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Original Research Article

Morbidity profile and outcome of low-birth-weight neonates in NICU of a tertiary care hospital

Anuya V. Chauhan, Dhara Gosai, Urvi Patel*

Department of Paediatrics, B J Medical College, Ahmedabad, Gujarat, India

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***Correspondence:**
Dr. Urvi Patel,
E-mail: dr.urvibpatel@gmail.com

ABSTRACT

Background: Birth weight has been accepted as the most important reliable index of the health status of the community and is an indicator of neonatal morbidity and mortality. Aims and objectives were to determine the incidence, clinical and epidemiological profile of low-birth-weight (LBW) neonates in NICU in tertiary care settings and to assess the distribution of various morbidities, mortalities and outcome based on the weight of the neonates.
Methods: This hospital-based prospective study was conducted for one year in NICU at a tertiary care centre, Ahmedabad. All neonates with birth weight <2.5 kg admitted in NICU were included in study. Data on gestational age and birth weight, congenital anomalies, morbidities and mortalities along with their outcomes was collected and analysed.
Results: Total admissions in NICU over a period of one year of the tertiary care centre, Ahmedabad were 4275 of which 64.63% were LBW. The maximum number among the LBW of the new-borns (72.47%) were having a birth weight ranging from 1500-2499 gm. The sex ratio was 1.46:1, indicating males (59.39%) more than females (40.61%) NICU stay of the babies in <1 kg, 1 to 1.499 kg and 1.5 kg were maximum at 8 to 10 days. The main cause of mortality in <1 kg and 1-1.499 kg babies were prematurity.
Conclusions: The prevalence of LBW neonates accounted for 64.63% of NICU admission. Common morbidities observed in LBW babies were perinatal asphyxia, RDS/HMD, jaundice. The early outcome was that 46.9% of babies were discharged while 39.3%.

Keywords: Newborn, Prematurity, Morbidity

INTRODUCTION

Birth weight has been accepted as the most important reliable index of the health status of the community and is an indicator of neonatal morbidity and mortality. However, most of the times weight at birth is not recorded because almost 80% of the deliveries in India take place at home or at the rural health centre where weighing scales tend to be either non-available or defective.[1] About 15 % or 20.3 million of all live births worldwide are estimated to be LBW<2500 gm accounting for 60-80% of all neonatal deaths. Globally, the current neonatal mortality rate (NMR) is 18 per 1000 live births.[2]

Regionalization and strengthening of rural health care services along with intact timely referral of at-risk newborn is a challenge in our country. Data indicate that in the least developed countries, only about half (54%) of the newborns are weighed at birth as proper weighing machines aren't available at rural hospitals and a similar proportion only (53%) initiate breastfeeding immediately after birth.[3] In India currently 20.73% of babies are delivered LBW. The 4275 neonates were enrolled in study, out of which 2736 (64.63%) were LBW. Out of 2736 LBW, 1876 (68.57%) were preterm neonates and 860 (31.43%) were IUGR. In India the percentage of mother who received antenatal care (ANC) has risen from

58.8% in national family health survey NFHS 4 (2015-16) to 70% in NFHS 5 (2019-20). Neonatal mortality rate is 24.9% according to NFHS-5.

Figure 1: Low birth weight baby.

In 2012, the world health assembly resolution 65.6 endorsed a comprehensive implementation plan on maternal, infant and young child nutrition, which specified six global nutrition targets for 2025.[5] LBW is, therefore, an important indicator for monitoring progress towards these internationally agreed-upon goals.[6] This study was conducted to evaluate the risk factors associated with LBW babies, various morbidities in a patient with LBW, a complications in LBW babies and to study the early outcome of admitted LBW babies.

Objectives

Objectives were to study the incidence of LBW of newborns, to study the clinical and epidemiological profile of LBW new-borns, to assess the risk factors associated with LBW babies, to evaluate the various morbidities and mortality in a patient with LBW, to study the complication in LBW babies and to study the immediate outcome of admitted LBW babies.

METHODS

Study design and setting

This is a hospital-based cross-sectional study conducted for one year in the neonatal intensive care unit, civil hospital, Ahmedabad.

