Demographic and Clinical profile of Neonates admitted in a NICU of a Tertiary Care Hospital in Bangladesh

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Abstract

Background: Neonatal morbidity and mortality remain major public health challenges in Bangladesh, particularly among critically ill neonates requiring intensive care. Identifying the clinical profile and outcomes of neonates admitted to tertiary care facilities is essential for improving neonatal survival and guiding preventive strategies.

Methods: This cross-sectional study was conducted in the Department of Neonatal Medicine, Bangladesh Shishu Hospital and Institute, Dhaka, from 1st January 2023 to 30th June 2023. A total of 382 neonates were admitted to the Neonatal Intensive Care Unit (NICU) during this period were included. Data on demographic characteristics, morbidity patterns and outcomes were collected and analyzed using SPSS version 25.

Results: Among 382 neonates admitted to the Neonatal Intensive Care Unit (NICU), males predominated (63.6%). Most were term infants (81.7%) and delivered by normal vaginal delivery (57.6%). Birth asphyxia (41.9%) was the leading cause of morbidity, followed by preterm low birth weight (18.3%) and neonatal sepsis (13.1%). The overall mortality rate was 41.4%, with birth asphyxia (54.4%) being the primary cause of death. Most admissions occurred within 24–72 hours of life (55.2%).

Conclusion: Birth asphyxia, neonatal sepsis and prematurity were identified as the major causes of neonatal morbidity and mortality in this tertiary care setting.

Key words: Neonates, NICU, birth asphyxia, neonatal sepsis, prematurity, mortality.

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Introduction

Neonatal mortality remains a major public health challenge worldwide, particularly in low- and middle-income countries like Bangladesh. According to the Bangladesh Demographic and Health Survey 2022, approximately 30 per 1,000 live births die within the first 28 days of life, with most deaths occurring in the first week.[1] Neonatal mortality contributes substantially to the under-5 mortality rate, reflecting not only the quality of maternal and neonatal healthcare but also socio-economic and environmental factors.[1,2]

The causes of neonatal morbidity and mortality are multifactorial. Birth asphyxia, prematurity, low birth weight and neonatal infections are among the leading causes identified globally and in Bangladesh. Birth asphyxia, often resulting from Perinatal hypoxia, can lead to multi-organ dysfunction and long-term neurodevelopmental impairment if not managed promptly.[3] Premature and low birth weight infants are particularly vulnerable to respiratory distress, sepsis and hypothermia due to underdeveloped organ systems.[4] Neonatal sepsis, including bacterial, viral and fungal infections, remains a significant contributor to morbidity and mortality, especially in resource-limited neonatal intensive care settings.[5] Other causes such as congenital anomalies, jaundice and metabolic disorders further add to the disease burden in this population.[6]

Neonatal intensive care units (NICUs) play a pivotal role in improving survival outcomes by providing specialized care, including respiratory support, thermoregulation, intravenous therapy and infection management.[7,8] Despite advances in neonatal care, high rates of mortality and morbidity persist in tertiary care hospitals in Bangladesh, highlighting the need for comprehensive data on the clinical profile of admitted neonates.[8] Such data are crucial for identifying high-risk groups, guiding clinical management and informing public health interventions aimed at reducing neonatal mortality.[9]

Although several studies have evaluated neonatal outcomes in Bangladesh, few have systematically described the clinical profile of neonates admitted to NICUs, including primary morbidities, risk factors and mortality patterns.[10] Understanding these patterns is essential for healthcare providers to prioritize interventions, optimize resource allocation and implement evidence-based protocols tailored to the local context. This study was therefore conducted to evaluate demographics, clinical profile, morbidity patterns and outcomes of neonates admitted to a tertiary care NICU in Bangladesh.

Methodology & Materials

This cross-sectional study was conducted in the Department of Neonatal Medicine, Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh, from 1st January 2023 to 30th June 2023. A total of 382 neonates admitted to the Neonatal Intensive Care Unit (NICU) during this period were included.

