Original Research Article

Evaluation the causes of mortalities among low-birth-weight new-borns in NICU, MGM medical college and LSK hospital in Kishanganj

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Abstract

Background: Babies below 1.8 kg are the group who are most susceptible to morbidity and mortality in the neonatal period . Since mortality and morbidity will be highest in this group in developing countries like India, this group is the subject of the present research work. **Methods:** This Study was conducted in the Neonatal Intensive Care Unit at the department of pediatric medicine, M.G.M. Medical College and L.S.K. Hospital. An annual delivery rate of approximately 6000 babies per year and approximately 100 – 120 babies < 1.8 kgs being delivered every year. The final sample size was 85 for the purpose of the study, study period was November 2018 to September 2019. **Results:** 1>Babies <1.8Kgs accounted for 12.6% of the total admissions for newborns 2>The overall mortality of babies < 1.8 kgs was 34.1% and the mortality was higher for lower birth weight group as compared to higher birth weight groups. The mortality rate of 751-1000 grams was 57.1% and mortality rate of 1001 - 1800 grams was 22.9%. **Conclusion:** The in-utero transfer of the premature babies with anticipated low birth weight will decrease the complication relating to transfer of such babies to special care nursery and thereby, improving the outcome.

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INTRODUCTION

A newborn infant weighing less than 2500g at birth is termed as low birth weight (LBW) neonate. Low birth weight in a newborn infant result due to intrauterine growth restriction (IUGR) or prematurity. Nearly one third of neonates born in India are low birth weight.[1] Compared with term infants, preterm infants are at high risk for respiratory morbidity, need of ventilation (noninvasive or invasive), jaundice, hypoglycemia and sepsis. The incidence of morbidities increased from 23% at 40 weeks to 30%, 39.7%, 67.5%,89.5%,and 89.75% at 38, 37, 36, 35 and 34 weeks respectively.[2] Hypoglycemia, is defined as a blood glucose value of less than 40 mg / dL (plasma glucose level of <45 mg / dl.). It is commonly associated with a variety of neonatal conditions like prematurity, intrauterine growth restriction and maternal diabetes. Screening for hypoglycemia in high-risk situations is recommended. Supervised breast feeding may be an initial treatment option in asymptomatic hypoglycemia. However, symptomatic hypoglycemia should always be treated with infusion of parenteral dextrose. Neonates needing dextrose infusion rates above 12 mg/ kg / min should be investigated for a definite cause of hypoglycemia. Hypoglycemia has been linked to poor neuro developmental outcome and hence aggressive screening and treatment is recommended.[3] Hyperbilirubinaemia is the commonest morbidity in the neonatal period and 5 to 10 % of all newborns require intervention for pathological jaundice. Jaundice is an important problem in the first week of life. High bilirubin

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levels may be toxic to the developing central nervous system and may cause neurological impairment even in term newborns though in most cases it is benign and no intervention is required, some have clinically significant hyperbilirubinemia mandating the use of phototherapy[4] and exchange transfusion. Respiratory Distress Syndrome or HMD is the commonest cause of neonatal mortality and morbidity in preterm babies. CPAP, Mechanical Ventilation and Surfactant are the prime modalities of intervention. RDS is common in preterm babies less than 34 weeks of gestation. The incidence is higher in neonates less than 28 weeks of gestation. In addition to prematurity, maternal diabetes, acidosis and caesarian section are risk factors.[5] Intraventricular - periventricular hemorrhage is common in preterm babies because of inadequately supported germinal matrix . Cranial USG is able to detect intraventricular – periventricular haemorrhage and periventricular leucomalacia.[6]

METHODOLOGY

It was prospective observational stud, Study was conducted in the Neonatal Intensive Care Unit at the department of pediatric medicine, M.G.M. Medical College and L.S.K. Hospital. An annual delivery rate of approximately 6000 babies per year and approximately 100 – 120 babies < 1.8 kgs being delivered every year . The final sample size was 85 for the purpose of the study, study period was November 2018 to September 2019.Neonates having birth weight below 1.8 kg was included and Neonates with Congenital anomalies and Birth Asphyxia were excluded in this study. 85 babies with birth weight below 1.8 kg. were followed up closely at our NICU for hypothermia, appearance of respiratory distress, sepsis, jaundice, hypoglycemia, hypocalcaemia, Seizures, Necrotizing enterocolitis, IVH etc.