Study duration

Study conducted from August 2021 to July 2022.

Sampling and sample size

Purposive sampling was adopted and the sample size of 4275 was considered based on the number of NICU admissions that occurred during the study period.

Study subjects

The study was conducted among 4275 live neonates admitted at civil hospital Ahmedabad NICU with a birth weight of less than 2.5 kg.

Study procedure/ collection of data

After obtaining, informed consent and ethical clearance from the institutional ethical committee, the study was carried out among the 4275 live recently born newborns admitted to our NICU.

Gestational age and birth weight were taken from records available with the mother and intramural newborn weight was recorded by the digital weighing machine.

Detailed examination of the newborn was conducted to look for major congenital malformation. Morbidities, mortalities and outcomes were noted among the newborns.

Inclusion criteria

LBW (<2.5 kg) neonate admitted in NICU were included.

Exclusion criteria

New-born with birth weight >2.5 kg were excluded.

Statistical analysis

All the data were entered into a Microsoft Excel sheet and the data were expressed in proportions.

RESULTS

During the study period, total admissions in NICU tertiary care centre, Ahmedabad were 4275 of which 2763 babies were LBW babies, which accounted for 64.63% at our centre; From which inborn were 903 babies (32.7%) and outborn were 1860 babies (67.3%).

A maximum number of the newborns (72.47%) were in the birth weight range 1500-2499 gm. This is because in our hospital critically ill LBW babies are referred from other government hospitals and private hospitals for further management.

Out of 2763 newborns, the sex ratio was 1.46:1, indicating males 1641 (59.39%) more than females 1122 (40.61%) in the present study.

The 56.40% of total newborns were born <34 weeks of gestation; whereas 15.54% of newborns were born between 34-37 weeks of gestation and 28.05% were born >37 weeks of gestation.

LBW babies were more in 34-37 weeks of gestation age i.e., 1770, 631 in <34 weeks of gestation and 652 in >37

weeks of gestation. In our study, 28.8% of the newborns had weight <1 kg and gestational age <34 weeks.

Out of 2763 LBW babies, the major congenital malformations were seen in 162 (5.86%) LBW babies which included Neural tube defect in 68 (41.97%), gastrointestinal malformation in 62 (38.27%), cardiac malformation in 20 (12.34%), diaphragmatic hernia in 12 (7.4%).

Morbidity profile was observed in less than 1 kg baby, RDS/HMD in 110 (55.55%) neonates, jaundice in 65 (32.82%) neonates, sepsis in 45 (22.72%) neonates, congenital anomaly in 11 (5.55%) neonates, hypothermia in 25 (12.62%) neonates and hypoglycaemia in 10 (5.05%) neonates. In 1-1.499 kg neonates, RDS/HMD in 331 (52.12%) neonates, birth asphyxia in 142 (22.36%) neonates, jaundice in 98 (15.43%) neonates, sepsis in 108 (17%) neonates, congenital anomaly in 41 (6.45%) neonates, meconium aspiration syndrome in 38 (5.98%) hypothermia in 21 (3.3%) neonates, hypoglycaemia in 7 (1.1%) neonates. In 1.5-2.499 kg neonates RDS/HMD in 501 (25.95%) neonates, birth asphyxia in 509 (26.37%), meconium aspiration syndrome in 309 (16.01%), sepsis in 307 (15.90%), jaundice in 181 (9.37%), congenital anomaly in 110 (5.69%), hypothermia in 84 (4.35%), hypoglycaemia in 18 (0.93%).

A total of 1296 (46.90%) patients were discharged, 374 (13.53%) patients took LAMA and 1084 (39.23%) of LBW babies died in our hospital.

In <1 kg neonates, 170 (85.5%) died, 16 (8.58%) took LAMA and in 1-1.499 kg, 321 (50.55%) neonates expired, 209 (32.91%) got discharged and 89 (14.01%) took LAMA. In 1.5-2.499 kg, 1078 (55.85%) neonates were discharged, 578 (29.94%) died, 268 (13.88%) neonates took LAMA.

