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Original Research Article

Mortality and morbidity of very low birth weight and extremely low birth weight babies in neonatal period

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ABSTRACT

Background: Preterm birth is one of the major clinical problems in neonatology as it is commonly associated with perinatal mortality, serious neonatal morbidity and in some cases, it leads to childhood disability. The objective of this study was to find out the outcomes of VLBW and ELBW babies in the form of mortality and morbidity in neonatal period.
Methods: A cross sectional study was conducted in SNCU, MKCG Medical College, Berhampur, Odisha between 2011 to 2013. All babies with birth weight less than 1500gm, admitted between days 1 to day 7 of life were enrolled in the study. Babies were broadly divided in to two groups i.e.VLBW group (weight 1000-1499gm) and ELBW group (weight<1000gm). Details of antenatal history, sociodemographic profile and birth history including significant events were noted. Outcome measures included were death, cured and with sequelae.
Results: Total number of babies enrolled in this study were two hundred twelve (n=212) and following observations were made. Mortality of ELBW babies was 61.11% and that of VLBW babies was 26.41%. Death rate in babies with weight range 500-749gm, 750-999gm, 1000-1249gm and 125-1499gm was 87.50%, 53.57%, 30.76% and 20.97% respectively. It was found that morbidities such as RDS, HIE, shock and hypoglycemia are significantly higher in ELBW babies as compared to VLBW babies.
Conclusions: Extremely low birth weight babies have shown high mortality and morbidity compared to very low birth weight babies and its related death multiply when associated with complications like hyaline membrane disease, hypoxic ischemic encephalopathy, and sepsis.

Keywords: Extremely low birth weight**,** Morbidity, Mortality**,** Preterm babies, Very low birth weight

INTRODUCTION

Preterm birth is one of the major clinical problems in neonatology as it is commonly associated with perinatal mortality, serious neonatal morbidity and in some cases, it leads to childhood disability. Very low birth weight (VLBW) babies constitute approximately 4%-7% of all live births.[1] Many VLBW babies are preterm and thus physically small and physiologically immature and need a major share of effort, time and resources for their care. Significant advances in perinatal and neonatal care and changes in the approach to immediate resuscitation have resulted in improved survival rates among preterm infants.[1,2] The survival rate for extremely low birthweight (ELBW) infants has also increased dramatically with the advent of pulmonary surfactant replacement therapy and assisted ventilation.[3] Mortality in this sub group is still high and there is much disparity in survival between developed countries and low income countries like India. Maximum numbers of deaths in VLBW and ELBW

babies occur in the early neonatal period. The neonatal mortality rate of Odisha is 42 per 1000 live births which is much higher than the national averages (33 per 1000 live births).[4]

No study till date has been conducted in southern Odisha on mortality and morbidity of VLBW and ELBW babies with the existing health care facility. Since this area is densely populated with primarily illiterate and tribal people, there is a need to know exact incidence of morbidity and mortality of these babies for planning and monitoring of the healthcare and to modify the management policies. Thus, a study of morbidity and mortality of VLBW and ELBW neonates is very much relevant and fruitful in this scenario.

The objective of this study was to find out the outcomes of VLBW and ELBW babies in the form of mortality and morbidity in neonatal period.

METHODS

A cross sectional study was conducted in SNCU, MKCG medical college, Berhampur, Odisha between 2011 to 2013. Ethical clearance was taken from institutional ethical committee of MKCG medical college, Berhampur. Appropriate consent was taken from parents prior to enrollment in this study.

Inclusion criteria

- All babies with birth weight less than 1500g, admitted between days 1 to day 7 of life were enrolled in the study.

Babies were broadly divided in to two groups i.e. VLBW group (weight1000-1499g) and ELBW group (weight<1000g). Details of antenatal history, sociodemographic profile and birth history including significant events were noted. Clinical examination at admission and at regular intervals was done and investigations were done as per requirements. All babies were followed up to 28 days of life. Outcome measures included were death, cured and with sequelae. All complications developed during hospital stay were recorded.

Stastical analysis

The categorical data were expressed as proportions and numerical data were expressed as Mean±SD by using descriptive statistics. The effect of each predictors on the morbidity and mortality of very low birth weight and extremely low birth weight babies were compared using chi-square and fisher's exact test and relative risk, odds ratio and P value were calculated. A p value <0.05 was considered significant.

RESULTS

Total number of babies enrolled in this study were two hundred twelve (n=212) and following observations were made. Mortality of ELBW babies was 61.11% and that of VLBW babies was 26.41%. Death rate in babies with weight range 500-749gm, 750-999gm, 1000-1249gm and 125-1499 gm was 87.50%, 53.57%, 30.76% and 20.97% respectively (Table 1).

