Original Research Article

Morbidity and mortality of low birth weight babies in early neonatal period in a rural area teaching hospital, Telangana, India

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Received: 24 March 2019
Revised: 22 April 2019
Accepted: 30 May 2019

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ABSTRACT

Background: A baby’s weight at birth is a strong indicator of newborn health and nutrition. Low birth weight (LBW) babies are more susceptible to morbidities and mortality in early neonatal period than normal birth weight (NBW) babies. Among neonatal deaths, 80% occurs in LBW / preterm babies and 75% of total neonatal deaths occur in early neonatal period. The present study was undertaken to know the incidence and early neonatal outcome of LBW babies in rural area.

Methods: Prospective observational study was conducted in babies born with <2.5 kg (LBW) birth weight.

Results: The prospective study of LBW babies was 25.07% with almost an equal contribution from preterm (50.46%) and Term Intra Uterine Growth Restricted (IUGR) (49.53%) babies. The most common morbidity found in LBW babies was Jaundice (40.09%) followed by respiratory distress (18.16%), sepsis (8.72%) and apnea (4.48%). Preterm-LBW babies had more morbidities in terms of apnea (100%), birth asphyxia (88.88%), respiratory distress (87.01%), sepsis (80.55%) and jaundice (67.64%). Early neonatal mortality was 21.22 per 1000 live births. Mortality was 100% for babies <1 kg in birth weight, 16% in 1-1.499 kg group and 0.75% in 1.5-2.499 kg group in early neonatal period. According to gestational age, mortality in preterm-LBW babies was 88.88% and 11.11% in Term IUGR-LBW babies. The most common cause of death in LBW babies was birth asphyxia (44.44%) followed by hyaline membrane disease (HMD) (33.33%).

Conclusions: The present study revealed that preterm babies contributed 50% to incidence of LBW babies. Morbidity and mortality in LBW babies were inversely related to birth weight and gestational age.

Keywords: Low birth weight, Preterm, Morbidity, Mortality

INTRODUCTION

LBW is defined as weight <2500 grams (5.5 pounds) at birth by World Health Organization (WHO). The incidence of LBW is 15-20% globally as per UNICEF 2014 data. More than 95 per cent of low birthweight babies are born in developing countries. South Asia had the highest incidence of 28% in terms of regional variations. India had the third highest LBW babies percentage in South Asia after Mauritania (35%), Pakistan and Yemen (each country 32%). Nearly 30% of neonates <7.5 million-are born with a LBW (<2500 g) in India. This accounts for 42% of the global burden, the largest for any country. According to National Family Health Survey-3 (NFHS-3, 2005-06), the prevalence of LBW was 22% in India.
LBW babies are mainly as a result of preterm birth (born before 37 weeks of pregnancy) and Intra Uterine Growth Restriction (IUGR). About 40% are premature births and 60% of the LBW infants are born at Term after fetal growth restriction in India.5 Preterm birth is truly global problem but more than 60% of preterm births occur in Africa and South Asia. As a result of increasing preterm births, a raising rate of Preterm-LBW babies is found. A recent study from India, revealed that among LBW babies, 52.7% were preterm babies and 42.3% were Term IUGR babies.6

Neonatal mortality rate (NMR) of India fell gradually from 49 deaths per thousand live births in 1997 to 25.4 deaths per thousand live births in 2016, which ranks it at 12 among 52 lower middle-income countries in terms of risk for new born as per first-ever report on the new born mortality, published by UNICEF on Tuesday, 20th Feb, 2018. A pooled analysis of the data from three studies on the timing of neonatal deaths indicates that about three-fourths of total neonatal deaths occur in the first week of life.5

A baby’s weight at birth is a strong indicator of newborn health and nutrition. Being undernourished in the womb increases the risk of death. LBW babies are at 11-13 times increased risk of dying than NBW infants as per community based studies in India. Indeed, 80% of total neonatal deaths occur among LBW/preterm neonates.5

The most common early neonatal complications among LBW babies are neonatal jaundice, birth asphyxia, septicemia, respiratory distress, hypothermia, hypoglycaemia, etc.7

The NMRs are not uniform in India, there is a rural-urban difference. The NMR in rural areas is twice that in urban areas (31 vs 15 per 1000 live births). In Andhra Pradesh, Assam, Jharkhand and Kerala, the discrepancy is more marked-difference of 60% or more.5

The present study was designed to find incidence of low birth weight babies and their early neonatal outcomes in a rural area teaching hospital, Telangana, India.

