

Original Research Article

Clinical profile of low birth babies in NICU: a rural tertiary care hospital based study

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Received: 31 October 2017

Accepted: 25 November 2017

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ABSTRACT

Background: The low birth weight (LBW) infant remains at much higher risk of mortality than the infant at normal weight at birth. In the neonatal period when most infant deaths occur, the proportion of low birth weight infants is the major determinant of the magnitude of mortality rates. Mortality and morbidity among low birth weight babies are a major public health problem in our country. It is important to identify risk factors associated with LBW babies.

Methods: Prospective observational study was conducted on 222 neonates with low birth weight admitted in Neonatal intensive care unit (NICU) of Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College, Sawangi Meghe, Wardha from September 2015 to August 2017. Maternal risk factors and neonatal morbidities were recorded. The study was designed to assess the risk factors of LBW babies and their short-term outcome.

Results: 222 low birth weight babies were studied, among which 36(16.22%) were weighed less than 1500 grams and 186 (83.78%) were 1500-2500 grams. The most common maternal risk factors which were associated with very low birth weight were low socio-economic status, occupations with more strenuous activity, low maternal educational status, poor antenatal care, poor pregnancy weight gain and chronic illnesses. Anemia was present in 99 (44.595%) mothers. Among other risk factors during pregnancy oligohydramnios was present in 43 (19.369%) mothers, followed by preeclampsia in 42 (18.918%) mothers and pyrexia in 31 (13.963%) mothers. 166 (74.76%) babies are small for gestational age (SGA) babies. Overall mortality rate was 40.54%.

Conclusions: Most of LBW babies are SGA babies. Low socio-economic status, low maternal educational status and poor antenatal care were the important risk factors. Morbidity and mortality of low birth weight babies could be reduced considerably by proper health education, improved antenatal care, prompt identification of high risk pregnancies, proper referral, better nursing care and management.

Keywords: Low birth weight, Maternal risk factors, Neonatal intensive care unit, Outcome

INTRODUCTION

The world health organisation has defined Low birth weight as babies whose birth weight is less than 2500 grams irrespective of duration of gestation.¹ LBW is associated with perinatal and neonatal mortality and morbidity. Etiology of LBW is complex interplay of various maternal, fetal and socioeconomic factors. LBW at birth may be because of either prematurity or

intrauterine growth retardation due to various neonatal and maternal factors.

Nearly 50% of all infant deaths occur in neonatal period and the common cause is LBW.² LBW neonates are of Paediatric priority because they have low chances of survival than babies weighing with birth weight more than 2500 grams. India being the most populous country in South East Asia, shares the major burden of LBW

babies with incidence of about 30% as against developed countries like USA where it is 8.2%.³

Neonatal mortality is directly related to birth weight and functional maturity of various systems and they suffer from various morbidities like birth asphyxia, infections, hyperbilirubinemia, hypothermia, respiratory distress syndrome, apnea.⁴

The paucity of studies from central India and the increasing prevalence of this condition in NICU, instigated us to determine the maternal and neonatal risk factors of LBW babies admitted to NICU in our hospital, AVBRH, Jawaharlal Nehru Medical College, DMIMS, Sawangi, Wardha. The aim of this study was to have data on LBW related neonatal morbidity and mortality and its risk factors in our institution in order to reduce its incidence and their better outcome.

METHODS

A Prospective observational study was conducted on 222 neonates with low birth weight (less than 2500 grams) admitted in neonatal intensive care unit (NICU) of Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College, Sawangi Meghe, Wardha from September 2015 to August 2017. Neonates whose parents or guardians did not agree to be a part of study were excluded. Ethical clearance was obtained from institutional ethics committee. Informed consent was taken from parents of all LBW new-borns included in this study.

All of them were studied in detail with regards to prenatal history, natal history and neonatal course. Their mothers' previous obstetric history, family history, antenatal, natal and post-natal risk factors which includes maternal chronic diseases, prolonged rupture of membranes (PROM), bleeding, pregnancy induced hypertension, drugs taken during pregnancy, gestational age, assessment by LMP, small for date, low birth weight baby, perinatal asphyxia, traumatic delivery, septicaemia and hyperbilirubinemia were recorded.

Complete clinical examination, anthropometry, investigations and treatment given were noted down. All

this information was recorded in predesigned and prevalidated proforma.

The weight of the neonate with no clothing was recorded on digital weighing scale. It was done on weighing machine manufactured by crown medical private limited, Mumbai. Daily standardization of the machine was done. 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 type method) from occipital protuberance to supraorbital ridges in the forehead.

