Original Research Article

Short term outcome and predictors of mortality among very low birth weight infants at a tertiary level hospital

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Abstract

Background: While infant mortality rates have been decreasing steadily all over the world, changes in neonatal mortality rate have been much slower. Very low birth weight babies imposes a serious burden to the entire neonatal care service system, needing more hospital stay, management as a whole, and in brief more resource mobilization. In present study we studied short term outcome and predictors of mortality among very low birth weight infants at our tertiary level hospital. **Material and Methods:** Present study was Neonatal Intensive Care Unit working under Department of Paediatrics, SRTR Hospital and Government Medical College, Ambejogai, Beed, India. Study was hospital based, prospective, observational study. conducted in live born babies, with very low birth weight (<1500g) admitted NICU within 24 hours of delivery. **Results:** During study period, 132 VLBW neonates were studied. Total 121 mothers were studied (11 twin pregnancies), majority were of 19-25 years (55.37 %), multiparous (52.07 %), 29-34 weeks gestational age (72.73 %), delivered by caesarean section (58.68 %), Other maternal characteristics were presence of maternal hypertension (26.45 %), multiple pregnancy (7.44 %) and inadequate antenatal care (less than 3 ANC visits) (18.18 %). In present study majority of neonates admitted for VLBW were male (53.79 %), birth weight between 1250-1499 grams (59.85 %), had APGAR score at 5 min of ≥ 8 (74.24 %). Appropriate for gestational age neonates (48.48 %) were marginally less than small for gestational age neonates.(51.52 %). Immediately after birth 42.42 % neonates required resuscitation while 29.55 % neonates required intubation immediately after birth (29.55 %). During NICU stay 23.48 % neonates required mechanical ventilation. Mean hospital stay was 18.9 ± 9.82 days. At the end of 1 month of age, 26.52 % neonatal mortality was noted among VLBW neonates. Predictors of mortality noted were hyperbilirubinemia, hypoglycemia, sepsis, perinatal asphyxia, RDS and seizures, **Conclusion:** Proper asepsis, judicious use of antibiotics, timely intervention like CPAP, etc. reduce the mortality. Upscaling of all components (antenatal care, ACS, prevention of hypothermia and RDS management strategies) are required to decrease premature infant mortality.

Keywords: short term outcome, predictors of mortality, very low birth weight infants, sepsis

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INTRODUCTION

While infant mortality rates have been decreasing steadily all over the world, changes in neonatal mortality rate have been much slower. One of the commonest causes of neonatal mortality in India is prematurity and low birth weight. The WHO defines Very low birth weight neonates as birth weight less than 1500g at birth irrespective of gestational age. The survival rates of very-low-birth-weight (VLBW) preterm infants have increased over the past few decades owing to the introduction of antenatal steroids, surfactants, and advanced ventilation techniques.[1,2] Although the overall survival rates of VLBW

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infants have increased, these infants remain at risk of growth and neurodevelopmental problems.[3,4] In earlier studies, common antenatal and perinatal predictors of mortality in VLBW infants in India were maternal bleed, failure to administer antenatal steroids, low Apgar score, apnoea, extreme prematurity, neonatal septicemia and shock.[5] Very low birth weight babies imposes a serious burden to the entire neonatal care service system, needing more hospital stay, management as a whole, and in brief more resource mobilization. In present study we studied short term outcome and predictors of mortality among very low birth weight infants at our tertiary level hospital.

MATERIAL AND METHODS

Present study was Neonatal Intensive Care Unit working under Department of Paediatrics, SRTR Hospital and Government Medical College, Ambejogai, Beed, India. Study was hospital based, prospective, observational study. conducted for a period of 1 years (January 2019 to December 2019). Study approval was taken from institutional ethical committee.

Inclusion criteria: Live born babies, with very low birth weight (<1500g) admitted NICU within 24 hours of delivery.

Exclusion criteria: Babies with lethal congenital anomalies. Babies discharged against medical advice. Babies with estimated gestational age less than 24 weeks. Babies lost to follow up before 1 month of age.

Study was explained and written consent was taken from parents/guardians. Maternal and neonatal details were collected by reviewing history sheets, interview and clinical examination. In case record proforma maternal details such as antenatal history, any medical complications during pregnancy, treatment received, any obstetric complications (spontaneous/induced preterm labour, hypertensive disorders of pregnancy, PPROM, eclampsia, ante-partum haemorrhage, PROM, history of preterm birth in previous pregnancies, multiple gestations, polyhydramnios and oligohydramnios), intranatal care received and labour details (onset of labour, mode of delivery, outcome) were noted.

