



Maternal Characteristics of Full-Term Birth Asphyxia Neonates

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Abstract

Background: In developing countries, perinatal hypoxia is still a leading cause of mortality and disability. In 2011, the infant mortality rate dropped from 92 per 1000 live births in 1991 to 43 per 1000 live births. However, neonatal mortality in Bangladesh remains high, accounting for more than half of all deaths under the age of five and more than two-thirds of infant mortality. As a result, any qualities that can operate as a risk factor for prenatal asphyxia can be quite beneficial. The aim of the study was to observe the maternal characteristics of perinatal asphyxia in full-term pregnancies. **Material & Methods:** This cross-sectional descriptive study was conducted at the Department of Obstetrics and Pediatrics, Rangpur Medical Collage, and Hospital, Rangpur, Bangladesh. The study duration was 2 years, from January 2012 to December 2013. The study was conducted with a total of 60 cases of birth asphyxia, who were delivered or admitted into the study hospital. **Results:** In 70% of cases, the mother was Primipara. Among the neonates, 61.67% were male, and 38.33% were female. Only 33% of the case neonates had received regular antenatal check-ups, while 55% had irregular check-ups, and 11.67% had no antenatal checkups. According to the grading of asphyxia, 51.67% of neonates had moderate asphyxia, 20% had mild asphyxia, and 28.33% had severe asphyxia. The mean serum sodium value in mild, moderate, and severe asphyxia were 135.33, 123.42, and 121.53 mmol/L respectively. Mean serum potassium values were 4.11, 4.86, and 5.51 mmol/L respectively. Mean serum creatinine 0.72, 1.00, and 1.83 mg/dl respectively. Mean blood urea levels were 36.17, 58.97, and 88.06 mg/dl respectively. A significant difference was observed between the mean values of serum electrolytes and patients' asphyxia grade. **Conclusion:** The study findings revealed that birth asphyxia was more common among vaginal deliveries and irregular or no neonatal care cases. Primipara patients had a higher likelihood of neonatal asphyxia. Serum electrolyte levels varied significantly based on the grade of asphyxia.

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INTRODUCTION

In impoverished countries, perinatal asphyxia is the most common preventable cause of neonatal brain injury, resulting in extraordinarily high neonatal death and morbidity. Despite great advances in monitoring technologies, prenatal awareness, and neonatal illnesses, perinatal asphyxia remains a leading cause of mortality and acquired brain damage in babies worldwide.^[1] According to WHO estimates, 3% of all newborns (3.6 million) in developing countries suffer from moderate to severe birth asphyxia, with around 23% (84000) dying and the same number suffering from major sequelae.^[2] Birth asphyxia accounts for 29% of all newborn fatalities globally, but only 21% in Bangladesh.^[3] Perinatal hypoxia is a significant newborn health issue in Bangladesh, particularly in rural regions. Untrained staff attend around 95% of rural births and 65% of urban deliveries. Twelve babies per thousand die within the first few hours of life.^[4] Perinatal asphyxia is a prevalent disease that demands admission to a neonatal center in Bangladesh. Despite recent improvements in obstetrical care in Dhaka's metropolitan and periurban regions, there is a growing trend of admission to neonatal hospitals for perinatal hypoxia, which can account for up to 40% of overall admissions.^[5] Even currently, overall hospital admission statistics only account only a small portion of the total incidence rate of perinatal asphyxia. The most prevalent derangements in extremely unwell asphyxiated newborns are fluid, electrolyte, and metabolic abnormalities. In young children, the syndrome of inappropriate antidiuretic hormone secretion (SIADH) causes hyponatremia and hypocalcemia.^[6] When the ischemic insult

