



Original Research Article

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

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Abstract

Background: LBW is defined by as weight at birth of less than 2500gm irrespective of gestation. 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. So, this study aims at identifying the clinical profile of Low birth weight neonates in a rural tertiary care hospital.

Method: Prospective hospital based study was conducted on 100 neonates with low birth weight (less than 2500gm) admitted in Neonatal intensive care unit (NICU) of department of Pediatrics, Maharishi Markandeshwar Institute of medical science and research (MMIMSR) Mullana-ambala (Haryana) from September 2015 to October 2016.. Maternal and neonatal risk factors were recorded. The study was designed to assess the clinical profile of LBW babies. All neonates less than 2500gms irrespective of gestational age, were examined and a detailed history was obtained and recorded in a predesigned Proforma.

Results: Out of 100 neonates, seventy four (74%) were categorized as low birth weight neonates, twenty four (24%) as very low birth weight and two (2%) were extremely low birth weight. Seventy two (72%) of enrolled group were appropriate for gestational age and twenty eight (28%) were small for gestational age. Majority of the neonates were born at a gestational age of 34-36 weeks. Blood group of both mother and newborn was analysed. Maximum of the mothers were found to be O+ve (n=20) blood group and newborns of B+ve (n=18) blood group. Neonatal hyperbilirubinemia (32%) was the leading cause requiring admission followed by Prematurity (25%) sepsis (18%), respiratory distress syndrome (15%) and birth asphyxia (10%).

Conclusion: Most of low birth babies are AGA babies. Neonatal hyperbilirubinemia (NNHB) and Prematurity were the leading cause requiring admission. Hence antenatal programs to prevent prematurity and low birth weight babies should be strengthened.

Keywords: Low birth weight newborn, Appropriate for gestational age, Neonatal hyperbilirubinemia.

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. Current Infant Mortality Rate (IMR) in India is 34/1000 live births³. India contributes to nearly 25% of global neonatal deaths⁴. Sustainable Development Goal 2030 focuses mainly on reduction in neonatal mortality to achieve U5MR⁵. Seventy five percent of neonatal deaths occur in first week of life⁶. Three major causes (78%) which contribute to neonatal mortality in developing countries are prematurity & low birth weight, neonatal infections and birth asphyxia⁷. Low birth weight (LBW) has been defined by World Health Organization (WHO) as a birth weight of a infant of 2499gm or less, regardless of gestational age⁸. Annually 6 to 8 million low birth weight infants are born in India.^[9] There is high incidence of low birth weight babies in our country, intra uterine growth retardation (small for date) accounts for higher number of low birth weight babies rather than preterm babies. 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. In babies with birth weight of less than 1800 g or babies born before 35 weeks of gestation have inactivity, lethargy and uncoordinated sucking and swallowing which is due to immaturity of central nervous system. Infections are an important cause of neonatal mortality in low birth weight babies. Inefficient cellular immunity and low IgG antibody levels predispose babies to infection. Premature birth is associated with an increased incidence of early onset sepsis with an incidence of 1.5% of infants having birth weight less than 1500 grams. Low birth weight babies have high risk of developing

hypoglycemia, hypocalcaemia, acidosis hypoxia and hypoproteinemia. The clinical problems and outcomes of small for gestational age babies are very difficult as compared to preterm babies. Symptomatic hypoglycemia, birth asphyxia, polycythemia, congenital malformations and pulmonary hemorrhage is more common in term small for gestational age babies as compared to preterm small for gestational age babies. Other problems like hyaline membrane disease, apneic attacks, inability to suck and swallow, aspiration of feeds, junctional obstruction, enterocolitis, hypothermia, hyperbilirubinemia, susceptibility to infections and intraventricular hemorrhage is more common in preterm small for gestational age babies as compared to small for gestational age babies.⁹

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.

Materials & Methods

Prospective hospital based study was conducted on 50 neonates with low birth weight (less than 2500gm) admitted in Neonatal intensive care unit (NICU) of department of Pediatrics, Maharishi Markandeshwar Institute of medical science and research (MMIMSR) Mullana, ambala (Haryana) from September 2014 to October 2015. Neonates with gross congenital malformations, out born babies and babies whose parents did not give consent for investigation were excluded. Maternal and neonatal risk factors were recorded. 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, immediate postnatal events like Apgar score and if any resuscitation done, were recorded in a predesigned proforma.

