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Original Research Article

Clinical profile of low-birth-weight neonates admitted in NICU: a tertiary care hospital-based study

Gargi H. Pathak, Anuya V. Chauhan, Dhara K. Gosai, Maulik Kumar R. Patel*

Department of Pediatrics, BJ Medical College, Ahmedabad, Gujarat, India

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***Correspondence:**
Dr. Maulik Kumar R. Patel,
E-mail: maulikpatel481997@gmail.com

ABSTRACT

Background: LBW is defined as weight at birth less than 2.5kg irrespective of gestational age. LBW neonate remains at much higher risk of morbidity and mortality than normal birth weight baby. Morbidity and mortality among LBW babies are a major health problem in our country, so it's important to identify risk factors.
Methods: A prospective observational study was conducted on 153 extramural LBW neonates admitted in Neonatal intensive care unit of civil hospital, BJ medical college Ahmedabad from April 2021 to January 2022.
Results: Out of 153 neonates, 94 (61.4%) were preterm, appropriate for gestational age and 59 (38.6%) were small for gestational age including 41 (26.8%) term and 18 (11.8%) preterm. 16 (10%) were extremely LBW neonates and 28 (18%) were very low birth weight neonates. 77 (53%) neonates were late preterm and term gestational age. Most common indication of NICU admission was respiratory distress syndrome in 53 (27.8%) followed by sepsis 35 (18.4%), neonatal hyperbilirubinemia 22 (11.6%), birth asphyxia 15 (7.8%) and prematurity+LBW 16 (8.4%).
Conclusions: Majority of LBW babies were preterm AGA babies. Respiratory distress syndrome, sepsis, birth asphyxia, prematurity and neonatal hyperbilirubinemia are major causes of admission. While, Respiratory distress syndrome, sepsis and birth asphyxia were common causes of expires. Respiratory distress syndrome is most common cause of morbidity and mortality in low-birth-weight babies. Appropriate and effective use of oxygen delivery system, surfactant, safe, early and effective transportation of neonates should be advised.

Keywords: Low birth weight, Appropriate for gestational age, Respiratory distress syndrome, Sepsis

INTRODUCTION

WHO defines low birth weight as 'Birth weight less than 2.5 kg regardless of gestational age.[1] 14.6% of all babies globally suffer from LBW and about half of this population belongs to southern Asia with around 26.4% LBW babies.[2] Newborn's weight at birth is an important marker of mother and fetal health and nutrition. UNICEF targeted for 30% reduction in LBW prevalence between 2012 to 2025 2. Neonatal mortality is inversely related to birth weight and functional maturity and LBW neonates suffer from various morbidities like respiratory distress syndrome, infection, asphyxia, hypothermia, hyperbilirubinemia.[3]

Aim and objectives

The aim of this study was to analyse data on LBW related neonatal morbidity and mortality and it's risk factors in our institution in order to reduce its incidence and improve the outcome.

METHODS

A prospective observational study was conducted on 153 low birth weight neonates admitted in Neonatal intensive care unit (NICU), department of pediatrics, Civil hospital, BJ medical college Ahmedabad from April 2021 to

January 2022. Informed consent was taken from parents or guardians of all neonates included in this study. Ethical approval of Institutional research ethical committee taken before research.

Inclusion and exclusion criteria

Inclusion criteria for current study were; neonates from 1st day of life to 28th day of life, admitted in NICU, examural babies, investigations like complete blood count, blood sugar levels, C-reactive protein, chest X-ray, blood culture done in all enrolled patients. Neonates whose parents or guardians did not agree to be part of study or taken leave against medical advice were excluded.