Objectives

- To estimate the incidence of low birth weight (LBW) babies
- To identify the percentage contribution of preterm and term IUGR babies to LBW
- To identify the morbidities in preterm and term IUGR LBW babies in early neonatal period
- To estimate early neonatal mortality in LBW babies.

Methods

A prospective observational hospital-based study was conducted in Obstetrics and Gynaecology (OBG) and Neonatal Intensive Care Unit (NICU) of Mediciti Institute of Medical Sciences, Telangana, India over a period of one year (2017-2018) after obtaining consent from hospital ethical committee. All babies were weighed soon after birth on digital weighing machine with ±10 grams difference in weight. Informed consent was taken once the mothers of LBW(<2.5 kg) babies were comfortable after delivery. The information required for the study was taken by detailed history and from the hospital documents as per the proforma.

The LBW babies who require admission immediately after birth were shifted to NICU and rest LBW babies were monitored in early neonatal life in post-natal wards every day and were admitted in NICU if need arose later during the early postnatal period. Gestational age was calculated as per modified New Ballard Score. Based on the score obtained babies were classified into Preterm (born before <37 completed weeks of gestational age) and term babies (born in between 37-42 weeks of gestation age). The weight of preterm LBW babies was plotted in 2013 sex specific Fenton preterm growth charts. Preterm LBW babies were classified as Appropriate for gestational age (AGA) if weight of babies fell between 10th to 90th centile and as small for gestational age (SGA) if the weight was below 10th centile in growth charts. Babies who were born >37 wks of gestation with birth weight <2.5 kg were taken as Term IUGR. (IUGR refers to a condition in which a fetus is unable to achieve its genetically determined potential size).

The relevant blood, urine, cerebrospinal fluid and radiological investigations were done for admitted LBW babies as needed, for their illness after admission in NICU. The stable LBW babies without any illness, were discharged on 3rd day of life along with the mother. They were called for review on 7th day of life to the pediatric outpatient department and if needed were admitted in NICU and work up was done.

Statistical analysis

The data was tabulated into proportions and Pearson’s Chi-square test was used to see significance between the proportions. A p <0.05 was considered statistically significant. The sample size was 1700 consecutive deliveries.

A prevalence of 22% for low birth weight as per NFHS 3 was taken into consideration (4). A sample size at 95% confidence limits was calculated applying the formula below.

\[ n = \frac{Z^2pq}{L^2} \]

Where, 
- \( n \) =Desired sample size
- \( Z \) =Score for 95%Confidence interval (CI) (1.96)
- \( p \) =prevalence (0.22)
- \( q \) =1-p= 0.78
- \( L \) =desired margin of error:0.02

So, sample size (n) was 1700
Inclusion criteria

Among the 1700 consecutive deliveries, Babies weighing <2.5 kg (LBW) born in OBG unit of Mediciti Hospital were included in the present study.

Exclusion criteria

- Mothers who were not willing to participate in the study.
- Out born LBW babies.

RESULTS

The total number of deliveries during the study period was 1700 (including 26 pairs of twin gestation). The number of babies delivered were 1726. The number of still births in this study period were 27. The total no of live births was 1699 after excluding still births. Out of 1699, 426 were live LBW babies, out of which 215 (50.46%) were preterm and 211 (49.53%) were Term IUGR. The incidence of LBW babies in this study was 25.07% with 95% CI (23.01-27.13).

Among the 426 live LBW babies, 400 (93.89%) were in 1.5-2.499 kg group, 25 (5.8%) babies in the 1-1.499kg (Very Low Birth Weight-VLBW) group and only 1 (0.23%) was in < 1kg birth weight (Extremely Low Birth Weight-ELBW) group. Overall female to male ratio was 1.3:1. The male to female ratio was 0.75:1 in 1.5-2.499kg group. The difference was statistically significant (Table 1).