creates renal insufficiency, these newborns might develop hyperkalemia.^[7] Perinatal asphyxia is the most prevalent illness linked with abnormal electrolytes among unwell newborns admitted to the critical care unit at Dhaka Shishu Hospital, and all types of electrolyte abnormalities, solo or combined, are also noted here.^[8] In newborns, specific symptoms of electrolyte abnormalities commonly coexist with indicators of underlying hypoxic ischemic encephalopathy, or HIE, and the use of fluid and electrolytes in such cases increases morbidity and death.^[9] In addition to HIE, organ damage is common in individuals with ischemic insult in newborn asphyxia.^[10] As a result, to assure their repair and enhance newborn outcomes, a high index of suspicion, rapid detection, and a detailed awareness of prevalent electrolyte imbalances are required. There is little information on this topic in our literature despite the fact that birth asphyxia is a leading cause of neonatal mortality. Maternal causes might also play a factor on the incidence rate of birth asphyxia. There have been multiple studies to observe if maternal factors could act as risk factors for birth asphyxia among neonates.^[11,12,13] Some studies have found a significant association between pre-term birth and birth asphyxia.^[14,15,16] However, very few studies can be found that have focused on additional maternal risk factors in full-term pregnancies, even fewer in Bangladeshi population. The present study was conducted to shed some light on the maternal characteristics unrelated to gestational age for perinatal asphyxia.



Objective

General Objective

To observe the maternal characteristics of full term perinatal asphyxia cases.

MATERIAL AND METHODS

This cross-sectional descriptive study was conducted at the Department of Obstetrics and Pediatrics, Rangpur Medical Collage, and Hospital, Rangpur, Bangladesh. The study duration was 2 years, from January 2012 to December 2013. The study was conducted with a total of 60 cases of birth asphyxia, who were delivered or admitted into the study hospital. Informed consent was obtained from the legal guardians of each participant, and ethical approval regarding the study was also obtained from the ethical review committee of the study hospital. Study participants were selected through purposive sampling following the inclusion and exclusion criteria. All collected data were analyzed using the SPSS software.

Inclusion Criteria

- Live born babies with perinatal asphyxia
- Babies who had a delay to establish first breath within one minute of birth
- Full-term pregnancy cases with healthy baby weight
- Newborn remains hypotonic or floppy over hours
- APGAR score < 7 at 5 min
- Evidence of other organ dysfunction like; respiratory distress, poor peripheral perfusion, oliguria

Exclusion Criteria

- Not asphyxiated babies
- Septicemic Neonates
- Neonates with gross congenital anomalies
- Baby of high-risk mothers like Diabetes mellitus, heart disease, etc.

RESULTS

The study showed that majority of the mothers 42 (70%) were primipara and 18 (30%) mothers were multipara. [Table 1]

Table 1: Maternal Distribution by parity (n=60)

Parity	Number	Percentage (%)
Primipara	42	70
Multipara	18	30

Table 2: Distribution of asphyxiated babies by antenatal checkup history (n=60)

Antenatal check up	Number	Percentage (%)
Regular	20	33.3
Irregular	33	55.1
No ANC	07	11.6

It was found that out of 60 cases 33(55%) mothers received antenatal cheek up but irregularly, 20(33.3%) mothers received regular antenatal cheek up and 7(11.6%) mothers did not go for antenatal cheek up at all.

Table 3: Distribution of asphyxiated babies by place of delivery (n=60)

Place of Delivery	Number	Percentage (%)
Home	23	38.3
Clinic	16	26.6
Hospital	21	35.1

Regarding place of delivery, 23(38.3%) asphyxiated neonates were delivered at hospital, 16(26.6%) deliveries were conducted at clinic and 21(35%) were delivered at home.

Table 4: Mean values of Serum Electrolyte, and Creatinine, Urea in different grading of asphyxia (n=60)

Serum Electrolyte level	Mild asphyxia (mean)	Moderate asphyxia (mean)	Severe asphyxia (mean)	p-value
Serum Sodium(mmol/L)	135.33	123.42	121.53	<0.001
Serum Potassium(mmol/L)	4.11	4.86	5.51	<0.002
Serum Creatinine(mg/dl)	0.72	1.00	1.83	<0.001
Blood Urea(mg/dl)	36.17	58.97	88.06	<0.001

Table 5: Distribution of asphyxiated neonates by clinical findings (n=60)

Clinical Findings	Number	Percentage (%)
Impaired Renal Function	24	40.00%
Hyponatremia	36	60.00%
Hypokalemia	4	6.67%
Hyperkalemia	11	18.33%
Low serum creatinine	30	50.00%
High serum creatinine	21	35.00%