The study results showed that the number of babies that died within 24 hours of birth was 693 (61.80%), within 1-6 days 267 (24.63%) and > 7 days 147 (13.56%). Early neonatal death accounted for 86.43%.

Within 24 hours, neonates weighting less than 1 kg died more in proportion (84.43%) followed by 1-1.499 kg neonates (69%) and 1.5-2.499 kg (51.36%). In 1 to 6 days, more neonates expired in weight band 1.5-2.499 kg (30.61%) followed by 1-1.499 kg neonates (20.9%) and less than 1 kg neonates (10.77%). Also, in more than 7 days, more neonates expired in weight band 1.5-2.499 kg (18.02%) followed by 1-1.499 kg neonates (10%) followed by less than 1 kg (4.79%). NICU stay of the baby in < 1 kg, 1 to 1.499 kg and 1.5 kg was maximum at 8 to 10 days.

The main cause of mortality in < 1 kg and 1-1.499 kg babies was prematurity. In <1 kg, mortality due to prematurity was 98 (33.22%) and in 1-1.5 kg, mortality due to prematurity was 111 (37.63%). In 1.5-2.499 kg, maximum mortality was due to respiratory distress syndrome 131 (53.03%).

Table 1: Percentage of LBW babies according to birth weight, (n=2763).

Birth weight (gm)	Present study number of neonates, n (%)
< 1000	198 (7.43)
1000-1499	635 (23.85)
1500-2499	1930 (72.47)
Total	2763

Table 2: Morbidity profile in LBW neonates.

Morbidity	Weight <1 kg, n=198 (%)	Weight 1-1.499 kg, n=635 (%)	Weight 1.5-2.499 kg, n=1930 (%)
RDS/HMD	110 (55.55)	331 (52.12)	501 (25.95)
MAS	0	38 (5.98)	309 (16.01)
Birth asphyxia	35 (17.67)	142 (22.36)	509 (26.37)
Jaundice	65 (32.82)	98 (15.43)	181 (9.37)
Sepsis	45 (22.72)	108 (17)	307 (15.90)
Congenital anomaly	11 (5.55)	41 (6.45)	110 (5.69)
Hypo-thermia	25 (12.62)	21 (3.3)	84 (4.35)
Hypo-glycaemia	10 (5.05)	7 (1.1)	18 (0.93)

Table 3: Mortality profile in LBW babies.

Cause of mortality	N (%)
Extreme prematurity	295 (10.67)
RDS/HMD	247 (8.94)
Birth asphyxia	184 (6.66)
Sepsis	172 (6.22)
MAS	34 (1.23)
Meningitis	1 (0.4)
Major congenital malformation	52 (1.88)
Extreme LBW	67 (6.1)
Others	94 (8.6)

DISCUSSION

In the present study, total admission in NICU tertiary care centre, Ahmedabad was 4275 of which 2763 babies were LBW babies, which accounted for a prevalence of 64.63% at our centre. According to NFHS- 5 (India), 24.9% of neonates are LBW and Mizoram has the lowest percentage (6%) of LBW.[7] According to national neonatal perinatal database (NNPD) report 2002 -2003,

out of 145623 live births, 31.3% were LBW infants.[8] According to UNICEF data in 2015, 20.5 million newborns, as estimated 14.6% of all babies born that year, suffered from LBW.[9]

NNPD data of 2002-2003, found that normal LBW (<2.5 kg) was 45523 (31.3%), very LBW (1.5 kg) was 5018 (3.4%), extremely LBW (<1 kg) was 973 (0.7 %).[8] Bhatnagar et al study, out of 5221 babies, 552 (10.59%) were weighing 2000 gm.[10] SEAR-NPD: 2007-08, 2244 (19.6%) neonates were less than 2500 gm and 82 (0.7%) were less than 1000 gm.[11]

Raman et al and Faucher et al observed 19.6% preterm and 40% LBW and preterm.[12,13] In Nejad et al study, the frequency of LBWs in early preterm was 124 (26.1%) and late preterm was 151 (31.7%) and in term was 200 (42.1%) in a total of 475 (100%) LBW neonates.[14]

