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Original Research Article

Study of risk factors in children with birth asphyxia

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ABSTRACT

Background: Birth asphyxia is a serious clinical problem worldwide and contributes greatly to neonatal mortality and morbidity. Perinatal asphyxia is the fifth largest cause of under-5 deaths (8.5%) after pneumonia, diarrhea, neonatal infections and complications of preterm birth. Risk factors of birth asphyxia have been divided into antepartum, intrapartum and fetal. Risk factors include increasing or decreasing ma-ternal age, prolonged rupture of membranes, meconium stained fluid, multiple births, non-attendance for antenatal care, low birth weight infants, malpresentation, augmentation of labour with oxytocin, antepartum haemorrhage, severe eclampsia and pre-eclampsia, ante partum and intrapartum anemia. The objective of this study was to study the risk factors in children with birth asphyxia.
Methods: Observational prospective study was conducted on babies delivered in our hospital and requiring resuscitation (basic and/or advanced). Their clinical course was observed and studied in NICU till time of discharge or death. Detailed maternal history was taken for risk factors.
Results: The mean age of mothers was 24.28 years which ranged from 20 years to 29 years. Most of the population was from the lower middle and upper lower socioeconomic status as per the Modified Kuppuswamy scale. 51% neonates were born to primiparous mothers. Anemia was widely prevalent in the moth-ers of neonates requiring resuscitation. The maternal risk factors for newborns requiring resuscita-tion were PIH (23.7%) , oligohydramnios (15%),multiple gestation (3.75 %), PROM (2.5%), diabetes mellitus (2.5%) and UTI (2.5%).One third of neonates requiring resuscitation were born to unbooked mothers.In the neonates requiring resuscitation, the male to female ratio was 1:1. The fetal factors associated with resuscitation of newborns were IUGR (33.75%), fetal distress (31.25%), prematurity (26.25%), MAS (12.5%) and malpresentations (5%).
Conclusions: The most common maternal risk factors for newborns requiring resuscitation was PIH followed by oligohydramnios, multiple gestation, PROM, diabetes mellitus and UTI.IUGR was the most com-mon fetal risk factor followed by fetal distress, prematurity, MAS and malpresentations. One third of neonates requiring resuscitation were born to unbooked mothers. In There was no gender predomi-nance found in this study.

Keywords: Birth asphyxia, PIH, PROM, IUGR

INTRODUCTION

World Health Organisation (WHO) defines Birth asphyxia as failure to initiate and sustain breath-ing in a newborn at birth.[1] It is a temporary interruption of oxygen availability that implies a risky metabolic challenge, even when the insult does not lead to a fatal outcome. Asphyxia results in hypoxemia (lack of oxygen) and hypercapnia (accumulation of carbon diox-ide).

The combination of the decrease in oxygen supply (hypoxia) and blood supply (ischemia) re-sults in a

cascade of biochemical changes inside the body, whose events lead to neuronal cell death and brain damage. Continuous asphyxia also leads to multiple organ systems dysfunction.

Birth asphyxia is a serious clinical problem worldwide and contributes greatly to neonatal mortality and morbidity.

Taking into account that neonatal deaths account for almost 40% of deaths of children under 5, it is apparent that millennium developmental goal 4 (aiming at a two-thirds reduction in under- 5 mortality by the year 2015 from a baseline in 1990) can only be met by substantially reducing neonatal deaths. Perinatal asphyxia is the fifth largest cause of under-5 deaths (8.5%) after pneumonia, diar-rhea, neonatal infections and complications of preterm birth.[2]

According to WHO, of the 130 million babies born every year, about 4 million die in the first 4 weeks of life the neonatal period. In low-income countries 23% of all neonatal deaths occurred due to birth asphyxia. It is the fifth largest cause of under-5 deaths (8.5%) after pneumonia, diarrhea, neonatal infections and complications of preterm birth.[3]

According to a survey conducted by WHO in 2005, it is also one of the leading causes of neonatal deaths within first week of life. It is strongly associated with 1.1 million intrapartum stillbirths and is responsible for long-term neurological disability and impairment.[4]

In 2003, WHO estimated that the number of disability adjusted life years (DALYs) attributed to birth asphyxia surpassed those due to all illnesses preventable by childhood vaccination.[5]

Causes of perinatal birth asphyxia may be maternal or fetal. Those who survive asphyxia at birth are at risk of developing neurological complications including epilepsy, cerebral palsy and developmental delay.