The weight of the neonate was recorded on digital weighing scale. Weight recording was done to the

accuracy of ± 5 grams. Length of the neonate was taken using infantometer. Head circumference was measured using non-stretch type (cross tape method) from occipital protuberance to supraorbital ridges in the forehead.

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. All the cases were subjected to following investigations: complete blood count, Total serum bilirubin, blood culture, blood sugar level, C-reactive protein and chest X-ray.

The data collected was entered into MS Excel and analyzed by using SPSS version 20 (Statistical package for social sciences). Descriptive statistics was applied on continuous data. Frequency and percentage were calculated using SPSS ver 20. Proportional comparison were made on basis on Chi-Square test, Fischer exact, Yate's corrected test wherever applicable.

Results

Total 100 neonates were enrolled in our study. out of 100 neonates, seventy four (74%) were categorized as low birth weight neonates, twenty four (24%) as very low birth weight and two (2%) were extremely low birth weight. The majority of the neonates were in low birth weight group (Table-1). There were fifty eight (58%) males and forty two (42%) females. Male to female ratio was 1.38:1 (Table-2) Fifty six (56%) of enrolled group were delivered by normal vaginal delivery and forty four (44%) by low segment cesarean section. Normal vaginal delivery to lower segment cesarean section ratio in this study was 1.27:1 (Table-3)

Seventy (70%) of enrolled group were appropriate for gestational age, twenty eight (28%) were small for gestational age and rest 2(2%) were large for gestational age (Table-4). The number of neonates

born at the gestational ages of 26 to 30 weeks, 30 to 32 weeks, 32 to 34 weeks, 34 to 36 weeks, 36 to 38 weeks, 38 to 40 weeks and 40 – 42 weeks were 12% (n=12), 2% (n=2), 16% (n=8), 34% (n=34), 28% (n=28), 6%(n=6) and 2% (n=2) respectively. Majority of the neonates were born at a gestational age of 34-36 weeks (Figure-1).

Blood group of both mother and newborn was analysed. Maximum of the mothers were found to be O+ve (n=40) blood group and newborns of B+ve (n=36) blood group (Figure-2). Apgar score at 1 min ranged from 2 to 8 with mean of 7 ± 1 and at 5 min ranged from 7 to 9 with mean of 9 ± 1 . Majority of neonates at 1 minute had APGAR of 7 or 8 and APGAR of 9 at 5mins (Table-5).

Seventy two (72%) of mother had anemia. Leaking per vagina more than 18 hour, pregnancy induced hypertension and systemic infection were present in sixteen (16%), eight (8%) and six (6%) respectively. Among maternal morbidities, majority had anemia (Figure-3).

The age of mothers ranged from 22 years to 36 years. Mean with SD age of mothers was 27.5 ± 4.1 years. Thirty eight (38%) were of the age group 21 to 25 years, thirty six (36%) were of the age group 26 to 30 years and twenty six (26%) were of age group more than 30 (Table-6)

Seventy four (74%) of enrolled neonates did not require oxygen to achieve target level of saturation (91-95%) and rest 26% (n=26) required oxygen at birth. Sixty six (66%) were given intravenous fluids at the time of birth. Oral feeds and orogastric feeds were given to thirty four (34%) and four (4%) respectively. Majority of neonates were given intravenous fluids initially.

Neonatal hyperbilirubinemia (32%) was the leading cause requiring admission followed by Prematurity (25%) sepsis (18%), respiratory distress syndrome (15%) and birth asphyxia (10%) (Figure-4).

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

Birth weight	Range (in Kg.)	Frequency	Percentage (%)
Extremely low	≤ 1.000	2	2.0
Very Low	1.001 – 1.500	24	24.0
Low	1.501 – 2.500	74	74.0

Seventy four (74%) were categorized as low birth weight neonates, twenty four (24%) as very low birth weight and two (2%) were extremely low birth weight. The majority of the neonates were in low birth weight group.

Table 2 Distribution of LBW neonates according to their gender.

Gender	Frequency	Percentage(%)
Male	58	58.0
Female	42	42.0

There were 58% males and 42% females. Male to female ratio was 1.38:1.

Table 3 Distribution of LBW neonates with respect to mode of delivery.

Mode of delivery	Frequency	Percentage (%)
Normal Vaginal Delivery	56	56.0
Lower Segment Caesarian Section	44	44.0

Fifty six (56%) of low birth weight neonates enrolled in the study were delivered by normal vaginal delivery and forty four (44%) by low segment cesarean section. Normal vaginal delivery to lower segment cesarean section ratio in this study was 1.27:1.