The mean serum sodium value in mild, moderate, and severe asphyxia were 135.33, 123.42, and 121.53 mmol/L respectively. Mean serum potassium values were 4.11, 4.86, and 5.51 mmol/L respectively. Mean serum creatinine 0.72, 1.00, and 1.83 mg/dl respectively. Mean blood urea levels were 36.17, 58.97, and 88.06 mg/dl respectively. A significant difference was observed between the mean values of serum electrolytes and patients' asphyxia grade. [Table 4]

The clinical findings of the asphyxiated neonates revealed that 60% had hyponatremia, 40% had impaired renal functions, 50% had low serum creatinine levels, 35% had high serum creatinine levels, 18.33% had hyperkalemia and 6.67% had hypokalemia. [Table 5]

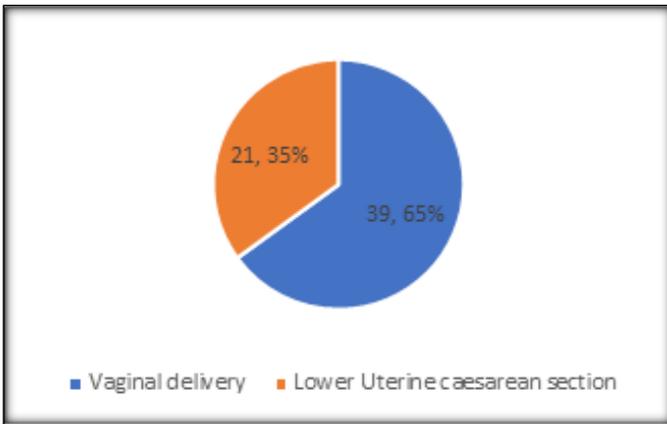


Figure 1: Distribution of the asphyxiated babies by mode of delivery (n=60)

65% of the neonates had been delivered through normal vaginal mode, while 35% had been cesarean section cases.

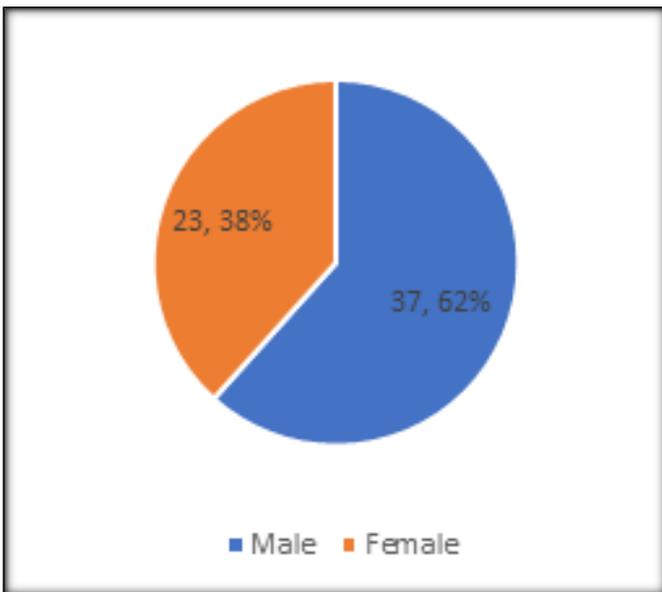


Figure 2: distribution of asphyxiated neonates by gender (n=60)

Among the neonatal births, 62% had been male, and only 38% had been female.