Risk factors of birth asphyxia have been divided into antepartum, intrapartum and fetal. Risk factors include increasing or decreasing maternal age, prolonged rupture of membranes, meconium stained fluid, multiple births, non-attendance for antenatal care, low birth weight infants, malpresentation, augmentation of labour with oxytocin, ante partum hemorrhage, severe eclampsia and pre-eclampsia, ante partum and intrapartum anemia.

Approximately 10% of newborn babies fail to initiate effectual breathing at birth; most of these start breathing after initial stimulation by the health personnel, about 3-5% need basic resuscitation, but <1% require advanced resuscitative effort to achieve efficient circulation to the vital organs.[6-11] Ac-cording to recent estimates approximately 10 million of 136 million neonates born annually require some assistance to begin breathing at birth.[10]

In order to prevent asphyxia which results in high morbidity and causes 19% of neonatal deaths, American Heart Association, (AHA) has issued guidelines that would identify babies needing respiratory assistance at birth.

According to American Heart Association and other recent authorities, neonatal resuscitation is categorized into 3 steps as follows:[10]

- *Initial steps:* Immediate assessment, providing warmth, drying the baby and tactile stimulation
- *Basic resuscitation:* Clearing airways, (suctioning if necessary), positioning the head and giving positive pressure ventilation via bag and mask
- *Advanced resuscitation:* Basic resuscitation (as above) plus endotracheal intubation, chest compression and epinephrine/volume administration as required.

Recognition of risk factors, results in identification of high risk deliveries and attendance of the resuscitation team, before the baby is born.

The prognosis and severity of the symptoms of child with birth asphyxia depends on the risk factors and management of the patient.

The major consequence of perinatal asphyxia is hypoxic ischaemic encephalopathy (HIE). Diagnosis of HIE requires abnormal findings on neurological examination the day after birth. The clinical spec-trum of HIE is described as mild, moderate or severe according to the Sarnat stages of HIE. Infants can progress from mild to moderate and/or severe encephalopathy over the 72 hours following the hypoxic-ischaemic insult. The death of an infant as a result of perinatal asphyxia is devastating and frequently avoidable.

In this region, there is not much data available on the risk factors of birth asphyxia, hence studies are required to evaluate the risk factors of birth asphyxia so that interventions can be done to educate and guide people about the risk factors and management strategies. Our main goal was to evaluate the antepartum, intrapartum and fetal risk factors of birth asphyxia and study the clinical profile in order to develop preventive interventions and thus to reduce neonatal mortality.

This research work aims to study the clinical profile of newborns requiring Basic and/or Ad-vanced resuscitation at birth.

METHODS

Study was conducted in Department of Pediatrics, Acharya Vinoba Bhave Rural Hospital, Sawangi, Wardha

The present study was a prospective observational study conducted during August 2014 to July 2016.

Inclusion criteria

Neonates born at AVBRH who needed resuscitation (*basic and/or**advanced) at birth.

Exclusion criteria

- Neonates whose parents didn't give consent.
- Neonates who needed only #Initial steps of resuscitation.

#Initial steps: Immediate assessment, providing warmth, drying the baby and tactile stimulation.

**Basic resuscitation:* Clearing airways, (suctioning if necessary), positioning the head and giving positive pressure ventilation via bag and mask.

***Advanced resuscitation:* Basic resuscitation (as above) plus endotracheal intubation, chest com-pression and epinephrine/volume administration as required.

- Babies delivered in our hospital and requiring resuscitation(Basic and/or Advanced) were in-cluded in the study after obtaining a written informed consent (Annexure I).
- Detailed maternal history was taken for risk factors after taking due permission (Annexure II) from the HOD, Obstetrics and Gynecology Department.
- Clinical course of neonate was observed and studied in NICU till time of discharge or death.
- All these details were entered in a predesigned validated pro forma. (Annexure III)
- The short-term outcome at discharge was noted along with comorbidities if any with special mention of CNS status.

Sample Size: 80

Calculated using the formula below.

