

Research Article**Morbidity and Mortality Profile of LBW Babies and Their Growth and Neurodevelopment Outcome at 1 year- NICU, Government General Hospital, Kakinada****D. Manikyamba¹, N. Madhavi², A. Krishna Prasad², I.V. Padmavathi³, Anitha⁴**¹Prof & HOD, ²Associate Prof, ³DM post graduate, ⁴Post graduate, Department of Paediatrics, Rangaraya Medical College, Government General Hospital, Kakinada, Andhra Pradesh, India***Corresponding author**

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Abstract: Low birth weight (LBW) babies are prone for various complications which effect the short term and long term outcome of these babies. Although technological advances in neonatal care have helped to improve survival of LBW babies, significant number of them remains with severe sequelae. Hence the present study was taken up to evaluate the immediate complications and long term outcome in terms of growth and development of LBW babies. A hospital based prospective observational study was conducted from March 2012 to August 2013. LBW babies admitted in NICU were enrolled in the study. Their complications during hospital stay were recorded. Survived babies were followed up for one year to monitor their growth and development. Out of 700 LBW babies enrolled in the study 73.8% were preterm and 26.2% were term IUGR. Overall mortality was 23.7%. Major causes of mortality were RDS and sepsis among preterm babies and sepsis and birth asphyxia among term IUGR babies. Out of 534 babies followed up, 178 babies were lost to follow up. 6.2% expired, 31% had poor catch up growth and 22% had developmental delay. Improvement of perinatal and neonatal services at Tertiary care centre can reduce LBW mortality.**Keywords:** Low birth weight, Neurodevelopment, Mortality and morbidity profile

INTRODUCTION

Birth weight is the most important biological indicator determining the chances of survival in the immediate newborn period as well as the growth and development and overall health status in infancy, childhood and even adulthood. Low birth weight is associated with increased neonatal mortality and morbidity, compromised growth and cognitive development. Increased risk of cardiovascular and metabolic disorders in adult life has also been reported [1].

Current Neonatal mortality rate (NMR) in India is 29 in 2013. Three fourth of neonatal deaths occur among low birth weight newborns. India Newborn Action Plan (INAP) was started on September 18th 2014 with a goal of NMR less than 10 by 2030[2]. Although technological advancements in perinatal and neonatal care have helped to improve survival of low birth weight babies, significant number of them remains with severe sequelae such as malnutrition, recurrent infections and neurodevelopmental handicaps. Hence the emphasis should be on intact survival. The studies conducted in developed countries report intact survival without handicaps in 85% of infants born less than 1500 gm (VLBW). This improvement has not been seen on a

global scale. The data from the developed countries can not readily be extrapolated to developing countries because of major differences in the availability of intensive care facilities, demographic and socio economic conditions. Data on morbidity and mortality profile and long term neurodevelopmental outcome of low birth weight babies from developing countries like India is scarce and is essential for planning and improvement of perinatal and neonatal services based on local needs. Hence the present study was taken up to evaluate the immediate complications as well as physical growth and neurodevelopmental outcome at 1 year follow up of LBW babies admitted and treated in our NICU.

MATERIALS AND METHODS

The present study was a hospital based prospective observational study conducted in NICU, Government General Hospital, Kakinada over a period of 18 months from March 2012 to August 2013. 700 LBW babies admitted in NICU were enrolled in the study. Babies with major congenital malformations were excluded from the study. Using a predesigned proforma maternal and neonatal details were collected. Maternal sociodemographic data, previous obstetric history and any complications during present pregnancy

like anaemia, PIH, APH, fever and UTI were recorded from history or available antenatal records.

Details of new born like birth weight / admission weight, gestational age based on LMP and Modified New Ballard’s Score were noted. Any complications during their hospital stay were recorded. At discharge, counselling was given to mothers regarding warmth care, feeding technique, asepsis and danger signs.