Table 4 Distribution of LBW infants with respect to their gestational size.

Category of LBW Babies	Frequency	Percentage (%)
Appropriate for gestational age (AGA)	70	70.0
Small for gestational age (SGA)	28	28.0
Large for gestational age (LGA)	2	2

Seventy (70%) of enrolled group were appropriate for gestational age, 28 (28%) were small for gestational age and rest 2(2%) were Large for gestational age. The ratio of appropriate for gestational age to small for gestational age was 2.6:1.

Table 5: Distribution of APGAR score at 1 and 5 minutes.

APGAR score	At 1 Minute		At 5 minute	
	Frequency	Percentage (%)	Frequency	Percentage (%)
2	1	2.0	0	0.0
4	1	2.0	0	0.0
5	4	8.0	0	0.0
6	4	8.0	0	0.0
7	20	40.0	3	6.0
8	20	40.0	8	16.0
9	0	0.0	39	78.0
Range	2 – 8		7 – 9	
Mean ± SD	7.0 ± 1.0		9 ± 1	

Apgar score at 1 min ranged from 2 to 8 with mean of 7 ± 1 and at 5 min ranged from 7 to 9 with mean of 9 ± 1. Majority of neonates at 1 minute had APGAR of 7 or 8 and APGAR of 9 at 5mins.

Table 6 Distribution of LBW babies with respect to mothers age group.

Age(in years)	Frequency	Percentage (%)
21 – 25	38	38.0
26 – 30	36	36.0
> 30	26	26.0
Range	22 – 36	
Mean ± SD	27.5 ± 4.1	

The age of mothers ranged from 22 years to 36 years. Mean with SD age of mothers was 27.5 ± 4.1 years. Nineteen (38%) were of the age group 21 to 25 years, eighteen (36%)were of the age group 26 to 30 years and thirteen (26%)were of age group more than 30.