General examination was done in detail, vital parameters (heart rate, respiratory rate, temperature, 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, blood culture, blood sugar level, C-reactive protein and chest X-ray.

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 and Fischer's exact test. 'P' value below 0.05 was considered significant.

RESULTS

In the present study 222 new-borns with low birth weight admitted in our NICU were divided into 2 groups based on their birth weight. Group 1 was babies weighing between 1500-2500 grams (186/83.78%) and Group 2 was babies weighing less than 1500 grams (36/16.22%). Out of 222 babies, 119 (53.60%) were male babies and 103 (46.40%) were females (Table 1). We found large proportion of male babies (1.5:1-male:female ratio). Male gender was associated with low birth weight; however, it was statistically not significant (P value: 0.402).

Table 1: Distribution of babies according to gender.

Groups	Gender		Total	χ ² value	P-value
	Male	Female			
Group 1	102	84	186	0.7035	0.402, ns
Group 2	17	19	36		
Total	119 (53.60%)	103 (46.40)	222 (100%)		

Table 2: Socio-demographic characteristics of the neonates.

Socio-demographic characteristics		Neonate weight <1500 gms	Neonate weight >1500 gms
Socio-economic class	Low	34	84
	Middle	02	102
	High	00	00
Mother's occupation	Housewife	04	133
	Labour	24	39
	Farmer	08	14
Mother's literacy	Illiterate	34	71
	Primary	01	109
	Secondary	01	06
Mother's pre-pregnancy weight	40-49	06	01
	50-55	25	83
	56-60	24	82
	>60	01	20
Time of ANC registration (trimester)	First	01	52
	Second	07	123
	Third	28	11
Total		36	186

Table 3: Obstetrical history of the neonates (n=222).

obstetrical history		Neonate weighing <1500 gms	Neonate weighing >1500 gms
Gestational age	<32	01	01
	32-37	35	67
	>37	00	118
Maternal disease	Hypertension	04	18
	Sickling	09	11
	Hypothyroidism	04	14
	Cardiac disorders	03	10
	Bronchial asthma	02	09
	No problem	14	124
Anemia	Absent	06	117
	Present	30	69
Obstetrical problems	Oligohydramnios	13	30
	Pre-eclampsia	07	35
	Pyrexia	08	23
	polyhydramnios	00	05
	Prom	01	03
	Chorioamnionitis	01	03
	Antepartum hemorrhage	00	03
	cervical incompetence	01	01
	no problem	05	83
	Total		36

Occurrence of low birth weight babies > 1500 grams were more in the mothers from middle socio-economic

group, whereas very low birth weight babies <1500 grams were more in the mothers from low socio-economic group which was statistically significant (p value: 0.000). Occurrence of low birth weight babies >1500 grams were more in mothers who were housewives, whereas very low birth weight babies < 1500 grams were more in the mothers who were labourers which was statistically significant (p value: 0.000).

Occurrence of low birth weight babies <1500 grams were more in mothers who were educated up to primary school, whereas very low birth weight babies <1500 grams were more in mothers who were illiterates which was statistically significant (p value: 0.000). Incidence of low birth weight babies in relation to pre-pregnancy weight of the mothers was statistically significant (p value: 0.000). Incidence of low birth weight babies in relation to the time of ANC registration was statistically significant in the present study (p value:0.000).

Table 4: Clinical presentations of low birth weight babies.

Clinical presentation	Babies weighing <1500 gms	Babies weighing >1500 gms
LBW with prematurity	33	27
Respiratory distress	32	20
Hyperbilirubinemia	00	40
Birth asphyxia	01	20
Feeding difficulties	00	17
Decreased activity	00	15
Hypoglycemia	00	07
Convulsions	00	04
Abdominal distension	00	04
Apnea	00	01
Hyperglycemia	00	01

Table 5: Outcome of studied LBW babies (n=222).

Outcome	Babies weighing <1500 gms	Babies weighing >1500 gms
Discharged	11	121
Death	25	65

LBW babies (83.78%) and VLBW babies (16.22%) were significantly related to gestational age (p value: 0.000). There were no maternal diseases in 66.67% and 38.88% cases of LBW and VLBW babies respectively. Anemia was present in 37% and 83% mothers of LBW and VLBW babies (p value: 0.000). Obstetrical problems were not present in 44.6 % and 13.88% cases of LBW and VLBW babies respectively (p value: 0.014).