Discharged babies were followed up every week in first month, at immunisation visits, i.e. 6, 10, 14 weeks and then at 6,9&12 months of age. At follow up visits any medical complications were noted, anthropometric data were collected and neurodevelopmental assessment was done by using Trivandrum developmental screening Chart [3]. If any delay in the development was identified, mothers were counselled about early stimulation of these babies. Definitions used Hyaline membrane disease was diagnosed based on onset of respiratory distress within 6 hrs and characteristic radiological findings. Sepsis was diagnosed based on clinical features, positive septic screen and positive blood cultures. Hypoglycaemia was defined as RBS < 40 mg/dl, Necrotising enterocolitis was diagnosed based on modified Bells staging criteria and ETROP guidelines were followed for screening of ROP. BPD was diagnosed based on criteria of oxygen requirement at 36 weeks post menstrual age for babies <32 weeks gestational age and for babies > 32 weeks, oxygen requirement at 56 days post natal age. NSG was done on 3, 7 and 21 days to detect intraventricular haemorrhage.

For growth monitoring WHO Z score charts [4] were used for term babies and Fenton charts⁵ were used for preterm babies till 40 weeks of corrected gestation age and the WHO charts thereafter.

RESULTS

Of the 700 babies enrolled in the study 380 were males and 320 were females. 83 (11.85 %) were ELBW, 158 (22.57%) were VLBW and the rest 459 (65.56 %) weighed between 1.5 to 2.5 kgs. 517 (73.8 %) were preterm and 183 (26.2%) were term IUGR babies. Maternal age < 20 years (31.6%) and maternal anaemia (58.4%) were important factors predisposing to LBW babies. Other maternal factors for LBW babies included PIH (12%), previous history of preterm labour (9%), oligohydrominos (7%), APH (5%), maternal fever (5.7%) and UTI (5%).

Morbidity profile of LBW babies was given in table 1. Major complications noted during the hospital stay were hyperbilirubinemia (55%), RDS (42%) sepsis (41%) and apnoea (39%) among ELBW babies. Hyperbilirubinemia (62%), sepsis (58%), apnoea (40%) and RDS (23 %) were major complications in VLBW babies. Sepsis (56%) and birth asphyxia (23 %) were major complications in babies of 1.5 to 2.5 kgs.

Mortality profile of LBW babies was shown in Table 2. Overall survival rate of LBW babies was 76% whereas survival among ELBW was 32% and VLBW babies was 65%. RDS & sepsis were major causes of death in ELBW and VLBW babies. Whereas sepsis and birth asphyxia were major causes of death in babies weighing 1.5 to 2.5 kgs. Out of 700 LBW babies enrolled in the study 166 babies expired during their hospital stay , 534 babies were discharged and enrolled for follow up, of which 34 babies expired during follow up and 178 children were lost for follow up. Among 322 children who completed follow up, poor catch up growth was seen in 99 (31%), poor head growth was seen in 76 (24%) and developmental delay was seen in 70 (22%) babies. 116 children (36%) had recurrent hospitalizations mainly due to respiratory infections and diarrheal episodes. Follow up details of LBW babies were given in Table 3.

Table-1: Morbidity profile of LBW babies

Complications	1 kg	1-1.5 kg	1.5-2.5 kg	Total
Total no of babies	83	158	459	700
Hyperbilirubinemia	46(55%)	98(62%)	142(31%)	294(42%)
RDS	35(42%)	37(23%)	20(4%)	92(13%)
Sepsis	34(41%)	92(58%)	255(56%)	381(54%)
Birth Asphyxia	18(22%)	29(18%)	105(23%)	152(22%)
Hypoglycaemia	24(29%)	33(22%)	45(10%)	102(15%)
NEC	12(15%)	15(9%)	11 (2%)	38(5%)
Apnoea	32(39%)	63(40%)	30(7%)	125(18%)
PDA	5(6%)	7(4%)	4(1%)	16(2%)
ROP	14(17%)	12(8%)	4(1%)	30(4%)
IVH	6 (7%)	2(1%)	-	8(1%)
BPD	1(1%)	3(2%)	-	4(0.5%)

