



Clinical Profile of Low Birth Weight Neonates Admitted in NICU: A Hospital Based Study

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Abstract

Introduction: Neonatal period is the first 28 days of life since birth. It is considered as the most susceptible period for mortality and morbidity. The study was designed to assess the clinical profile of LBW babies and its risk factors in order to reduce its incidence and their better outcome.

Material and Methods: This study is hospital based prospective observational study carried out at shardaben hospital, Ahmedabad. Neonates with birth weight <2500 gm admitted in NICU of our hospital in June 2022 to August 2022 were included in this study. All neonates were examined and details history were taken and outcome was studied.

Results: In our study out of 80 neonates, 71.2% were categorized as low birth weight neonates, 23.7% as very low birth weight and 5% were extremely low birth weight. There were 57.5% males and 42.5% females. 51.2% were delivered by normal vaginal delivery and 48.7% by LSCS. Sixty one (76.2%) received antenatal steroids which improved the survival of the LBW neonates (p value <0.05). Hyperbilirubinemia (25.4%), prematurity (21%), RDS (20.5%) were found to be significant morbidities among the studied LBW babies. 50% of ELBW required mechanical ventilation compared to 24.5% in LBW infants. The mortality rate was more in ELBW babies, it was 75% higher than in LBW neonates.

Conclusion: Hyperbilirubinemia is most common comorbidity in LBW baby in our hospital followed by prematurity and respiratory distress syndrome. In our hospital we still need to improve care and intervention for ELBW baby because mortality is still high compare to others. Proper antenatal and perinatal care and reproductive health education is required to prevent birth of VLBW.

Keywords: Low birth weight, neonates, mortality, outcomes

Introduction

Neonatal period is the first 28 days of life since birth. It is considered as the most susceptible period for mortality and morbidity¹. Neonatal mortality accounts for 2/3 rd of the infant mortality². The current infant mortality rate for India in 2023 is 26.619 deaths per 1000 live births, a 3.89% decline from 2022³. India contributes to nearly 25% of global neonatal deaths⁴.

Low birth weight (LBW) has been defined by World Health Organization (WHO) as a birth weight of a infant of 2499 gm or less, regardless of gestational age⁵. Annually 6 to 8 million low birth weight infants are born in India⁶.

The most important marker for adverse perinatal and neonatal outcome is the birth weight. There is increased risk of mortality among low birth weight by 2-3 times as compared to normal birth weight babies due to infection. There is three times more risk of developing neurodevelopmental sequelae of birth asphyxia in low birth weight babies as compared to normal weight babies. Low birth weight babies have high risk of developing hypoglycemia, hypocalcaemia, acidosis, hypoxia and hypoproteinemia⁷.

Three major causes (78%) which contribute to neonatal mortality in developing countries are prematurity & low birth weight, neonatal infections and birth asphyxia⁸. Although they represent a small percentage of overall births and Neonatal Intensive Care Unit (NICU) admissions, VLBW infants are often the most critically ill and at the highest risk for mortality and long term morbidity of any NICU patient contributing disproportionately to overall hospital days and consuming a large percentage of NICU personnel time, effort and cost of care⁹.

To grow a healthy baby, mothers need good nutrition and rest, adequate antenatal care, and a clean environment. Together, these ingredients for a healthy pregnancy can help to prevent, identify and treat the conditions that cause low birth weight and thus foster achievement of the World Health Assembly (WHA) nutrition target to reduce low birth weight by 30 per cent between 2012 and 2025.

Prematurity and low birth weight are major factors for neonatal mortality especially VLBW, hence this study has been undertaken with an aim and objectives to determine maternal risk factors, morbidity patterns and outcome of VLBW babies during their period of hospital stay, so that necessary steps can be taken to reduce NMR in this LBW group and ultimately reach target NMR⁹.

The study was designed to assess the clinical profile of LBW babies and its risk factors in order to reduce its incidence and their better outcome.

