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Morbidity profile and outcome of low-birth-weight infants in a tertiary care hospital in UT of Jammu and Kashmir.

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Abstract

Introduction: Advances in care of low birth infants has led to increased survival rates resulting in surge in number of low-birth-weight infants with comorbidities. As the number of low-birth-weight infants in Asia is high because of maternal malnutrition and as morbidity data of low birth infants is lacking, this study was undertaken to study morbidity and outcome in low-birth-weight infants.

Methods: A prospective observational study was conducted in NICU of associated hospital of government medical college over a period of six months in 2019 where in all low birth infants with weight less than 2500 grams but more than 500 grams were included and all their parameters were recorded in predesigned proforma. All the babies were managed by standard protocols and results of morbidity and outcome were analyzed by standard statistical methods.

Results: The incidence of low-birth-weight infants in our study was 17.01% (347/2041), out of which 57.63% were of LBW, 26.80% were VLBW and 15.56% were ELBW 227(65.41%) and 120(34.59%) were inborn and out-born respectively 182(52.44%) and 165(47.56%) were born by normal vaginal delivery and lower segment caesarean section respectively. In our study 98 babies were ventilated. The spectrum of various morbidities was sepsis, birth anoxia, shock, meningitis, hypoglycemia, respiratory distress syndrome, necrotizing enterocolitis, neonatal hyper bilirubinemia, seizures, and meconium aspiration.

Conclusion: The low-birth-weight infants account for about 17% of total neonatal admissions and 42% of neonatal deaths with two-thirds of deaths accounted by babies with weight less than 1500 grams. The major causes of morbidity and mortality were sepsis, shock and respiratory distress syndrome highlighting the importance of infection control practices and prevention of prematurity by improving antenatal care and maternal nutrition.

Keywords: Vaginal delivery, Low-birth-weight, Maternal malnutrition.

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Introduction

Low birth weight has been defined by the World Health Organization (WHO) as weight at birth of less than 2500 grams [1-5]. This practical cut-off for international comparison is based on epidemiological observations that infants weighing less than 2500 grams are approximately 20 times more likely to die than heavier babies [6]. Birth weight is an indicator of future health and survival of child. It is an important factor to determine whether the child is ready to adjust to his surroundings.

Low birth weight leads to inhibited growth, cognitive development and is also associated with chronic diseases later in life [7]. Low birth weight and prematurity are major determinants of perinatal survival as well as post-natal morbidity and present major health problems in developing countries [8].The prevalence of low birth weight is highest in the South Asian region.

As the region is populous, nearly half of global low birth weight infants are born in this region. India, the most populous country in South Asia shares a very high prevalence of Low Birth Weight (LBW) babies [9]. LBW is the strongest determinant of infant morbidity and mortality in India [10].

Currently nationwide data on birth weight in different states and districts is not available because as majority of births occur at home and these infants are not weighed soon after birth. The incidence of low birth weight in India has been reported to range from 21% to 33% as compared to 4.5% in industrially developed countries (UNICEF 1997).

In 2011, Indian statistical institute reported that nearly 20% of newborns have LBW in India [11]. Prevalence of low birth weight is higher in Asia than elsewhere in the world predominantly because of maternal malnutrition prior to and during pregnancy [12].

Methods

Aims and objectives

- To know the morbidity pattern amongst preterm and low birth weight neonates admitted in our hospital [13-15].
- To know the outcome of these babies

Inclusion criteria

All the babies admitted to NICU with birth weight less than 2500 grams were included in the study.

Exclusion criteria

Neonates <23 weeks of gestation or birth weight <500 grams.

Settings and design

A prospective observational study was conducted in the 10 bedded levels III NICU and 25 bedded level II NICU of associated hospital of medical college in the Union territory of Jammu and Kashmir [16]. The associated hospital is the main referral centre of neonatology besides having an adjacent obstetric centre with about 16000 annual deliveries. Study was conducted over a period of 6 months from 1st January to 30th June in 2019 [17-20].

All the babies with birth weight less than 2500 grams were registered and their complete residential addresses was recorded in a predesigned and pretested proforma. The demographic profile, mode of delivery and mode of transportation in case of referrals was also recorded [21]. Gestational age was calculated using Last Menstrual Period (LMP) and new Ballard scoring. Low Birth Weight (LBW) babies were further classified as Low Birth Weight (LBW), Very Low Birth Weight (VLBW), Extremely Low Birth Weight (ELBW) and Appropriate for Gestational Age (AGA), Small for Gestational Age (SGA) and Large for Gestational Age (LGA) [22].