Table-2: Mortality profile of LBW babies

Birth weight	No. of babies	Mortality rate (n)	Causes of death	No. of deaths
< 1 kg	83	68% (56)	RDS Birth Asphyxia Sepsis Aspiration	24(43%) 15(27%) 14(25%) 3(5%)
1-1.5 kg	158	35% (56)	Sepsis RDS Aspiration NEC Anomalies	31(55%) 15(27%) 4(7%) 3(5%) 3(5%)
1.5-2.5kg	459	12% (54)	Sepsis Birth Asphyxia MAS Anomalies	33(61%) 16((30%) 3(6%) 2(4%)

Table-3: Follow up details of LBW babies

	1kg	1-1.5kg	1.5-2.5kg	Total
No. of babies enrolled into follow up	27	102	405	534
No. of babies completed follow up	19	80	223	322
Recurrent hospitalisations during follow up	15 (79%)	54 (68%)	47 (21%)	116 (36%)
Deaths in follow up	6 (32%)	12 (15%)	16 (7%)	34 (6%)
Weight/length<2 SD	8 (42%)	27 (34%)	64 (29%)	99 (30%)
Developmental delay	5 (26%)	19 (24%)	46 (21%)	70 (22%)
HC <3 rd centile	6 (32%)	17 (21%)	53 (24%)	76 (24%)

DISCUSSION

In the present study out of 700 LBW babies 74% were preterm and 26% were term IUGR. Maternal age < 20 yrs and anaemia were the important risk factors predisposing to LBW babies. In the present study maternal anaemia, the commonest risk factor for preterm babies was observed in 58.4% mothers. K.K Roy *et al.* [6] from AIIMS reported anaemia in 82.6% mothers of preterm babies. Other risk factors like PIH, APH and previous history of preterm labour were comparable in both the studies.

Several studies have shown that addressing the antenatal risk factors markedly influence the birth weight of babies. Improvement of adolescent girl nutrition, strict implementation of 21 years as the minimum age for marriage in girls, iron and folic acid supplementation in antenatal period and judicious use of tocolytics to postpone preterm labour can help in preventing preterm deliveries and increase birth weight.

The mortality rate of LBW babies in the present study was 24%. Mortality among VLBW babies was 35%. Prakash *et al.* [7] from Nepal reported much higher mortality (45.8%) whereas K.K. Roy *et al.* [6] from AIIMS reported much lower mortality (15.7%). Mortality rate was higher in preterm (26%) than in term IUGR (15%) babies. Major causes of mortality among preterm were sepsis and RDS whereas birth asphyxia

and sepsis were common causes of death among term IUGR babies. Antenatal steroids can decrease the morbidity and mortality due to RDS. Major complications observed in the present study were hyperbilirubinemia, RDS, sepsis and birth asphyxia. The incidence of sepsis was 56% in the present study and 77% in Prakash *et al.* [7] study from Nepal. The incidence of sepsis was only 14% in K.K.Roy *et al.* [6] study from AIIMS. The incidence of all other complications was similar in the present study and Prakash *et al.* [7] study but very low in K.K.Roy *et al.*'s [6] study. This may be because of better NICU facilities at AIIMS.

The higher mortality and morbidity in the present study indicate a need for up gradation of NICU facilities and improving newborn care at community level. Establishment and proper maintenance of NBCCs and ongoing training of health care personnel including staff nurses in NRP can decrease the chances of birth asphyxia. Training on simple measures like proper hand washing, KMC for warm care and exclusive breast feeding can further decrease the mortality and morbidity due to sepsis and hypothermia.

SNCU/NICU attached to the Government Medical Colleges provide level 3 services to majority of LBW babies in developing countries as NICUs in corporate sector are scarce and very expensive. Hence

strengthening of services in public sector in the form of improvement of infrastructure, purchase of equipment with annual maintenance contract to keep the essential and costly equipment in working condition, increasing the human resources and training the personnel on NRP and FBNC certainly decrease the mortality and morbidity of LBW babies.

