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Original Research Article

A Prospective Study on Antenatal and Natal Risk Factors of Birth Aphyxia in Term Babies and the Short-Term Outcome of Babies Admitted With Birth Asphyxia-Nicu, Government General Hospital, and Kakinada

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Abstract: About one quarter of all neonatal deaths globally are caused by birth asphyxia. Short term complications of asphyxia include multi organ dysfunction and death, whereas in the long-term, survivors of hypoxic ischaemic encephalopathy might develop cerebral palsy, developmental delay, visual, hearing and intellectual impairment, epilepsy and learning and behavioural problems. This study is aimed at evaluating the antenatal and intrapartum risk factors for birth asphyxia and to study the short term outcome of term babies admitted with birth asphyxia. Methodology: All term babies delivered at Government General Hospital, Kakinada with birth asphyxia were enrolled in the study. Weight and gestational age matched babies were taken as controls. Antenatal and natal history, condition of baby at admission and details of resuscitation were recorded in a predesigned, structured preformed. In admitted babies complications and short term outcome in terms of mortality were noted. Results: A total of 360 babies were studied, of which 180 were term asphyxiated and 180 were term healthy babies. The prevalence of birth asphyxia was 34.9 cases per 1000 live births. 85.56 % of asphyxiated babies had signs of hypoxic ischaemic encephalopathy. The antenatal and intranasal risk factors found to be significantly associated with birth asphyxia in the present study were, primiparous mother, less than 4 antenatal check-ups, anaemia during pregnancy, oligoamnios, hypertensive disorders of pregnancy, prolonged labour, cord complications, meconium stained amniotic fluid and forceps delivery. Common neonatal complications observed were seizures (44.2%), respiratory distress (34.3%), shock (30.8%) and hypoglycaemia. The mortality rate of birth asphyxia babies was 27.64%. Mean duration of hospital stay was 9.08 ± 4.77days.Conclusions: Counselling of all pregnant women on antenatal care, timely referral of high risk pregnancies for institutional deliveries and improving the facilities and human resources at tertiary care centres can go a long way in reducing the incidence of birth asphyxia.
Keywords: birth asphyxia, hypoxic ischemic encephalopathy, antenatal and intrapartum risk factors.

INTRODUCTION

Birth asphyxia is a significant contributor to the newborn morbidity and mortality as well as long term neurological deficit [1, 2]. About one quarter of all neonatal deaths globally are caused by birth asphyxia [3]. Short term complications of asphyxia include multi organ dysfunction and death [4, 5], whereas in the long-term, survivors of hypoxic ischaemic encephalopathy might develop cerebral palsy, developmental delay, visual, hearing and intellectual impairment, epilepsy and learning and behavioural problems [4-8].

Knowledge of the antenatal and natal risk factors for birth asphyxia helps in identification of high risk cases and takes necessary preventive interventions. Analysing the complications of asphyxiated babies and their relation to short term outcome helps in prognosticating the illness and counselling the parents. Early identification and timely treatment of those complications can reduce the mortality and morbidity. There are very few studies in this area in this aspect. Hence the present study is taken up to evaluate

antenatal and natal risk factors for birth asphyxia and to study neonatal complications and their relation to mortality of asphyxiated babies.

METHODOLOGY

This prospective observational study was conducted over a period of 18 months from April 2014 to September 2015, in neonatal intensive care unit, Government General Hospital, Kakinada in collaboration with obstetric department. The study was approved by institutional ethics committee. First six months babies were enrolled and next one year these babies were followed. 180 term intramural babies who had birth asphyxia (according to W.H.O definition – failure to initiate and sustain respirations) were enrolled in the study. Another 180 term intra mural babies matched in weight and gestational age without birth asphyxia were taken as control group. Babies with life threatening congenital anomalies, inborn errors of metabolism and neuromuscular disorders were excluded from the study. Written consent was taken from the parents of enrolled babies.

As per institutional policy, all deliveries were attended by trained junior residents. Resuscitation was carried out as per neonatal resuscitation program 2010 by American Heart Association [9]. Details of time needed for establishment of spontaneous respirations, need for positive pressure ventilation and chest compressions, medications given if any and Apgar score at 1 minute and 5 minutes were noted. Details of antenatal and natal history and condition of baby at birth were recorded in a structured predesigned proforma. Antenatal details like maternal age, parity, number of antenatal visits were noted. Antenatal complications like anaemia, oligohydramnios and hypertensive disorders were noted. Intra partum details regarding mode of delivery, presence or absence of prolonged labour, cephalo-pelvic disproportion, meconium stained amniotic fluid, fetal distress and cord complications were noted. Babies with birth asphyxia were admitted in NICU, categorised based on Sarnat and Sarnat staging of HIE, managed as per NICU protocols and any complications during hospital stay were noted. Appropriate investigations were done when required.

