

# Mortality Profile and Timing of Death in Extremely Low Birth Weight Infants from 2013 to 2015 Admitted to Neonatal Intensive Care Unit, Government General Hospital, Anantapur

N Praveen Deen Kumar<sup>1</sup>, B Praveena<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Pediatrics, Government Medical College, Anantapur, Andhra Pradesh, India, <sup>2</sup>Tutor, Department of Microbiology, Government Medical College, Anantapur, Andhra Pradesh, India

## Abstract

**Introduction:** Infant mortality is a major public health problem worldwide, whereas many programs related to children have started to decrease the infant mortality rate.

**Materials And Methods:** A retrospective study done to understand the mortality profile, etiology, and timing of death among ELBW infants in a tertiary care Neonatal Intensive Care Unit (NICU), Government General Hospital, Anantapur

**Results:** A total of 97 ELBW were died due to various causes from 2013 to 2015. Among 97 ELBW studied children, males and females were equally affected. Out of 97 ELBW children, 48 (49.4%) were males and 49 (50.5%) were female (Table 1). Gestational age of ELBW children was around  $26.1 \pm 1.5$  weeks.

**Conclusion:** From this study, we conclude that there is a rise in mortality rate in ELBW babies, whereas most of the deaths due to multiple cause occurring within 7 h of hospital admission.

**Key words:** Mortality, Death, Low Birth Weight, Infants

## INTRODUCTION

Infant mortality is a major public health problem worldwide, whereas many programs related to children have started to decrease the infant mortality rate. Among infant mortality, most of the data come from neonatal deaths, approximately two-third of all infant mortalities.<sup>1</sup>

Extreme low birth weight (ELBW) is defined as a birth weight of a liveborn infant of <1000 g. Most ELBW infants are also the youngest of premature newborns, usually born <28 weeks gestational age.<sup>2</sup> ELBW infants are also at high risk of developing neonatal infections.

Causes of LBW are mainly preterm birth which is due to precocious fetal endocrine activation, uterine overdistension, decidual bleeding, and intrauterine inflammation/infection.<sup>3</sup> Other causes include short gestational age (SGA) which may be constitutional or intrauterine growth restriction due to various reasons such as infections during pregnancy (TORCH), babies with congenital anomalies or chromosomal abnormalities, and environmental factors.<sup>4,5</sup>

Data regarding deaths in ELBW babies help to know the cause of death, assess disease patterns, and its complications, to implement necessary actions to reduce the mortality rate and also to plan and implement programs.

Many recent advances in perinatal care have resulted in a decrease in mortality rate for very LBW infants by antenatal steroids and surfactant therapy.<sup>6,7</sup> However, few studies are concerning about problems by these advances in therapy such as prolong dying, extend suffering, or use resources for infants who will eventually die.<sup>8,9</sup>

### Access this article online



www.ijss-sn.com

**Month of Submission :** 05-2016  
**Month of Peer Review :** 06-2016  
**Month of Acceptance :** 07-2016  
**Month of Publishing :** 07-2016

**Corresponding Author:** Dr. N Praveen Deen Kumar, Department of Pediatrics, Government Medical College, Anantapur - 515 001, Andhra Pradesh, India. Phone: +91-9440655505. E-mail: praveendeen@gmail.com

The purpose of the study is mainly to evaluate the cause of deaths in ELBW babies, timing of death, and to assess the mortality profile.

## MATERIALS AND METHODS

A retrospective study done to understand the mortality profile, etiology, and timing of death among ELBW infants in a tertiary care Neonatal Intensive Care Unit (NICU), Government General Hospital, Anantapur. All the data related to children were kept unlinked anonymously. The study was approved by the Institutional Ethical Committee.

All neonates admitted in NICU from 2013 to 2015 with ELBW both inborn and outborn, who were died with various causes were included in this study. A total of 97 ELBW deaths were studied.

All the data of live born neonates either from inborn or outborn, will enter into a register and registers for deaths are separately maintained in NICU as per our institutional board. Even infant anthropometric data were recorded at the time of birth. All the ELBW infants were treated according to the NICU protocols from birth to discharge or death or transfer to another hospital. If an infant died before diagnosing the cause of illness, they were sent for immediate verbal autopsy, and the probable diagnosis and cause of death were made with attending doctors.