Sample size = $Z1-\alpha/22\ p(1-p) / d2$

Where;

$Z1-\alpha/2$ = Standard normal variate (at 5% type 1 error ($P<0.05$) it is 1.96)

p = Expected proportion in population based on previous studies or pilot studies

d = Absolute error or precision

Statistical analysis

The results obtained were tabulated and analysed using appropriate statistical programme, Statistical Package for Social Sciences (SPSS), version 17.0 and Graph Pad Prism 5.0.

The results were compared using the Chi square test and multiple logistic regression, p value was calculated.

The results were tested at 5% level of significance.

Maternal obstetric history was taken which included the gravity, parity, abortions and living issues and was entered in the GPAL format.

- Gravida indicating the number of times a woman is or has been pregnant, regardless of the pregnancy outcome. A current pregnancy, if any, is included in this count. Twin pregnancy was counted as 1
- Parity, or "para" indicating the number of pregnancies reaching viable gestational age (26-28 weeks in India). The number of fetuses does not determine the parity. Twin pregnancy carried to viable gestational age was counted as 1
- Abortus is the number of pregnancies that were lost for any reason, including induced abortions or miscarriages. Stillbirths were not included
- Living issues means number of live children the mother has at present.

Mother's ANC status i.e. booked/unbooked pregnancy was asked.

According to WHO, a booked case is when the pregnant lady has had a minimum of three visits for antenatal checkup after she was registered and confirmed pregnant. The lady should have taken a minimum of 100 tablets of iron and calcium during her second trimester and should have taken two doses of tetanus toxoid if it was her first pregnancy. And now she should be in her third trimester and should have come for a safe confinement.

Mother's ABO Blood group and Rh type was taken.

Socioeconomic status was taken according to the Modified Kuppuswamy Scale (Annexure IV) and mothers were graded into 5 classes:

- Upper
- Upper Middle
- Lower Middle
- Upper lower
- Lower

History of maternal health conditions like pregnancy induced hypertension, eclampsia, polyhy-dramnios, oligohydramnios and gestational diabetes mellitus were asked for.

Pregnancy induced hypertension (gestational hypertension)

Gestational hypertension was defined as having a blood pressure higher than 140/90 measured on two separate occasions, more than 6 hours apart, without the presence

of protein in the urine and diagnosed after 20 weeks of gestation.

Preeclampsia

Pre-eclampsia is gestational hypertension plus proteinuria (>300 mg of protein in a 24-hour urine sample).

Eclampsia

Defined when tonic-clonic seizures appear in a pregnant woman with high blood pressure and pro-teinuria.

Maternal hemoglobin level was noted and mothers were classified into 4 groups (as per WHO Classification of anaemia in pregnancy);

- No anaemia Hb >10.1 gm/100 ml
- Mild anaemia Hb 8.1-10 gm/100 ml
- Moderate anaemia Hb 6.5-8 gm/100 ml
- Severe anaemia Hb <6.5 gm/100 ml.

History of consanguinity in marriage was taken.

History of any maternal illness such as fever, leak per vagina or abdominal pain was asked.

Type of delivery vaginal /lower segment caesarean section (LSCS) was noted along with the presentation of fetus (Vertex/Breech/Other).

Indications for LSCS both maternal and fetal were noted in case LSCS was done.

Mode of administration of anaesthesia in LSCS was noted (Spinal/Epidural).

Resuscitation method for neonate was taken:

- Bag and Mask ventilation
- Endotracheal intubation
- Endotracheal suctioning in limp meconium stained neonate.

Neonatal information was entered next

Birth weight in kg was taken using electronic weighing scale having a least count of 5 gram which was later rounded off to weight in kg correct to 1 digit after decimal.

Information about neonate being Appropriate for Gestational Age/ Small for Gestational Age or Large for Gestational Age were taken.

- *Appropriate for gestational age (AGA):* the baby's weight was appropriate for the gestational age (weight between 10th and 90th percentile)
- *Small for gestational age (SGA):* a baby whose weight was less than expected for the gestational age (weight less than 10th percentile)
- *Large for gestational age (LGA):* a baby whose weight was more than expected for the gesta-tional age (weight more than the 90th percentile).

