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Study of Neonatal Morbidity and Mortality in Very Low Birth Weight Neonates Admitted In Neonatal Intensive Care Unit in a Tertiary Care Centre

Dr Lakshmanaswamy.A[1] ,Dr Senthilkumar .P[1]*, Dr Abinaya.G[1], Sathyan V K[1]
[1]*Department of Pediatrics, Coimbatore Medical College Hospital, Coimbatore- 641014, India.*
**Correspondence to: Dr Senthilkumar.P*

Abstract
Background
In recent trends, there is increasing number of babies born with very low birth weight. These VLBW babies are at risk of developing hypoglycemia, sepsis, hyperbilirubinemia, respiratory distress when compared to term babies. By studying the risk factors leading to very low birth weight and their morbidities, health professionals will be able to anticipate and manage them accordingly.
Methods
This is a Prospective cohort study where all VLBW neonates admitted in our NICU were enrolled. Relevant details were collected which includes maternal details, maternal risk factors, order of birth, gestational age , antenatal steroids, mode of delivery and baby's details include their sex, need of resuscitation, Apgar score, gestational age, birth weight and need of mechanical ventilation , surfactant therapy were recorded
Results:
A total of 382 VLBW neonates were included. Out of 382 neonates, 199(52%) were males and 183(48%) were females, 195(51%) were born out of normal vaginal delivery and 187(49%) by caesarean section. Their Mean birth weight was 1.25 kg in males and 1.27 kg in females. Majority of VLBW neonates were in the gestational age group between 28-32 weeks (n = 224, 59%) and 32-34 weeks (n = 92, 24%).The most common maternal risk factor associated with VLBW being Gestational hypertension -210(55%) followed by Anemia – 63(17%),.The major morbidity was sepsis (n=133, 35%) followed by RDS (n= 105, 27%), TTN (n= 85, 22%). The most common mortality was Sepsis (n=49, 52%), RDS (n= 38, 40%).
Conclusion
Prematurity is the primary cause behind these neonatal deaths. This emphasizes the need to prevent preterm deliveries. Effective preventive strategies to decrease the preterm birth will be the next big step to decrease the perinatal morbidity rate.

Key words- *Morbidity, Mortality, Very low birth weight, Neonates*

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I. Introduction

Prematurity (Gestational age (GA) < 37 weeks) is the major cause of morbidity in neonates especially very low birth weight (VLBW) neonates. The WHO defines Very low birth as birth weight less than 1500g at birth irrespective of gestational age.

The Incidence of VLBW babies is less than 2 % of the births globally. In India, VLBW babies constitute 4 % to 7 % of live births and approximately 30 % of Neonatal death[1,2]. Neonatal death constitutes nearly two third of infant deaths in India. Neonatal mortality rate is an important contributing factor for under five mortality rate. Out of the 26 lakh neonatal deaths occurring worldwide per year, 6.4 lakh neonatal deaths occur in India[3].

The main reason for increasing morbidity & mortality in VLBW neonates is due to their physiologic & metabolic immaturity. These neonates are prone for increased risk of hypoglycemia, jaundice, infection & re-hospitalization during first year of life. VLBW is one of the most serious challenges in Maternal and Child Health in developing countries. Nearly half of neonates who survive to hospital discharge have complications later which will affect the quality of their life.

Despite improvement in the neonatal care & facilities, neonatal mortality remains high particularly in the developing countries. By studying the factors associated with neonatal death, morbidity & mortality in VLBW neonates can be reduced.

II. Materials And Methods

It was a Prospective cohort study. All very low birth weight neonates who were admitted in NICU were included. They were included in the study after getting written informed consent from the parents for using their neonates' clinical data for the study purpose. Ethical committee clearance was obtained.

All VLBW neonates admitted in our NICU were enrolled in the study. Relevant details were collected which includes maternal details like their age , address , socioeconomic status, educational status, maternal weight, risk factors (Hypertension, Anemia, Gestational Diabetes mellitus, Multiple gestation, Chronic medical illness, Hypothyroidism, HIV status, Hepatitis B), order of birth, gestational age , Antenatal steroids, mode of delivery and Baby's details include their sex, need of resuscitation, Apgar score[8], gestational age, birth weight and their illness , need of mechanical ventilation and surfactant therapy were recorded TABLE- 1.

Table-1 Characteristic Features of the Study

		Number (%)
Gender	Female	183 (48%)
	Male	197 (52%)
Gestational Age	<28 Weeks	24 (6%)
	28-32 weeks	224 (59%)
	32-34 Weeks	92 (24%)
	34-36 Weeks	42 (11%)
Place of Birth	Inborn	231 (60%)
	Outborn	151 (40%)
SGA		222 (58%)
AGA		92 (24%)
IUGR		68 (18%)