Aims & Objectives

- To assess the demographic profile of LBW neonates.

- To assess the clinical profile and common complications of LBW neonates.

Materials & Method

A Prospective observational study was conducted on 80 neonates with low birth weight (less than 2500gm) admitted in Neonatal intensive care unit (NICU) of department of Paediatrics, Shardaben General Hospital, Ahmedabad from June 2022 to August 2022.

Neonates with gross congenital malformations, out born babies and babies whose parents did not gave consent for investigation were excluded.

Ethical clearance was obtained from institutional ethics committee. Informed consent was taken from parents of all LBW newborns included in this study.

The study was designed to assess the morbidity and mortality profile of LBW babies. All neonates less than 2500gms irrespective of gestational age, were examined and a detailed antenatal, natal and postnatal history was obtained and recorded in a predesigned proforma. The neonate's birth weight, gestational age, sex, mode of delivery, indication for any interventions, were recorded in the proforma. The weight of the neonate was recorded on digital weighing scale. Weight recording was done to the accuracy of ± 5 grams. According to weight the neonates were classified as LBW (2.500-1.501 kg), VLBW (1.500-1.001 kg) and ELBW ≤ 1.000 kg.

Gestational age was calculated with the help of LMP (Last menstrual period) using Naegele's formula and USG findings. Then they were classified into preterm (<37 weeks of GA) and term (37 weeks-42 weeks of GA). Gestational maturity was assessed by New Ballard Score.

General examination was done in detail, vital parameters (heart rate, respiratory rate, temperature, BP, CRT, peripheral pulses), abnormalities like pallor, edema, icterus, cyanosis, congenital and craniofacial anomalies were noted. Detailed head to toe examination was done. All the neonatal reflexes were examined for any abnormality. Systemic examination was done.

The data was collected and analyzed according to appropriate statistical analysis.

Statistical analysis was performed using the statistics software STATA 10 for windows. The analysis of student's t-test was used for comparison of mean and categories, variables were compared using chi-square test. 'P' value below 0.05 was considered significant.

Results

Total 80 neonates were enrolled in our study. Out of 80 neonates, fifty seven (71.2%) were categorized as low birth weight neonates, nineteen (23.7%) as very low birth weight and four (5%) were extremely low birth weight. There were forty six (57.5%) males and Thirty four (42.5%) females. Male to female ratio was 1.3:1. The majority of the neonates were in low birth weight group with male predominance. (Table-1).

Forty one (51.2%) of enrolled group were delivered by normal vaginal delivery, maximum in age group of 21-25 yrs (41.4%) and thirty nine (48.7%) by low segment cesarean section, in the same age group being 41%. Normal vaginal delivery to lower segment cesarean section ratio in this study was 1: 1 (Table-2)

Out of eighty neonates, sixty one (76.2%) received antenatal steroids (Table-3). Table-6 shows that antenatal steroids improves the survival of the LBW neonates (91.8%), which is statistically significant with p value <0.05.

Hyperbilirubinemia (25.4%), prematurity (21%), RDS (20.5%), apnea (11.8%), Hypoglycemia (10.8%), feeding difficulties and birth asphyxia (3.7%), abdominal distension (2.7%) were found to be significant morbidities among the studied LBW babies. (Table-4).

Hyperbilirubinemia was more common among LBW neonates (61.7%) as compared to VLBW neonates (34.1%). Where as prematurity (46.1%) and RDS (47.3%) was more common among VLBW neonates.