Inclusion Criteria

- All neonates aged 0–28 days admitted to the NICU during the study period, irrespective of sex, gestational age, or birth weight.

Exclusion Criteria

- Neonates discharged or referred before completion of diagnostic evaluation.
- Neonates whose parents or guardians did not give consent for participation.

Data were collected using a structured proforma through medical record review and direct observation. Information recorded included demographic details (age, sex, birth weight, gestational age), perinatal history (mode and place of delivery, maternal complications), clinical diagnosis at admission and outcome (discharge, death, discharge on risk bond).

Clinical diagnoses were made according to standard clinical, laboratory and imaging criteria. Data were entered and analyzed using SPSS version 25 (IBM Corp., USA). Descriptive statistics including frequency, percentage, mean and standard deviation were calculated.

Results

In this study, among the total 382 neonates, male infants predominated (63.6%), while female infants accounted for 36.4% of admissions. Figure 1 shows the sex distribution of neonates admitted to the Neonatal Intensive Care Unit (NICU). The majority of neonates, 220 (57.6%), were delivered through normal vaginal delivery, while 155 (40.6%) were born via cesarean section. Assisted vaginal deliveries, including forceps or vacuum extraction, accounted for 7 (1.8%) cases. Figure 2 illustrates the distribution of delivery modes among 382 neonates admitted to the NICU. Among the 382 neonates, 37 (9.7%) were admitted within the first 24 hours of life, while the majority, 211 (55.2%), were admitted between 24 to 72 hours. A substantial proportion, 134 (35.1%), were admitted after 72 hours of birth. Figure 3 shows the age distribution of neonates at the time of admission to the Neonatal Intensive Care Unit (NICU).

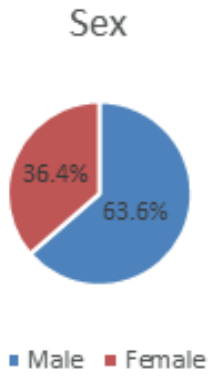

Fig. 1: Sex Distribution of Neonates (n = 382)

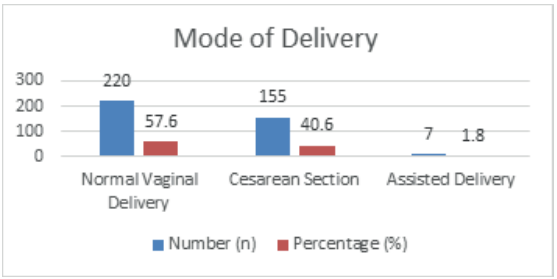

Fig. 2: Mode of delivery of study neonates admitted to NICU (n = 382)

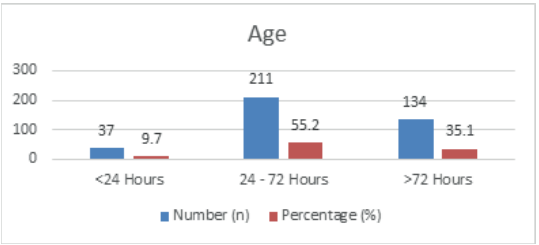

Fig. 3 : Age at Hospital Admission among neonates admitted to NICU (n = 382)

In our study the majority of neonates, 312 (81.7%), were term infants (≥37 weeks). Preterm neonates accounted for 70 (18.3%), with 44 (11.5%) in the 34–36.9 weeks range, 12 (3.1%) in 32–33.9 weeks, 11 (2.9%) in 28–31.9 weeks, and 3 (0.8%) extremely preterm (<28 weeks). Table I presents the gestational age distribution among 382 neonates admitted to the Neonatal Intensive Care Unit (NICU). Table II presents the distribution of outcomes among 382 neonates admitted to the NICU of Bangladesh Shishu Hospital and Institute during the study period. Among them, the majority—172 (45.0%)—showed improvement and were successfully discharged. A total of 49 (12.8%) neonates were discharged on risk bond at the request of

their guardians, while 158 (41.4%) neonates unfortunately succumbed to their illnesses during hospital stay. Additionally, 3 (0.8%) neonates were referred to other intensive care units, ie; Cardiac Intensive Care Unit (CICU)/ Critical Care Nephrology Department (CCND) for specialized management.

