



A Study of Course and Outcome of Babies Weighing less than 1500 Grams at Birth after Discharge from NICU

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Abstract

Introduction: WHO defines very low birth weight babies as birth weight <1500 gms at birth irrespective of gestational age. In India VLBW babies constitute 4 -7% of live births and 30% of neonatal death. They are prone to a large variety of complications such as hypothermia, RDS, infection and require proper NICU care. Based on the socioeconomic status of the parents, overcrowding of beds etc various institutions follow various guidelines to discharge VLBW babies. Hence this study aims to study the course and outcome of VLBW babies discharged at 1500 gms weight.

Materials and Methods: This is a longitudinal follow up study done between September 2017-september 2018 with thorough history and examination for all the outborn and inborn vlbw babies based on a predesigned proforma. The criteria upon which the baby is discharged and the outcome were noted.

Results: Out of 472 babies admitted to NICU during the study 33(7%) were VLBW. And 12% of them were discharged at 1500 gms or less. 10 (83.3%) came back for follow up and 2 (16.7%) infants died. Both infants discharged at <1200 gms accounted for 100% of deaths with main cause presumed to be sepsis. 6 out of 10 surviving babies achieved 15g/kg/day weight gain and 3 babies developed respiratory infections and 1 had seizures.

Conclusion: Discharge of a VLBW baby at 1500gms weight was found to be safe with proper parental counselling, appropriate newborn care and regular follow-up.

Introduction

“Children’s health- Tomorrow’s wealth”

Children are the wealth of any country. They are the most valuable asset for any society. They are the builders of the future of any nation.

The WHO defines Very low birth weight babies (VLBW) as birth weight < 1500 grams at birth irrespective of gestational age. ⁽¹⁾ In India VLBW babies constitute 4% to 7% of the live births and approximately 30% of neonatal death. ⁽²⁾

Risk factors for LBW include mothers with multiple pregnancies, previous low birth weight infants, poor nutrition, heart disease or hypertension, drug addiction, alcohol abuse insufficient prenatal care, environmental factors, smoking, lead exposure, other types of air pollutions, infection during pregnancy, poor blood flow to the uterus, Smoking, drinking, using drugs, and poor nutritional habits. ^{2,3}

Main complications found in low birth weight babies are Asphyxia, Hypothermia, Bronchopulmonary dysplasia, Hypoglycemia, Hyperbilirubinemia, infection, anemia, retinopathy and dehydration⁴.

ELBW infants are at more risk for the same health and neuro-developmental problems than VLBW babies. Neurological, neuro-developmental, neurosensory, and functional morbidities increase with decreasing birth weight. Ranges of surviving ELBW infants with moderate or severe disability start at 20-30 % for the heavier ELBW group (700-1000 grams BW) and are reported to be approximately 30% to 50% for infants born at the limits of viability (less than 25 weeks of gestation). Many children demonstrate more than one disability – e.g. severe vision impairment, hearing impairment, cerebral palsy, mental retardation^{5,6,7,8}

The outcome in VLBW babies is mainly related to gestational age, birth weight, and diseases of the newborns, available care in facilities such as NICU, time of discharge, postnatal care and follow-up.⁽³⁾ However early home discharge of preterm infants is a priority in developing countries due to poor socio-economic status and personal reasons and overcrowding at neonatal care facilities etc. There is a wide variation in home discharge policies for VLBW infants which is constantly debated up on like 1800gms⁽⁴⁾ to 1500 gms⁽⁵⁾ or no weight criteria at all⁽⁶⁾ weight at discharge play an important role in determining the survival and future outcome of these babies.

The study of the risk factors of neonatal death, indicators of the several aspects of mother and child healthcare, enables us to understand the links in the chain of determinant events that lead to death and to identify groups exposed to different risks. In the case of VLBW newborns, the study of factors associated with death may lead to the critical analysis of healthcare services and actions aimed at improving care for this group. Therefore, studies may help to identify the different healthcare needs and provide subsidies

for interventions aimed at reducing infant death during the early prenatal period. Hence this study. Parents, physicians and schools are seeing increased numbers of children presenting with the major and minor neuro-developmental morbidities associated with prematurity. Some of these children have cerebral palsy, vision impairment, hearing loss, and/or mental retardation. Approximately one-third of ELBW children have been reported to receive educational placements outside of the regular classroom.^{9,10} VLBW children, which includes the ELBW population, show lower rates of high school graduation than normal BW children and are less likely to go to college than are full-term babies.^{11,12}

The “take-home” message for the post-NICU management of the ELBW infant is that, given the high risk for the adverse sequelae of prematurity, every ELBW infant needs extra-vigilant monitoring and early referral for concerns. Many procedures that might be considered optional for larger LBW infants become essentially mandatory for the ELBW infant - including hearing assessment, close ophthalmologic follow-up, ongoing Neuro-developmental assessment, and assessment of school performance.