Data related to deaths of ELBW infants including age at death, sex, home or hospital delivery, birth weight, gestational age, cause of death, timing of death, and duration between hospital admission and death were collected from death register.

Gestational age of ELBW babies was assessed using new Ballard's score. According to the International Classification of Diseases, 10<sup>th</sup> revision, infant deaths were classified into six major categories including congenital anomalies, short gestation/LBW, respiratory conditions, infections, sudden infant death syndrome, and external causes such as injuries, homicide, and unknown causes.

All the data were recorded in a predesigned, structured pro forma and were entered into excel sheet, the results were analyzed and tabulated.

## RESULTS

A total of 97 ELBW were died due to various causes from 2013 to 2015.

Among 97 ELBW studied children, males and females were equally affected. Out of 97 ELBW children, 48 (49.4%) were

males and 49 (50.5%) were female (Table 1). Gestational age of ELBW children was around  $26.1 \pm 1.5$  weeks.

Duration between hospital admission and deaths of ELBW children was depicted in Table 2. Out of 97 ELBW deaths, most of the deaths occurred in between  $>12$  and  $\leq 72$  h (45.3%) followed by  $\leq 12$  h (21.6%). Less number of deaths were noted in  $>28$  days (1.03%) of hospital admission.

ELBW deaths were assessed according to age at death, out of 97 ELBW deaths, most of them occurred within 6 days - 75 (77.3%) (Table 3 and Figure 1).

Most of the ELBW infants' deaths are due to multiple etiologies. Out of 97 ELBW deaths, 75 (77.3%) were due to multiple causes and 22 (22.6%) were occurred because of single etiology. Respiratory distress syndrome (RDS)

**Table 1: Demographic details of studied population**

Demographic data	2013 (%)	2014 (%)	2015 (%)	Total (%)
Number of ELBW deaths	28	31	38	97
Males	15 (53.5)	16 (51.6)	17 (44.7)	48 (49.4)
Out born	21 (75)	23 (74.1)	22 (57.9)	66 (68)
Caste				
SC	3 (10.7)	2 (6.5)	3 (7.9)	8 (8.2)
ST	2 (7.1)	1 (3.2)	2 (5.3)	5 (5.1)
BC	20 (71.4)	21 (67.7)	28 (73.7)	69 (71.1)
OC	3 (10.7)	7 (22.6)	5 (13.1)	15 (15.4)
Mean birth weight of ELBW infant deaths (g)	811.4	833.4	863.4	836.0
Gestational age (weeks)	26.1 $\pm$ 1.3	25.4 $\pm$ 1.6	26.5 $\pm$ 1.2	26.1 $\pm$ 1.5

ELBW: Extreme low birth weight

**Table 2: Duration between hospital admission and deaths of ELBW children**

Duration	Number of cases 2013 n=28 (%)	Number of cases 2014 n=31 (%)	Number of cases 2015 n=38 (%)	Total n=97 (%)
$\leq 12$ h	7 (25)	5 (16.1)	9 (23.7)	21 (21.6)
$>12$ - $\leq 72$	10 (35.7)	15 (48.3)	19 (50)	44 (45.3)
$>72$ h-7 days	4 (14.3)	6 (19.3)	5 (13.2)	15 (15.4)
8-14 days	1 (3.2)	1 (3.2)	4 (10.5)	6 (6.1)
15-28 days	6 (21.4)	3 (9.6)	1 (2.6)	10 (10.3)
$>28$ days	0 (0)	1 (3.2)	0 (0)	1 (1.03)
Total	28 (28.8)	31 (31.9)	38 (39.1)	97 (100)

ELBW: Extreme low birth weight

**Table 3: Age at death of ELBW children**

Age in days	Number of cases 2013 n=28 (%)	Number of cases 2014 n=31 (%)	Number of cases 2015 n=38 (%)	Total (%)
$<1$	11 (39.3)	8 (25.8)	10 (26.3)	29 (29.8)
1-6	10 (35.7)	15 (48.4)	21 (55.3)	46 (47.4)
$\geq 7$	7 (25)	8 (25.8)	7 (18.4)	22 (22.6)
Total	28 (28.8)	31 (31.9)	38 (39.1)	97 (100)