Prematurity and respiratory distress was more common clinical presentation in VLBW babies (91.6%) than LBW babies (15%) which was statistically highly significant (p

value:0.000). Jaundice, birth asphyxia, feeding difficulties, decreased activity, hypoglycaemia, convulsions, abdominal distension, apnoea, hyperglycaemia were the other presentations during the hospital stay.

Table 6: Mortality in relation to birth weight.

Birth weight	<1 kg (n=14)	1-<1.5 kg (n=22)	1.5-2.5 kg (n=186)	Total (n=222)
Neonatal death	14 (100%)	11 (50%)	65 (35%)	90 (40.54%)

Discharge rate was higher in LBW (65.05%) babies than that of VLBW (30.55%) babies but death rate was significantly (p value: 0.000) higher in VLBW (69.44%) than that of LBW (34.9%) babies.

As the birth weight increases, the mortality decreases, and this was statistically significant in our study (p value: 0.001).

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 222 neonates with low birth weight admitted in NICU of Department of Paediatrics of Acharya Vinoba Bhave Rural Hospital. The present study highlights the etiology, risk factors, clinical profile and immediate outcome of LBW babies in a tertiary care hospital.

In the present study, males were 119 (53.601%) and females were 103 (46.396%) with male to female ration of 1.15:1. Rahman K et al studied 1099 neonates during their study period out of which 51.04% were males and 48.95% were females.⁵ In study conducted by Arefin MS et al it was found that during the study period 58% males and 42% females were LBW babies.⁶

In the present study most of mothers were from low socioeconomic group 118 (53.15%). Followed by middle socioeconomic group 104 (46.85%) socioeconomic status of mothers in relation to LBW babies revealed statistical significant difference in our study. Low socioeconomic status may be responsible for their poor nutrition, less extra dietary intake and less affordable to health expenses. Dhankar M et al also reported that LBW was more common in lower socioeconomic group.⁷ Arefin MS et al also reported that incidence of LBW babies was more from low and middle socioeconomic group.⁶

In the present study, out of 222 mothers of LBW babies, 137 (61.711%) mothers were housewives, 63 (28.378%) mothers were labourers and 22 (9.909%) mothers were farmers. 47.297% mothers were illiterate, 49.549% mothers were educated upto primary school and 3.153%

mothers were educated upto secondary school. We found that LBW babies were more among housewives than agriculture workers or labourers, which might be explained by lower socioeconomic status of the women. We also found that more proportion of LBW babies were among illiterate and primary educated mothers. Lower level of education might have associated with lower health awareness and health seeking behaviour of the mothers. This may be explained by the increased awareness of educated women regarding available health services leading to change in health seeking behaviour and intake of adequate nutrition.

Dhankar M et al found that maximum LBW babies (38%) were born to uneducated mothers.⁷ Mannan et al reported that LBW babies were more amongst housewives than labourers or farmers.⁸ In the present study out of 222 mothers who delivered LBW babies 48.65% mothers had a pre-pregnancy weight in between 50-55 kgs and 38.74% mothers had a pre pregnancy weight in between 56-60 kgs we have found that pre pregnancy weight of the mothers was also an important factor in relation to the incidence of low birth babies. Study done by Hirve S et al found that higher incidence of low birth weight babies was more among underweight mothers (<40kgs).⁹ A study done by Rizvi et al, found that pre pregnancy weight of mothers was one of the important indicator for the incidence of LBW babies.¹⁰

In the present study out of 222 mothers, 55.55% mothers had their ANC registration during second trimester and 36.484% mothers had only 2 antenatal visits. A higher number of very low birth weight babies were born to mothers who were registered in the third trimester and those with very less (only one) antenatal visit. This indicates the role of good antenatal care in preventing LBW babies. A study conducted by Dhankar et al found that higher incidence of low birth weight babies was associated with poor antenatal care by the mothers (38.4%).⁷ A study conducted by Ferrera et al also found that mothers who had poor antenatal care, delivered low birth weight babies (41.7%). In the present study, out of 222 low birth weight babies admitted in NICU, 53.15% babies were having gestational age of more than 37 weeks and most of them are small for gestational age (SGA) babies and 45.95% babies were in between the gestational age of 32-37 weeks.¹¹

