Original Research Article

Risk factors of birth asphyxia in neonates

Mohammed AS[1], Samina Tarannum[2]

[1]Dr. Mohammed Abdul Saleem, Assistant Professor, Department of Paediatrics, Gandhi Medical College, Secunderabad, Telangana, India, [2]Dr. Samina Tarannum, Assistant Professor, Department of Paediatrics, Gandhi Medical College, Secunderabad, Telangana, India. E-mail Id: drsaleemgmc@gmail.com

Corresponding Author: Dr. Samina Tarannum, Assistant Professor, Department of Paediatrics, Gandhi Medical College, Secunderabad, Telangana, India. E-mail Id: drsaleemgmc@gmail.com

Abstract

Background: Perinatal asphyxia is an insult to fetus or newborn due to lack of oxygen (hypoxia) or lack of perfusion (ischemia) to various organ of sufficient magnitude and duration. Perinatal asphyxia is one of the major causes of early neonatal mortality in India. **Objective:** To study the risk factors of birth asphyxia in children. **Design:** Observational prospective study on babies delivered in our hospital and requiring resuscitation. **Duration:** March 2014 to September 2014. **Setting:** Department of Paediatrics, Gandhi Medical College. **Participants:** 100 babies delivered in our hospital and requiring resuscitation. **Methods:** All neonates who needed resuscitation at birth were included. Maternal obstetric history was taken which included the gravity, parity, abortions and living issues. Mother's ANC status was asked. Mother's ABO Blood group and Rh type was taken. History of maternal health conditions was asked for. History of maternal illness was also taken. Neonatal information was entered next which birth weight, term information and others. **Results:** The mean age of mothers was 25.3 years. 54% neonates were born to primiparous mothers. Anemia was widely prevalent in the mothers of neonates requiring resuscitation. The maternal risk factors for newborns requiring resuscitation were PIH (22%), oligohydramnios (14%), multiple gestation (4%), PROM (3%), diabetes mellitus (3%) and UTI (5%). One third of neonates requiring resuscitation were born to unbooked mothers. The fetal factors associated with resuscitation of newborns were IUGR (35%), fetal distress (32%), prematurity (31%), MAS (10%) and mal-presentations (4%). **Conclusion:** 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 common fetal risk factor followed by fetal distress, prematurity, MAS and mal-presentations.

Key words: Birth asphyxia, Children, Risk Factors, PIH, IUGR.

Introduction

World Health Organization defined birth asphyxia as "the failure to initiate and sustain breathing at birth. The exact definition of birth asphyxia is given by the ACOG (American College of Obstetricians and Gynecologists), AAP includes existence of 3 factors: Metabolic or mixed academia (pH<7) which is determined by umbilical cord arterial blood samples; APGAR score of this definition is designed for use in hospital-based settings which requires evaluation [1,2,3].

Worldwide Midwives uses APGAR score for describing the wellbeing of new-borns at birth. Because it is a clinical indicator commonly used to describe the new-born's physical condition at birth. In many cases, the timing of asphyxia cannot be established with certainty that is why the severity of asphyxia is widely assessed by the APGAR score, at 1 and 5 min after birth [4,5].

Commonly the first 1 min after birth which is the "golden minute" the baby should be breathing well. The ACOG stated that a low APGAR score beyond 5 min is a suggestive criterion for an estimate of the severity of asphyxia. The birth of a healthy new-born is one of the finest gifts of nature.

The birth process takes only few hours but it is the most hazardous period of life since it is associated with the largest number of deaths as compared to any other phase of life. If new-born is unable to breathe spontaneously at birth it results birth asphyxia and

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causes a damaging condition of impaired blood gas exchange and if it persists leading to progressive hypoxemia, hypercapnia with significant metabolic acidosis and tissue oxygen debt, which can cause serious multi organ failure and poor prognosis and high mortality stillbirth or lifelong disability in the surviving infant commonly with a very high incidence of 25% irreversible neurologic damage and 1.15 million develop clinical encephalopathy such as cerebral palsy, mental retardation and epilepsy leading to detrimental long term consequences for both child and family.

Cognitive and behavioral difficulties which lead to memory and attention deficit hyperactivity disorder (ADHD), autism and schizophrenia.

Globally birth asphyxia continues to present a major clinical problem and one of the common and leading causes of perinatal and neonatal mortality and morbidity especially in developing countries [6,7,8,9]. Four million babies are born with asphyxia each year.

According to statistics by WHO, in developing countries 3% of infants (3.6 million babies) suffer from moderate to severe asphyxia, of whom 23% (840,000) die which equates to nearly 1 million neonatal deaths per year and in countries with high neonatal mortality rates the death rate is 8 times that of countries with low NMRs and almost the same number suffer from the associated consequences [10].

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 [11,12]. The objective of this research was to study the risk factors of birth asphyxia in children requiring resuscitation.

Materials and Methods

Place of Study: Department of Paediatrics, Gandhi Medical College.

Type of Study: Observational prospective study on babies delivered in our hospital and requiring resuscitation.