ELBW: Extreme low birth weight

**Table 4: Etiologies of ELBW infant deaths**

Cause of death	Number of cases 2013 n=28 (%)	Number of cases 2014 n=31 (%)	Number of cases 2015 n=38 (%)	Total n=97 (%)
RDS	10 (35.7)	11 (35.5)	15 (39.5)	36 (37.1)
Sepsis	5 (17.8)	12 (38.7)	9 (23.7)	26 (26.8)
Birth asphyxia	8 (28.6)	2 (6.4)	7 (18.4)	17 (17.5)
NEC	2 (7.1)	3 (9.7)	1 (2.6)	6 (6.1)
MODS/DIC/Shock	1 (3.6)	2 (6.4)	5 (13.2)	8 (8.2)
Congenital anomalies	1 (3.6)	1 (3.2)	0 (0)	2 (2.0)
Others	1 (3.6)	0 (0)	1 (2.6)	2 (2.0)
<b>Total</b>	<b>28 (100)</b>	<b>31 (100)</b>	<b>38 (100)</b>	<b>97 (100)</b>

RDS: Respiratory distress syndrome, NEC: Necrotizing enterocolitis, MODS: Multiorgan dysfunction syndrome, DIC: Disseminated intravascular coagulation, ELBW: Extreme low birth weight

was the most common cause responsible for ELBW infant deaths (37.1%), followed by sepsis (26.8%), which is the second most common cause (Table 4).

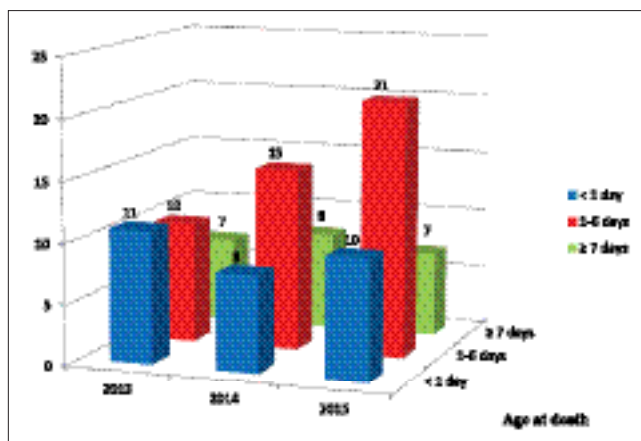
In 3 years, various causes were responsible for deaths including RDS - 36 (37.1%), sepsis - 26 (26.8%), birth asphyxia - 17 (17.5%), necrotizing enterocolitis (NEC) - 6 (6.1%), multiorgan dysfunction syndrome (MODS)/disseminated intravascular coagulation (DIC)/shock - 8 (8.2%), congenital anomalies - 2 (2.06%), and others - 2 (2.06%) (Figure 2).

## DISCUSSION

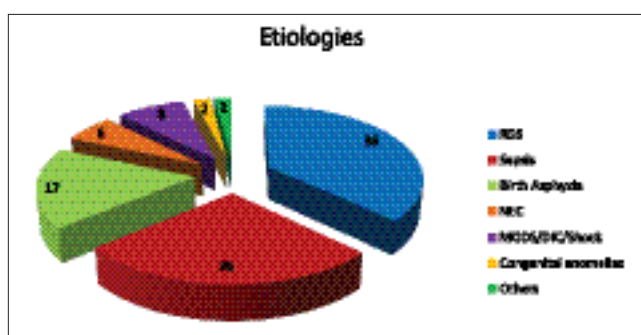
ELBW or SGA is one of the causes for increase in neonatal mortality rate. On this, many other factors combined with ELBW play a major role in increasing the incidence of mortality rate. In this study, we have discussed the various factors which influence the mortality rate among ELBW children.

A total of 97 ELBW children were died due to various causes. All the studied children were premature children. ELBW deaths were increasing in recent years, as in 2015 deaths were 38. In this study, 30 ELBW deaths per year on an average were observed which is quite significant. Patel *et al.*<sup>10</sup> observed a decrease in ELBW infant deaths from 2004 to 2011; it was 28.5% in 2004-2007, and 25.8% in 2008-2011.