Table 1: The knowledge about the disease caused by dog bite (N=111).

| LBW babies as per birth weight in kg | Total no of babies (%) | No of Male LBW babies (%) | No of Female LBW babies (%) | P value |
|-------------------------------------|------------------------|---------------------------|----------------------------|---------|
| 1.5-2.499                           | 400 (93.89)            | 172 (43)                  | 228 (57)                   | 0.0001  |
| 1-1.499                             | 25 (5.8)               | 11 (44)                   | 14 (56)                    | 0.396   |
| <1                                  | 1 (0.23)               | 1 (100)                   | 0                          | *       |
| Total                               | 426                    | 184 (43.19)               | 242 (56.80)                | *       |

*insufficient observations to calculate p value

Table 2: Distribution of admitted and not admitted LBW babies as preterm AGA, preterm SGA and term IUGR.

| LBW babies       | Total no of babies (%) | No of admitted babies (%) | No of not admitted babies (%) | P value |
|-------------------|------------------------|---------------------------|-------------------------------|---------|
| Preterm AGA       | 148 (34.90)            | 87 (58.78)                | 61 (41.21)                    | 0.003   |
| Preterm SGA       | 65 (15.33)             | 47 (72.3)                 | 18 (27.69)                    | <0.001  |
| Term IUGR         | 211 (49.76)            | 62 (29.38)                | 149 (70.6)                    | <0.001  |
| Total LBW         | 424                    | 196 (46.22)               | 228 (53.77)                   | 0.028   |

Table 3: Morbidities in Preterm and Term LBW babies in early neonatal period.

| Morbidities      | Total LBW babies 424 (%) | Preterm-LBW No. (%) (Total =213) | Term IUGR-LBW No. (%) (Total=211) | P value |
|------------------|---------------------------|----------------------------------|-----------------------------------|---------|
| Jaundice         | 170(40.09)                | 115 (67.64)                      | 55 (32.35)                        | 0.0001  |
| Respiratory distress | 77(18.16)              | 67 (87.01)                      | 10 (12.98)                        | 0.0001  |
| Sepsis           | 37(8.72)                  | 29 (80.55)                      | 8 (21.62)                         | 0.0004  |
| Apnea            | 19(4.48)                  | 19 (100)                        | 0                                 | 0.0001  |
| Birth asphyxia   | 9(2.12)                   | 8 (88.88)                       | 1 (11.11)                         | 0.037   |
| Hypoglycemia     | 8(1.88)                   | 6 (0.75)                        | 2 (0.25)                          | 0.284   |
| Hyperglycemia    | 2(0.47)                   | 2 (100)                         | 0                                 | 0.498   |
| NEC              | 4(0.94)                   | 4 (100)                         | 0                                 | 0.123   |
| Early HDN        | 1(0.23)                   | 1 (100)                         | 0                                 | 1       |
| Polycythemia     | 1(0.23)                   | 1(100)                          | 0                                 | 1       |
| Congenital anomalies | 14(3.3)                | 8 (57.14)                       | 6 (42.85)                         | 0.787   |
| PDA              | 2(0.47)                   | 2 (100)                         | 0                                 | 0.498   |

In the present study two LBW babies were excluded in view of major congenital anomalies requiring immediate pediatric surgical intervention and referral to higher center. In the remaining 424 babies, 228 (53.77%) LBW
babies were healthy and 196 (46.22%) babies required hospital admission in early neonatal period. In Preterm AGA and Preterm SGA groups, number of admitted babies was higher than non-admitted babies while it was reverse in Term IUGR group. This observation was statistically significant (Table 2).