Materials and Methodology

Objectives of the Study

This was a longitudinal follow up study and was carried out in the Department of Pediatrics (NICU, Nursery), Department of Pediatrics (Out Patient Department), HI-TECH Medical College & Hospital, Bhubaneswar in the time frame of November 2017 to October 2020 in-order to determine whether discharge at 1500 gms was a safe criteria .

The data for Mother's risk factors like hypertension, eclampsia, ante-partum hemorrhage, PROM, history of preterm, multiple gestations, polyhydramnios, oligohydramnios, antenatal steroids was also taken. The data of the baby from the Resuscitation necessities, APGAR Scoring ,Gestational Age, Ballard scoring, need for nasal continuous positive airways pressure

(NCPAP), surfactant therapy and mechanical ventilation ,Other problems encountered during neonatal stay, discharge criteria and the weight at discharge including other anthropometric measurements was taken.

Upon follow up the frequency of disease, complications, growth and developmental outcomes was assessed.

Inclusion Criteria

- Mothers of low birth weight babies who are interested to participate in the study.
- All very low birth weight babies admitted to NICU at HI-TECH Medical College & Hospital, Bhubaneswar and all the VLBW babies attending the outpatients Department for follow up by reviewing their hospital records if available.

Exclusion Criteria

- Mothers with physical disabilities and impairments, mothers who are not interested to participate in the study.
- Very low birth weight babies who cannot be followed up because of various reasons including refusal of consent.

Very low birth weight babies having multiple congenital anomalies incompatible with life or suffering major trauma during perinatal or postnatal period were not included

Before enlisting for this study, written informed consent was obtained from the parents and statistical data was analysed using SPSS software.

Results and Discussion

Total of 530 neonates were admitted over two years hospitalized in HI-TECH Medical College & Hospital, Bhubaneswar NICU, out of which 110 were VLBW neonates. 42 patients were excluded as 60 of which hospitalized after 24 hours and 8 others were discharged against medical advice by parent's request. In these 60 babies with birth weight less than 1500g admitted in NICU and gestational age ranging from 23 to 37 weeks were studied.

As seen in table No. 1, it was observed that 56.67% mothers were in 21 – 25 years age group, 31.67% in 26 – 30 years age group and 11.67% of mothers were in 31 – 35 years age group. The mean age of mother was 26.45 ± 2.31 . The incidence of very low birth weight was 93.33% in primi and 6.67% in multipara. 98.33% babies were delivered by LSCS and 1.67% were delivered by spontaneous vaginal delivery. 65.00% mothers were residents of urban area and 35.00% patients were from rural area. 68.33% patients had consanguinity in marriage whereas 31.67% were non consanguinous. 78.33% patients were literate and 21.67% patient was found illiterate. 73.33% patients had occupation as House wife and 26.67% patients were working women.

51.67% of babies had gestational age between 23 to 27 weeks, 26.67% babies between 28 to 32 weeks, 18.33% babies between 33 to 37 weeks and 3.33% had gestational age more than 37 weeks. (Table 1).

Table No. 1 Characteristics of Mothers of very low birth weight infants admitted to NICU

Social Profile of Mothers		No. of Patients	Percentage (%)
Mothers Age in Years	21 – 25	34	56.67%
	26 – 30	19	31.67%
	31 – 35	7	11.67%
Parity	Primi	56	93.33%
	Multi	4	6.67%
Mode of Delivery	LSCS	59	98.33%
	Vaginal Delivery	1	1.67%
Residential Area	Urban	39	65.00%
	Rural	21	35.00%
Gestational Age	23 – 27	31	51.67%
	28 – 32	16	26.67%
	33 – 37	11	18.33%
	> 37	2	3.33%
Consanguinity	Yes	41	68.33%
	No	19	31.67%
Education	Literate	47	78.33%
	Illiterate	13	21.67%
Occupation	House Wife	44	73.33%
	Working	16	26.67%