Table-2 MORBIDITY PATTERN IN VLBW NEONATES

	VLBW neonates	
Disease	n	(%)
SEPSIS	133	35%
RESPIRATORY DISTRESS SYNDROME	105	27%
TRANSIENT TACHYPNEA OF NEWBORN	85	22%
HYPOGLYCEMIA	47	12%
NEONATAL HYPERBILIRUBINEMIA	31	8%
ASPHYXIA	24	6%
MENINGITIS	24	6%
INTRAVENTRICULAR HEMORRHAGE	15	4%
SHOCK	15	4%
PNEUMONIA	10	3%
HYDROCEPHALUS	8	2%
PATENT DUCTUS ARTERIOSUS	6	2%
APNEA OF PREMATURITY	9	2%
NECROTISING ENTEROCOLITIS	7	2%
RETINOPATHY OF PREMATURITY	5	1%
INFANT OF DIABETIC MOTHER	5	1%
PNEUMOTHORAX	2	1%
MECONIUM ASPIRATION SYNDROME	2	1%

III. Results

A total of 382 VLBW neonates were included in the study. As shown in Table 1 -199(52%) were males and 183(48%) were females. 231(60%) were inborn and 151(40%) were out born. Mean birth weight was 1.25 kg in males and 1.27 kg in females. 222(58%) were SGA, 92(24%) -AGA, 68(18%) were IUGR. Majority of VLBW neonates were in the gestational age group between 28-32 weeks (n = 224, 59%) and 32-34 weeks (n = 92, 24%).The most common maternal risk factor associated with VLBW being Gestational hypertension -210 (55%) followed by Anemia – 63 (17%), Gestational diabetes mellitus- 8 (2%), Hypothyroidism- 4 (1%). 90 VLBW babies were born without any maternal risk factors. Most of the mothers belong to low socioeconomic status. Only 2(0.5%) out of 382 were meconium stained and 389 (99.5%) had clear amniotic fluid. Antenatal steroids coverage being 325 (85%).

The most common morbidity among VLBW neonates being sepsis (n = 133, 35%), RDS (n = 105, 27%), TTN (n = 85, 22%), Hypoglycemia (n = 47, 12%), NNH (n = 31, 8%). Perinatal asphyxia (n = 24, 6%), meningitis (n = 24, 6%) were the other major morbidities. The major cause of mortality in VLBW neonates were found to be Sepsis 49 (52%), followed by Respiratory Distress syndrome 38 (40%). Other causes accounted to 8% of total VLBW neonates [Table 2].

In Table 3, sepsis being most common mortality (n= 49, 52%), Respiratory distress syndrome being (n= 38, 40 %) followed by IVH contributing 4% among total deaths.

Table-3 Mortality Pattern VLBW Neonates

Mortality	Number	(%)
Sepsis	49	52
RDS	38	40
Asphyxia	0	0
Meningitis	1	1
Pneumothorax	2	2
Pre-maturity	1	1
IVH	4	4

IV. Discussion

This study includes 382 very low birth neonates admitted in NICU, Coimbatore Medical College Hospital during the period from January 2017 – December 2017.

Out of 382 VLBW neonates, 199 (52%) were males & 183 (48%) were females; 231 (60%) were Inborn & 151 (40%) were Out born.

Their mean birth weight was 1.25 Kg in males & 1.27 kg in females. 195(51%) were born out of Normal vaginal delivery & 187 (49%) were born by caesarean section.

Out of 382 neonates, 222(58%) were SGA, 92 (24%) were AGA and 68(18%) were IUGR.SGA babies were among VLBW neonates.

Most of VLBW neonates were in the gestational age between 28-32 weeks (n= 224, 59%) & 32-34 weeks (n= 92, 24%).

The most common maternal risk factor associated with VLBW was gestational hypertension is 210 (55%) followed by anemia 63 (17%). Most of the mothers belong to low socio economic status (88.6%). This leads to inadequate intake and increased risk of infections and leading to anemia which indirectly leads to low birth weight babies.

In Jaiswal et al study[2], Neonatal jaundice requiring phototherapy (55.1%) followed by respiratory morbidity (10.5%) and hypoglycemia (8.8%) were the frequent identified morbidities in late preterm infants. In our study, sepsis (35%) followed by RDS (27%), TTN (22%), NNH (8%). Sepsis found to be the major morbidity in our study. Multiple gestation , IUGR and cesarean deliveries were found to be the risk factors for morbidity in Jaiswal et al. study. But in our study, Gestational hypertension (n =210, 55%) followed by anemia (n= 63, 17%) were the major risk factors. Cesarean delivery and normal vaginal delivery were found to be equal and does not contribute to morbidity in VLBW neonates in our study.

The most common morbidity among VLBW neonates being sepsis (n=133, 35%) followed by RDS (n= 105, 27%), TTN (n= 85, 22%), hypoglycemia (n= 47, 12%). In schinder et al[3]. study, IVH followed acute respiratory illness & sepsis were the most common cause of death.

In our study the major cause of mortality being Sepsis (n=49, 52%) followed by RDS (respiratory distress syndrome) (n=38, 40%).