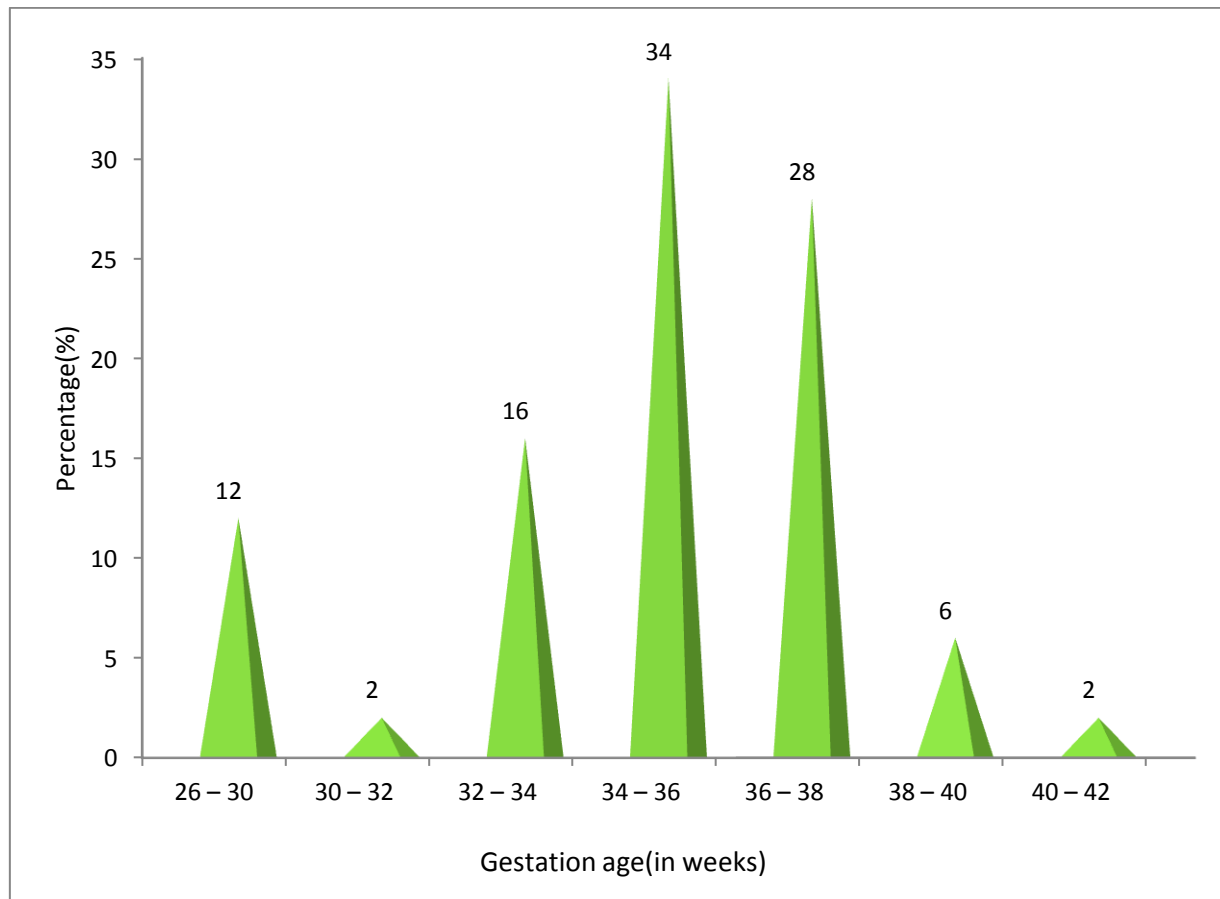


Figure 1 Distribution of LBW babies according to gestational age.

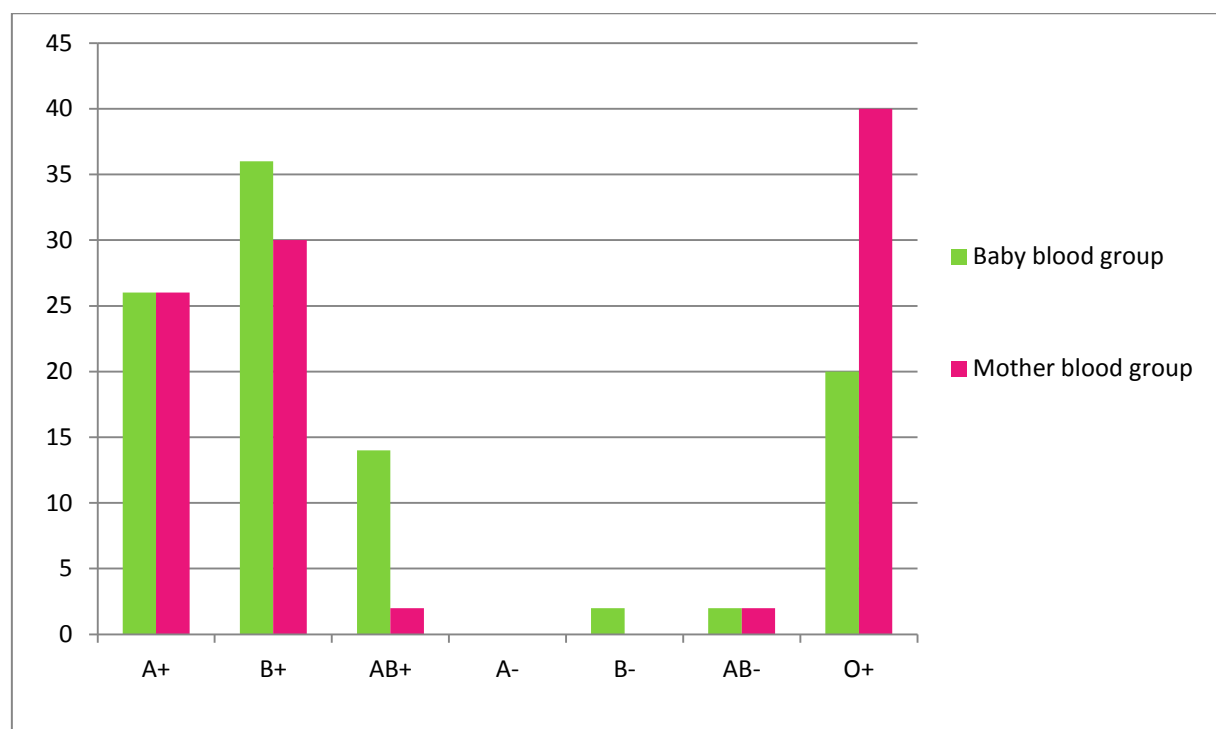


Figure 2 Blood group of babies and their mothers enrolled in the study.