All newborns with birth weight less than 2500 grams and greater than 500 grams were assessed for a period of one month after birth [23]. Babies were assessed for morbidities like birth asphyxia, jaundice, sepsis, respiratory distress syndrome, intraventricular hemorrhage, necrotizing enterocolitis, apnea, pulmonary hemorrhage. All the babies were examined, monitored, and managed by standard protocols. The morbidity profile and outcome of those babies within 1 month was analyzed.

Results

The total admissions in our study over a period of six months were 2041. Out of 2041 neonates, 347 (17.01%) were having birth weight of less than 2.5 kg and 1694 (82.99%) neonates were having birth weight of more than 2.5 kg. The further breakup of low birth babies as LBW, VLBW and ELBW is shown in Table 1, 227 neonates were inborn and 120 were out born [24].

Weight group	N	Percentage%
LBW (>1.5 Kg and <2.5 Kg)	200	57.63%
VLBW (>1 Kg and <1.5 Kg)	93	26.8%
ELBW (<1 Kg)	54	15.56%
Total	347	100%

Table 1. Profile of various LBW groups.

Out of inborn neonates 137 were LBW, 64 were VLBW and 26 were ELBW. Out born delivered included hospital delivered 105 and home delivered 15. Hospital delivered included 53 LBW, 28 VLBW and 24 ELBW neonates. Home delivered included 10 LBW, 1 VLBW and 4 ELBW neonates. The mode of delivery of each weight group is tabulated in Table 2 [25].

Mode of delivery	LBW	VLBW	ELBW	N	Percentage%
LSCS	107	54	4	165	47.55%
NVD	129	51	2	182	52.45%
Total	236	105	6	347	100%

Table 2. Modes of delivery.

The profile of babies and their outcomes who needed resuscitation with AMBU bag and those who needed ventilation is shown in Table 3 and 4.

Outcome	LBW	VLBW	ELBW	Total
Death	12	17	16	45
Lama	11	7	24	42
Discharge	1	0	0	1
Total	24	24	40	88

Table 3. Babies resuscitated with AMBU.

Outcome	LBW	VLBW	ELBW	Total
Death	8	8	10	26
Lama	0	0	0	0
Discharge	29	39	4	72
Total	37	47	14	98

Table 4. Babies treated with ventilation.

The profile and outcome of babies treated with surfactant is shown in Table 5.

Outcome	LBW	VLBW	ELBW	Total
Death	3	17	26	46
Lama	3	3	24	30
Discharge	20	45	4	69
Total	26	65	54	145

Table 5. Babies treated with surfactant.

The outcome and profile of babies with birth anoxia is shown in Table 6.

Outcome	LBW	VLBW	ELBW	Total
Death	9	9	8	26
Lama	2	0	2	4
Discharge	10	12	2	24
Total	21	21	12	54

Table 6. Outcome and profile of babies with birth anoxia.

The profile of babies with sepsis and their outcome is shown in Table 7.

Outcome	LBW	VLBW	ELBW	Total
Death	9	26	34	69
Lama	8	3	10	21
Discharge	73	20	2	95
Total	90	49	46	185

Table 7. Profile and outcome of babies with sepsis.

The profile of babies and their outcomes with shock, meningitis, hypoglycemia and respiratory distress syndrome is shown in Table 8 to Table 11 as under.

Outcome	LBW	VLBW	ELBW	Total
Death	13	28	36	77
Lama	11	3	10	24
Discharge	54	24	2	80
Total	78	55	48	181

Table 8. Outcome and profile of babies with shock.

Outcome	LBW	VLBW	ELBW	Total
Death	5	4	6	15
Lama	1	2	2	5
Discharge	9	8	0	17
Total	15	14	8	37

Table 9. Outcome and profile of babies with meningitis.

Outcome	LBW	VLBW	ELBW	Total
Death	3	8	14	25
Lama	0	0	8	8
Discharge	38	14	2	54
Total	41	22	24	87

Table 10. Outcome and profile of babies with hypoglycemia.