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

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

History of maternal health conditions was asked for. History of maternal illness was also taken. Neonatal information was entered next which birth weight, term information and others.

Sampling Methods: Sample size was calculated using the formula: Sample size = Z1-α/22 p (1-p) / d2.

Inclusion Criteria: All neonates who needed resuscitation at birth were included.

Exclusion Criteria: Neonates whose parents didn't give consent and who needed only initial steps of resuscitation were excluded.

Statistical Methods: The results obtained were tabulated and analyzed using appropriate statistical programme, Statistical Package for Social Sciences (SPSS), version 18.0 and Graph Pad Prism 5.1.

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.

Results

Table-1: Distribution of maternal risk factors.

Risk Factor	N (%)
PIH	22(22%)
Oligohydramnios	14(14%)
Polyhydramnios	8(8%)
Multiple Gestation	4(4%)
Tobacco Chewing	2(2%)
Diabetes Mellitus	3(3%)
Eclampsia	1(1%)
Bleeding Per Vaginal	2(2%)
Threatened Preterm	1(1%)
PROM	3(3%)
Maternal Fever	1(1%)
UTI	5(5%)
AS Pattern	1(1%)
Bad OBS History	1(1%)

The maternal risk factors for newborns requiring resuscitation were PIH (22%), oligohydramnios (14%), multiple gestation (4%), PROM (3%), diabetes mellitus (3%) and UTI (5%). Other risk factors found in this study were threatened preterm labor, PROM, maternal fever, UTI, AS pattern and bad obstetric history.

Table-2: Distribution of registration of status of mothers

Registration Status	N (%)
Booked	67(67%)
Unbooked	33(33%)
Total	**100(100%)**

The above table shows that of the 100 babies requiring resuscitation 33 were born to mothers who were unbooked.

Table-3: Distribution of neonates according to their gender.

Gender	N (%)
Male	52(52%)
Female	48(48%)

Table-4: Distribution of neonates according to fetal risk factors

Risk Factor	N (%)
IUGR	35(35%)
Fetal Distress	32(32%)
Prematurity	31(31%)
MAS	10(10%)
Congenital Malformation	7(7%)
Mal-presentation	4(4%)

The fetal factors associated with resuscitation of newborns were IUGR (35%), fetal distress (32%), prematurity (31%), MAS (10%) and mal-presentations (4%).

Table-5: Distribution of neonates according to birth weight.

Birth Weight(Kg)	N (%)
<1Kg	4(4%)
1-1.4 Kg	11(11%)
1.5-2.4Kg	47(47%)
≥2.5Kg	38(38%)
Total	**100(100%)**

Table 5 shows that we had 62 children with low birth weight requiring resuscitation. Of these 2 were ELBW's and 11 were VLBW's.

Discussion

Perinatal asphyxia, neonatal asphyxia or birth asphyxia is the medical condition resulting from deprivation of oxygen to a newborn infant that lasts long enough during the birth process to cause physical harm, usually to the brain.

Hypoxic damage can occur to most of the infant's organs (heart, lungs, liver, gut, kidneys), but brain damage is of most concern and perhaps the least likely to quickly or completely heal. In more pronounced cases, an infant will survive, but with damage to the brain manifested as either mental, such as developmental delay or intellectual disability, or physical, such as spasticity.

It results most commonly from a drop in maternal blood pressure or some other substantial interference with blood flow to the infant's brain during delivery [13,14,15]. This can occur due to inadequate circulation or perfusion, impaired respiratory effort, or inadequate ventilation. Perinatal asphyxia happens in 2 to 10 per 1000 newborns that are born at term, and more for those that are born prematurely [16,17].

WHO estimates that 4 million neonatal deaths occur yearly due to birth asphyxia, representing 38% of deaths of children under 5 years of age. Fatalities from perinatal asphyxia remain high in developing countries, and continually assessing its risk factors will help improve outcomes in these settings [18,19].

We explored how some identified risk factors predict mortality in asphyxiated newborns, to assist clinicians in prioritizing interventions. This was a 1-year prospective study conducted at the Gandhi Medical College. All newborns who met the study criteria that

were admitted to this facility in this period were enrolled and monitored. Data collected were analysed with SPSS Version 18. A total of 100 newborns with perinatal asphyxia were enrolled into the study.

According to our study, the mean age of mothers was 25.3 years. Most of the population was from the lower middle and upper lower socioeconomic status. 54% neonates were born to primiparous mothers. Anemia was widely prevalent in the mothers of neonates requiring resuscitation.

The maternal risk factors for newborns requiring resuscitation were PIH (22%), oligohydramnios (14%), multiple gestation(4%), PROM (3%), diabetes mellitus (3%) and UTI (5%). One third of neonates requiring resuscitation were born to unbooked mothers. The fetal factors associated with resuscitation of newborns were IUGR (35%), fetal distress (32%), prematurity (31%), MAS (10%) and mal-presentations (4%).

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 common fetal risk factor followed by fetal distress, prematurity, MAS and mal-presentations. One third of neonates requiring resuscitation were born to unbooked mothers.

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