Kabilan et al[4]. study reveals that birth weight & mechanical ventilation are the two major factors responsible for mortality in VLBW babies. Major cause of morbidity was RDS (n=56, 33.6%), birth asphyxia (n= 54, 32.4%) and Sepsis (n= 46, 27.6%). Most of the death occurred due to RDS (n= 43, 25.8%). RDS occurred in 90% of VLBW infants with incidence of 33.6% and mortality rate of 76%. In our study, Sepsis and RDS were the major cause of morbidity and mortality in VLBW neonates. RDS accounts for 40% of mortality which is one of the major cause of death in VLBW infants.

In Ghulam nabi et al[5]. study, Jaundice was the major morbidity. But in our study, jaundice constitutes 31 (8%) of morbidity

In Thapar K.et al[7] study, sepsis was the major cause of morbidity followed by HMD and Jaundice. Majority of them were in the gestational age 33-36 weeks (n=68, 44.2%), small for gestational age (n= 89, 57.8) .Similar to this study, Sepsis and RDS were the major cause of morbidity in VLBW neonates in our study. But most of them were in the gestational age between 28-32 weeks (n = 224, 59%) and 32-34 weeks (n = 92, 24%).

In Sangamam et al[11]. study, the most common morbidity was Hyperbilirubinemia (16.77%) followed by Hypoglycemia (14.99%) and Hyaline membrane disease (14.86 %).The most common maternal

complications associated with LBW were anemia (43.36%) and hypertensive disorders of pregnancy (17.6%). In our study, Sepsis and RDS were the major morbidities among VLBW neonates. Maternal hypertension and anemia being the most common risk factors leading to VLBW in our study. Hypoglycemia accounts for 47 (12%) of morbidity in our study. Preterm infants are at risk of developing hypoglycemia after birth, because they have immature hepatic glycogenolysis and adipose tissue lipolysis, hormonal dysregulation and deficient hepatic gluconeogenesis and ketogenesis.

In Rasania et al study[6], 16.39% had birth asphyxia, 28.6% had sepsis, 7.37% had RDS and 32.78% had hyperbilirubinemia. Need for respiratory support was significantly higher in moderate preterm (47.8%). In our study, 35% had sepsis, 27% had RDS and 22 % had TTN followed by hypoglycemia. Out of 382 VLBW neonates, 105 neonates had respiratory distress syndrome; 43 received surfactant therapy, 38 neonates with RDS succumb to death. Most of the VLBW neonates were in the gestational age group of 28-32 weeks and 32-34 weeks. Out of 382 VLBW neonates, 287 (75%) were alive and 95 (25%) were died.

VLBW neonates (n = 71, 18.5%) were mechanically ventilated. There was no association of gender, birth, locality and sex with outcome. Gestational age and Mechanical ventilation had positive correlation with outcome. As the gestational age decreases, both morbidity and mortality increases.

Since RDS and sepsis are the major cause of mortality, quality of care in the antenatal, perinatal and postnatal periods of newborn to be improved.

We need to strengthen the ongoing trainings of health care personnel like NRP and to provide appropriate antenatal education and care from the grass root level.

V. Conclusion

Uplifting the socioeconomic status of women, Nutritional counseling to reduce anemia should be considered to reduce the incidence of very low birth weight babies. Antenatal steroid therapy needs to be more vigorously implemented.

Sepsis and Respiratory distress syndrome were the major cause of death.

Prematurity is the primary cause behind these neonatal deaths. This emphasizes the need to prevent preterm deliveries. Effective preventive strategies to decrease the preterm birth will be the next big step to decrease the perinatal morbidity rate of our state.

RECOMMENDATION:

By proper health education and strengthening of antenatal services along with awareness of neonatal problems in low birth weight babies, the incidence of very low birth weight and their complications can be reduced.

FUTURE PERSPECTIVES:

- This include preventive strategies at many levels with special emphasis on the prevention ,early detection and effective management of Pregnancy Induced Hypertension(PIH) which is found to be the leading cause of preterm delivery in our Centre. Antenatal steroid therapy needs to be more rigorously implemented.
- Policies at government level to implement strict Aseptic measures in delivery rooms, Early CPAP administration, Good neonatal transport facilities are essential to further raise our Neonatal health standards

WHAT THIS STUDY ADDS?

- Prematurity is the primary cause behind all the leading cause of neonatal deaths.
- Preventing premature births is the single most important step in reducing our neonatal mortality rate.
- Government policies aimed at implementing strict aseptic measures in delivery rooms, Early CPAP administration, Good neonatal transport facilities can make a great leap in raising our Neonatal health standards .

ABBREVIATIONS

VLBW- Very low birth weight
NNH- Neonatal hyperbilirubinemia
WHO- World health organization
GA- Gestational age
NICU- Neonatal intensive care unit
IVH- Intraventricular hemorrhage
HMD- Hyaline membrane disease
AAP- American association of pediatrics
NRP- Neonatal resuscitation program
PDA- Patent ductus arteriosus
NEC- Necrotising enterocolitis

AOP- Apnea of prematurity
SGA- Small for gestation
AGA- Appropriate for gestation
IUGR- Intrauterine growth restriction
RDS- Respiratory distress syndrome
GDM- Gestational Diabetes mellitus
PROM- Premature rupture of membranes
PIH- Pregnancy induced hypertension
PPV- Positive pressure ventilation

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