Outcome	LBW	VLBW	ELBW	Total
Death	3	8	14	25
Lama	0	0	8	8
Discharge	38	14	2	54
Total	41	22	24	87

Table 11. Outcome and profile of babies with respiratory distress syndrome.

The profile of babies with NEC is shown in Table 12.

Outcome	LBW	VLBW	ELBW	Total
Death	3	3	1	7
Lama	0	1	1	2
Discharge	2	0	0	2
Total	5	4	2	11

Table 12. Outcome and profile of babies with NEC.

The profile of babies with NNH is shown as under in Table 13.

Outcome	LBW	VLBW	ELBW	Total
Death	0	6	8	14
Lama	0	2	8	10
Discharge	53	26	1	80
Total	53	34	17	104

Table 13. Outcome and profile of babies with NNH.

The profile of babies with meconium aspiration is shown in Table 14 as under.

Outcome	LBW	VLBW	ELBW	Total
Death	3	3	6	12
Lama	0	1	0	1
Discharge	5	2	4	11
Total	8	6	10	24

Table 14. Profile and outcome of babies with meconium aspiration.

The profile of babies with seizures is shown in Table 15 as under.

Outcome	LBW	VLBW	ELBW	Total
Death	3	0	2	5
Lama	0	0	0	0
Discharge	7	2	2	11
Total	10	2	4	16

Table 15. Outcome and profile of babies with seizures.

The profile of babies who Left Against Medical Advice (LAMA) is shown in Table 16 as under.

Diagnosis	LBW	VLBW	ELBW	Total
Birth ANOXIA	2	0	2	4
Sepsis	8	3	10	21
Shock	11	3	10	24
Meningitis	1	2	2	5
RDS	0	12	24	36
NEC	0	1	1	2
MAS	0	1	0	1
Total	22	22	49	93

Table 16. Diagnosis and profile of babies who went LAMA.

The spectrum of various diagnoses is shown in Table 17.

Diagnosis	LBW	VLBW	ELBW	TOTAL
Birth ANOXIA	21	21	12	54
Sepsis	90	49	46	185
Shock	76	55	48	179
Meningitis	15	14	8	37
RDS	38	32	54	124
NEC	5	4	8	17
MAS	8	6	10	24
Total	253	181	186	620*

Table 17. Diagnosis in different weight groups. *: Some babies had more than one diagnosis.

The different diagnosis and weight patterns of babies who died in our NICU are shown in Table 18 as under.

Diagnosis	No. of deaths in LBW	No. of deaths in VLBW	No. of deaths in ELBW	Total
Birth anoxia	9	9	4	22
Sepsis	9	26	22	57
Shock	13	28	24	65
RDS	3	12	26	41
Total	20	30	26	76

Table 18. Diagnostic and weight profile of babies who died.

Discussion

During the study period the total of 2041 neonates were admitted in the hospital among which 1694 were normal birth weight and 347 were low birth weight. The incidence of low birth weight in our NICU was therefore 17.1% which is in accordance with the Indian statistics regarding the low-birth-weight incidence. In 2011, Indian statistical institute reported nearly 20% of new-born have low birth weight in India.

Out of 347 babies with birth weight of less than 2.5 kg, 200(57.6%) were LBW, 93(26.8%) were VLBW and 54(15.5%) were ELBW similar to Janaswamy et al. in their study on 250 low birth weights who had incidence of LBW, VLBW and ELBW as 42.8%, 24.2% and 12.1% respectively, and Yasmin et al. in their study on 931 low birth weights who had incidence of LBW, VLBW and ELBW as 71%, 22% and 7% respectively.

Out of 347 low birth weight babies 227(65.5%) were inborn and 120(34.5%) were out born. Out of 120 out born babies majority were hospital deliveries and 15 were home deliveries. 200(57%) babies were delivered by normal vaginal delivery and 147(43%) by LSCS. Janaswamy et al. in their study on 250 low birth weights showed comparable incidence of NVD's as 51.6% and LSCS as 48.4% [26].

Out of 347 admitted as LBW, there were 76 deaths. Thus, the mortality rate was 21% in our study. Ezeaka et al. studied outcome of LBW babies in Logos Nigeria and found mortality of 23.2%, which is similar to the mortality found in our study. Brito et al. also found a mortality of 23% in their study; however, the mortality rates among LBW neonates are variable between developing countries, possibly reflecting differences in health care facilities. One study by Njuguna et al. from Kenya demonstrated a mortality rate of 51.6% among LBW neonates [24].