All participants were studied in details with regards to prenatal history, natal history and neonatal course. Mother's previous obstetrics history, family history and antenatal risk factors which include maternal chronic illness, prolonged rupture of membrane, antepartum bleeding, pregnancy induced hypertension, drug history were taken. Gestational age assessment was done by LMP date. Detailed natal and postnatal history of neonates obtained and recorded. Complete clinical examination, anthropometry, investigation and treatment given were noted down in pre designed proforma. The weight of neonates with no clothing was recorded on digital weighing scale. Weight recording was done to the accuracy of 5 grams. Length of the neonates was taken using infantometer. Head circumference was measured using non stretch type (cross type method) from occipital protuberance to supraorbital ridges on forehead. General examination was done in detail, Vital parameters (heart rate, respiratory rate, temperature, peripheral pulses) and abnormalities like pallor, edema, icterus, cyanosis, congenital and craniofacial abnormalities were noted. Detailed head to toe examination was done. All the neonatal reflexes were examined for any abnormality. Systemic examination was done. Kangaroo mother care (KMC) was explained, encouraged and its data was also collected. Cases were subjected to investigation as and when required like: Complete blood count, blood culture, blood sugar levels, C-reactive protein and chest X-ray. Data collected was entered into MS Excel and analysed by using SPSS (Statistical package for social sciences).

RESULTS

Total 153 neonates were enrolled in our study. Out of them 83 (54%) were male babies and 70 (46%) were female neonates. 94 (61%) were appropriate for gestational age and 59 (39%) were small for gestational age. Out of 59 SGA babies, 41 (26.8%) were term and 18 (11.8%) were preterm. In our study birth weight distribution was, <1 kg having 16 (10%) neonates, 1-1.499 kg having 28 (18%) neonates, 1.5-1.999 kg having 38 (25%) neonates and majority in 2-2.499 kg having 71 (47%) neonates.

Table 1: Weight distribution of neonates (n=153).

Weight distribution (kg)	N (%)
<1	16 (10)
1-1.499	28 (18)
1.5-1.999	38 (25)
2-2.499	71 (47)

Table 2: Distribution of neonates according to gestational age (n=153).

Gestational age (weeks)	N (%)
<28	14 (9)
28-30	18 (12)
30-32	19 (12)
32-34	22 (14)
34-36	39 (26)
Term	41 (27)

Table 3: Obstetric risk factors in mother (n=51).

Obstetric risk factors	N (%)
Oligohydramnios	21 (13.9)
Pre eclampsia	9 (5.9)
Eclampsia	3 (1.9)
Polyhydroamnios	2 (1.3)
PROM	6 (3.9)
Chorioamnionitis	1 (0.6)
APH	5 (3.3)
Cervical incompetence	4 (2.6)

Gestational age distribution in preterm babies was <28 wks, 28-30 wks, 30-32 wks, 32-34 wks, 34-36 wks having 14 (9%), 18 (12%), 19 (12%), 22 (14%), 39 (26%), 41 (27%) babies respectively. With 41 (27%) neonates having term gestational age and low birth weight. Majority of neonates belongs to late preterm and term gestational age. 103 (68%) were vaginally delivered child and 48 (32%) were delivered through cesarean section. Anemia was present in 125 (83%) mothers and only 26 (17%) mothers had normal hemoglobin level according to WHO classification. Obstetric risk factors were found in 34% (N=51) mothers with most common risk factor being oligohydramnios, in 21 (13.9%) mothers followed by pre-eclampsia, premature rupture of membrane, antepartum haemorrhage, cervical incompetence, eclampsia, polyhydroamnios and chorioamnionitis in 9 (5.9%), 6 (3.9%), 5 (3.3%), 4 (2.6%), 3 (1.9%), 2 (1.3%) and 1 (0.6%) respectively. Chronic maternal illnesses like, hypertension, hypothyroidism, cardiac disease and diabetes mellitus were present in 10 (6.6%), 5 (3.3%), 4 (2.6%) and 2 (1.3%) mothers respectively. Majority, 63 (42%) of LBW neonates were born to primigravida mothers followed by 50 (32%) were born to 3rd or more gravida mother, 40 (26%) were born to 2nd gravida mother.

Table 4: Morbidity profile of neonates.