Information about neonate being term/preterm/post-term was taken

- Preterm: 36.6 weeks and less
- Term: 37 weeks through 41.6 weeks
- Postterm: 42 weeks and beyond.

RESULTS

Maternal factors

Table 1: Age wise distribution of mothers.

Age group (years)	No. of mothers	Percentage
<25	42	52.5
≥25	38	47.5
Total	**80**	**100.00**
Mean±SD	24.28±2.06 (20-29 years)	
Median	24 years	

The above table shows the age wise distribution of mothers. In our study, 42(52.5 %) mothers were under 25 years age. Mean maternal age was 24.28 years while the median age was 24 years.

Table 2: Distribution of neonates according to maternal socio-economic status.

Socio-economic status	No. of mothers	Percentage
Upper	0	0.00
Upper middle	7	8.8
Lower middle	48	60.0
Upper lower	23	28.8
Lower lower	2	2.5
Total	**80**	**100**

Table 2 shows distribution of socio-economic status of mothers according to Modified Kuppuswa-my Scale The lower middle class formed the majority 60% followed by upper lower (28.8%), upper mid-dle (8.8%) and lower 2.5%) classes.

Table 3: Distribution of neonates according to mother's parity.

Mother's parity	No. of neonates	Percentage
Primi	41	51.25
Two or more	39	48.75
Total	**80**	**100**

Table 3 shows that newborns requiring resuscitation were more in Primipara mothers (51.25%).

Table 4: Distribution of neonates according to mother's haemoglobin status.

Anemia	No. of mother	Percentage
No Anemia	7	8.8
Mild	21	26.3
Moderate	27	33.8
Severe	25	31.3
Total	**80**	**100**

Table 4 shows distribution of neonates according to haemoglobin status into 4 groups.

The groups were divided as

- No anaemia > 10.1 gm/100 ml
- Mild anaemia - 8.1-10 gm/100 ml (mild anaemia)
- Moderate anaemia -6.5-8 gm/100 ml (moderate anaemia)
- Severe anaemia <6.5 gm/100 ml (severe anaemia)

Majority (91.2%) of mothers were anemics and only 8.8% had normal haemoglobin levels.

Table 5: Distribution of maternal risk factors.

Maternal risk factors	No. of mother	Percentage
PIH	19	23.75
Oligohydramnios	12	15
Polyhydramnios	9	11.25
Multiple gestation	3	3.75
Tobacco chewing	3	3.75
Diabetes mellitus	2	2.5
GDM	1	1.25
DM	1	1.25
Eclampsia	1	1.25
Bleeding PV(APH)	1	1.25
Others		
Threatened preterm	5	6.25
PROM	2	2.5
Maternal fever	2	2.5
UTI	2	2.5
AS pattern	1	1.25
Bad Obs history	1	1.25

Table 5 shows the various maternal risk factors associated with birth asphyxia. PIH was the most common risk factor associated with newborns who required resuscitation and was found in 23.75% of mothers. This was followed by oligohydramnios (15%), polyhydramnios (11.25%), multiple gestation and tobacco chewing (both 3.75%), diabetes mellitus (2.5%), eclampsia (1.25%) and APH (1.25%).

Other risk factors found in this study were threatened preterm labor, PROM, maternal fever, UTI, AS pattern and bad obstetric history.

Table 6: Distribution of registration of status of mothers.

Registration status	No. of mothers	Percentage
Booked	55	68.75
Unbooked	25	31.25
Total	**80**	**100.00**

The above table shows that of the 80 babies requiring resuscitation 25 were born to mothers who were unbooked.

Neonatal factors

Table 7: Distribution of neonates according to their gender.

Gender	No. of neonates	Percentage
Male	40	50.00
Female	40	50.00
Total	**80**	**100.00**

Table 7 shows that in our study,there were equal number of males (40) and females (40) and there was no predilection for a particular gender.

Table 8: Distribution of neonates according to fetal factors.

Fetal factors	No. of babies	Percentage N = 80
IUGR	27	33.25
Fetal distress	25	31.25
Prematurity	21	26.25
MAS	10	12.50
Congenital malformation	6	7.5
Breech/Malpresentation	4	5

Table 8 shows distribution of fatal risk factors. The most common fetal risk factor was IUGR (33.25%) followed by fetal distress (31.25%) and prematurity (26.25%). Also, we found 10 children with MAS, 6 with congenital malformations and 4 with malpresentations.