The difference between mortality among LBW, VLBW and ELBW neonates was found to be statistically significant. Among LBW neonates 90% neonates survived and 10% died. In VLBW category 67.8% survived and 32.2% died. There was 48.1% mortality in ELBW group. This was found in several other studies like that of Gera et al. and Basu et al. This observation is consistent with our clinical understanding that survival decreases as birth weight decreases [23].

Shock was found to be present in a significant number of LBW neonates in our study and there was a significant statistical difference in mortality between the neonates who had shock and those who did not have shock (mortality 36.3% *vs*. 6.5%). Mortality due to shock was also higher in ELBW 24/48(50%) as compared to LBW 13/76(17.1%). This result is in conformity with other studies. Mukhyopadhya et al. stated that hypotensive shock predicted mortality in LBW babies. Basu et al. did a univariate analysis of several risk factors and concluded that among other factors shock is directly responsible for increased mortality in LBW neonates. Similar observations were made by Gera et al. [27].

Sepsis was found to be an important predictor of mortality in our study. There was a statistically significant difference in mortality between those neonates who had sepsis and those who did not have sepsis (mortality 30.8% *vs.* 11.7%). Out of 46 ELBW neonates having sepsis 22(47.8%) died. Similar observations were made in other studies. In a study done by Periera et al. overall 21 of 71 VLBW neonates died with sepsis 29%. The study concluded that sepsis related mortality is high in low-birth-weight neonates, mainly in extreme low birth weight neonates. Hornik et al. analyzed the results of all cultures obtained from VLBW infants admitted in NICUs from 1997 to 2012. Over 108000 VLBW infants were admitted during study period. Early onset sepsis occurred in 1032 infants and late onset sepsis occurred in 12204 infants [28].

The study found that early and late onset sepsis was associated with increased risk of death controlling for other confounders. A study conducted by Mukhyopadhaya et al. enrolled neonates with a birth weight <1000 g admitted to intensive care unit. They were analyzed for survival and development of major morbidity. The study found that major causes of mortality in the study sample were sepsis 46%, birth asphyxia 20% and pulmonary hemorrhage 19%. Thus, the major contribution to mortality was attributable to sepsis. Sepsis continues to be a major cause of mortality in newborns, particularly in premature and LBW neonates [29].

Respiratory Distress Syndrome remains a major cause of morbidity and mortality among LBW. Out of 347 low birth weight neonates 124 (LBW=38, VLBW=32, ELBW=54) had respiratory distress. Out of which 41(33.05%) died. Among ELBW neonates' mortality was 48.1%(26/54). There was a statistically significant difference in mortality between LBW neonates who received mechanical ventilation and those who did not receive mechanical ventilation. Among neonates who did not receive mechanical ventilation or bag and AMBU

ventilation only 6/151(3.9%) babies died and 96.1% survived while as among neonates who received mechanical ventilation, 73.5% survived and 26.5% died. Among neonates who were on bag and AMBU ventilation there was higher mortality as compared to those who were on mechanical ventilator 45(45.9%) neonates out of 98 who were on bag and AMBU ventilation died which is statistically very significant [30].

Mukhyopadhyay et al. found, similar results in a study that aimed at predicting mortality and major morbidity in extremely low birth weight neonates. Study by Chye et al. also found mechanical ventilation as a risk factor predicting mortality in LBW infants. The neonates who need mechanical ventilation are usually very sick besides being more exposed to ventilator associated problems like barotrauma, ventilator associated pneumonia, unintended respiratory alkalosis and impairment of hepatic, renal and cardiac functions leading to increased risk for adverse outcome. 42 patients left hospital due to non-availability of mechanical ventilator. Some of these patients were taken to private hospitals and some who were moribund were taken home by attendants.

Conclusion

Prematurity and low birth babies are one of the most important causes of neonatal mortality and morbidity, with degree of morbidity and proportions of mortality inversely related to birth weight. Respiratory distress syndrome, sepsis and shock are most important causes of mortality and morbidity. Prevention of prematurity, implementation of infection control practices and up gradation of neonatal care at all levels are main tools to mitigate this menace.

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