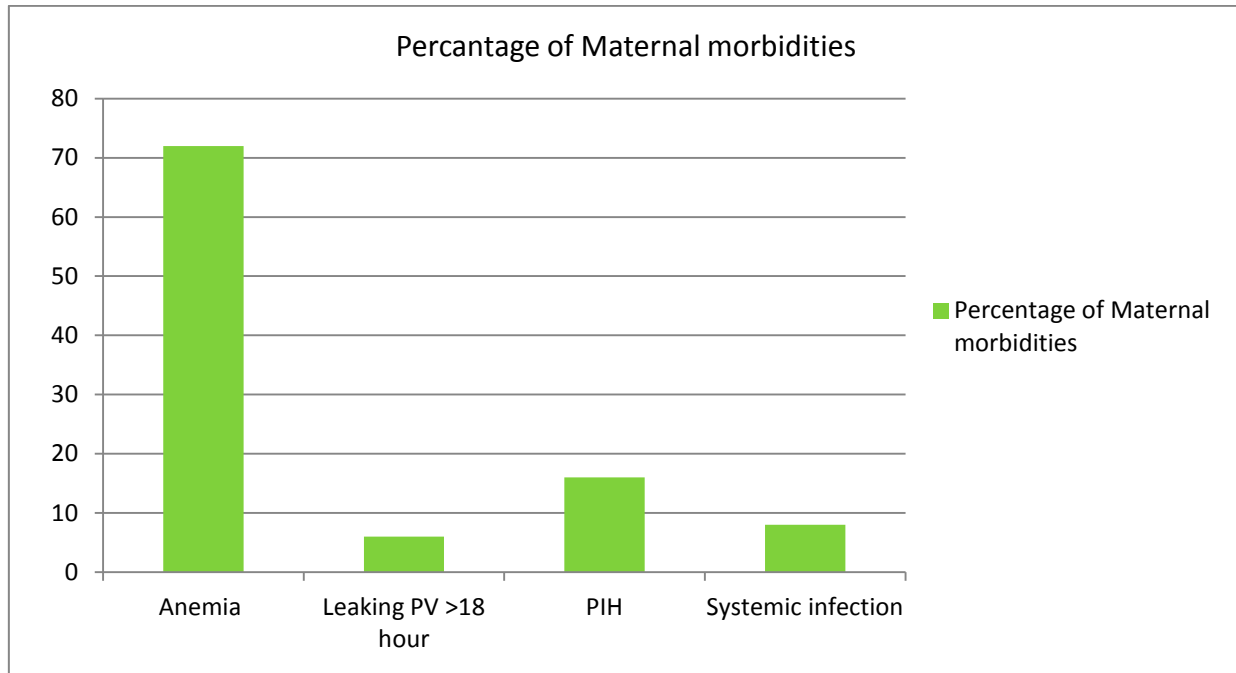
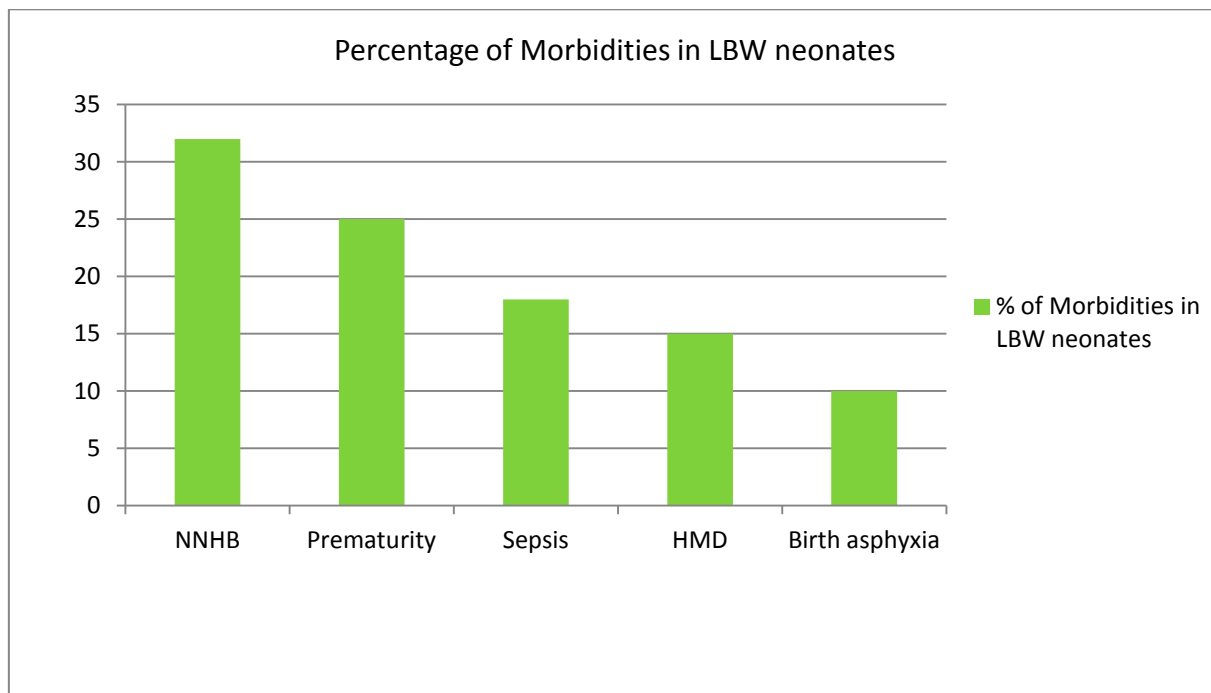