Table 9: Distribution of neonates according to birth weight.

Birth weight (kg)	No. of babies	Percentage
<1 kg	2	2.5
1-1.499 kg	6	7.5
1.5-2.499 kg	53	66.25
≥ 2.5	19	23.75
Total	**80**	**100.00**
Mean±SD	2.24±0.54(0.70-3.50)	

Table 9 shows that we had 61 children with low birth weight requiring resuscitation. Of these 2 were ELBW's and 6 were VLBW's.

The mean birth weight was 2.24 kg in our study.

Table 10: Distribution of registration of status of mothers.

Registration status	No. of mothers	Percentage
Booked	55	68.75
Unbooked	25	31.25
Total	**80**	**100.00**

The above table shows that of the 80 babies requiring resuscitation 25 were born to mothers who were unbooked.

DISCUSSION

In this study, the mean age of mothers was found to be 24.28 years.

Similar results were found in the study by Chandra et al, and Padayachee et al, wherein they found the mean maternal age to be 23.7 years and 25.6 years respectively.[4,5]

Aslam et al, studied the risk factors for birth asphyxia in Pakistan and observed that most common range of maternal age was 20-25 years.[6]

In a similar study conducted in an urban health set up, Chiabi et al, found maximum ie 78.9% cases in the 20-34 year age group.[7]

Lee et al in their study in Nepal on 23,662 births found that mothers aged 20-29 years old were at lower risk for birth asphyxia mortality compared to newborns born to young mothers (<20 years).[8]

Laopaiboon et al found in their study that Advanced Maternal Age (35 years or older) was associated with increased cases of APGAR score < 7 at 5 minutes.[9]

However, in our study the minimum maternal age was 20 years and maximum was 29 years and we didn't find extremes of age most probably due to our limited sample size.

Religion-wise the neonates followed the demographic profile of our region with a Hindu majority followed by Buddhists, Muslims and Christians.

In this study, the maximum cases were from lower middle (60%) and upper lower (28.8%) socioeconomic status as per the Modified Kuppuswamy Scale (Annexure IV).

Lee et al, found low socioeconomic status to be highly associated with birth asphyxia as it may increase asphyxia risk by influencing maternal nutritional status, care-seeking and access to health care services during the antenatal and intrapartum periods.[8]

However, Babu et al, found no association among the literacy level or socioeconomic status of mothers and incidence of birth asphyxia.[10]

Etuk et al, had also found no association between socioeconomic status and asphyxia.[11]

There were no patients from upper Kuppuswamy class most probably due to the patient profile visiting our hospital.

Also, people belonging to lower class were unexpectedly less as compared to upper lower and lower middle class. A probable reason would be financial constraints making them visit government hospitals.

In this study, out of the 80 neonates who were enrolled 41 (51.25%) had primigravida mothers while rest 39 (48.75%) were multigravida. this was in concordance with studies by Padayachee et al, Aslam et al and Lee et al.[5,6,8]

The median parity was 1 in the study done by Padayachee et al, in Johannesburg, South Africa.[5]

Aslam et al, in their study maternal risk factors for asphyxia found 56.9% primigravidae in their study.[6]

Lee et al, in their study in Southern Nepal found primiparity to be risk factor for birth asphyxia with a relative risk of 1.71 (CI 1.16-2.53).[8]

However Chiabi et al in his study in Cameroon found a contrasting result with 32.2% mothers to be Primigravidae and 67.8% to be multigravida.[7]

Prolonged labour, prematurity and low birth weight, which are common in primi, might be the possible explanation.

In this study we found that most of the neonates (91.2%) had mothers with anaemia (with 31.3% severe anemics).

Akhtar et al, in their study of effect of maternal anaemia on fetal outcome found significant correlation between low maternal haemoglobin (<10g/L) and birth asphyxia.[12]

Dalal et al13, 2013 found in their study that 52.2% mothers of newborns with birth asphyxia had anaemia while Mohan et al14, 2013 found 23.33% mothers to be severely anaemic in their study.