Hypothermia in a newborn baby was defined as core temperature of < 36 degrees celcius .

Respiratory Distress was evaluated using Downes score or Silverman Anderson retraction score

Respiratory support was given by free flow oxygen, head box, Indegenous CPAP, nasal CPAP machine (Meditrin) or Ventilator (Maquet servo i)

SEPSIS has been defined as Confirmed Sepsis ie. Blood culture positive (Bact Alert 3 D) or Presumed sepsis ie. Screen positive if two (or more) parameters mentioned below are positive .

Sepsis Screen parameters

Total leukocyte count < 5000 / mm3

Absolute neutrophil count < 1000 / mm3

Immature/total neutrophil > 0.2

C reactive protein (CRP) ≥ 6 mg / L

Neonatal Jaundice was treated by Phototherapy or by exchange transfusion depending upon the serum level of bilirubin, the birth weight, the gestational age at birth and the presence of Rh incompatibility, ABO incompatibility, risk factors like birth asphyxia, sepsis, birth trauma, G 6 P D deficiency and hypothyroidism.The decision for treating with phototherapy or with exchange transfusion was made as per guidelines laid down by Bhutani VK and others in American Academy of Pediatrics subcommittee on hyperbilirubinaemia .

RESULTS

Table 1: Distribution of outcome in babies < 1.8 kgs as per sex (n=85)

Sex	Survived and Discharged	Died	Total
Male	26	18	44
Female	30	11	41
Total	56	29	85

Out of 85 babies < 1.8kgs, 44 (51.8 %) were male and 41(48.2%) were female . Out of the 44 male babies, 18 (40.9%) died whereas out of 41 female babies 11 (26.8 %) died.

Table 2: Distribution of babies< 1.8 kgs as per AGA / SGA (n=85)

Babies < 1.8 kgs	Survived and Discharged	Died	Total
AGA	48	26	74
SGA	08	03	11
Total	56	29	85

Amongst babies < 1.8kgs, SGA babies accounted for 12.9% (11 of 85) as compared to AGA babies accounting for 87.1% (74 out of 85) . Amongst babies <1.8kgs, the mortality rate was 35.1% for AGA and 27.3% for SGA babies respectively.

Table 3: Mortality Distribution in babies < 1.8 kgs as per gestational age

Gestational age	Survived and Discharged	Died	Total	Mortality Percentage (%)
≤ 25 wks	00	02	02	100%
26-27 wks	02	04	06	66.7%
28-29 wks	07	08	15	55.3%
30-31 wks	15	08	23	34.7%
32-33 wks	17	06	23	26.1%
≥ 34 wks	15	01	16	06.2%
Total	**56**	**29**	**85**	**34.1%**

1>Maximum number of babies < 1.8 kgs was born in the gestational age group 30 – 33 completed weeks and least number of babies in the <25 weeks gestational age group.

2>The mortality rate was very high,being 100% for gestation ≤25 wks while only 6.1 % in the 34 weeks and above age group.