Out of 97 ELBW infant deaths, males and females were equally affected. Out of 97 ELBW children, 48 (49.4%) were males and 49 (50.5%) were females (Table 1). Gestational age of ELBW children was around 27 weeks. Mean birth weight of ELBW babies was around 830 g in this study. Patel *et al.*<sup>10</sup> reported that deaths occurred at mean gestational age of  $24.3 \pm 1.7$  weeks and birth weight was around 660 g. Mukhopadhyay *et al.*<sup>11</sup> reported mean birth weight was  $843 \pm 108$  g and gestational age was  $29.1 \pm 2.6$  weeks among ELBW neonates. Many studies



**Figure 1: The number of extremely low birth weight children deaths at different ages from 2013 to 2015**



**Figure 2: Etiologies of extremely low birth weight infant deaths**

have found that neonates <750 g weight and <28 weeks gestational age were associated with higher mortality.<sup>12,13</sup>

Duration between hospital admission and deaths of ELBW children was depicted in Table 2. Out of 97 ELBW deaths, most of the deaths occurred in between >12 h and ≤72 h (45.3%) followed by ≤12 h (21.6%). Less number of deaths were noted in >28 days (1.03%) of hospital admission. Patel *et al.*<sup>10</sup> documented that most common cause of death within 12 h after birth is immaturity, which was observed from 2000 to 2011 and also observed that deaths occurring after 12 h are due to RDS.

Most of ELBW deaths occurred within 72 h in the present study. Even with good hospital care, death rate is rising among ELBW children and as days in hospital increases death rate is decreasing, which indicates ELBW babies need care in hospitals from the time of birth to prevent various etiologies responsible for deaths. Patel *et al.*<sup>10</sup> reported that 40.4% of deaths occurred within 12 h after birth and 17.3% occurred after 28 days.

ELBW deaths were assessed according to the age at death, out of 97 children, most of them occurred within 6 days - 75 (77.3%). In this study, within 6 days, highest death rate signifies the disease pattern which is more severe. Yasmin

*et al.*<sup>14</sup> reported that 84% of neonatal deaths occurred in first 7 days and half of those within 48 h. Jacob *et al.*<sup>1</sup> observed 59% of NICU deaths within 7 days of birth and 85% within 28 days after birth.

As per this study, out of 97 ELBW deaths, 75 (77.3%) were due to multiple causes and 22 (22.6%) were occurred because of single etiology. In 3 years, various causes were responsible for deaths including RDS - 36 (37.1%), sepsis - 26 (26.8%), birth asphyxia - 17 (17.5%), NEC - 6 (6.1%), MODS/DIC/shock - 8 (8.2%), congenital anomalies - 2(2.06%), and others - 2 (2.06%).

Mukhopadhyay *et al.*<sup>11</sup> observed major causes of mortality were sepsis (46%), birth asphyxia (20%), and pulmonary hemorrhage (19%). Mukhopadhyay *et al.*<sup>11</sup> and Kermorvant-Duchemin *et al.*<sup>15</sup> reported 46% and 71% mortality due to sepsis. Yasmin *et al.*<sup>14</sup> reported the predominant cause of NICU deaths was LBW (14%), followed by sepsis (12%), acquired bowel disease (11%), lung hypoplasia (9.5%), intraventricular hemorrhage (9.4%), RDS (8%), hypoxic ischemic encephalopathy (6.1%), genetic syndromes (5%), major heart defects (3.4%), bronchopulmonary (2.8%), hemorrhagic shock (2.2%), pulmonary hemorrhage (2%), renal failure (2%), congenital diaphragmatic hernia (1.7%), air leak syndrome (0.6%), and pulmonary hypertension (0.6%).

Evaluating the cause of death, age at death, and deaths in hospital even after treatment is quite significant to understand the reasons behind mortality rate. Nam *et al* and Carver *et al.*<sup>16,17</sup> documented that reliability of finding the underlying cause of death is adversely affected because evaluating the disease differs among health-care providers.