Morbidities	No of neonates (N=153)	Preterm AGA (N=94)	Term SGA (N=41)	Preterm SGA (N=18)
Respiratory distress syndrome	53 (27.8)	43	4	6
Sepsis	35 (18.4)	23	8	4
Birth asphyxia	15 (7.8)	5	7	3
Neonatal hyperbilirubinemia	22 (11.6)	11	7	4
Low birth weight and prematurity	16 (8.4)	13	0	3
Hypoglycemia	14 (7.3)	6	4	4
Hypocalcaemia	5 (2.6)	3	1	1
Retinopathy of prematurity	3 (1.6)	3	0	0
Congenital heart disease	12 (6.2)	7	4	1
Intraventricular haemorrhage	5 (2.6)	4	0	1
Tracheoesophageal fistula	6 (3.1)	2	4	0
Meningomyelocele	4 (2.1)	1	3	0
Imperforated anus	1 (0.5)	0	1	0

Morbidities found in Low birth weight neonates were Respiratory distress syndrome, sepsis, Birth asphyxia, Neonatal hyperbilirubinemia, Low birth weight+prematurity requiring admission, hypoglycemia, hypocalcaemia, retinopathy of prematurity, congenital heart disease, intraventricular haemorrhage, tracheoesophageal fistula, meningomyelocele, imperforated anus found in 53 (27.8%), 35 (18.4%), 15 (7.8%), 22 (11.6%), 16 (8.4%), 14 (7.3%), 5 (2.6%), 3 (1.6%), 12 (6.2%), 5 (2.6%), 6 (3.1%), 4 (2.1%), 1 (0.5%) respectively. Most common indication for NICU admission of neonates was respiratory distress syndrome in our study. Followed by sepsis, neonatal hyperbilirubinemia, birth asphyxia and preterm, LBW management.

Table 5: Duration of NICU stay in neonates.

Duration of stay (days)	N (%)
1-3	20 (13)
4-6	46 (30)
7-10	56 (37)
11-14	19 (12)
>14	12 (8)

In our study duration of hospital stay data also collected. Suggestive of 1-3 days, 4-6 days, 7-10 days, 11-14 days, more than 14 days admission in 20 (13%), 46 (30%), 56 (37%), 19 (12%), 12 (8%) neonates respectively. In our study 95 (62%) neonates were discharged while 58 (38%) were expired. Out of 58 expired neonates 32 (55%) were male and 26 (45%) were female. Number of neonates expired with birth weight of <1 kg, 1-1.499 kg, 1.5-2.499 kg were 12 (80%), 9 (55%), 37 (35%) respectively. Most common cause of mortality was respiratory distress syndrome in 29 (50%) neonates. followed by sepsis in 17 (29%) and birth asphyxia in 12 (21%) neonates.

DISCUSSION

Our study included 153 LBW neonates. Out of them 83 (54%) were male and 70 (46%) were female with male to female ratio of 1.18:1. Rahman et al studied 1099 neonates, including 51.04% males and 48.95% females.[4] Arefin MS et al comprised of 58% males and 42% female babies.[5] In present study 94 (61%) neonates were preterm and appropriate for gestational age and 59(39%) were small for gestational age comprising 41 (26.8%) term and small for gestational age babies and 18 (11.8%) preterm and small for gestational age babies, with no large for gestational age babies. Study by Dias et al showed that 66% were appropriate for gestational age and 17% were small for gestational age and 17% were large for gestational age.[6] Our study included neonates with birth weight <1 kg 16(10%), 1-1.499 kg 28(18%), 1.5-1.999 38 (25%) and 2-2.499 kg 71 (47%) comparable with Saini et al having <1 kg 2%, 1-1.5 kg 24% and 1.5 to 2.5 kg 74%.[7]

Neonates admitted in NICU with gestational age of <28 wks, 28-30 wks, 30-32 wks, 32-34 wks, 34-36 wks, >36 wks were 14 (9%), 18 (12%), 19 (12%), 22 (14%), 39 (26%), 41 (27%) were respectively. Present finding was in accordance with studies done by Roy and Arafin et al which showed similar observation.[5,8] Rahman et al also found 43% of LBW babies were born between 34-37 weeks of gestation.[4] In our study 103(68%) were vaginally delivered and 48 (32%) were delivered through caesarean section. Like Balaji et al described 38.5% delivery through caesarean section.[9] 125 (83%) mothers were found to be anemic during pregnancy and it was statistically significant with the incidence of LBW babies in our study. Anand et al from rural Wardha also found presence of anemia during pregnancy was significantly associated with LBW.[10] We have also studied antenatal risk factors, which showed that 23 (15%) mothers had oligohydramnios, 19 (13%) had pre-eclampsia, 6 (4%) had Premature rupture of membrane, 3 (2%) had eclampsia, 2 (1.3%) had