Neonatal details such as (gender, birth weight, resuscitation required, diagnosis on admission, treatment received, laboratory and radiological investigations done, hospital stay and outcome) were noted. Babies were followed up till 1 month of age.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

During study period, 132 VLBW neonates were studied. Total 121 mothers were studied (11 twin pregnancies), majority were of 19-25 years (55.37 %), multiparous (52.07 %), 29-34 weeks gestational age (72.73 %), delivered by caesarean section (58.68 %), Other maternal characteristics were presence of maternal hypertension (26.45 %), multiple pregnancy (7.44 %) and inadequate antenatal care (less than 3 ANC visits) (18.18 %).

Table 1: Maternal characteristics.

Maternal characteristics	No. of cases (n=121)	Percentage
Age (in years)		
19-25	67	55.37%
26-30	43	35.54%
31-35	11	9.09%
Parity		
Primi	59	48.76%
Multi	63	52.07%
Gestational age		
23-28	17	14.05%
29-34	88	72.73%
>34	16	13.22%
Mode of delivery		
LSCS	71	58.68%
Vaginal delivery	50	41.32%
Other		
Maternal hypertension	32	26.45%
Multiple pregnancy	9	7.44%
Inadequate antenatal care (less than 3 ANC visits)	22	18.18%

In present study majority of neonates admitted for VLBW were male (53.79 %), birth weight between 1250-1499 grams (59.85 %), had APGAR score at 5 min of ≥ 8 (74.24 %). Appropriate for gestational age neonates (48.48 %) were marginally less than small for gestational age neonates. (51.52 %). Immediately after birth 42.42 % neonates required

resuscitation while 29.55 % neonates required intubation immediately after birth (29.55 %). During NICU stay 23.48 % neonates required mechanical ventilation. Mean hospital stay was 18.9 ± 9.82 days

Table 2: Neonatal characteristics.

Neonatal characteristics.	No. of cases (n=132)	Percentage
Gender		
Male	71	53.79%
Female	61	46.21%
Birth weight (grams)		
<750	3	2.27%
750-999	19	14.39%
1000-1249	31	23.48%
1250-1499	79	59.85%
APGAR score at 5 min		
0-3	9	6.82%
4-7	25	18.94%
≥ 8	98	74.24%
Other characteristics		
Appropriate for gestational age	64	48.48%
Small for gestational age	68	51.52%
Required resuscitation	56	42.42%
Required intubation immediately after birth	39	29.55%
Required mechanical ventilation	31	23.48%
Mean hospital stay (days)	18.9 ± 9.82	

Neonatal complications observed in present study were neonatal hyperbilirubinemia (89.39 %), hypoglycemia (59.09 %), probable sepsis (49.24 %), perinatal asphyxia (46.21 %), RDS (42.42 %), screen positive sepsis (29.55 %), culture positive sepsis (24.24 %), seizures (15.91 %), HIE (8.33 %), NEC (4.55 %), pulmonary hemorrhage (1.52 %) and IVH (1.52 %),

Table 3: Neonatal complications..

Neonatal complications	No. of cases (n=132)	Percentage
Neonatal hyperbilirubinemia	118	89.39%
Hypoglycemia	78	59.09%
Probable sepsis	65	49.24%
Perinatal asphyxia	61	46.21%
RDS	56	42.42%
Screen positive sepsis	39	29.55%
Culture positive sepsis	32	24.24%
Seizures	21	15.91%
HIE	11	8.33%
NEC	6	4.55%
Pulmonary hemorrhage	2	1.52%
IVH	2	1.52%

At the end of 1 month of age, 26.52 % neonatal mortality was noted among VLBW neonates. Predictors of mortality noted were hyperbilirubinemia, hypoglycemia, sepsis, perinatal asphyxia, RDS and seizures,