In the present study at 1 year corrected age 70% babies showed good catch up growth. Bavadekare *et al.* [8] reported catch up growth in only 20% of LBW babies. Modi *et al.* [9] reported significantly lower Z scores of weight for length and head circumference. In the present study developmental delay, the major cause of concern in the long term care of surviving LBW babies all over the world was noted in 21% and 24% of LBW and VLBW babies respectively. Modi *et al.* [9] reported lower mean DQ by 6 points in VLBW cohort and Mukopadhaya *et al.* [10] observed lower mean mental and motor DQ (<70) in 17% and 26% of VLBW babies. Poor catch up growth and poor development were commonly observed in term IUGR babies than in preterm AGA babies. Proper counselling at the time of discharge regarding warmth care, a sepsis, feeding practices, danger signs and need for regular follow up pays rich dividends in the long term outcome of LBW babies. Regular and timely follow up helps in early identification of growth faltering and developmental delay and nutritional advice along with early stimulation ensures better growth and development of LBW babies.

In the present study 178 babies were lost for follow up. This was probably due to lower education and poor socioeconomic status of the mothers and logistic problem like poor communication and transport constraints, as many of them were referred from faraway places. To improve follow up, these babies can be entrusted to a medical social worker at discharge

who takes up the responsibility of communicating the follow up visits to the local health care personnel thus bridging the gap between community health workers and tertiary care centres. All the above suggested measures go a long way in improving the immediate and long term outcome of LBW babies in resource limited health facilities and promote their intact survival.

CONCLUSION

The present study shows that neonatal mortality is still high in LBW babies (24%). The best option is to prevent LBW by improving maternal health. Common causes of mortality in early neonatal period were sepsis, RDS and birth asphyxia. Neurodevelopmental delay and poor catch up growth were seen in 22% and 30% of babies followed up for 1 year. One third of babies were lost to follow up. Tracking the discharged babies by a medical social worker can improve the follow up rate. Improvement of perinatal and neonatal services in the tertiary care centres in Government sector can help to achieve the INAP goal of NMR less than 10 by 2030.

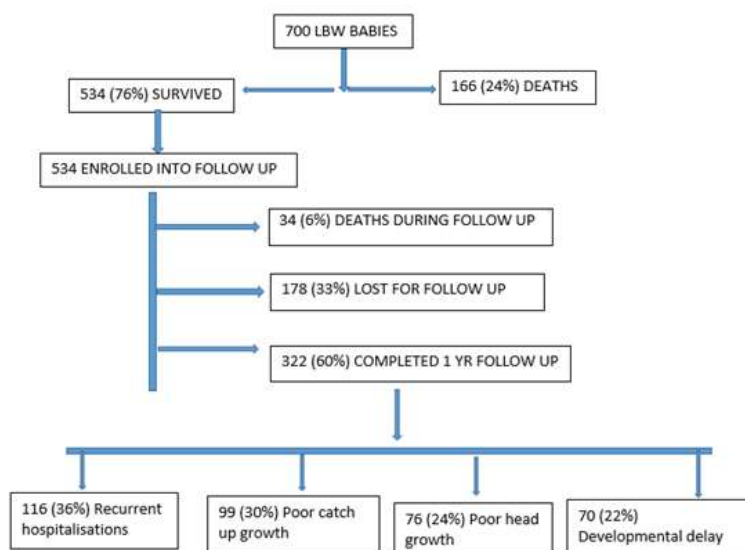
What is already known?

Improvement in NICU facilities in central institutes and corporate sector led to survival of LBW babies on par with western countries.

What this study adds?

- Morbidity and mortality of LBW babies is still high in government sector due to inadequate human resources and infrastructure.
- Proper follow up care of LBW babies helps early detection of growth faltering and developmental delay facilitating early intervention.

FINAL OUTCOME OF LBW BABIES



Abbreviations

LBW: Low birth weight, NICU: Neonatal intensive care unit, IUGR: Intrauterine growth retardation, RDS: Respiratory distress syndrome, NMR: Neonatal mortality rate, VLBW: very low birth weight, ELBW: Extremely low birth weight, PIH: Pregnancy induced hypertension, APH: antepartum haemorrhage, UTI: urinary tract infections, LMP: Last menstrual period, BPD: Broncho pulmonary dysplasia, ROP: Retinopathy of prematurity, NRP: Neonatal resuscitation programme, NBCC: New-born care corners, KMC: Kangaroo mother care, FBNC: Facility based new born care

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