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Antenatal and intrapartum risk factors for perinatal asphyxia: A case control study.

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Abstract

We have studied risk factors for perinatal asphyxia among babies fulfilling the inclusion criteria and compared them with matched controls. Maternal or antepartum factors included were maternal age, gestational age, hypertension, diabetes mellitus and antenatal clinic (ANC) visits less than 3. Intrapartum factors included malpresentation, mode of delivery, meconium stained amniotic fluid, Chorioamnionitis and Prolonged rupture of membranes. Factors independently associated with perinatal asphyxia using multiple logistic regression analysis were instrumental delivery, inadequate antenatal care, maternal anemia and meconium stained amniotic fluid. Identifying the risk factors and taking appropriate measure could help in reducing the incidence of perinatal asphyxia.

Keywords: Perinatal asphyxia, Risk factors, Instrumental delivery, Meconium stained amniotic fluid, Maternal anemia, Antenatal care

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Introduction

The National Neonatology Forum (NNF) of India has defined asphyxia as gasping or ineffective breathing or lack of breathing at one minute of life[1]. Despite major advances in monitoring technology and knowledge of fetal and neonatal pathologies, perinatal asphyxia remains a serious condition causing significant mortality and long-term morbidity. Hypoxic-ischemic encephalopathy (HIE) is characterized by clinical and laboratory evidence of acute or subacute brain injury due to asphyxia. Most often, the exact timing and underlying cause remain unknown. Despite intensive efforts, HIE remains an important problem. The risk of death or severe handicap in survivors of moderate or severe HIE is about 60%. Even children without motor impairments have low cognitive scores on long term follow-up, poor scholastic attainment, and often need special educational support [2,3].

It is one of the top 20 leading causes of burden of disease in all age groups (in terms of disability life adjusted years). According to World Health Organizatio(WHO), birth asphyxia causes 23% of all neonatal deaths worldwide and is the fifth largest cause of under five mortality among children (8%). It accounts for 920,000 neonatal deaths every year and is associated with another 1.1 million intrapartum stillbirths[4,5]. It is exceptionally imperative to know its risk factors especially in resource restricted settings like India and hence this study.

Material and Methods

After institute ethical committee approval, this case-control study was conducted between May 2011 to January 2012. Term neonate with perinatal asphyxia was taken as case and neonate without perinatal asphyxia of the same gestation as control. Term neonates with umbilical cord or first postnatal hour pH $\leq$7 and Base deficit $\geq$ 12meq, APGAR $\leq$5 at 10 min and any one of the following: evidence of encephalopathy, evidence of fetal distress, assisted ventilation for at least 10 min after birth, evidence of any organ dysfunction, history of acute perinatal event were included in asphyxia group. All babies were managed as per standard NNF guidelines. Babies with major congenital abnormalities and extramural babies were excluded from the study.

Babies were enrolled after informed consent from the parent. The collected data included both antenatal and intrapartum risk factors. Antepartum risk factors included were maternal age, gestational age, hypertension, diabetes mellitus and antenatal visits (less than 3). Intrapartum risk

factors comprised of mal-presentation, mode of delivery, chorioamnionitis, oligohydramnios, meconium stained amniotic fluid, premature rupture of membranes (more than 18 hours). The antenatal, intrapartum and postnatal details were compiled for the cases and controls. The course of hospital stay and progress were monitored

All categorical variables were presented as frequencies and percentages. Chi square test was used to compare the frequencies and percentages. To assess the factors associated with perinatal asphyxia, univariate analysis was carried out. Logistic regression was used for those factors found significant in univariate analysis. All the statistical analysis were carried out at 5% level of significance and p value <0.05 was considered significant. Analysis was done using SPSS (Version 19) software.

Results

Two hundred neonates were included in the study with equal number of cases and controls. Univariate analysis of antenatal factors showed maternal age less<20, primi parity, inadequate antenatal care, maternal anemia and antepartum hemorrhage as significant risk factors. Analysis of intrapartum factors showed prolonged rupture of membranes, chorioamnionitis and instrumental delivery as significant risk factors for perinatal asphyxia (Table 1). All significant variables on univariate analysis were included in multiple logistic regression analysis. Factors that were independently associated with perinatal asphyxia were instrumental delivery, inadequate antenatal visits, maternal anemia and meconium stained amniotic fluid (Table 2).