In a retrospective case control study in Pakistan by Aslam et al, he found 48% mothers to be anaemic in the

newborns with birth asphyxia (case group) while the control group (newborns with no birth asphyxia) had 37.6% anaemic mothers.[6]

Similarly, a prospective case control study by Mohan et al, found that 23.3% mothers born to mothers with severe anaemia had birth asphyxia (cases) while only 5% of the newborns without asphyxia had mothers with severe anaemia.[14]

Aslam et al found in his case-control study 48% mothers to be anaemic in the case group while the control group had 37.6% anaemic mothers.[6]

Goswami et al found that 93.33% of infants of non-anaemic mothers showed an apgar score 8-10 at one minute, whereas only 72.33% of infants born to anaemic mothers had a similar score i.e. 27.67% had some degree of asphyxia.[15]

In a study on Indian women Rusia et al, evaluated the effect of maternal haemoglobin con-centration (Hb. conc) and iron deficiency anaemia on the placental weight and the foetal outcome.[16] The maternal Hb conc. showed a significant correlation with placental weight ($p < 0.05$), birth weight ($p < 0.01$), Apgar score ($p < 0.001$) and birth asphyxia. In mothers with Hb<90 g/L, 44.4% babies had birth asphyxia.

A possilble explanation for this is the inadequate supply of Oxygen across the placenta due to maternal anaemia which leads to poor placental growth and neonatal development. This manifests at birth in babies having low APGAR scores and birth asphyxia.

In this study, PIH (23.7%) was the most common risk factor for newborns requiring resuscitation. We also found oligohydramnios (15%), multiple gestation (3.75 %), PROM (2.5%), diabetes mellitus (2.5%) and UTI (2.5%) as maternal risk factors in neonates requiring resuscitation.

Chandra et al in her study on perinatal asphyxia in India found PIH as a strong independent asso-ciation for perinatal asphyxia (RR=3.2 CI 1.5-6.7). Multiple gestation was found in 1.9% of the cases.[4]

Chiabi et al in his prospective case control study in Cameroon, Africa found significant association of PIH, Prolonged labor and PROM with birth asphyxia.[7]

Mohan et al in her case control study from India found PIH and obstructed labor to have significant association with birth asphyxia.[1]

Seyyed-Abolfazl Afjeh et al from Teheran found a positive correlation between need for resucitation and low birth weight, preterm labor, chorioamnionitis, pre-eclampsia, prolonged rupture of membranes, abruptio placentae, prolonged labor, meconium staining of amniotic fluid, multiple pregnancy and fetal distress.[17]

Aslam et al, in his study in Pakistan found oligohydramnios to be present in 7.3% cases. Al-so, multiple gestation was seen in 0.8% of the cases.[6]

DM was seen in 2.5% cases in our study and in 3.3% cases in study done by Chiabi et al.[7]

UTI was present as risk factor in 2.5% cases in our study and in 1.1 % cases in study done by Chiabi et al in Cameroon.[7]

PIH leads to a decrease in placental blood flow, loss of placental integrity, and damage of endothelial cells. All these phenomena can lead to an inadequate fetoplacental blood flow with foetal hypoxia leading to birth asphyxia.

In this case, 68.75 % mothers were booked cases while 31.25 % were unbooked cases.

Chandra et al, in their multivariate analysis of risk factors of asphyxia found less number of antenatal visits (Mean = 1) in the asphyxia group while control group had a mean of 2 antenatal visits.[4]

Aslam et al, in their study on risk factors of birth asphyxia found 74.7% cases to be un-booked.[6]

Booked cases receive better antental care along with early detection and management of maternal health conditions and so there are fewer cases of poorer fetal outcome and birth asphyxia.

In the present study, total number of neonates studied were 80. Out of these 80 children, 40 (50%) were males and 40 (50%) were females. We found no gender predominance.

Chandra et al, found 51% females against 49% males amongst liveborns with asphyxia which was in concordance with our study.[4]

However, many studies show some degree of male predominance in birth asphyxia.