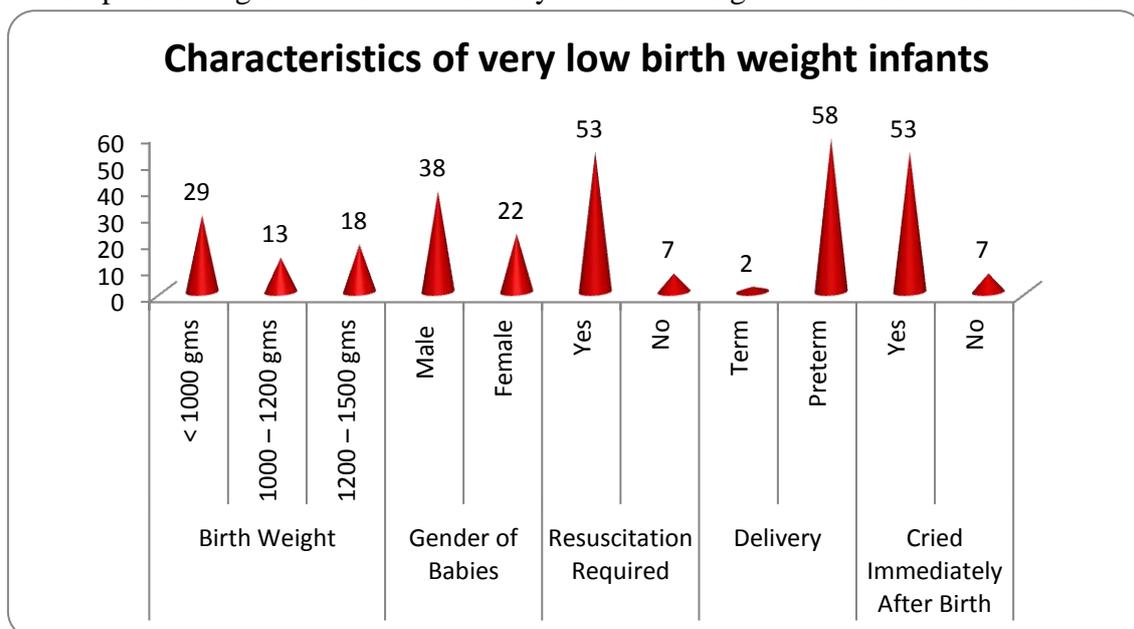
Table No. 2 Conditions of Mothers of very low birth weight infants admitted to NICU

Risk Factors		No. of Patients	Percentage (%)
Anemia	Yes	46	76.67%
	No	14	23.33%
Hypertension	Yes	13	21.67%
	No	47	78.33%
Diabetes Mellitus	Yes	2	3.33%
	No	58	96.67%
RH Negative	Yes	19	31.67%
	No	41	68.33%
Multiple Gestation	Yes	11	18.33%
	No	49	81.67%
HIV	Yes	0	0.00%
	No	60	100.00%
Hepatitis – B	Yes	0	0.00%
	No	60	100.00%
Syphilis	Yes	0	0.00%
	No	60	100.00%
Other Medical Problems	Yes	22	36.67%
	No	38	63.33%
Hypothyroid	Yes	42	70.00%
	No	18	30.00%

Table No. 3 Characteristics of very low birth weight infants admitted to NICU

Characteristics of very low birth weight infants		No. of Patients	Percentage (%)
Birth Weight	< 1000 gms	29	48.33%
	1000 – 1200 gms	13	21.67%
	1200 – 1500 gms	18	30.00%
Gender of Babies	Male	38	63.33%
	Female	22	36.67%
Resuscitation Required	Yes	53	88.33%
	No	7	11.67%
Delivery	Term	2	3.33%
	Preterm	58	96.67%
Cried Immediately After Birth	Yes	53	88.33%
	No	7	11.67%
Apgar Score at 1 minute	0 to 4	25	41.67%
	5 to 7	20	33.33%
	8 to 10	15	25.00%
Apgar Score at 5 minute	0 to 4	7	11.67%
	5 to 7	13	21.67%
	8 to 10	40	66.67%
Outcome	Death	7	11.67%
	Survival	53	88.33%

Figure No. 1 Graph showing Characteristics of very low birth weight infants admitted to NICU



As illustrated in Table No. 3, 48.33% infants were VLBW, 21.67% infants ELBW and 30% between 1200 to 1500 gms. 63.33% infants were male and 36.67% were female. In this study 88.33% infants had required resuscitation and 11.67% infants did not. 3.33% infants were delivered in term and 96.67% infants were delivered preterm. 88.33% very low birth weight infants were cried immediately after birth whereas 11.67% infants did not cry immediately. It was seen that 41.67%

infants had 0 to 4 apgar score at 1 minute, 33.33% infants were 5 to 7 apgar score at 1 minute and 25.00% infants were 8 to 10 apgar score at 1 minute. In this study 11.67% infants were 0 to 4 apgar score at 5 minute, 21.67% infants were 5 to 7 apgar score at 5 minute and 66.67% infants were 8 to 10 apgar score at 5 minute. The outcome as death of very low birth weight infants were 11.67% and 88.33% infants were survive after discharge from NICU.