Out of the total deaths (n=81) occurred, 61(75.31%) no. of babies expired in the early neonatal period. RDS and sepsis were the leading cause of mortality in these babies i.e. 37.03 % and 34.56% respectively. RDS is the primary cause of death in ELBW babies whereas sepsis contributed to maximal mortality in VLBW babies (Table 2).

Table 1: Different ranges of birth weights and its mortality in new-borns.

Birth weight (g)	No. of babies	Survived	Mortality	Mortality (%)
500-749	16	2	14	87.50
750-999	56	26	30	53.57
1000-1249	78	54	24	30.76
1250-1499	62	49	13	20.97

Table 2: Distribution of expired babies in relation to birth weight and primary cause of death.

Cause of death	Birth weight (g)			
	<750 (%) (n=14)	750-999 (%) (n=30)	≥1000 (%) (n=37)	Total (%) (n=81)
RDS	6 (42.85)	13 (43.33)	11 (29.72)	30 (37.03)
Sepsis	3 (21.42)	9 (30.00)	16 (43.24)	28 (34.56)
HIE	2 (14.28)	3 (10.00)	6 (16.21)	11 (13.58)
Shock	2 (14.28)	3 (10.00)	2 (5.40)	7 (8.64)
Congenital	0 (0.00)	1 (3.33)	2 (5.40)	3 (3.70)
Apnoea	1 (7.10)	1 (3.33)	0 (0)	2 (2.47)

Table 3: Differences in different morbidities in ELBW and VLBW babies.

Morbidities	ELBW [n=72]	VLBW [n=140]	P Value
RDS	27 (37.50)	16 (11.42)	P<0.001
Shock	32 (44.44)	18 (12.85)	P<0.001
HIE	22 (30.55)	12 (8.57)	P<0.001
Sepsis	26 (36.11)	39 (27.85)	ns
NNH	21 (29.16)	32 (22.85%)	ns
Hypoglycaemia	20 (27.77)	20 (14.28%)	P<0.05
Apnoea	6 (8.33)	14 (10%)	ns
IVH	6 (8.33)	4 (2.85%)	ns
Electrolyte imbalance	6 (8.33)	6 (4.28%)	ns
Cong. Anomaly	2 (2.77)	4 (2.85%)	ns

P<0.05-statistically significant; P<0.001 highly significant; ns-not significant

Table 4: Relative risk of various morbidities in expired and survived neonates.

Morbidities	Expired (%) (n=81)	Survived (%) (n=131)	Relative risk	Odds ratio
RDS	30 (37.04)	13 (9.92)	3.733	5.339
Sepsis	28 (34.56)	37 (28.24)	1.222	1.342
Shock	29 (35.80)	22 (16.79)	2.139	2.763
HIE	11 (13.58)	23 (17.55)	0.773	0.737
Apnoea	5 (6.17)	15 (11.45)	0.539	0.508
Congenital anomaly	3 (3.70)	3 (2.29)	1.617	1.641
NNH	18 (22.22)	35 (26.71)	0.831	0.783
Hypoglycaemia	14 (17.28)	26 (19.85)	0.466	0.843
IVH	2 (2.46)	8 (6.10)	0.404	0.389
Dyselectrolytemia	3 (3.70)	9 (6.87)	0.539	0.521

It was found that morbidities such as RDS, HIE, shock and hypoglycemia are significantly higher in ELBW babies as compared to VLBW babies. Other important morbidities like sepsis, neonatal hyperbilirubinemia and apnea of prematurity were statistically insignificant between these two groups (Table 3).

When different morbidities were compared between expired and survival groups, it was observed that relative risks and odd's ratio were higher in expired patients with RDS, shock and congenital anomalies. RDS had highest relative risk of 3.733 with odd's ratio of 5.339 suggestive of significant impact on mortality (Table 4).

DISCUSSION

The mortality of babies with weights between 500-749gm is highest i.e. 87.50% as compared to 20.97% in babies with weight between 1250-1499gm in present study. Survival data of infants born at UCSF from 1998 to 2002 (inclusive) with weight 500-750gm, 751-1000gm, 1001-1250gm, 1251-1500gm were 74%,82%,92%,95% respectively.[5] There is wide variability in survival rate as reported in different centers.[6-8] Survival of very low birth weight babies is 73.57% as compare to 38.90% in extremely low birth weight babies. A study at AIIMS from 2001 to 2005 found 84.25% survival in very low birth weight babies and 69.2% in extremely low birth weight babies.[9] A study at PGIMER from 2009-2011 found 48% mortality in extremely low birth weight babies.[10] This is due to differences in the patient population, antenatal care, intranatal care, aggressive neonatal care and availability of NICU facilities. The highest mortality in lower birth weight groups is probably due to immaturity and physiological handicap as compared to higher birth weight groups. Data collected from different studies were primarily from tertiary set up hospitals with best facilities. Possible causes of slight increase in mortality in present study are due to SNCU set up with lack of sophisticated instruments. The mortality of very low birth weight babies in present study is much lower than extremely low birth weight babies as observed in other studies.