Table I: Gestational age distribution of neonates admitted to NICU (n = 382)

Age	Number (n)	Percentage (%)
<28 weeks	3	0.8
28-31.9 week	11	2.9
32-33.9 week	12	3.1
34-36.9 week	44	11.5
≥37 week	312	81.7
Total	**382**	**100.0**

Table II: Outcome of neonates admitted to NICU (n = 382)

Outcome	Number (n)	Percentage (%)
Improved and discharged	172	45.0
Discharged on risk bond	49	12.8
Neonatal death	158	41.4
Referred to Other ICU (CICU, CCND)	3	0.8
Total	**382**	**100**

In this study we found that the most common cause of admission was birth asphyxia, affecting 160 (41.9%) neonates, followed by preterm low birth weight (PTLBW) in 70 (18.3%) cases. Neonatal sepsis was observed in 50 (13.1%) neonates, while neonatal jaundice accounted for 45 (11.8%) cases. Intrauterine growth restriction (IUGR) was noted in 9 (2.4%) neonates Birth defects and other infections such as diarrhoea, skin infections, and neonatal tetanus were identified in 12 (3.1%) cases each. and other conditions including meconium aspiration syndrome (MAS), transient tachypnea of the newborn (TTN), infants of diabetic mothers (IDM), and surgical causes constituted 24 (6.3%) cases. Table III demonstrates the distribution of major morbidities among 382 neonates admitted to the Neonatal Intensive Care Unit (NICU).

Table III: Primary morbidity pattern among admitted neonates (n = 382)

Morbidity	Number (n)	Percentage (%)
Birth asphyxia	160	41.9
PTLBW	70	18.3
Neonatal sepsis	50	13.1
Neonatal jaundice	45	11.8
IUGR	9	2.4
Birth defects	12	3.1
Other infections (diarrhoea, skin infection, neonatal tetanus)	12	3.1
Others (MAS, TTN, IDM, surgical causes)	24	6.3
Total	**382**	**100**

This study revealed that Birth asphyxia was the leading cause, responsible for 86 (54.4%) deaths, followed by neonatal sepsis in 24 (15.2%) cases and prematurity (<37 weeks) in 17 (10.8%) cases. Very low birth weight (<1500 g) accounted for 7 (4.4%) deaths, while birth defects and miscellaneous causes including MAS, TTN, IDM, and surgical conditions each contributed to 9 (5.7%) deaths. Neonatal jaundice and other infections such as diarrhoea, skin infections, and neonatal tetanus were responsible for 2 (1.3%) and 4 (2.5%) deaths, respectively. Table IV presents the causes of death among 158 neonates who died during their stay in the Neonatal Intensive Care Unit (NICU).

Table IV: Causes of Neonatal Death (n = 158)

Cause of Death	Number (n)	Percentage (%)
Birth asphyxia	86	54.4
Neonatal sepsis	24	15.2
Prematurity (<37 weeks)	17	10.8
Very low birth weight (<1500 g)	7	4.4
Birth defects	9	5.7
Neonatal jaundice	2	1.3
Other infections (diarrhoea, skin infection, neonatal tetanus)	4	2.5
Others (MAS, TTN, IDM, surgical causes)	9	5.7
Total	**158**	**100**

Discussion

This study assessed the morbidity and mortality patterns among neonates admitted to the Neonatal Intensive Care Unit (NICU) of Bangladesh Shishu Hospital and Institute, where birth asphyxia (41.9%), prematurity (18.3%) and neonatal sepsis (13.1%) were the leading causes of admission. Among the 158 neonatal deaths, the major causes were birth asphyxia (41.4%), neonatal sepsis (19.4%) and prematurity (10.8%). These findings are consistent with several national and international studies conducted in tertiary neonatal units.

