



Original Research Article

MORBIDITY AND MORTALITY PROFILE AND OUTCOME OF NEONATES ADMITTED IN SPECIAL NEWBORN CARE UNIT IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Every year four million babies die in the neonatal period (1st 4 weeks of life), with India contributing to one-fourth of the total mortality burden. The highest contribution to infant and U5MR is neonatal mortality. 75% of the neonatal deaths occur in the first week of life and at least 50% occur in the first day of life. The morbidity and mortality profile of neonates differ in different SNCU. Aims and Objectives: The aim of the study was to determine the causes of morbidity and mortality in neonates admitted to the Special Care Newborn Unit of Lakhimpur Medical College & Hospital and to describe the outcome of the neonates admitted in SNCU.

Materials and Methods: A retrospective study was done in SNCU in the department of the Pediatrics, Lakhimpur Medical College and Hospital for a period of 1 yr from January 2024-December 2024

Results: During the study period, a total 2478 neonates were admitted in SNCU, inborn were 1965(79.3%) and 513(20.7%) were outborn. In the inborn unit neonatal jaundice 1046(53.23%) was the most common cause of admission followed by prematurity 263(13.9%) and birth asphyxia 263(13.4%). In outborn unit, prematurity 148(28.8%) was the most common cause of admission followed by birth asphyxia 146(28.5%). Mortality rate was overall 57(2.3%) out of 2478 admissions. Overall prematurity was the major cause of mortality which was 33(57.90%) (inborn 60% and outborn 54.2%). It was followed by birth asphyxia 16(28.07%) (Inborn 30.3%, outborn 25%), followed by Sepsis 6(10.52%) (inborn 3%, outborn 20.8%), and RDS 2(3.51%).

Conclusion : The present study shows that neonatal jaundice, prematurity and birth asphyxia are common morbidities requiring admission. Prematurity is the most common cause of mortality followed by birth asphyxia and neonatal sepsis.

Keywords: Newborn, inborn, outborn, referral, morbidity, mortality

INTRODUCTION

The development of a country is reflected by its growth indicators. WHO states that 5.9 million children died under 5 years of age in 2015 (16000 deaths per day). Every year four million babies die in the neonatal period (1st 4 weeks of life), with India contributing to one-fourth of the total mortality burden. The highest contribution to infant and U5MR

is neonatal mortality.^[1] 75% of the neonatal deaths occur in the first week of life and at least 50% occur in the first day of life.^[2] While the under -five mortality rate (U5MR) dropped by 30% from 74 per 1000 live births (2005-2006) to 52 (2012), the Neonatal Mortality Rate (NMR) has been slow to decline, decreasing by 22% from 37/1000 live births to 29/ 1000 live births during the same period. Therefore, all efforts to reduce IMR U5MR

essentially have to focus on steps for sustained reduction of neonatal mortality as 70% of infant deaths are due to neonatal mortality. There is evidence regarding significant reduction in NMR with facility based care. Studies elsewhere in the country have shown that the major causes of admission and death, were Birth Asphyxia, Sepsis and Low Birth Weight/ Prematurity.^[3] The millennium development goal 4 (reducing under-5 mortality by two-thirds) cannot be achieved without substantial reduction in neonatal mortality.^[4]

With its demographic, cultural, economic, social and ethnic diversity, India does face numerous challenges with significant rural-urban, poor-rich, gender, socio-economic and geographical differences in neonatal deaths.^[5,6,7] There is change in the pattern of diseases with geographic regions. The morbidity and mortality profile of neonates differ in different SNCU. There is a dearth of study of morbidity and mortality profile of neonates from this region of the country. The Department of Paediatrics, Lakhimpur Medical College and Hospital is a tertiary care teaching hospital where patients from nearby districts of Assam are being referred and cared. Hence, this study was undertaken with the following aim to study the morbidity and mortality profile and with objective of detailed analysis of outcome of neonates admitted in SNCU.

Aims and Objectives

The aim of the project study was to determine the causes of morbidity and mortality in neonates admitted to the Special Care Newborn Unit of Lakhimpur Medical College & Hospital.