Respiratory distress syndrome was the primary cause of death in both ELBW and VLBW group of babies accounting for 37.03% of all causes of deaths. Sepsis and hypoxic ischemic encephalopathy (HIE) were the next common causes of death accounting for 34.56% and 13.58% of all deaths. A prospective study between 2009 to 2011 in PGIMER, Chandigarh found sepsis (46%), perinatal asphyxia (20%), pulmonary haemorrhage (19%) were the major causes of mortality in ELBW group of babies.[10] NICHDNRN centre data showed an average of 93% of respiratory distress syndrome in babies with <28 weeks of gestation.[11]

Data from Scopes and Einkeren hospital in Israel found 68% and 66% of infants developing RDS respectively.[12] The main cause of death in babies with respiratory distress syndrome was due to lack of surfactant. Mortality caused by RDS in our set up is probably due to lack of surfactant supplementation in majority of babies along with unavailability of adequate numbers of CPAP to all babies. Other factors that might have contributed to mortality were possibly overcrowding of patients leading to loss of quality health care and inadequate referral linkage.

The incidence of respiratory distress syndrome in extremely low birth weight babies was 37.5% as compared to 11.42% in very low birth weight babies. In one study, the incidence of respiratory distress syndrome was 38.8% in extremely low birth weight babies and 10% in very low birth weight babies.[9] Respiratory distress syndrome was higher in extremely low birth weight babies because of immaturity of lungs with inadequate surfactant production. The incidence of sepsis was 36.11% in ELBW babies and VLBW babies 27.85% which was insignificant. Common complications likeshock, respiratory distress syndrome, hypoxic ischemic encephalopathy and hypoglycaemia were significantly higher in ELBW babies. Similar findings were reported in other studies.[9,10,13] Lack of cerebral autoregulation, incomplete development and maturation of lungs, impaired defence mechanism of preemies puts them at risk of shock, respiratory distress syndrome and sepsis respectively.

Respiratory distress syndrome, sepsis and shock were the major morbidities having highest odds for mortality in VLBW an ELBW babies. It was also reported in other studies.[6,8] Hypotension was strongly associated with mortality.[6,14] Preterm infants have incomplete development and maturation of lungs. Alveolarisation, type 2 cell differentiation, surfactant production is impaired. This increases the chances of respiratory distress syndrome. Respiratory distress syndrome had highest odds for mortality in the present study. This was most likely due to less number babies received antenatal steroid and there was lesser provision of CPAP and surfactant administration in our set up. Shock was reported in 35.8% in the expired groups as compared to 16.79% in the survived group of babies which was highly significant. Shock had highest association with mortality as found in other studies. The auto regulatory blood pressure range in premature neonate is believed to be narrow and the normal blood pressure is to the lower elbow of auto regulatory curve. The possible reason is that sepsis, HIE and RDS were major causes of death in the present study and might have contributed to the aetiology of shock. Presence of congenital anomaly associated with low birth weight increases mortality as found in present study. Sepsis is commonest cause of mortality in developing countries and prematurity increases the risk to many folds.[15] Similarly sepsis was the major morbidity in present study contributing to mortality.

Limitations of this study were the primarily conducted in secondary care settings, so mortality and morbidity cannot be projected as the standards, study was conducted in a single hospital catering to a specific region of a state. Results of this study need to be corroborated with other regions of the country to come to a conclusion, many patients could not be given timely management due to inadequate equipment's, financial constraints, exact data of many babies who were referred from outside hospitals were only collected from available documents (referral sheet), gestational age adjusted mortality was not taken in to account rather mortality was decided based on birth weight, long term morbidities were not taken to account in this study beyond neonatal period.

CONCLUSION

Extremely low birth weight babies have shown high mortality and morbidity compared to very low birth weight babies and its related death multiply when associated with complications like hyaline membrane disease, hypoxic ischemic encephalopathy, sepsis. Death rate and the complications of very low birth weight and extremely low birth weight babies can be reduced by improving the standards of existing management system of new-born care. Further researches are also to be carried out to bridge up the gaps and to find out the preventable factors which will help to decrease the preterm mortality. Mortality and morbidity of very low birth weight (VLBW) babies In SNCU settings are at par with tertiary care settings.

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