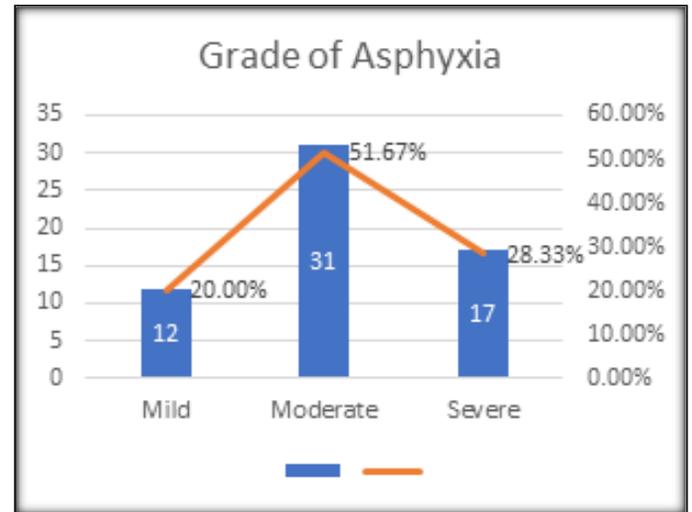


Figure 3: Distribution of neonates by grades of asphyxia (n=60)

By observing the grade of asphyxia among neonates, it was observed that majority (51.67%) had moderate grade asphyxia, while 28.33% had severe grade asphyxia. Only 20% of neonates had mild grade asphyxia.

DISCUSSION

In impoverished nations such as Bangladesh, perinatal hypoxia is a leading cause of infant mortality and disability.^[17] The most prevalent derangements in the asphyxiated newborn are fluid, electrolyte, and metabolic abnormalities. These factors, coupled with impaired renal function, may be the major cause of morbidity and death in prenatal asphyxia patients. To overcome these problems, early diagnosis of potential risk factors for newborn asphyxiation is critical. A greater frequency of asphyxia is connected with a number of risk factors, including a lack of prenatal care, parity, method of birth, low nutritional status, antepartum hemorrhage, and maternal toxemia.^[18] Patient parity can be an essential risk factor; in our



study, 70% of the case group participants were primipara, while only 30% of asphyxiated neonates were born of multigravida mothers. This reflects our society's lack of antenatal check-up awareness, which delays the timely prognosis of high-risk pregnancies and contributes to the development of birth asphyxia. These findings were also consistent with earlier research on newborn hypoxia.^[1,19,20] This increased rate of asphyxiated neonates born to Primipara mothers may be attributable to the decreased expansibility of the birth canal in Primipara, as well as the lengthening of labor in such cases. Proper and consistent prenatal care can also help to reduce the occurrence of perinatal asphyxia. Only 33.3% of the 60 participants in the current study had a regular check-up, while 11.6% of neonates received no prenatal care at all. Proper prenatal care can significantly reduce the risk of a variety of negative consequences for both the fetus and the mother. Many studies have found that those who did not receive sufficient antenatal care had a considerably higher incidence of newborn problems, including birth asphyxia.^[11,15,21,22,23] In terms of delivery location, 23 (38.3%) of asphyxiated neonates were delivered at the hospital, 16 (26.6%) were delivered at the clinic, and 21 (35%) were delivered at home. This study was carried out in a tertiary care hospital, and the majority of the moms were admitted after a failed home trial or were referred by other healthcare facilities. Some out-born hospital-delivered neonates were admitted to this hospital after they were unable to effectively address birth asphyxia due to a lack of resources. Out of 60 asphyxiated newborns, 39 (65%) were delivered vaginally, whereas 21

(35%) were delivered through LUCS. This also lends credence to the hypothesis that diminished expansibility of the birth canal has a significant impact on child hypoxia. Our study's case group had a high rate of vaginal deliveries, which was similar to other research.^[12,24,25] This study found that male newborns outnumbered female babies, which is consistent with earlier studies.^[1,26,27] Only 20% of the newborns had mild asphyxia, while 51.67% had significant asphyxia and 28.33% had severe asphyxia. The mean serum electrolyte levels differed significantly amongst hypoxia patients of different degrees. The majority of the individuals exhibited hyponatremia, low serum creatinine levels, and decreased renal function, according to clinical results. Impaired renal function, also known as acute kidney injury, is a common clinical finding in newborn asphyxia patients, and it is frequently associated with low blood creatinine levels and hyponatremia.^[28,29,30]

Limitations of the Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSIONS

The study findings revealed that birth asphyxia were more common among vaginal deliveries and irregular or no neonatal care cases. Primipara patients had a higher likelihood of neonatal asphyxia. Serum electrolyte levels varied significantly based on the grade of asphyxia.

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