To assess the burden of morbidity and mortality amongst the neonates in a tertiary care centre.

To describe the outcome of the neonates admitted in the SNCU.

MATERIALS AND METHODS

A retrospective study was done in SNCU in the department of the Pediatrics Lakhimpur Medical College and Hospital for a period of 1 yr from January 2024-December2024. Clearance from Institutional ethical committee was taken Data were collected from the monthly reporting format and patient case records. Then data was analysed using arithmetic mean and also expressed in percentages. Percentage is used to compare one quantity against another.

Inclusion Criteria

All neonates less than 28 days admitted in SNCU during the study period.

Exclusion Criteria

Age >28 days and Still-birth neonates were not admitted in SNCU and were excluded from the study. All newborns included in the present study were assessed for gestational age clinically by new Ballard score. Anthropometric measurements including birth weight were recorded. The outcome of the cases were also recorded. The data was analysed according to age, gender, gestation (term, preterm), birth weight {normal birth weight, LBW, Very Low Birth Weight (VLBW), Extremely Low Birth Weight (ELBW)}, causes of admissions and deaths. Inborn neonates means admitted neonates delivered in LMCH and outborn neonates means admitted neonates delivered outside LMCH.

Statistical Analysis

Data was collected from the monthly reporting format and patient records and compiled in MS Excel. Data was analysed using arithmetic mean and also expressed in percentages. Percentage is used to compare one quantity against another.

RESULTS

Table 1: Admissions

CATEGORIES	No of admission	Percentage %(total n-2478)
INBORN	1965	79.3%
OUTBORN	513	20.7%

During the study period, a total 2478 neonates were admitted in SNCU, inborn were 1965(79.3%) and 513(20.7%) were outborn.

Table 2: Admission profile based on gender, birth weight, gestational age

CATEGORIES	INBORN(n-1965)	OUTBORN(n-513)	TOTAL(n=2478)
Gender			
Male	1081(55.04%)	306(59.65%)	1387(55.9%)
Female	884(44.96%)	207(40.35%)	1091(44.1%)
Birth weight gms			
>2500	1531(78%)	337(65.7%)	1868(75.4%)
1500-2499	269(13.6%)	75(14.6%)	344(13.9%)
1000-1499	147(7.5%)	93(18.1%)	240(9.7%)
<1000	18(0.9%)	8(1.6%)	26(1%)
Gestation			
>37wks	1559(79.4%)	349(68%)	1980(79.9%)
37-34wks	105(5.3%)	57(11.1%)	90(3.6%)
<34wks	301(15.3%)	107(20.9%)	408(16.5%)

The overall male and female was (55.9%) vs (44.1%).The male and female of inborn was 1081(55.04%) vs 884(44.96%). The male and female of outborn was 306(59.65%) vs 207(40.35%). Results showed higher male admission in both the units [Table 2].

In the inborn unit, 1531(78%)were normal birth weight [Table2] while 269(13.6%)were LBW [Table-

2]. In the outborn unit, 337(65.7%) were normal birth weight [Table2] while 75(14.6%)were LBW. As per birth weight criteria overall 1868(75.4%)were >2500 gm (normal birth weight) and 344(13.9%)were LBW. As per gestation, overall 1980(79.9%) were term babies [Table2] and 498(20%) were PTreterm babies [Table2]. Preterm babies comprised 406(20.7%) and 164(32%) respectively in inborn and outborn unit.