polyhydroamnios, 5 (3.3%) had antepartum haemorrhage, 4 (2.6%) had cervical incompetence and 1 (0.6%) had chorioamnionitis. Overall, 41% mothers had antenatal risk factors. Study done by Bian et al found that 49% mothers who had risk factors during pregnancy delivered low birth weight babies.[11] Kumar et al study founded 19.36% mothers had oligohydramnios, 18.91% mothers had preeclampsia and 3% mothers had other risk factors like PROM, APH, cervical incompetence, polyhydroamnios and chorioamnionitis.[12] In our study 14 (9.2%) mothers had hypertension, 5 (3.3%) had hypothyroidism, 4 (2.6%) had cardiac disease and 2 (1.3%) had diabetes mellitus. Kumar et al study also found hypertension in 9.9%, hypothyroidism in 8.1%, cardiac disorder in 5.8% mothers.[12] Our study reveals, 63 (42%) babies were born to primigravida mothers, while 40 (26%) in second gravida and 50 (32%) born to third gravida or more. But Agrawal et al revealed in their study that the proportion of LBW babies was maximum among birth order 1 (39.1%), followed by birth order 2 (34.9%) and birth order 3 (26%).[13] Agarwal et al also found 42.8% LBW babies in primigravida.[14] In our study, 153 LBW babies were admitted for management of, Respiratory distress syndrome 53 (35%), sepsis 35 (23%), birth asphyxia 15 (10%), neonatal hyperbilirubinemia 22 (14%), LBW and prematurity 16 (10%), hypoglycemia 8 (5%), hypocalcemia 5 (3%), retinopathy of prematurity 3 (2%), congenital heart disease12 (7.5%), intraventricular haemorrhage 5 (3%), tracheo oesophageal fistula 6 (4%), meningomyelocele 4 (2%), imperforated anus 1 (0.5%). A study done by Gupta et al found that 30% of the LBW neonates presented with hyperbilirubinemia, 28.5% presented with respiratory distress and 23.5% presented with septicemia.[15] A study done by Minare et al found that majority (67%) of the LBW babies presented with neonatal sepsis, birth asphyxia, respiratory distress and neonatal hyperbilirubinemia.[16] We have also recorded admission days of neonates, which was not extensively studied in previous studies. We found that duration of hospital stay was 1-3 days in 20 (13%) neonates, 4-6 days in 46 (30%) neonates, 7-10 days in 56 (37%) neonates, 11-14 days in 19 (12%) neonates and more than 14 days in 12 (21%) neonates. Out of 153 neonates 95 (62%) were successfully discharged and 58 (38%) expired. A study done by Arefin et al and Begum et al also showed mortality rate of 40% and 34% respectively.[5,17] Probable reason for higher mortality rate in our study is that our hospital is tertiary referral center and we have included only outborn babies. When compared among the individual groups, the mortality rate in weighing 1.5-2.5 kg 35%, 1- 1.5 kg 55% and <1 kg 80%. Similar trend of significant increase in mortality with decrease in birth weight was also observed by Arefin et al and Begum et al.[5,17] Most common cause of mortality found in our study was respiratory distress syndrome in 29 (50%) neonates, followed by sepsis in 17 (29%) and birth asphyxia in 12 (21%) neonates.

Limitations

Limitations of current study were; this study included only examural babies. This institute is tertiary health care center and referral center for Gujarat so, factors like improper transport, delay in transport may affect the outcome in this study. Micro ESR measurement for sepsis and therapeutic hypothermia not available in our institute.

CONCLUSION

Most of low-birth-weight neonates are preterm appropriate for gestational age. Respiratory distress syndrome is the most common indication for NICU admission followed by sepsis, neonatal hyperbilirubinemia, prematurity and LBW and birth asphyxia. Antenatal programs should be strengthened for prevention, early identification and management of obstetric complications and prevention of prematurity and LBW. Appropriate and effective use of antenatal steroids, surfactant, oxygen therapy and antibiotics should be advocated. Neonatal resuscitation protocols need to be universalised, maintenance of asepsis, prevention of hypothermia and hypoglycemia, Kangaroo mother care and judicious oxygen therapy are of paramount importance.

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