = 0.2138$).

The incidence of birth asphyxia in mothers who did not have any Antenatal visit was 25.3% while in mothers who had = 1 antenatal visit was 6.1% and this difference was statistically significant In the present study, it was observed that pregnancy related maternal conditions (PIH, Placenta Praevia, Abruptio Placentae, Obstructed labour, MSAF and Oligamnios) did significantly increase the incidence of birth asphyxia.

Discussion:

3238 deliveries conducted between Jan 2015 to Dec 2015 were assessed (excluding cases with congenital malformations), out of which 248 (7.6%) suffered from birth asphyxia. Comparable

incidence rates were reported by Dalal et al[4] (6.6%). Lower incidence rates of 2.7% (Airede et al [5]) and 3.7% (Chandra et al [6]) have been reported in the literature. Comparatively higher incidence rates were reported by Haidry et al[7] (21.92%), Dongol et al[8] (14%), Chiabi et al[9](8.1%), Martono TriUtomo[10] (8.0%) and Gupta et al[11] (17.3%). High variation in the incidence of birth asphyxia can be attributed to variability in the definitions of Birth asphyxia. Also, in the present study, only inborns were included in the study while the inclusion criteria were different for different studies.

Incidence of birth asphyxia was significantly higher in male newborns (9.6% vs 5.4%) in the present study. Similar findings were reported by Dongol et al[8] (55.88% vs 44.12%), Aslam et al[12] (61.3% vs 38.8%), Yadav et al[13](72.6% vs 27.4%) and Gupta et al[11] (72.0% vs 28.0%). This observation is attributed to the fact that females are genetically stronger than males, hence can better withstand compromised intrauterine and extrauterine environment.

The incidence of birth asphyxia in the present study was 13.3%, 12.2% and 5.2% in Preterm, Postterm and term babies implying higher incidence of birth asphyxia in preterms. Similar findings were shared by Aslam et al [12] . The incidence of birth asphyxia in the present study was 69.4% in ELBWs while 31.4% in babies with birth weight 1000 – 1499g and 9.1% in 1500 – 2499 g. Similar trend was published by Aslam et al[12] (39.8% in ELBWs vs 20.3% in 1000 – 1499 g). However, Dongol et al[8] (50.0%) and Pitsawong et al[14] (23.49%) showed highest incidence of asphyxia in babies with birth weight 1500 – 2500 grams rather than ELBWs. The higher incidence of asphyxia in ELBWs could be explained due to maternal complications like anemia, hypertension and diabetes.

In the present study, incidence of birth asphyxia is more in SGA babies (13.2%) as compared to AGA (6.5%) and LGA (5.1%) babies. Similar trends were shared by Chandra et al[6] (27.5% in SGA vs 7.8% in LGA). Oswyn et al [15], however, reported higher incidence of asphyxia in LGA babies (17.6%) in comparison to SGA babies (16.2%). There is higher incidence of asphyxia in SGA babies probably because they are associated with high risk pregnancy because of which they are more prone to intrauterine asphyxia.

The incidence of birth asphyxia was 6.9% in Vertex presentation while it was 14.4% in breech, 18.2% in face, 33.3% in hand prolapsed while 100% in Footling presentation. The presenting part of the baby, thus, is a significant determinant of the incidence of birth asphyxia (p = 0.000). Similar observation was reported by Pitsawong et al [14]who found birth asphyxia to be more common in breech presentation than in vertex presentation.

Birth Asphyxia was significantly more common in vaginal deliveries (8.7%) than LSCS (5.9%) (p = 0.00360) in the present study.

In the present study, incidence of birth asphyxia was highest in babies born to mothers of age group <20 years (70.6%). None of the study showed similar results. While all studies such as Dongol et al[8](2010), Martono Tri Utomo[10](2011), Chiabi et al[9](2013), Gane et al[16](2013)showed highest incidence in the age group 20-35 years. While lowest was in the age group 35-39 years (1.9%). Babies born to young mothers (<20 years) had more asphyxia because of lack of knowledge about the care during pregnancy and about complications which may arise during deliveries and due to lack of ANC and hence more prone for malnutrition , PIH, preterm labor all leading to fetal distress and asphyxia.

In the present study the incidence of birth asphyxia in primipara delivery was (9.3%), multipara (7.1%) and Grandmultipara (9.2%). In the studies by Dongol et al[8](2010)(58.8% vs 4.9%), Babu B et al[17] (2014) (54.9% vs 45.1%), Shireen et al[18](2007)(57%vs 43%), Hulal saieh sahib[19](2015)(61.2% vs 38.8%), Dalal et al[4](2013)(56.9%vs 47.5%) showed similar results of higher incidence of birth asphyxia in primipara than multipara deliveries. While it was opposite in studies of Gane et al[16](2013) and Gupta et al[11](2014). Higher incidence of asphyxia in primiparous deliveries could be due to the ignorance regarding demands of pregnancy and missing of regular ANC visits and thus landing up in prolonged labor and its complications.

In the present study the incidence of birth asphyxia in mothers who did not have any Antenatal visit was 25.3% while in mothers who

had = 1 antenatal visit was 6.1%. Similar results were found in studies conducted by Shireen et al[18](2007)(78% vs 72%), Dalal et al[4](2013)(58.1%vs41.9%), Gane et al[16](2013)(66%vs34%), Babu et al[17](2014)(71.9%vs 28.1%), Hulal saleh sahib[19]2015)(67%vs54%). While in the study conducted by Dongol et al[8](2010)(15.7%vs69%) results were opposite. The high incidence of asphyxia in babies born to mothers with no ANC visit is because of the late diagnosis and therefore improper management of high risk pregnancies leading to poor outcome and asphyxia.

In the present study, it was observed that increased incidence of birth asphyxia was associated with pregnancy related maternal conditions- PIH(10.4%), Placenta Previa(18.7%), Abruptio Placentae(9.2%), Obstructed labor(26%), MSAF (15.2%) and Oligamnios (13.5%). Similar results were found in studies conducted by Mohan et al[20](2012), Dalal et al[4](2013), Hulal saleh sahib et al[19](2015), Oswyn et al[15](2000), Gane et al[16](2013), Babu et al[17](2014).

Conclusion:

All around the world, birth asphyxia is one of the commonest causes of neonatal deaths and also a major cause of neonatal admissions. The present study reaffirms the fact that most of the birth asphyxia insults are strongly associated with pregnancy related complications, intrapartum complications and neonatal factors. If the incidence of birth asphyxia and its consequent perinatal mortality and long term morbidity in the surviving infants is to be reduced, then regular Antenatal visits are a must, for the early detection of high risk pregnancies and timely management of the complications. Risk assessment for preterm delivery is also a key as early appropriate management to avoid preterm birth and early referral of mother with complicated labor to the hospital can minimise birth asphyxia and its complications. Encouragement of institutional deliveries is an important aspect. Health professionals especially paediatricians should have adequate knowledge and should be trained with skills of neonatal resuscitation program because basic resuscitation would substantially reduce neonatal mortality and morbidity.

Conflict of Interest: None

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