### Table 4: Morbidities among Preterm-LBW babies in early neonatal period.

| Morbidities                                | No. of preterm (%) | No. of preterm AGA (%) | No. of preterm SGA (%) | P value |
|--------------------------------------------|--------------------|------------------------|------------------------|---------|
| Jaundice                                   | 115 (53.99)        | 76 (66.08)             | 39 (33.91)             | 0.296   |
| Respiratory distress                       | 67 (31.45)         | 37 (55.22)             | 30 (44.77)             | 0.003   |
| Hyaline Membrane disease (HMD)             | 26 (38.80)         | 21 (80.76)             | 5 (19.23)              | 0.001   |
| Transient Tachypnea of Newborn (TTNB)      | 25 (37.31)         | 10 (40)                | 15 (60)                | 0.07    |
| Congenital pneumonia                       | 13 (19.04)         | 5 (38.46)              | 8 (61.53)              | 0.22    |
| Sepsis                                     | 29 (13.61)         | 21 (72.41)             | 8 (27.58)              | 0.829   |
| Apnea                                      | 19 (8.92)          | 15 (78.94)             | 4 (21.05)              | 0.44    |
| Birth asphyxia                             | 8 (3.75)           | 5 (62.5)               | 3 (37.5)               | 0.702   |
| Hypoglycemia                               | 6 (2.81)           | 3 (50)                 | 3 (50)                 | 0.372   |
| Hyperglycemia                              | 2 (0.93)           | (0)                    | 2 (100)                | 0.09    |
| NEC                                        | 4 (1.87)           | 1 (25)                 | 3 (75)                 | 0.085   |
| Early HDN                                  | 1 (0.46)           | (0)                    | 1 (100)                | 0.305   |
| Polycythemia                               | 1 (0.46)           | 1 (100)                | (0)                    | 1       |
| Congenital anomalies                       | 8 (3.75)           | 4 (50)                 | 4 (50)                 | 0.25    |
| Congenital heart disease                   | 2 (0.93)           | (0)                    | 2 (100)                | 0.09    |

**Morbidities in preterm AGA, preterm SGA and term IUGR low birth weight babies**

The most common morbidities found in LBW babies were neonatal jaundice followed by respiratory distress, sepsis and apnea. Preterm-LBW babies were significantly more affected than Term IUGR-LBW by these morbidities and the difference was significant statistically (Table 3). The most common morbidities in preterm-LBW babies were jaundice followed by respiratory distress, sepsis and apnea. The respiratory distress was more common in Preterm AGA than Preterm SGA which was statistically significant. HMD was significantly more a cause of Respiratory distress in Preterm AGA than in Preterm SGA babies as shown in Table 4. Morbidities in Term-IUGR LBW were jaundice (32.35%), sepsis (21.62%), respiratory distress (12.98%) and birth asphyxia (11.11%) (Table 3).

### Table 5: Causes of early neonatal Mortality in LBW babies.

| Causes in LBW | No. of deaths among 213 Preterm-LBW | No. of deaths among 211 Term-LBW | P value |
|---------------|-------------------------------------|----------------------------------|---------|
| Birth asphyxia| 4                                   | 4 (44.44)                        |         |
| HMD           | 3                                   | 3 (33.33)                        |         |
| Aspiration of feeds | 1                                 | 1 (11.11)                        |         |
| Sepsis        | 1                                   | 1 (11.11)                        |         |
| Total         | 8 (88.88)                           | 1 (11.11)                        | 9 (100) | 0.0371 |

**Mortality in early neonatal period among LBW**

Among the 424 LBW babies, 9 deaths were seen in early neonatal period. Early neonatal mortality in present study was 21.22 per 1000 live births. 88.88% of early neonatal deaths were contributed by Preterm LBW babies and the rest by Term IUGR babies which was statistically significant (Table 5). The most common cause of early neonatal deaths in Preterm LBW babies was Birth asphyxia (44.44%), followed by Hyaline membrane disease (33.33%) and...
Sepsis (11.11%) as shown in Table 5. Mortality was 100% for babies <1 kg in birth weight, 16% inVLBW group and 0.75% in 1.5-2.499 kg group.

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Cite this article as: Pabbati J, Subramanian P, Renikunta M. Morbidity and mortality of low birth weight babies in early neonatal period in a rural area teaching hospital, Telangana, India. Int J Contemp Pediatr 2019;6:1582-7.