

## Maternal Risk factors, morbidity, and mortality pattern of LBW babies admitted in NICU: A Retrospective study done in Banas Medical College and Research Centre, Palanpur, Gujarat, India

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**Background:** This study was undertaken to know about the maternal risk factors, morbidity, and mortality of low birth weight (LBW) babies admitted to NICU in a tertiary care hospital. **Methods:** This is a hospital-based, retrospective, descriptive study, done on LBW babies admitted to the NICU of Banas Medical College and Research Institute, Palanpur from January 2019- March 2020. **Results:** Out of the 1018 newborns admitted to NICU, 735 were LBW babies and 700 LBW babies were analyzed because 35 cases did not fit in inclusion criteria. The magnitude of LBW babies was 68.7 %. Out of 700 LBW babies, 530 (75.7%) had weight between 1.5kg to 2.49 kg, 138 (19.7%) babies were of VLBW ( 1kg -1.5kg) and 32(4.57%) babies were of ELBW (weight <1 kg). Out of 700 LBW babies, 450 (64.3%) were males and 250(35.7%) were females and 60 (8.57%) were term babies and 640 (91.42%) were preterm babies. Among the maternal risk factors most common was maternal undernutrition (30%), followed by maternal anemia in 180 cases (25.7%), inadequate ANC visits in 170 cases (24.2%), maternal age <20 years in 110 cases (15.7%). **Conclusion:** Identification of maternal risk factors and providing proper care and appropriate management to LBW can reduce neonatal morbidity and mortality

**Keywords:** Neonatal intensive care unit, LBW babies, Maternal Risk factors, Morbidity, Mortality

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## Introduction

LBW is a major public health problem in India and it contributes significantly to infant mortality as mortality of LBW babies is 40 times more than the normal-weight babies [1]. According to the World Health Organization (WHO) definition, infants with birthweight less than 2500 g are low birth weight (LBW) [2]. There are almost 23 million LBW infants from 121 million births in a year, a high proportion of which are in developing countries [1]. The incidence of LBW is estimated to be 16% worldwide, 90 % in the least developed and developing countries [3], and 7 % in the developed countries. LBW babies have a higher risk of morbidity and mortality relative to the risk in an infant of normal birth weight. These babies are at an increased risk of asphyxia, hypoglycemia, polycythemia-hyperviscosity, hypothermia. and are more prone to have impaired neurodevelopment and diabetes mellitus in adult life [4]. In most developing countries it was approximated that every ten seconds an infant die from a disease or infection that can be attributed to low birth weight [5]. Low birth weight can be caused either by premature delivery (short gestation) or by fetal growth retardation. Known factors for pre-term delivery and fetal growth retardation which are associated with LBW include low maternal food intake, hard physical work during pregnancy, and illness, especially infections [6,7]. Several studies suggest that cigarette smoking, genetic and environmental factors can cause LBW [8]. Short maternal stature, very young age, high parity, close birth spacing, high C8 cell counts in HIV infections are all associated factors [9,10]. This study was undertaken to find maternal risk factors, morbidity, and mortality patterns of low birth weight babies.

## Materials and Methods

**Setting:** Hospital-based study done in Banas Medical College and Research Institute, Palanpur, Gujarat

**Duration and type of study:** Hospital-based, retrospective, descriptive study done from January 2019- March 2020.

**Sampling methods:** Based on all babies who fulfilled inclusion criteria

**Sample size calculation:** All LBW babies admitted and treated in NICU from January 2019- March 2020 were included.

**Inclusion Criteria:** LBW babies admitted and treated in NICU from January 2019- March 2020

**Exclusion Criteria:** Babies with inadequate data.

Babies with life-threatening congenital malformations

**Data collection procedure:** Hospital Registration number of LBW babies was identified from the NICU Nominal Register and their case sheets were retrieved from the medical records department. Data was taken regarding maternal risk factors, morbidity, and mortality pattern of LBW babies from medical records.

**Any scoring system:** Gestational age was assessed by the Modified Ballard Score method as found in case sheets.

Mothers with less than three antenatal check-ups (ANC) visits to health care facilities were defined to have inadequate ANC visits. Maternal undernutrition was defined as a body mass index <18.5 kg/m<sup>2</sup>. The gestational age (GA) was assessed using the date of the last menstrual period and confirmed by the Modified Ballard Score method. Blood sugar level <40 mg per decilitre was defined as hypoglycemia. Axillary temperature below 35.50 F was defined as severe hypothermia as per the WHO Integrated Management of Childhood Illness guideline. Any level of serum bilirubin requiring intervention was defined as non-physiological hyperbilirubinemia [11]. Morbidities like birth asphyxia (HIE), sepsis, jaundice, Respiratory Distress Syndrome (RDS), Apnoea of prematurity, Meconium aspiration syndrome (MAS) were predefined. Morbidity and Mortality pattern of LBW babies was noted.