Table 4: Distribution of Morbidity and Mortality amongst babies < 1.8 Kgs

Morbidity	Incidence	Survivors	Deaths
Neonatal jaundice			
	46	45	01
Septicemia	37	24	13
RDS	35	23	12
Pneumonia	22	14	08
Hypoglycemia	14	12	02
Hypocalcemia	06	06	00
Seizures	05	05	00
Hypothermia	04	04	00
MAS	03	02	01
NEC	03	01	02

Commonest Morbidities in order of decreasing frequency of incidence were :

a) Neonatal Jaundice b) Septicemia c) Respiratory Distress Syndrome d) Pneumonia e)Hypoglycemia f) Hypocalcemia g) Seizures h) Hypothermia i) Meconium aspiration syndrome j) Necrotising Enterocolitis. The most common causes of Mortality in babies < 1.8kgs were a) Septicemia b) RDS and c) pneumonia These were followed by hypoglycemia, necrotizing enterocolitis and meconium aspiration syndrome as minor causes.

Table 5: Incidence of Screen positive and culture positive sepsis (n = 85)

Babies < 1.8 kgs	Screen Negative	Screen Positive	Total
Culture Negetive	42	06	48
Culture Positive	---	37	37
Total	**42**	**43**	**85**

Out of 85 babies in the study all of whom were screened for sepsis and blood cultures were also sent, 43 were Screen positive sepsis and 37 (43.5%) were culture positive sepsis, 06 were screen positive but culture negative.

Table 6: Respiratory Distress and Respiratory Support in babies < 1.8kgs

Morbidity	Incidence	Head Box Oxygen	n CPAP	Mechanical Ventilation	Death
RDS	**35**	**---**	**10**	**25**	**12**
Pneumonia	**22**	**11**	**02**	**09**	**08**
MAS*	**03**	**01**	**---**	**02**	**01**
Others**	**01**	**01**	**---**	**---**	**---**
Total	**61**	**13**	**12**	**36**	**21**

MAS *– Meconium Aspiration Syndrome.# Others** - 1 baby had Transient Tachypnoea of the Newborn.

Table 7 shows that:

Out of 35 babies having RDS, 25 needed Mechanical Ventilation but 12 of them did not survive, only 10 could be managed with nCPAP, all of whom survived. Out of 22 babies having Pneumonia, 9 needed Mechanical Ventilation but only 1 survived, 2 could be managed with nCPAP while 11 needed only warm humidified oxygen through head box, all of whom survived. Out of 3 babies having MAS, 2 needed Mechanical Ventilation and only 1could be managed with warm humidified oxygen through head box. Out of a total of 36 babies who had to be ventilated for different causes of respiratory distress, 21 succumbed and only 15 survived.