STATISTICAL ANALYSIS

All categorical variables were presented as frequencies and percentages. Chi- square test was applied and p values were calculated for the risk factors and outcome of babies. To assess the risk factors associated with perinatal asphyxia, univariate analysis was carried out. The statistical analysis was carried out at 5% level of significance and p value <0.05 was considered significant. Data analysis was done by Microsoft Excel and IBM SPSS (version 21) software.

RESULTS

There were 5154 deliveries in Government General Hospital, Kakinada during the study period, of which 180 babies had birth asphyxia. The prevalence of birth asphyxia was 34.9 cases per 1000 live births (3.5%). Out of the 180 babies with birth asphyxia, 67 babies (37.2%) had stage I, 55 (30.6%) babies had stage II and 32 (17.8%) babies had stage III hypoxic ischaemic encephalopathy. 26 babies did not show any signs of hypoxic ischaemic encephalopathy. Antenatal and intrapartum risk factors for birth asphyxia were shown in table 1.

Primiparity, less than 4 antenatal check-ups, anaemia complicating pregnancy, oligohydramnios and hypertensive disorders of pregnancy were found to be significant antenatal risk factors for birth asphyxia with p value < 0.05. Prolonged labour, fetal distress, meconium stained amniotic fluid, cord complications and forceps delivery were found to be significant intrapartum risk factors for birth asphyxia (p- value < 0.05).10.6% of babies with birth asphyxia did not have any risk factors. Incidence of birth asphyxia was more in males (males: females, 2.1:1) which was statistically significant. Correlation of APGAR score and resuscitation requirement with severity of HIE (table 2) showed that 50% of babies with HIE stage III had 5 minute APGAR score < 4 and 62.5 % babies who required chest compressions and prolonged bag and mask ventilation had stage III HIE. Out of 180 babies with birth asphyxia, 8 babies left against medical advice and the clinical course was noted in 172 cases.

Table 1: Antenatal and Natal Risk Factors

	Cases (n=180)	Controls(n=180)	OR(CI)	P-value
MATERNAL AGE				
<20 years	22(12.2)	16(8.9)	1.42(0.72-2.81)	0.3896
21-30 years	148(82.2)	158(87.8)	0.64(0.35-1.15)	0.1846
>30 years	10(5.6)	06(3.3)	1.70(0.60-4.79)	0.4429
PRIMI PARITY	129(71.7)	79(43.9)	3.23(2.08-5.01)	<0.0001
MULTI PARITY	51(28.3)	101(56.1)		
ANTE NATAL CHECKUPS≤3	42(23.3)	20(11.1)	2.43(1.36-4.34)	0.0038
ANTE NATAL CHECKUPS>3	138(77.7)	160(88.9)		
ANEMIA	108(60.0)	77(42.8)	2.00(1.31-3.05)	0.0015
OLIGOAMNIOS	18(10.0)	07(3.9)	2.74(1.11-6.74)	0.0381
HTN DISORDERS	34(18.9)	11(6.1)	3.57(1.75-7.31)	0.0004
NVD	113(62.8)	122(67.8)	0.80(0.51-1.23)	0.3771
FORECEPS	21(11.7)	04(2.2)	5.81(1.95-17.29)	0.0009
LSCS	46(25.6)	54(30.0)	0.80(0.50-1.27)	0.4095
PROM	18(10.0)	12(6.7)	1.55(0.72-3.33)	0.3401
FETAL DISTRESS	33(18.3)	07(3.9)	5.54(2.38-12.91)	0.0001
PROLONGED LABOUR	30(16.7)	11(6.1)	3.07(1.48-6.34)	0.0028
CORD COMPLICATIONS	21(11.7)	06(3.3)	3.83(1.50-9.73)	0.005
MSAF	68(37.8)	29(16.1)	3.16(1.91-5.20)	0.0001

Table 2. Correlation of Resuscitation Requirement and Apgar With HIE Severity.

RESUSCITATION REQUIREMENT	No HIE	HIE I	HIE II	HIE III
STIMULUS	16(47%)	11(32.4%)	06(17.6%)	01(3.0%)
BMV	10(9.9%)	54(53.5%)	34(33.6%)	03(3.0%)
BMV + CHEST COMPRESSIONS	00	02(4.4%)	15(33.3%)	28(62.3%)
APGAR CORRELATION				
APGAR 5 MINUTE <4	00	00	05(09.09%)	16(50%)
APGAR 5 MINUTE 4-6	00	00	22(40.00%)	10(31.25%)
APGAR 5 MINUTE >6	26	67(100%)	28(50.91%)	06(18.8%)

The most common neonatal complication in babies with birth asphyxia was seizures (44.18%) other complications in order of frequency include respiratory distress (34.3%), shock(30.81%), hypoglycaemia(25%), jaundice requiring phototherapy(23%), sepsis(20.93%), acute renal failure(16.86%), anaemia(16.86%), hypocalcaemia(13.95), necrotising enterocolitis(17.1%) and polycythaemia(5.8%).All babies with HIE II and 86% of babies with HIE III had seizures. Out of 76 asphyxiated babies with seizures8 babies had refractory seizures requiring more than 2 anti-epileptic drugs to control the seizures.