Table 3: Morbidity profile

DISEASE	INBORN (%)1965	OUTBORN (%)513	TOTAL n(%)2478
Neonatal jaundice	1046(53.23%)	124(24.2%)	1170(47.22%)
Prematurity	263(13.4%)	148(28.8%)	411(16.58%)
Birth asphyxia	263(13.4%)	146(28.5%)	409(16.51%)
Sepsis	187(9.5%)	49(9.5%)	236(9.52%)
Meconium aspiration syndrome	110(5.6%)	23(4.5%)	133(5.37%)
Respiratory distress syndrome	71(3.6%)	16(3.1%)	87(3.51%)
Congenital malformation	16(0.82%)	5(1%)	21(0.85%)
Hypoglycemia	8(0.4%)	2(0.4%)	10(0.4%)
Hypothermia	1(0.05%)	0	1(0.04%)

In the inborn unit neonatal jaundice 1046(53.23%) was the most common cause of admission followed by prematurity 263(13.4%) and birth asphyxia263 (13.4%). In outborn unit, prematurity 148(28.8%) was the most common cause of admission followed by birth asphyxia 146(28.5%).Overall in both the units neonatal jaundice 1170(47.22%) ,prematurity

411(16.58%) and birth asphyxia 409(16.51%) and respiratory distress syndrome were 87(3.51%) admitted. Meconium Aspiration Syndrome MAS 133(5.37%),congenital malformation 21(0.85%)neonatal sepsis 236(9.52%) and 10(0.4%) Hypoglycemia and 1(0.04)% hypothermia cases were admitted.

Table 4: Outcome of total admitted cases

	INBORN N-2018(%)	OUTBORN N-460(%)	TOTAL n-2478
Discharged successfully	1747(86.6%)	301(65.43%)	2048(82.65%)
Referred	205(10.15%)	110(23.9%)	315(12.71%)
Leave against medical advice	33(1.6%)	25(5.4%)	58(2.34%)
Expired	33(1.6%)	24(5.2%)	57(2.30%)

In inborn unit 1747(86.6%) patients were discharged successfully while 33(1.6%) patients left the SNCU against medical advice,205(10.15%) cases were referred to higher centre and 33(1.6%) cases expired.In outborn unit 301(65.43%) patients were discharged successfully while 315(12.71%) were

referred to higher centre,25(5.4%) patients Left Against Medical Advice (LAMA) . Overall (82.65%) cases were discharged successfully and (12.71%) cases were referred.58(2.34%) left against medical advice and 57(2.3%) cases expired. [Table 4].

Table 5: Mortality profile based on gender, birth weight, gestational age

	INBORN N-33(%)	OUTBORN N-24(%)	TOTAL N -57(%)
Mortality	33 out of 1965(1.7%)	24 out of 513(4.7%)	57 out of 2478(2.3%)
GENDER			
Male	18(54.5%)	14(58.3%)	32(56.1%)
Female	15(45.5%)	10(41.7%)	25(43.9%)
BIRTH WEIGHT			
>2500gms	9(27.3%)	6(25%)	15(26.32%)
1500-2499gms	12(36.3%)	11(45.8%)	23(40.35%)
1000-1499gms	6(18.2%)	5(20.9%)	11(19.30%)
<1000gms	6(18.2%)	2(8.3%)	8(14.03%)
GESTATION			
Term	13(39.4%)	11(45%)	24(42.11%)
Preterm	20(60.6%)	13(55%)	33(57.89%)

Mortality rate was overall 57 out of 2478(2.3%)whereas in inborn unit it was 33 out of 1965(1.7%) and outborn 24 out of 513(4.7%) [Table 5]. Among the total 57 deaths, overall 32(56.1%) were male and 25(43.9%)were female. In inborn unit 18(54.5%)were male and 15(45.5%) were female whereas in outborn unit 14(58.3%) were male and

10(41.7%)were female [Table 5]. In both the units male mortality was higher than female. Overall preterm babies were more than term 33(57.89%) vs 24(42.11%) [Table 5]. Among the death, 15(26.32%) were normal birth weight babies and 23(40.35%) were LBW(low birth weight),11(19.3%) were very LBWand 8(14.03%) were extremely LBW babies.

Table 6: Causes of mortality

DISEASE	INBORN N-33(%)	OUTBORN N-24(%)	TOTAL N-57(%)
Prematurity	20(60.6%)	13(54.2%)	33(57.90%)
Birth asphyxia	10(30.3%)	6(25%)	16(28.07%)
Sepsis	1(3%)	5(20.8%)	6(10.52%)
Respiratory distress syndrome	2(6.1%)	0(0%)	2(3.51%)

Overall prematurity was the major cause of mortality which was 33(57.90%) (inborn 60.6% and outborn 54.2%). It was followed by birth asphyxia 16(28.07%) (Inborn 30.3%, outborn 25%), followed by Sepsis 6(10.52%) (inborn 3%, outborn 20.8%), and RDS 2(3.51%).