Present findings were in accordance with other studies done by Roy KK and Arefin MS et al which showed similar observations.^{12,6} A study done by Rahman K et al that 43% of the low birth weight infants were born between 34-37 weeks of gestation.⁵ In the present study, out of 222 mothers of low LBW babies, majority of the mothers had hypertension (9.909%), followed by sickling (9.00%), hypothyroidism (8.108%), cardiac disorders (5.855%) and bronchial asthma (4.954%) we have found statistical significance between chronic illness in the mothers and incidence of LBW babies in the present study. Arefin MS et al reported that there is significant

association between chronic illness in mothers and incidence of LBW babies with the percentage of 47.40%.⁶

A study done by Gupta MK et al found that 53% of LBW babies born to mothers who had chronic illness.¹³ In the present study out of 222 mothers of low birth babies, 44-59% mothers were found to be anaemic during pregnancy and it was statistically significant with the incidence of low birth weight babies in our study. Deshmukh et al in urban area of Nagpur, identified maternal anemia had significant, four times risk of low birth weight than non anemic.¹⁴ Anand et al from rural Wardha and Mavalankar from Ahmedabad found presence of anemia during pregnancy was significantly associated with LBW and SGA respectively.^{15,16}

In a study done by Rizvi found that mothers who did not taken iron supplements during pregnancy had increased odds of having an LBW baby.¹⁰ Anaemia is prevalent in India especially among pregnancy mothers. Government of India has IFA supplementation program to reduce the anemia and prevent adverse pregnancy outcome.

In the present study, out of 222 mothers of low birth weight babies, 19.369% of mothers had oligohydramnias, 18.91% mothers had preeclampsia, 13.963% mothers had pyrexia, 3% mothers had other risk factors like PROM, APH, cervical incompetence, chorioamnionitis, polyhydramnias etc., we have found that risk factors in the mothers during their antenatal period was also an important factor for delivering the low birth weight babies. Preeclampsia or pregnancy induced hypertension causes uteroplacental insufficiency, thereby increases chances of low birth weight babies.

A study done by Bian Y et al found that 49% mothers who had risk factors during pregnancy delivered low birth weight babies.¹⁷ A study done by Arefin Ms et al also showed significant relation between risk factors in the pregnant women and incidence of low birth weight babies.⁶ In the present study, out of 222 low birth weight babies admitted in NICU, 27.02% babies were admitted in view of low birth weight with prematurity, 23.423% babies were admitted in view of respiratory distress, 18.01% babies were admitted in view of other conditions like convulsions, birth asphyxia, feeding difficulties, decreased activity, abdominal distension, apnea, hypoglycemia and hyperglycemia which was statistically very significant.

A study done by Gupta MK et al found that 30% of the LBW infants presented with hyperbilirubinemia, 28.5% LBW infants presented with respiratory distress and 23.5% of LBW infants presented with septicemia.¹³ A study done by Minare M et al found that majority (67%) of the LBW infants presented with neonatal sepsis, birth asphyxia, respiratory distress and hyperbilirubinemia.¹⁸ In the present study, out of 222 babies admitted, mortality rate of 40.54% was seen in LBW babies and 59.45%

LBW babies were discharged there was significantly high mortality rate in our study, probable reason could be that our hospital is tertiary referral centre and we have included the out born babies in the present study. When compared among the individual group, the mortality rate increased significantly from LBW (>1500grams) (35%) to VLBW (1<1500 grams) (50%) to ELBW (<1kg) (100%). The similar trend of significant increase in mortality with decrease in birth weight was also observed by Arefin MS et al and Begum HA et al.^{6,19} A study done by Arefin MS et al also showed overall survival and mortality rate of 48% and 40% respectively.⁶ A study done by Begum HA et al also found mortality and survival rate of about 51% and 34.4% respectively.¹⁹

CONCLUSION

Birth weight is considered as the single most crucial determinant of chances of survival, freedom from morbidity as well as healthy growth and development of a new-born. Magnitude of LBW is a sensitive indicator of public health. The association of anaemia, low socioeconomic status, and occupation with more strenuous activity, low educational status, poor antenatal care, chronic illness in mothers and poor pregnancy weight gain has been observed in this study.

Well known social, reproductive and health related determinants of LBW were quite prevalent in this community as revealed by our study, majority of which could be prevented or modified. Therefore, some strategies addressing improvement of literacy level of the mothers thereby increasing utilization of the existing maternal health services and making sure that mothers at greater risk of delivering LBW babies receive appropriate care, may provide same opportunity to reduce LBW babies in this rural area of Maharashtra, India. Further studies need to be done and corroborated in this regard.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kumar M, Swarnkar K, Vagha J. Clinical profile of low birth babies in NICU: a rural tertiary care hospital based study. *Int J Contemp Pediatr* 2018;5:239-44.