## Results

Out of the 1018 newborns admitted to NICU, 735 were LBW babies and 33 were excluded because of insufficient data, and 2 were excluded because they had life-threatening congenital malformation. Perinatal characteristics, maternal risk factors, and outcomes of the remaining 700 LBW babies were analyzed. The magnitude of LBW babies was 68.7 %. Out of 700 LBW babies, 530 (75.7%) had weight between 1.5kg to 2.5kg, 138 (19.7%) babies were of VLBW ( 1kg -1.5kg) and 32(4.57%) babies were of ELBW (weight <1 kg). Out of 700 LBW babies, 450 (64.3%) babies were males and 250(35.7%) were females and 60 (8.57%) were term and 640 (91.42%) were preterm babies.

**Table-1: Characteristics of LBW babies admitted in NICU (n=700).**

Data	Number	Percentage
Classification of LBW	700	68 %
Gestational age		
Term babies	60	8.57%
Preterm babies	640	91.42%
Birth weight		
<1 kg	32	4.57%
1-1.5kg	138	19.7%
1.5 -2.49 kg	530	75.7%
Gender		
Male	450	64.3%
Female	250	35.7%

Among the maternal risk factors most common was maternal undernutrition (30%), followed by maternal anemia in 180 cases (25.7%), inadequate ANC visits in 170 cases (24.2%), maternal age <20 years in 110 cases (15.7%). Less common causes were bad obstetric history (1.14%), Twins delivery (1%), acute infections, and elderly primi in (0.85%) respectively and the least common was PROM in 0.42% cases.

**Table-2: Maternal risk factors associated with LBW babies (n=700).**

Maternal risk factors	Number	Percentage
Maternal undernutrition	210	30%
Maternal anemia	180	25.7%
Inadequate ANC visits	170	24.2%
Maternal age <20 years	110	15.7%
Bad obstetric history	8	1.14%
Twins delivery	7	1%
Acute infections	6	0.85%
Elderly primi	6	0.85%
PROM	3	0.42%

Out of 700 LBW babies, morbidity was seen in 590 LBW babies (84.28%). Most common cause of morbidity was sepsis in 91 (15.4%) cases followed by jaundice in 90 (15.25%) cases, feeding difficulties in 82 (13.9%), hypothermia in 68 (11.5%), hypoglycemia in 56 (9.5%), AOP in 50(8.47%), RDS in 45 cases (7.62%). Less common causes were seizures in 30 (5%), MAS in 28 (4.74%), HIE in 20 (3.389%), TTNB in 20 (3.38%), and least common was a congenital anomaly in 10 (1.69%). Mortality was seen in 110 cases (15.7%). The most common cause of mortality was sepsis in 40 cases (36.36%), extreme prematurity, and RDS in 20 (18.18%) cases respectively, ELBW with IVH in 15 (13.6%) and AOP in 12 (11%) cases.

The least common cause was MAS with PPHN in 3 (2.72%) cases.

**Table-3: Morbidity and Mortality Pattern of LBW babies (n=700).**

Data	Number	Percentage
Morbidity pattern	590	84.28
Sepsis	91	15.4
Jaundice	90	15.25
Feeding difficulties	82	13.89
Hypothermia	68	11.5
Hypoglycemia	56	9.49
Apnoea of prematurity	50	8.47
HMD - hyaline membrane disease	45	7.62
Seizures	30	5.08
MAS - Meconium aspiration syndrome	28	4.74
HIE	20	3.38
TTNB- transient tachypnoea of new-born	20	3.38
Congenital anomalies	10	1.69
Mortality pattern	110	15.7
Sepsis	40	36.36
extreme prematurity	20	18.18
RDS	20	18.18
ELBW with IVH	15	13.6
AOP	12	10.9
MAS with PPHN	3	2.72

## Discussion

In the present study magnitude of LBW babies admitted in the NICU was 68%. A study done by Tushar et al in Gujarat found the magnitude of LBW babies to be 56%[12]. Another study done by Deswal et al in 1999 from India found the incidence of LBW to be about 9.14 % [13].

In the present study, 64.3% (450) were males and 35.7% (250) were females. Mannan MA et al. in Bangladesh (2012) showed that 62.86% of VLBW babies in their study were males showing male sex as a risk factor for VLBW delivery [14] Naskar N et al also found in their study that majority of VLBW babies admitted were males(57.53%)[15]

In the present study 91.42% (640) LBW babies were preterm while only 8.57% (60) were term babies. Manganaro et al (1991) [16], Mannan MA et al. [14] (2012), and Roy et al. (2006) [17] found similar results in their studies. In literature, two-thirds of infants born weighing less than 2,500 grams are preterm [18].