Table No. 4 : Association of Gender of Infants with the outcome of infants

Gender of Infants	Outcome		Total	P Value
	Death (%)	Survived (%)		
Male	2 (5.3%)	36 (94.7%)	38 (100.0%)	Chi Square = 2.603 P = 0.107
Female	5 (22.7%)	17 (77.3%)	22 (100.0%)	
Total	7 (11.7%)	53 (88.3%)	60 (100.0%)	

From the above table it was seen that survival of very low birth weight infants did not correlate with gender of infants. A chi-square value is 2.603

with P value 0.107 which indicates that outcome was not found statistically significant with gender of infants at 95% confidence interval.

Table No. 5: Association of Gestational Age with the outcome of infants

Gestational Age	Outcome		Total	P Value
	Death (%)	Survived (%)		
23 – 27	4 (12.9%)	27 (87.1)	31 (100.0%)	Chi Square = 0.392 P = 1.00
28 – 32	2 (12.5%)	14 (87.5%)	16 (100.0%)	
33 – 37	1 (9.1%)	10 (90.9%)	11 (100.0%)	
> 37	0 (0.0%)	2 (100.0%)	2 (100.0%)	
Total	7 (11.7%)	53 (88.3%)	60 (100.0%)	

It was observed that survival of very low birth weight infants did not correlate with gestational age of mothers. A chi-square value is 0.392 with P

value 1.00 which indicates that outcome was not found statistically significant with gestational age of mothers at 95% confidence interval.

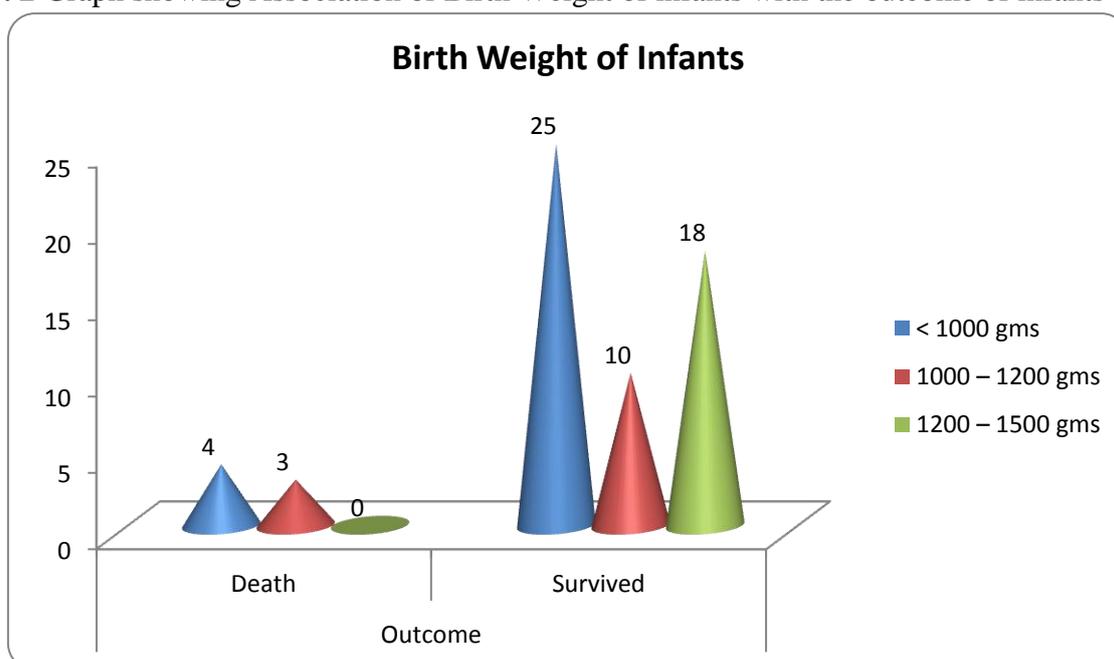
Table No. 6 Association of Birth Weight of infants with the outcome of infants