The mortality rate of babies with HIE I, HIE II and HIE III was 7.6%, 28.9% and 82% respectively. Mortality rate was high in asphyxiated babies with complications like hypoglycaemia, respiratory distress, shock and seizures which was statistically significant with p value < 0.05. The overall mortality rate of babies with birth asphyxia was 26.74%. The mean duration of hospital stay in survivors was 3.14 days, 7.63 days, 11.43 days and 14.13 days in babies with no HIE, HIE I, HIE II and HIE III respectively.

Table 3: Correlation of Neonatal Complications with Mortality

COMPLICATIONS	TOTAL	SURVIVORS(n=126)	DEATH(n=46)	P-VALUE
HYPOGLYCEMIA	43	25(19.84)	18(39.13)	0.0160
HYPOCALCEMIA	24	14(11.11)	10(21.73)	0.0855
ANEMIA	29	21(16.66)	08(17.39)	1.000
POLYCYTHEMIA	10	07(05.55)	03(06.52)	0.3077
HYPERBILIRUBINEMIA	40	28(22.22)	12(26.08)	0.6838
SHOCK	53	29(23.01)	24(52.17)	0.0004
ARF	29	18(14.28)	11(23.91)	0.1673
NEC	19	16(12.69)	03(06.52)	0.4092
RESPIRATORY DISTRESS	59	30(23.80)	29(63.04)	0.0001
SEPSIS	36	25(19.84)	11(23.91)	0.6722
SEIZURES (>3)	33	09(07.14)	24(52.17)	0.0001

DISCUSSION

In the present study, the overall prevalence of birth asphyxia in term deliveries was 34.9 per 1000 live births. The prevalence of birth asphyxia varies widely across the countries. The prevalence of birth asphyxia in various parts of India and other developing countries of the world was reported to be 22 to 93.7 per 1000 live births [10-16]. According to the state of newborn health statement released in 2016 the reported incidence varies from 2 to 16.2% in community-based studies [17]. According to NNPD (2002 - 2003) [13] the prevalence was84 per 1000 live births. The prevalence of birth asphyxia in developed countries ranged from 4-6 per 1000 live births. The incidence of HIE among asphyxiated babies was 85.6 % in the present study and it varied between 31.6% to 82.1% in several other studies. In the present study 10.6% babies with birth asphyxia did not have any risk factors. This highlights the importance of all institutional deliveries being attended by trained paediatricians and training of all health care personnel attending deliveries in neonatal resuscitation. Reduction of risk factors causing birth asphyxia is not an easy task in developing countries with high incidence of home deliveries and late referral to tertiary care centre.

Primiparity with less than 4 antenatal visits was found to be important antenatal risk factors for birth asphyxia in the present study. Several other studies showed similar results [11, 18-22]. It has been shown that primiparous women are often ignorant of the demands of the pregnancy there by neglecting early and regular attendance to antenatal clinics. This leads to late diagnosis of high risk pregnancies thereby increasing the risk of birth asphyxia [23]. Hypertensive disorders of pregnancy leading to abnormal trophoblastic invasion of the maternal decidual arteries is believed to reduce the placental perfusion and cause relative placental ischaemia which increase the risk of birth asphyxia [24,25].

In the present study among the various intra partum risk factors, prolonged labour, cord complications, meconium stained amniotic fluid and forceps delivery were more commonly associated with birth asphyxia. Several other studies reported similar association [12, 15, 21, 26-31]. Early identification of these complications and timely intervention by caesarean section can help in reducing the incidence of birth asphyxia.

Late referrals and deficiency of human resources at tertiary care centres are major problems in the present study. Decentralisation of services and utilising urban health centres for normal deliveries and reserving the limited resources of teaching hospitals to only high risk cases can reduce the work load to some extent.

Seizures, respiratory distress, shock, jaundice, acute renal failure and sepsis were the common complications observed in the study, similar complications were reported by several other authors [10, 22, 32-34]. The overall mortality was 26.74% in the present study. Complications like hypoglycaemia, respiratory distress, sepsis and seizures in the neonatal period were associated with high mortality which was statistically significant. As birth asphyxia leads to multiorgan dysfunction which significantly increases the mortality, careful monitoring for these complications and their early treatment helps in reducing the mortality.

CONCLUSION

Major manifestations of birth asphyxia are produced as a result of hypoxia and ischaemia to brain and other vital organs. As antenatal and intrapartum factors causing birth asphyxia are known, the focus should be on identification of high risk cases and promoting institutional deliveries for these cases. As birth asphyxia is unanticipated in some of the cases it is mandatory to train periodically all medical and paramedical personnel working in delivery rooms in neonatal resuscitation. As the short outcome of birth asphyxia is determined by the severity of HIE and associated complications, all babies requiring resuscitation must be admitted and carefully observed for early intervention.

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