DISCUSSION

The neonatal period the first 28 days of life carries the highest risk of mortality per day than any other period during the childhood.^[8] Neonatal jaundice, prematurity, birth asphyxia and neonatal sepsis are common morbidities requiring admission. Prematurity, Birth asphyxia, and neonatal sepsis are common causes of neonatal mortality [Table 6] During the study period, 2478 neonates were admitted in SNCU, inborn 79.3% and outborn 20.7%. Similar findings were reported by other studies done by Randad K et al,^[9] in Mumbai, India showed (inborn 76.46%, outborn 23.54%, Mendu SB et al., in rural area of Telangana state, India showed (inborn 82.76%, outborn 17.24%).^[10] Mahibur Rahman et al in GMCH showed inborn 65.3% and outborn 34.7% 11. Rahman K and Begum R at Tezpur, Assam, India showed (inborn 64.7%, outborn 35.2%)¹², Anupama D et al., at Silchar, Assam showed (inborn 60.5%, outborn 39.5%),^[13] and Prasanna CL et al., at Andhra Pradesh showed (inborn 58.5%, outborn 41.5%),^[14] There was male preponderance with (55.9%) were male babies and 44.1% were female babies. Similar findings were reported by Modi R et al., in Gujarat, India (56.36% vs 43.63%)¹⁵ Rahman K and Begum R at Tezpur, Assam (58.7% vs 41.2%), Anupama D et al., at Silchar, Assam (58.53% vs 41.38%),^[12,13] therefore higher number of male admissions needs to be further evaluated. In the present study overall 24.6% babies were LBW. In other studies, the LBW admissions were Rahman K and Begum R at Tezpur, Assam showed 49.8%, Anupama D et al., at Silchar, Assam showed 47.7%,^[12,13] Sharma AK and Gaur A at Gwalior, Madhya Pradesh,^[16] showed 61.5% and Rakholia R et al., in Uttarakhand,^[17] India showed (61.6%) which were higher than the present study. In the present study overall 79.9% babies were term and 20.1% were Preterm. Other studies done by Rahman K and Begum R at Tezpur, Assam showed (49.4% vs 50.6%) and Rakholia R et al., in Uttarakhand, India showed (49.65% vs 50.35%), where the number of term and PT babies were almost equal.^[12,16] Neonatal Jaundice was found to be the most common cause of admission in 47.22% neonates. Similar findings were reported by Mahibur Rahman et al,^[11], Rahman K and Begum R at Tezpur, Assam showed neonatal jaundice 19.9% and Anupama D et al., at

Silchar Assam showed neonatal jaundice 19.04%, respectively which was lower than the present study.^[12,13] Significantly higher number of jaundice babies were admitted in inborn unit (53.23%) vs (24.2%). This is because the jaundice babies were diagnosed early during regular postnatal round and managed accordingly by phototherapy when required.

Prematurity was the second most common cause of admission in 16.58% neonates. Mahibur Rahman et al,^[11] reported 20.4% cases of RDS with prematurity. The study conducted by Anupama D et al., at Silchar, Assam showed 16.8% neonates with prematurity with RDS.^[13]

The overall incidence of birth asphyxia was 16.51%. The study conducted by Rahman K and Begum R at Tezpur, Assam showed 28.7%, and Anupama D et al., at Silchar, Assam showed 11.65%.^[12,13] The incidence of birth asphyxia was higher in outborn babies compared to inborn babies (outborn (28.5%), inborn 13.4%). This finding was similar with studies conducted by Rahman K and Begum R at Tezpur, Assam showed (outborn 31.2%, inborn 27.3%) and Anupama D et al., at Silchar, Assam showed (outborn 13.06%, inborn 10.73%).^[12,13] It may be due to delayed referrals of high risk mothers, lack of access to health facilities, inadequate quality of antenatal, intranatal care and lack of effective neonatal resuscitation. The overall incidence of neonatal sepsis was 9.52% which was similar to the study done by Rahman K and Begum R at Tezpur, Assam 12 showed 10.8%, and while Anupama D et al,^[13] at Silchar, Assam found 21.61% which was higher than the present study.