Birth Weight of Infants	Outcome		Total	P Value
	Death (%)	Survived (%)		
< 1000 gms	4 (13.8%)	25 (86.2%)	29 (100.0%)	Chi Square = 4.147 P = 0.126
1000 – 1200 gms	3 (23.1%)	10 (76.9%)	13 (100.0%)	
1200 – 1500 gms	0 (0.0%)	18 (100.0%)	18 (100.0%)	
Total	7 (11.7%)	53 (88.3%)	60 (100.0%)	

It was found that survival of very low birth weight infants did not correlate with birth weight of infants. A chi-square value is 4.147 with P value

0.126 which indicates that outcome was not found statistically significant with birth weight of infants at 95% confidence interval (Table 12).

Figure No. 2 Graph showing Association of Birth Weight of infants with the outcome of infants



It was seen that survival of very low birth weight infants did not correlate with delivery. A chi-square value is 0.357 with P value 0.550 which indicates that outcome was not found statistically significant with delivery at 95% confidence interval

It was found that survival of very low birth weight infants did not correlate with anemia of mothers. A chi-square value is 0.016 with P value 0.899 which indicates that outcome was not found statistically significant with anemia of mothers at 95% confidence interval.

It was found that survival of very low birth weight infants did not correlate with multiple gestations of mothers. A chi-square value is 0.051 with P value 0.822 which indicates that outcome was not found statistically significant with multiple gestations of mothers.

It was found that survival of very low birth weight infants did not correlate with Socio-Economic Status of mothers. A chi-square value is 1.404 with P value 0.496 which indicates that outcome was not found statistically significant with Socio-Economic Status of mothers. Mean gestational age of low birth weight infants admitted in NICU is 34.45 with standard deviation 2.19 of survived infants whereas mean gestational age of mothers 29.78 with standard deviation 1.36 of death infants.

It is found that mean birth weight of survived infants admitted in NICU is 1223.35 with standard deviation 132.22 and means birth weight of death infants is 1087.03 with standard deviation 124.56 of death infants.

In this study it was found that survival of very low birth weight infants correlates with educational status of mothers. A chi-square value is 15.119 with P value 0.001 which indicates that outcome was found to be statistically significant with educational status of mothers at 95% confidence interval. In present study it was observed that survival of very low birth weight infants correlates with residential area of mothers. A chi-square value is 6.613 with P value 0.010 which indicates that outcome was found to be statistically

significant with residential area of mothers at 5% level of significance

Conclusion

Birth weight and gestational age specifically predicts survival of preterm VLBW babies, facilitating decision making for obstetricians, neonatologists and parents. In the present study total survival rate was 88.3% with a mortality of 11.7%.

Survival among infants weighing between 1000 - 1200 grams is poor. In addition to severe prematurity, the poor survival among these infants (1000 - 1200 grams) is most likely related to the fact that they were not offered mechanical ventilation. Mechanical ventilation should be offered to infants weighing between 1000 - 1200 grams as it may improve their survival even in institutions with limited resources.

Common antenatal and perinatal predictors of mortality in VLBW infants in India include maternal bleed, failure to administer antenatal steroids, low Apgar score, apnoea, extreme prematurity, neonatal septicaemia and shock.

Birth weight and gestational age specifically predicts survival of preterm VLBW babies, facilitating decision making for obstetricians, neonatologists and parents. Preterm VLBW infants have varying effects in terms of psychological and financial burden on family in developing countries like India. The factors leading to VLBW delivery in developing countries like India are modifiable and preventable.

This study concluded that significant difference found in course and outcomes of very low weight babies whose weight is less than 1500 grams after discharge from NICU attending OPD. This study also conclude that educational status of mothers, residential area of mothers and antenatal steroids are plays an important role in the outcome of very low weight babies whose weight is less than 1500 grams after discharge from NICU. This study also determines 1500 gms weight of babies at discharge may be a safe criteria for early

discharge. To improve outcome for out born babies, high risk pregnancies should be delivered at tertiary care centres. Early use of full course of antenatal steroids and support for regionalized transport teams can further improve neonatal outcomes. A continuing audit of these measures should be encouraged, and the results should be made available to all health care workers working in obstetrics and neonatology. Individual family status like educational qualification, residential area of the family and awareness regarding the care of babies shall be improved by the mothers as well as family members and it shall be look forward by the primary health centres to improve outcome of low birth weight babies.

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