Lee et al, found a male majority in birth asphyxia related deaths where they found 59% males and 41% females.[8]

Also, in the study by Chiabi et al, it was reported that 56% were males and 44% were fe-males and the male to female ratio was 1.3:1.[7]

Padayachee et al, found 260 (57.8%) males 185 (41.1%) females and 5 (1.1%) of unknown gender.[5]

Dalal et al, in their study found that out of total 320 babies of full term birth asphyxia, 52.5% were males.[13]

Our study not finding any gender predominance can be attributed to the small sample size.

IUGR (33.75%) was the most common risk factor followed by fetal distress which was present in 31.25% of the cases.

Padayachee et al found 20.2% while Mohan et al had 58.33 % neonates with fetal distress as a risk factor for asphyxia in their studies.[1,5]

In his descriptive retrospective study in Johannesburg, South Africa which collected data over 5 years Padayachee et al, included 450 infants with perinatal asphyxia.[5] He found that 20.2% of the neonates had fetal distress, 10.9% had MSL, 3.1% had cord around neck and only 1 newborn had a malpresentation. He included babies who weighed more than 1800 g at birth.

Mohan K, who studied the risk factors for asphyxia found a statistically significant difference between neonates with fetal distress who had birth asphyxia and who didn't have birth asphyx-ia.She also found 23.3% of neonates with asphyxia having MSL and 3.3% with multiple gestation.[1]

Prematurity was the second most common fetal risk factor with 26.25% neonates in this study.

Chandra et al4 reported prematurity in 5.9 % cases in her study on risk factors for apshyxia.

Chandra et al did a cohort study on perinatal asphyxia which included 51 live births with birth asphyxia and 2265 live births serving as controls (without asphyxia).[4] They found IUGR as the only neonatal factor which was significantly associated with birth asphyxia. They didn't find significant association of maturity and multiple births with birth asphyxia.

Aslam et al6 studied the risk factors of birth asphyxia wherein 123 newborns with birth asphyxia were cases and 117 neonates without birth asphyxia as controls. He found prematurity (OR = 26.68) and MSAF (OR = 0.8) to be significantly associated with birth asphyxia. However, he didn't find multiple gestation to be associated with birth asphyxia.

Chiabi et al in his study in Cameroon found that breech delivery had a statistically significant association with birth asphyxia.[7] They didn't find prematurity to have statistically significant association with birth asphyxia.

In the study by Lee et al in Nepal prematurity was associated with 2.28 fold (95% CI:1.69-3.09) higher birth asphyxia risk.[8]

This study had majority of babies from 1.5-2.499 kg weight group (66.25%) followed by ≥2.5 kg group (23.75%), 1-1.499 kg (7.5%) and <1 kg (2.5%).

Aslam et al found a significant association of birth weight and birth asphyxia in his case control study wherein babies born with birth weight between 1-2 kg had increased risk for birth asphyxia.[6]

Bari et al in their study in Bangladesh found that the incidence of birth asphyxia among the LBW babies was 10.0%.[18] It was only 1.4% among the NBW babies. The difference of the incidence of birth asphyxia between the LBW and NBW babies was statistically significant ($p<0.05$).

Afjeh SA et al, from Teheran found a positive correlation between need for resusci-tation and low birth weight and also that low birth weight was an independent risk factor for endo-tracheal intubation.[17]

However Chiabi et al and Chandra et al, did not find any association of birth weight with birth asphyxia.[4,7]

Fetoplacental insufficiencies is one of the factors leading to low birth weight. This causes inadequate placental development and contributes to increased risk for birth asphyxia.

Limitations of this study were clustering was seen in socioeconomic profile of patients. Umbilical cord blood gas analysis could not be done for all the babies. Study could not include all the patients over the study period.

CONCLUSION

The mean age of mothers was 24.28 years. Most of the population was from the lower middle and upper lower socioeconomic status as per the Modified Kuppuswamy scale. More than half of the neonates were born to primiparous mothers. Anemia was widely prevalent in the mothers of neonates requiring resuscitation. The most common maternal risk factors for newborns requiring resuscitation was PIH followed by oligohydramnios, multiple gestation, PROM, diabetes mellitus and UTI. One third of neonates requiring resuscitation were born to unbooked mothers. In the neonates requiring resuscitation, the male to female ratio was 1:1. IUGR was the most common fetal risk factor followed by fetal distress, prematurity,MAS and malpresentations. In the study group, 66.25% of total newborns were in the weight range of 1.5-2.499 kg.