Mechanical ventilation requirement was around 24.5% among LBW infants compared to ELBW in which 50% required mechanical ventilation due to RDS. (Table-5)

Discharge rate was higher in LBW (76.11%) babies than that of VLBW (22.38%) babies but death rate was significantly higher in ELBW (75%). (Table-7)

Table 1: Frequency distribution of neonates with respect to their birth weight & gender

Birth weight	Range (in Kg.)	MCH (frequency)	FCH (frequency)	Total
Extremely low	≤ 1.000	1	3	4
Very Low	1.001 - 1.500	13	6	19
Low	1.501 - 2.500	32	25	57
Total		46	34	80

Table 2: Distribution of LBW neonates according to mode of delivery with respect to maternal age

	Normal Vaginal Delivery			Lower Segment Caesarian Section		
	LBW	VLBW	ELBW	LBW	VLBW	ELBW
< 21 yrs	9	2	0	4	4	0
21 - 25 Yrs	14	2	1	10	3	3
26 - 30 Yrs	8	1	0	5	5	0
>30 Yrs	4	0	0	3	2	0
	41			39		

Table 3: Distribution of LBW infants with respect to Antenatal steroids

Antenatal steroids to mother	LBW	VLBW	ELBW
Given	45	14	2
Not given	12	5	2

Table 4: Distribution of morbidities in LBW neonates

	LBW	VLBW	ELBW	Total
Prematurity	17	18	4	39 (21%)
RDS	16	18	4	38 (20.5%)
Hyperbilirubinemia	29	16	2	47 (25.4%)
Hypoglycemia	17	3	0	20 (10.8%)

Apnea	9	8	4	22 (11.8%)
Abdominal distension	0	3	2	5 (2.7%)
Feeding difficulties	7	0	0	7 (3.7%)
Birth Asphyxia	7	0	0	7 (3.7%)

Table 5: Distribution of LBW neonates with respect to mode of oxygen support

	LBW	VLBW	ELBW
No respiratory support	18	0	0
O2 support	4	2	0
AirVo2 (HNFC)	3	0	0
Bubble CPAP	8	6	0
NIPPV	10	8	2
Invasive ventilation	14	3	2
	57	19	4

Table 6: Distribution of neonates with respect to antenatal steroids and outcomes

Antenatal steroids	Successfully discharge	Death	p value
Given	56	5	0.0004
Not given	11	8	

Table 7: Distribution of LBW neonates with respect to outcomes

	LBW	VLBW	ELBW
Successfully discharge	51	15	1
Death	6	4	3

Discussion

Low birth weight (<2500 grams) babies have a high risk of neonatal and infant morbidity and hence the proportion of babies with low birth weight is considered as a Sensitive index of nation's health and development. We have conducted a prospective observational study on 80 Neonates with low birth weight admitted in NICU of Department of Paediatrics, Shardaben general hospital, Ahmedabad. The present study highlights the etiology, Risk factors, clinical profile and immediate outcome of LBW babies in a tertiary care hospital ¹⁰.

Out of 80 neonates, fifty seven (71.2%) were categorized as low birth weight neonates (1.501-2.500), nineteen (23.7%) as very low birth weight (1.001-1.500) and four (5%) were extremely low birth weight (<= 1000). The majority of the neonates were in low birth weight group. There were forty six (57.5%) males and thirty four (42.5%) females. In our study, 56.1% males and 43.8% females are LBW babies. In study conducted by Arefin MS *et al.*, it was found that during the study period 58% males and 42% females were LBW babies ¹¹, values being quite similar to this study, showing male sex as a risk factor for LBW delivery. Majority of LBW babies admitted, were males probably indicating Preference of the parents to seek health care for the male Babies ⁹.

Nineteen (23.7%) of low birth weight neonates were born to mothers with age of <21 years. Thirty three (41.2%) with age of 21 to 25 years, nineteen (23.7%) in 26 to 30 years of age group and nine (11.2%) were born to age group of more than 30 years. Majority of LBW neonates were born to mother in age group of 21-25 years. Shrestha S *et al.*, in 2010 concluded that one of the common risk factors is maternal age of less than 20 years¹², which is not consistent with our study. Diallo *et al.*, study shows that preterm births are more common at early age of conception (7.95%) and late age of conception (3.95%), showing that extremes of maternal age play large role in preterm birth.