Figure 3: Distribution of maternal morbidities among study population.



Discussion

Out of 100 neonates, seventy four (74%) were categorized as low birth weight neonates, twenty four (24%) as very low birth weight and two (2%) were extremely low birth weight. The majority of the neonates were in low birth weight group. There were fifty eight (58%) males and forty two (42%) females. In study conducted by Arefin MS et al it was found that during the study period 58% males and 42% females were LBW babies¹⁰.

The weight of neonates ranged from 800g to 2400g. maximum number of neonates (n=74) 74% were between the range 1501 gram to 2500g. 24% (n=24) were between 1001 g to 1500g and 2% (n=2) was below 1000g. Mean birth weight of neonates was 1850g with SD of 400 g. different studies in literature have reported varying weight distribution. Budhathoki S et al in 2014 in their study reported the mean birth weight of enrolled neonates was 1640 g with SD of 344g¹¹

In the present study group 70% that is 70 belong to appropriate for gestational age group and 28% that is 28 are small for gestational age and rest 2(2%) came under large for gestational age group. A study conducted by Dias E and Gada S in 2014, 66% were appropriate for gestational age and 17% were small for gestational age and 17% were large for gestational age.¹²

Thirty eight (38%) of low birth weight neonates were born to mothers with age of 21 to 23 years. Thirty six (36%) with age of 26 to 30 years and twenty six (26%) were born to age group of more than 30 years. Range of maternal age was 22-36 years. Mean age was 27.5 with SD of 4.1. Shrestha S et al in 2010 concluded that one of the common risk factors is maternal age of less than 20 years.¹³ Distribution of maternal morbidities in the study population were analysed, Seventy two (72%) of low birth weight neonates were born to mothers with anemia. Sixteen(16%) were born to mothers with leaking per vagina more than 24 hours, eight(8%)were born to mothers with Pregnancy induced hypertension and six (6%) were born to mothers with other systemic infection. Shrestha S et al analysed that common risk factors associated with preterm birth were inadequate antenatal checkup (52%), maternal age < 20 years (34.7%). Antepartum hemorrhage (23.4%) and pregnancy induced hypertension (13.1%).¹³

In our study thirty four (34%) were on breast feed, four (4%) were on orogastric feed and sixty six (66%) required intravenous fluid at the time of birth. Dias E and Gada S in 2014 studied on 100 low birth weight neonates from which 90% were breast fed, 4% were on orogastric feed and 6% were on intravenous fluid at the time of birth.¹²

Staffler A et al in 2013 studied that very low birth weight preterm infants are at risk of hypoglycemia once on Total parenteral nutrition¹⁴.

In the present study, neonatal jaundice, prematurity and RDS were the leading morbidities observed. Other studies from other places in India presented sepsis and prematurity as the leading cause for admissions¹⁵. 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%).¹⁶

Conclusion

Most of low birth babies are appropriate for gestational age. Neonatal hyperbilirubinemia was the leading cause requiring admission followed by Prematurity, sepsis, respiratory distress syndrome and birth asphyxia. Low birth weight and prematurity were the significant contributors to morbidity and mortality. Hence antenatal programs to prevent prematurity and low birth weight babies should be strengthened.

Declarations

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Conflict of interest: none

Ethical approval: done

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