DISCUSSION

Literatures in medical science document that no baby less than 1000 gms used to survive before 1950's and the percentage survival of very low birth weight babies was also very small.[7] But with the progress in medical science and with its therapeutic and interventional care, increasing number of low birth weight babies are surviving with good outcome . This decrease in infant mortality rate is noticed throughout the globe from early 1990s.[8] In our country, managing babies below 1800 grams was still a great problem as the mortality and morbidity was still very high because of the lack of technology, lack of adequate government funding, lack of social support and lack of training and optimism among health care professionals . An increasing trend of survival of preterm and very low birth weight babies was noticed following introduction of NICU facilities, ventilatory support, surfactant and antenatal steroids. With the understanding of physiological immaturity and handicaps of prematurity, the right intervention at the right time helps these babies to properly adapt to the problems of the extra- uterine life. Out of the total 1006 newborn admitted to the NICU during the study period, babies < 1.8 kgs (127) constituted 12.6% of the total neonatal admission .In this study, babies less than 1800 gms represented 12.6 % of total admission which is much higher as compared to NNF-2002 data [9] (3.3% of live births). This was probably because of a greater number of high risk pregnancies including preterm deliveries being conducted in this tertiary referral centre. The death rate of male babies was 40.9% as compared to that of female neonates (26.8%) in this study. This survival advantage of female neonates found in this study is comparable to that in other studies[10] The present study found that mortality was 100%, 66.7%, 53.3%, 34.7%, 26.1% and 6.2% for gestational age of ≤ 25 wks, 26-27 wks, 28-29 wks, 30-31 wks, 32-33 wks and ≥ 34 wks respectively. There is a decline in mortality with increase in gestational age and this is similar to findings in other studies.[11] In the present study, the birth weight wise distribution of babies < 1.8 kgs reveals that 3 babies (3.5%), 21 babies (24.7%), 61 babies (71.8%) had a birth weight of less than 750 gms, 751-1000 gms and 1001-1800 gms respectively. The fall in mortality was noticeable with increase in birth weight. It was found that all the 3 babies (100%) ≤ 750 gms died in the NICU. The mortality among babies weighing 751-1000 gms and 1001-1800 gmswas 12 (57.1%) and 14 (22.9%) respectively which was comparable to the findings in other studies.[11] The higher incidence of mortality among lower birth weight groups was due to respiratory distress syndrome, sepsis and pneumonia in the present study. The present study illustrated that neonatal hyperbilirubinaemia needing treatment was the commonest morbidity in the study group comprising neonates < 1.8 kgs. It's incidence was 46 out of 85 (54.1%) neonates. About 23 out of 24 babies below 1000 grams needed treatment for hyperbilirubinemia . Phototherapy was needed in 2 out of 3 babies in the <= 750 grams and 16 out of 20 babies in the 751 – 1000 grams category. Exchange transfusion was needed in 1 out of 3 babies in the <= 750 grams, 4 out of 20 babies in the 751 – 1000 grams category and 3 out of 23(13.04%) babies in the 1001 -1800 grams group. This findings were corroborative to findings in another study on immediate neonatal outcome in VLBW and ELBW babies.[12] Septicemia was the second most common morbidity in the present study and most of these were late onset. In the present study the incidence of screen and culture positive sepsis taken together was 43 out of 85 (50.6%). Of the 44 cases of screen positive sepsis, 37 were culture positive. The incidence is parallel to that of other studies.[13,14]. Mortality due to sepsis alone could not be determined since most of those that died had multiple morbidities. The most common organism isolated in blood culture was Klebsiella (40.6% of isolates) followed by Coagulase Positive Staphylococcus (21.6%% of the isolates) and Pseudomonas (13.5% of the isolates) . The blood culture reports showed no growth in 42 (49.4%) out of 85 babies .

CONCLUSION

The overall mortality of babies < 1.8 kgs was 34.1% and the mortality was higher for lower birth weight group as compared to higher birth weight groups. The mortality rate of 751-1000 grams was 57.1% and mortality rate of 1001 - 1800 grams was 22.9% .None of the babies of less than or equal to 750 gms survived. The National Neonatal Perinatal Database [(17)] reported the incidence and the mortality of VLBW babies between 2002-03 as 2.9% and 32% respectively. The recent data on mortality of neonates < 1.8 Kgs in India is not available. It is still high for each birth weight group as compared to well equipped advanced centers in the developed nations.

Female sex and higher gestational age of the babies were associated with increased survival.

The mortality rate was 35.1% for AGA and 27.3% for SGA babies respectively .

Maximum number of babies < 1.8 kgs was born in the gestational age group 30 – 33 completed weeks and least number of babies in the <25 weeks gestational age group

The mortality rate was very high,being 100% for gestation ≤25 wks while only 6.1 % in the 34 weeks and above age group .

The most common morbidities in babies < 1.8 Kgs were jaundice(54.1%), septicemia (43.5%) and RDS (41.2%) followed by pneumonia, hypoglycemia, neonatal jaundice and NEC.

Morbidities of babies <1.8 Kgs such as sepsis, respiratory distress syndrome, pneumonia were the most common causes of mortality in the study.

Klebsiella, Coagulase Positive Staphylococci and Pseudomonas were the most common organisms isolated among all the gestational age groups amongst babies < 1.8 kgs.

Overall incidence of Culture positive Sepsis in this study was 37 out of 85 (43.5%)

Most babies having RDS needed Ventilator support and more than 50% of those on ventilator survived.

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