Deaths of babies impart emotional stress to parents. Increase in mortality rate indicates poor health seeking behavior of mothers, poor diagnostic, infrastructure, and health-care facilities at institutions and overall signifies defects in societal health developments.

## CONCLUSION

From this study, we conclude that there is a rise in mortality rate in ELBW babies, whereas most of the deaths due to

multiple cause occurring within 7 h of hospital admission. To reduce the incidence of ELBW deaths needs the utmost care of children at hospital by finding the cause earliest. Design of policies and implementing health education units, regular monitoring of mortality statistics, making preventive and corrective actions in various aspects helps to get mortality rate to baseline.

## REFERENCES

- Jacob J, Kamitsuka M, Clark RH, Kelleher AS, Spitzer AR. Etiologies of NICU deaths. *Paediatr* 2015;135:67-776.
- Siva Subramanian KN. Extremely low birth weight infant. *eMed* 2007. p. 11-28.
- Simhan HN, Caritis SN. Prevention of preterm delivery. *N Engl J Med* 2007;357:477-87.
- Knopik VS. Maternal smoking during pregnancy and child outcomes: Real or spurious effect? *Dev Neuropsychol* 2009;34:1-36.
- Salmasi G, Grady R, Jones J, McDonald SD; Knowledge Synthesis Group. Environmental tobacco smoke exposure and perinatal outcomes: A systematic review and meta-analyses. *Acta Obstet Gynecol Scand* 2010;89:423-41.
- Jobe AH. Pulmonary surfactant therapy. *N Engl J Med* 1993;328:861-8.
- Guyer B, Martin JA, MacDorman MF, Anderson RN, Strobino DM. Annual summary of vital statistics-1996. *Pediatrics* 1997;100:905-18.
- Kalter HD, Na Y, O'Campo P. Decrease in infant mortality in New York City after 1989. *Am J Public Health* 1998;88:816-20.
- Meadow W, Reimshisel T, Lantos J. Birth weight-specific mortality for extremely low birth weight infants vanishes by four days of life: Epidemiology and ethics in the neonatal intensive care unit. *Pediatrics* 1996;97:636-43.
- Patel RM, Kandefer S, Walsh MC, Bell EF, Carlo WA, Laptook AR, *et al.* Causes and timing of death in extremely premature infants from 2000 through 2011. *N Engl J Med* 2015;372:331-40.
- Mukhopadhyay K, Louis D, Mahajan R, Kumar P. Predictors of mortality and major morbidities in extremely low birth weight neonates. *Indian Pediatr* 2013;50:1119-23.
- Tagare A, Chaudhari S, Kadam S, Vaidya U, Pandit A, Sayyad MG. Mortality and morbidity in extremely low birth weight (ELBW) infants in a neonatal intensive care unit. *Indian J Pediatr* 2013;80:16-20.
- Narayan S, Aggarwal R, Upadhyay A, Deorari AK, Singh M, Paul VK. Survival and morbidity in extremely low birth weight (ELBW) infants. *Indian Pediatr* 2003;40:130-5.
- Yasmin S, Osrin D, Paul E, Costello A. Neonatal mortality of low-birth-weight infants in Bangladesh. *Bull World Health Organ* 2001;79:608-14.
- Kermorvant-Duchemin E, Laborie S, Rabilloud M, Lapillonne A, Claris O. Outcome and prognostic factors in neonates with septic shock. *Pediatr Crit Care Med* 2008;9:186-91.
- Nam CB, Eberstein IW, Deeb LC, Terrie EW. Infant mortality by cause: A comparison of underlying and multiple cause designations. *Eur J Popul* 1989;5:45-70.
- Carver JD, McDermott RJ, Jacobson HN, Sherin KM, Kanarek K, Pimentel B, *et al.* Infant mortality statistics do not adequately reflect the impact of short gestation. *Pediatrics* 1993;92:229-32.

**How to cite this article:** Kumar NPD, Praveena B. Mortality Profile and Timing of Death in Extremely Low Birth Weight Infants from 2013 to 2015 Admitted to Neonatal Intensive Care Unit, Government General Hospital, Anantapur. *Int J Sci Stud* 2016;4(4):114-117.

**Source of Support:** Nil, **Conflict of Interest:** None declared.