In the present study distribution among birth weight showed that ELBW (<1 kg) babies were 32 (4.57%)

VLBW babies were (1 to 1.5kg) 138 (19.7%), and 1.5 to 2.49kg were 530(75.7%). In a study done by Chidiebere ODI et al, 12.0% of babies were of ELBW, 28.1% babies were of VLBW while 59.9% had weights between  $\geq 1.5$ - 2.5 kg [19].

In the present study, among the maternal risk factors, the most common was maternal undernutrition in 210 (30%) cases. Maternal pre-pregnancy BMI plays an important role in determining the birth weight of the baby. One explanation for the lower mean neonate birth weight in women with low pre-pregnancy weight may be that the fetus was prevented from receiving an adequate supply of nutrients from the mother because of changes in maternal hemodynamic status [20].

This was followed by maternal anemia in 180 (25.7%) cases. It was shown that for women with iron deficiency the mean weight of their infants was 242 g less, and the risk of LBW was significantly greater among women with moderate anemia compared with those without anemia [21]. This was followed by inadequate ANC visits in 170 (24.2%) cases, maternal age <20 years in 110 cases (15.7%). Less common causes were bad obstetric history (1.14%), Twins delivery (1%), acute infections and elderly primi (0.85%), and least common was PROM in 0.42%. T Parikh et al, Naskar N et al also found similar maternal risk factors to be associated with LBW babies [12,15].

According to the outcome, out of 700 LBW babies, morbidity was seen in 590 LBW babies (84.28%). Common causes of morbidity were sepsis in 91 (15.4%), jaundice in 90 (15.25%), feeding difficulties in 82 (13.9%), hypothermia in 68 (11.5%), hypoglycemia in 56 (9.5%), AOP in 50 (8.47%), RDS in 45 cases (7.62%). Less common causes were seizures in 30 (5%), MAS in 28 (4.74%), HIE in 20 (3.389%), TTNB in 20 (3.38%), and least common was congenital anomaly in 10 (1.69%) cases. Mortality was seen in 110 cases (15.7%). The most common cause of mortality was sepsis in 40 cases (36.36%) followed by extreme prematurity and HMD in 20 (18.18%) cases respectively, ELBW with IVH in 15 (13.6%), AOP in 12 (11%). The least common cause was MAS with PPHN in 3 (2.72%).

In a study done by Poudel P et al in Nepal, it was found that most common cause of morbidity among VLBW babies was clinical sepsis (77.1%) followed by non-physiological hyperbilirubinemia (73.6%),

Apnoea (48.6%), shock (42.9%), hypoglycemia (39.3%), anemia (29.3%), hyaline membrane disease (HMD, 21.4%), patent ductus arteriosus (15.0%), severe hypothermia (12.1%), culture-proven sepsis (15.7%), retinopathy of prematurity (5.7%), and bronchopulmonary dysplasia (3.6%). Overall survival was 54.3% and major causes of death were HMD (51.0%) and sepsis (34.7%) [22]. In a prospective observational study done by Tagare et al, Respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), pulmonary hemorrhage and sepsis were the major causes of death, while RDS, sepsis, and hyperbilirubinemia were the most common morbidities during the neonatal period [23].

## Limitations

This study does not provide any scope for follow up of LBW babies and as it is a hospital-based study it does not reflect about prevalence, morbidity, and mortality pattern of LBW babies in the community.

## Conclusion

LBW is a common problem in India which contributes significantly to neonatal mortality rate. In the present study, it was found that maternal undernutrition, maternal anemia, inadequate ANC visits were most commonly associated with LBW. Therefore all interventions must be taken to give proper antenatal care to mothers like educating them regarding the importance of proper diet in pregnancy, intake of iron tablets during pregnancy, maintaining hygiene, screening for infections, avoiding successive pregnancies, avoidance of teenage and elderly pregnancy, etc to prevent LBW. LBW babies should be given proper care in NICU in form of safe and infection-free environments, surfactant therapy and ventilation should be made a priority and health care personnel should be more responsible in caring for these babies.

## What does this study add to existing knowledge?

Prematurity and LBW are the leading cause of neonatal mortality. As seen in this study, maternal health and antenatal care predominantly affect the birth weight of the baby. Therefore, all steps should be taken to improve maternal health and general wellbeing in order to improve the neonatal mortality rate.

## Author's contribution

**Dr. Ajit K. Shrivastava:** Study design

**Dr. Neha Sharma:** Study design, collection of data

**Dr. Santosh K. Roy:** Collection of data

**Dr. Heenaben R. Desai:** Data analysis

**Dr. Anjum A. Hasan:** Data analysis

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