Tajkia et al., similarly observed that birth asphyxia (35.5%), neonatal sepsis (23%) and prematurity (18%) were the predominant causes of neonatal admissions in Dhaka, aligning closely with our findings.[11] The high burden of asphyxia-related admissions and deaths in both studies underscores persistent gaps in perinatal and delivery care. Hosain et al., also reported that birth asphyxia and sepsis were responsible for over half of all neonatal deaths in their NICU cohort in Bangladesh, reinforcing our observation that these conditions remain the most critical contributors to neonatal mortality.[12]

The mortality rate in our study (41.4%) was higher than that reported by Ahmmad et al., in Rajshahi Medical College Hospital (34.5%), which may be attributed to differences in case severity, referral patterns and resource availability.[13] In our setting, most neonates were referred in critical condition, often after home or peripheral hospital deliveries, reflecting delayed care-seeking and transport challenges—factors also noted by Desalew et al., in Ethiopian NICUs as significant predictors of mortality.[14]

Prematurity was the second most frequent cause of morbidity (18.3%) and a notable contributor to mortality (10.8%) in our cohort. Comparable rates were found in studies by Yismaw et al. and Yismaw and Tarekegn in Ethiopia, where preterm complications accounted for approximately 15–20% of neonatal deaths.[15,16] These studies highlight the vulnerability of premature infants to respiratory distress, sepsis and feeding difficulties—conditions often exacerbated in resource-limited NICUs.

Neonatal sepsis accounted for 13.1% of admissions and 15.2% of deaths in our study. This aligns with Nyma et al., who reported sepsis prevalence of 17% among NICU admissions in Dhaka, with significant case fatality due to late presentation and multidrug-resistant organisms.[17] Similar bacteriological trends were observed by Pokhrel et al., in Nepal and Yusef et al., in Jordan, who emphasized the growing challenge of antimicrobial resistance as a major determinant of poor neonatal outcomes.[18,19] These findings collectively highlight the urgent need for strengthened infection control, rational antibiotic use and improved hand hygiene compliance in neonatal units.

The contribution of congenital anomalies to neonatal mortality (5.7%) in this study is consistent with the 6–8% reported by Cao et al., in a large Chinese NICU study, indicating that even with advanced facilities, structural and chromosomal anomalies remain significant contributors to neonatal deaths.[20] Similarly, very low birth weight (<1500 g) contributed to 4.4% of deaths in our study, comparable to the 4% mortality reported by Panda et al., in a secondary-level NICU in Odisha, India.[21]

The predominance of male neonates (63.6%) among admissions in our cohort is also in agreement with multiple studies from Bangladesh and other developing countries, possibly reflecting biological vulnerability as well as gender-based healthcare-seeking preferences.[11,13]

Despite improved neonatal services in Bangladesh, the persistently high mortality rate in our study reflects systemic challenges, including limited antenatal care, inadequate intrapartum monitoring and delayed neonatal resuscitation. Islam et al., emphasized that early identification and management of birth asphyxia through skilled attendance at birth could substantially reduce neonatal deaths—a recommendation highly relevant to our findings, where over half of deaths were asphyxia-related.[22]

Overall, our findings reaffirm that preventable conditions such as birth asphyxia, sepsis and prematurity remain dominant causes of neonatal mortality in Bangladesh. These results echo the conclusions of Desalew et al. and Hosain et al., who stressed the importance of strengthening perinatal care, ensuring timely referral and upgrading NICU facilities with trained personnel.[12,14]

Limitations of the study

This study was conducted in a single tertiary care neonatal unit and may not fully represent the situation in other hospitals or community settings. As a hospital-based study, it primarily included referred and critically ill neonates, which might have led to an overestimation of mortality. Additionally, some cases lacked complete antenatal or delivery records, limiting the ability to assess associated maternal and perinatal risk factors.

Conclusion

In conclusion, the study highlights that preventable conditions such as birth asphyxia, neonatal sepsis and prematurity remain the leading causes of neonatal morbidity and mortality.

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Conflicts of interest

There are no conflicts of interest.

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