Table 4: Neonatal outcome

Outcome	No. of cases (n=132)	Percentage
Death	35	26.52%
Survived	97	73.48%

DISCUSSION

VLBW infants frequently suffer morbidities such as chronic lung disease, nosocomial infections (NIs), necrotizing enterocolitis (NEC), intraventricular hemorrhage (IVH), periventricular leukomalacia (PVL), retinopathy of prematurity (ROP), and even death.[6] The main reason for increasing morbidity and mortality in VLBW neonates is due to their physiologic and metabolic immaturity. These neonates are prone for increased risk of hypoglycemia, jaundice, infection and re-hospitalization during their neonatal period. VLBW is one of the most serious challenges in Maternal and Child Health in developing countries. However, there are also other known contributory factors, which can be divided into neonate-

related or maternal-related risk factors. Examples of neonate-related risk factors studied in the literature include low Apgar scores, hyaline membrane disease (HMD), intubation and mechanical ventilation, sepsis and hemodynamic instability.[7,8] Maternal or obstetric risk factors include eclampsia, alcohol consumption, smoking, low socioeconomic status, scarce antenatal care and human immuno deficiency virus (HIV) infection.[9,10] Gupta *et al.*,[11] noted that primary causes of death among the VLBW infants were extreme prematurity (32.6%), pulmonary hemorrhage (28.5%), sepsis (18.3%), IVH (8.1%), RDS (6%), NEC (2%), pulmonary hypertension (2%), and aspiration (2%). Omar Abu S *et al.*,[12] studied 468 infants weighing 500–1500g at birth, 82% survived until discharge, major morbidities were Chronic Lung Disease (33%), necrotizing enterocolitis (10%), Intraventricular Hemorrhage of any grade (22.2%) and Periventricular Leukomalacia (3.8%). Cesarean sections were conducted in 75% cases and 49% cases were multiple births. In study by Michaelis IA *et al.*,[13] 173 very low birth weight (VLBW) infants were studied, overall mortality rate was 32.0%. 53,5% with a birth weight below 1000 g died during the admission. Main factors associated with mortality were lower gestational age and lower birth weight. Need for ventilator support and sepsis were associated with higher mortality, as were maternal factors such as HIV infection and age below 20 years. In a meta-analysis by Mohamed SO *et al.*,[14] neonatal hypothermia rate is high in VLBW infants and it is a risk factor for mortality and morbidity in VLBW infants. Risk factors for HT include low gestational age, asphyxia, improper control of the thermal environment, inadequate breastfeeding, mode and place of delivery. In a meta-analysis, pooled prevalence of hypothermia among VLBW infants was 48.3% (95% CI, 42.0–54.7%). Hypothermia in VLBW infants was significantly associated with mortality (OR = 1.89; 1.72–2.09), intra-ventricular hemorrhage (OR = 1.86; 1.09–3.14), bronchopulmonary dysplasia (OR = 1.28; 1.16–1.40), neonatal sepsis (OR = 1.47; 1.09–2.49), and retinopathy of prematurity (OR = 1.45; 1.28–1.72). Sadeghi Moghaddam P *et al.*,[15] noted that survival-to-discharge rate was 50% for infants weighing < 1000 g and 84.2% for those weighing 1000 – 1499 g. Survival rates at 26, 27, and 28 weeks' gestation were 54.1%, 63.6%, and 70.2%, respectively. An Apgar score of more than 5 at the first minute and more than 7 at the fifth minute were associated with better survival after hospital discharge. In the study by Shinde R *et al.*,[16] total survival rate was 86.6% with a mortality of 13.4%. Most important antenatal risk factor for VLBW were premature rupture of membrane (32.9%), Preeclampsia (31.7%) followed by multiple gestations (25.2%). Common morbidities in VLBW neonates are Neonatal jaundice, Probable sepsis, Apnea of prematurity and RDS. Survival improved with increasing gestational age and weight. Birth weight and gestational age specifically predicts survival of preterm VLBW babies, facilitating decision making for obstetricians, neonatologists and parents. In developed countries, RDS management includes invasive and non-invasive ventilation options, surfactant replacement therapy (SRT) and other adjunctive therapies. In developing countries with limited or absent ventilation facilities, management of RDS poses significant challenges.[17] Lizelle Van Wyk *et al.*,[18] noted that the combination of oxygen, nasal continuous positive airway pressure (CPAP) and surfactant therapy has the potential to prevent 42% of RDS-related deaths in sub-Saharan Africa, despite the financial implications. WHO does recommend supplementation with vitamin D, calcium and phosphorus and iron for very low birthweight babies and vitamin K at birth for low birthweight babies.[19] The current improved survival rates compared to the past may be the result of enhanced perinatal and neonatal care, improved standard resuscitation protocols, and increased administration of antenatal steroids and surfactant.

CONCLUSION

Proper asepsis, judicious use of antibiotics, timely intervention like CPAP, etc. reduce the mortality. Proper counseling while discharge regarding feeding, warmth care, asepsis, danger sign and need for follow up plays a pivotal role in the further outcome. Upscaling of all components (antenatal care, ACS, prevention of hypothermia and RDS management strategies) are required to decrease premature infant mortality.

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