The best mode of delivery for VLBW neonates is debated but most authorities regard caesarean section as the method of choice for these infants; however, 61.7% of our patients had been delivered normally with increased mortality rate and NVD was an independent risk factor for neonatal mortality¹². Our study being consistent with this study having 51.2% in case of NVD and rest CS¹³.

In a study conducted by Naskar *et al.*,¹⁴ incidence of RDS was found to be 19.89%. Overall incidence of RDS was found to be much higher (47.5%) in this study probably due to poor coverage of antenatal steroids. However, exposure to antenatal steroids was found to be associated with improved survival and discharge.

In the present study 37.5% (30) LBW babies were preterm while 62.5% (50) were term babies. The result being different from the previous studies by Manganaro *et al.*, (1991)¹⁵, Mannan MA *et al.*,¹⁶ (2012), and Roy *et al.*, (2006)¹⁷ stating majority of LBW neonates were preterm, suggesting that multiple factors were acting together to make them small.

Ahmed A *et al.*,¹⁸ (2008) showed the incidence of jaundice needing phototherapy to be 26.7%, similar to this study the incidence being 25.4%. Incidence of birth asphyxia was found to be much lower (3.7%) compared to their study reflecting improved perinatal care. Compared to the study of Mannan *et al.*,¹⁶(2012), the incidence of jaundice, prematurity and RDS were much higher in this study but the incidence of apnoea and NEC were much lower.

In our study LBW infants developed hyperbilirubinemia (25.4%) as the most common clinical outcome followed by prematurity (21%) and respiratory distress (20.5%). A study done by Gupta MK *et al.*, found that 28.5% LBW infants presented with respiratory distress and 23.5% of LBW infants presented with septicaemia¹⁹. These findings are not similar to our study probably because of the different pattern of the study population.

15.7% of VLBW and 50% of ELBW neonates in our study required ventilatory support. In study conducted by Roy *et al.*, there were 30 (83.3%) babies in ELBW group and 28 (40%) babies in VLBW group who needed ventilatory support immediately or in subsequent days in NICU. This clearly reflects that NICU ventilatory support facility is one of the major contributory factors for neonatal survival in both the groups¹⁷.

The outcome of both ELBW and VLBW babies depends on many factors like optimization of neonatal care, better knowledge of the pathophysiology of the premature infant, advent of exogenous surfactant therapy and neonatal intensive care

unit to handle sick infants. The survival rate in VLBW group was 84.2% and this was better than the survival rate in ELBW group (69.2%). There is a wide variability in survival rate as reported in different centres¹⁷. This is due to difference in patient population, antenatal care, intranatal care, aggressive neonatal care and availability of NICU facilities. In our study, the survival rate was better in LBW (89.4%) followed by VLBW (78.9%) where as in ELBW group, the survival rate was quite low (25%) demanding better NICU protocol care for such group in our setup.

In the present study, Prematurity, RDS, hyperbilirubinemia, hypoglycemia were the leading morbidities observed. Other studies from other places in India presented sepsis and prematurity as the leading cause for admissions²⁰. The National Neonatal Perinatal Database shows sepsis (36%) as the most common morbidity responsible for admission followed by prematurity (26.5%) and perinatal asphyxia (10%)²¹.

Conclusion

Birth weight is considered as a most important parameter to determine chances of survival, growth and development of baby.

Most of low birth babies are appropriate for gestational age. Hyperbilirubinemia is most common comorbidity in LBW baby in our hospital followed by prematurity and respiratory distress syndrome. Low birth weight and prematurity were the significant contributors to morbidity and mortality. In our hospital we still need to improve care and intervention for ELBW baby because mortality is still high compare to other. Proper antenatal and perinatal care and reproductive health education is required to prevent birth of VLBW and the associated complications. Hence antenatal programs and perinatal care to prevent prematurity and low birth weight babies should be strengthened.

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