Recommendations

Proper antenatal care goes a long way for successful pregnancy outcome.

Personnel trained in neonatal resuscitation to be present for all deliveries and especially for deliveries with maternal and/or fetal risk factors.

All medical officers caring for pregnant women should be trained for Navjat Shishu Suraksha Karyakram (NSSK) which is undertaken by MOHFW, wherein the health care providers at dis-trict hospitals, CHC's and PHC's are trained in the basic resuscitation of the neonate including Bag and Mask ventilation. As most of the babies who don't cry at birth get revived with BMV alone, this training will help health care providers to salvage many newborns who don't cry at birth.

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REFERENCES

1. World Health Organisation. Perinatal mortality: a listing of available information. WHO/frh/msm/96.7.Geneva: WHO; 1996.
2. United Nations. The Millenium Development Goals Report, 2010. New York; 2010
3. Gleason C, Devaskar S, Avery M. Avery's diseases of the newborn. Philadelphia, PA: Else-vier/Saunders; 2012.
4. Chandra S, Ramji S, Thirupuram S. Perinatal asphyxia: multivariate analysis of risk factors in hospital births. India Pediatr. 1997;34(3):206-12.
5. Padayachee N, Ballot DE. Outcomes of neonates with perinatal asphyxia at a tertiary academic hospital in Johannesburg, South Africa. South African J Ch Health. 2013;7:89-94.
6. Aslam HM, Saleem S, Afzal R, Iqbal U, Saleem SM, Shaikh MW, et al. Risk factors of birth asphyxia. Ital J Pediatr. 2014;40(1):94.
7. Chiabi A, Nguefack S, Mah E, Nodem S, Mbuagbaw L, Mbonda E, et al. Risk factors for birth asphyxia in an Urban Health Facility in Cameroon. Iran J Child Neurol. 2013;7(3):46-54.
8. Lee AC, Mullany LC, Tielsch JM, Katz J, Khatry SK, LeClerq SC, et al. Risk factors for neonatal mortality due to birth asphyxia in southern Nepal: a prospective, community-based cohort study. Pediatr. 2008;121(5):e1381-90.
9. Laopaiboon M, Lumbiganon P, Intarut N, Mori R, Ganchimeg T, Vogel J, et al. Advanced maternal age and pregnancy outcomes. Obstetric Anesthesia Digest. 2015;35(1):27.
10. Babu BVA, Devi SS, Kumar BK. Birth asphyxia – incidence and immediate outcome in rela-tion to risk factors and complications. Int J Res Health Sci. 2014;2(4):1064-71.
11. Etuk SJ, Etuk IS, Ekott MI, Udoma EJ. Perinatal outcome in pregnancies booked for ante-natal care but delivered outside health facilities in Calabar, Nigeria. Acta Trop. 2000;75:29-33.
12. Akhter S, Momen MA, Rahman MM, Parveen T, Karim RK. Effect of maternal anemia on fetal outcome. Mymensingh Med J. 2010;19(3):391-8.
13. Dalal CA, Bodar NL. Astudy on birth asphyxia at tertiary health centre. Natl J Med Res. 2013;3:374-6.
14. Mohan K, Mishra PC, Singh DK. Clinical profile of birth asphyxia in newborn. Int J Sci Tech. 2013;3(1):10-9.
15. Goswami TM, Patel VN, Pandya NH, Mevada AK, Desai KS, Solanki KB. Maternal anaemia during pregnancy and its impact on perinatal outcome. Int J Biomed Adv Res. 2014;5:99-102.
16. Rusia U, Madan N, Agarwal N, Sikka M, Sood S. Effect of maternal iron deficiency anaemia on foetal outcome. Indian J Pathol Microbiol. 1995;38:273-9.
17. Afjeh SA, Sabzehei MK, Esmaili F. Neonatal resuscitation in the delivery room from a ter-tiary level hospital: risk factors and outcome. Iran J Pediatr. 2013;23:675-80.
18. Bari M, Ullah M, Khatun M. Morbidity and mortality of low birth weight baby. TAJ. 2009;21(1):35-9.

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