According to our present study data, major cause of morbidity in less than 1 kg neonates is RDS/HMD, in 1-1.499 kg again RDS/HMD and in 1.5-2.499 kg, birth asphyxia. According to NNPD data 2002-2003 morbidity was more due to transient tachypnea of new-born 4685 (3.2%), morbidity due to other pattern as HMD 1674 (1.2%), MAS 1896 (1.3%), HIE 2075 (1.4%), hypoxic ischemic encephalopathy 2075 (1.4%), seizure 1501 (1%), intraventricular haemorrhage 413 (0.3%), intracranial bleed other than intraventricular 128 (0.1%), hyperbilirubinemia 4813 (3.3%), hypoglycaemia 1306 (0.9%), hypothermia (0.9%), apnoea (1026), anaemia 768 (0.5%).[8]

According to NNPD data 2002-2003, factors associated with mortality in LBW were perinatal asphyxia 1060 (28.8%), prematurity 968 (26.3%), infection 683 (18.6%), malformation 337(9.2%), and other causes 632 (17.2%). SEAR: NPD 2007-08 (n=11449) data showed primary causes of neonatal death, as prematurity 44 (34.1%), infections 29 (22.5%), malformation 28 (21.7%), asphyxia 12 (95%) and other causes 16 (12.4%).[11]

In our study, in less than 1.5 kg neonates, more neonates died and in 1.5 - 2.499 more neonates were discharged. According to NNPD data 2002-2003, neonatal mortality observed in <1 kg was 535 (55.0 %), in 1.0-1.499 kg 955 (49.6%) and in 1.5-2.499 kg 1288 (19.4%).[8] NNPD data 2002-2003, LBW neonatal mortality rate is 6.1. NNPD data 2002-2003 data showed, 33% of them died within 24 hrs of birth. 54.8% died after 24 hrs but before 7 days of life and 12.2% died beyond the first week in the neonatal period.[8] Early neonatal death accounted for 87.8%. SEAR: NPD 2007-08 (India) found, mortality major indices (total death=30), early neonatal death (0-7 days) 21 (70%), death within 24 hours is 8 (26.8%), death in 1-7 day 13 (43.3%), late neonatal death 7-28 days 8 (26.7%).[11]

For 3 years before 2019-20 NFHS-5, the neonatal mortality rate was 24.9 deaths per 1000 live births.[7] According to NFHS-5, in urban the neonatal mortality is 18 and in rural 27.5. NNPD data 2002-2003, the neonatal mortality rate was 25.3 per 1000 live births, a primary cause of neonatal mortality by perinatal asphyxia was in 1060 (28.8%), prematurity was in 968 (26.3%), septicaemia/meningitis was in 590 (16%), another cause was in 508 (13.8%), hyaline membrane disease in 495 (13.5%), congenital malformation was in 337 (9.2%), intraventricular haemorrhage in 149 (4.1%), pneumonia in 93 (2.5 %), not established were 119 (3.2 %).[8]

Limitation

This was a hospital-based study thus it cannot be generalized to the general population. In out born neonates, actual birth weight and post-birth immediate care were not available. Long term follow-up of low birth babies was not available.

CONCLUSION

The prevalence of LBW in admitted neonates was 64.63%. Out of all, out born LBW babies were more as compared to inborn babies due to the high referral rate at the tertiary care centre. Out of all admitted LBW babies, most of the babies were in the weight group of 1.5-2.5 kg and most of the babies were in the age group of 34-37 weeks. Common morbidities observed in LBW babies were birth asphyxia, RDS/HMD and jaundice. In the extreme premature age group, the most common morbidities were hyaline membrane disease, birth asphyxia. As weight increased from 1 kg to 2.5 kg Morbidity due to RDS/HMD decreased, MAS increased, due to birth asphyxia increased and morbidity due to jaundice, sepsis, hypothermia and hypo-glycemia decreased. The early outcome was that 46.9% of babies were discharged while 39.3% expired. In LBW neonates, the more common cause of mortality was extreme prematurity 295 (10.67%).

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