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***Table1**. Antenatal and intrapartum risk factors for perinatal asphyxia*

Risk factors	**Cases** (n=100) n (%)	**Controls** (n=100) n (%)	**Odds ratio** (CI)	***p* VALUE**
Maternal age				
<20	27	11	2.99(1.39-6.44)	<0.00
21-30	55	69	0.54(0.30-0.97)	0.057
>31	18	20	0.87(0.43-1.78)	0.85
PARITY				
Primi	35	21	2.02	0.04
Multi	65	79	0.49	
Antenatal visits <3	34	12	3.77(1.81-7.85)	<0.00
Infertility treatment	10	06	1.74(0.60-4.98)	0.43
Previous neonatal deaths	06	02	3.12(0.61-15.89)	0.27
Gestational diabetes mellitus	16	10	1.71(0.73-3.98)	0.29
Thyroid disease	13	06	2.34(0.85-6.43)	0.14
Antepartum haemorrhage	10	05	2.11(0.69-6.41)	0.28
Maternal anaemia	32	12	3.45(1.65-7.19)	<0.00
Short stature	03	01	3.06(0.31-29.96)	0.62
PIH	23	10	2.68(1.20-5.99)	0.02
Prolonged rupture of membranes (>24 hours)	16	08	2.19(0.89-5.38)	0.12
Induction of labour	28	16	2.04(1.02-4.07)	0.06
General anaesthesia	08	04	2.08(0.60-7.16)	0.37
Meconium stained amniotic fluid	30	08	4.92(2.12-11.41)	<0.00
Chorioamnionitis	08	02	4.26(0.88-20.59)	0.10
Mode of delivery				
Spontaneous vaginal	46	60	0.56(0.32-0.99))	0.06
Instrumental	28	08	4.47(1.92-10.40)	<0.00
LSCS	26	32	0.74(0.40-1.37)	0.43
Sex of the neonate				
Male	60	47	1.69(0.96-2.96)	0.08
Female	40	53	0.59(0.33-1.03)	

PIH- pregnancy induced hypertension, LSCS- Lower segment cesarian section

Table 2. *Multivariate logistic regression analysis of risk factors.*

RISK FACTORS	ODDS RATIO	CONFIDENCE INTERVAL	*p* VALUE
Instrumental delivery	6.007	2.288 to 15.773	0.00
Primi parity	2.014	0.877 to 4.627	0.09
Antenatal visits <3	3.073	1.280 to 7.375	0.01
PIH	2.356	0.866 to 6.408	0.09
Maternal Anemia	4.012	1.588 to 10.139	0.00
Meconium stained amniotic fluid	5.622	2.034 to 15.537	0.00
Maternal age <20	2.302	0.826 to 6.417	0.11

PIH- pregnancy induced hypertension

Discussion

Perinatal mortality, morbidity and long-term sequelae have been related to maternal and obstetric risk factors [6,7]. Birth asphyxia is a perinatal event, and may result in death or permanent sequelae. Prevention of perinatal asphyxia and its complications is dependent on the early identification of pregnancies at risk, with appropriate intervention in selected cases.

In this study, risk factors associated with perinatal asphyxia were instrumental deliveries, meconium stained liquor, maternal age <20 years, primi parity, inadequate antenatal care, pregnancy induced hypertension(PIH), antepartum hemorrhage, and chorioamnionitis. Multivariate regression analysis revealed instrumental delivery as the most significant risk factor, followed by maternal anemia, lack of antenatal care and meconium stained liquor.

The present study showed primiparity as a significant risk factor for severe asphyxia. This is in corroboration with the previous studies [8-10]. The primiparous are often ignorant of the demands of pregnancy and often neglect regular attendance to antenatal care. This may result in complications that lead to perinatal asphyxia. However, socioeconomic and cultural factors may also contribute for the same.

Mothers with antenatal visits less than three had higher risk for perinatal asphyxia.This highlights one of the major problems of poor utilization of health care services in developing countries. Similar findings were noted by others [8,10,11]. Significant number of mothers of asphyxiated babies were unbooked. Mothers aged less than twenty had higher risk of delivering babies with perinatal asphyxia. Lower maternal age has been linked with increased rate of neonatal mortality[12,13]. Recent studies have shown an increased risk of prematurity among young nulliparous adolescents [14,15], suggesting that prematurity and low birth weight may mediate the effect of young maternal age on neonatal mortality[12]. some studies found that maternal age more than 35 years as a risk factor for asphyxia[9,16]

Pre-eclampsia was also observed as a significant risk factor for asphyxia. Pre eclampsia has also been reported previously as a risk factor [8-10]. Preeclampsia if prolonged is associated with reduced blood supply, nutrients and oxygen to the fetus results in intrauterine growth restriction. This complication in itself can be associated with asphyxia [8,10]. Instrumental delivery was major risk factor in our study. Other hospital based studies also had similar results [17]. Some studies did not show significant association with instrumental deliveries but they were mainly conducted in community level where such deliveries may be few in number [18]. Elective caesarean section was found to have a protective effect. It may exert protective effect by avoiding risk factors like post-maturity, persistent malpresentations and difficult deliveries. Although male babies had higher risk for asphyxia, it was not statistically significant in our study.

We conclude that instrumental delivery, lack of antenatal care, maternal anemia and meconium stained liquor were important risk factors for asphyxia. Majority of these factors can be prevented by appropriate antenatal and natal interventions.

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