Other causes for admission were MAS (5.7%), RDS (3.51%), hypoglycemia (0.4%), hypothermia (0.04%) and congenital malformation (0.85%). Since there was no facility of pediatric surgery for surgical intervention of neonates, only few cases of congenital malformation were admitted. Out of the total 2478 admitted neonates, 315(12.71%) patients were referred to other centre while 58(2.34%) patients left against medical advice (LAMA). Out of the remaining babies, 2048(82.65%) were discharged successfully and 57(2.30%) neonates expired. The overall incidence of LAMA was 2.34% which was lower than the studies done by Rahman K and Begum R at Tezpur, Assam showed 8.1%, and Anupama D et al., at Silchar, Assam showed 4.17%,^[12,13] Rate of successful discharge was comparable to Baruah MN et al 18(83.3%) but more than Rakholia R et al,^[17] 66.5% and NNPD 1969.3%.

Mortality rate was 2.3% which was lower than the studies done by Rahman K and Begum R at Tezpur, Assam (11.4%) and Anupama D et al., in Silchar,

Assam (12.37%).^[12,13] The mortality data shows higher mortality in outborn (4.7%) compared to inborn (7.1%). Studies by Rahman K and Begum R at Tezpur Assam showed higher outborn mortality (outborn 14.3%, inborn 9.9%), and Anupama D et al., at Silchar, Assam showed higher outborn mortality (outborn 18.01%, inborn 8.69%).^[12,13] The higher outborn mortality may be due to inadequate functioning of peripheral neonatal facilities like Newborn Stabilisation Unit, delayed referral, lack of pretransport stabilisation.

Among the total mortality, male contribution (56.1%) is more than female (43.9%). Preterm babies were more than term (57.89% vs (42.11%). Disease specific mortality revealed that the most common causes of death are prematurity (57.9%) followed by birth asphyxia (28.07%), sepsis (10.52%) and RDS (3.51%). While birth asphyxia was the leading cause of death in other studies done by Rahman K and Begum R at Tezpur, Assam showed overall 53.9% , Anupama D et al., at Silchar, Assam showed overall 50.48%.^[12,13] Present study also shows much higher incidence of mortality due to sepsis in out born (20.8%) compared to inborn (3%). This trend of high outborn sepsis is published by some other studies also like Kumar R et al 20 (out born 15.2%, inborn 8.6 %). High incidence of sepsis is due to unhygienic delivery practices in the periphery, overcrowding of neonatal unit and non compliance with asepsis protocol during neonatal care. Incidence of death due to RDS with prematurity was lower than the study done by Kumar R et al,^[20] in Uttarakhand, India which showed 17.5% and Rahman K and Begum R at Tezpur, Assam showed 23.2%.^[12]

Limitation

The present study was a hospital-based retrospective study. Therefore, the present study could not analyse the epidemiological factors, socio-economic background, antenatal, intranatal and postnatal factors that could have influenced the outcome.

CONCLUSION

The present study shows that neonatal jaundice, prematurity and birth asphyxia are common morbidities requiring admission. Prematurity is the most common cause of mortality followed by birth asphyxia and neonatal sepsis. Improvement of maternal health, proper antenatal, intranatal and neonatal care and timely intervention by referral to tertiary centres will help to improve neonatal outcome. The tertiary care centres should be strengthened with adequate life saving equipments and sufficient number of trained health staffs as per workload and patient load to prevent high mortality and morbidity and also to provide best possible care required for sick babies admitted. Also Simple

interventions like skilled birth attendance and access to emergency obstetric care can reduce NMR.

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