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Original Research Article

A neonatal morbidities and outcomes among late preterm infants

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ABSTRACT

Background: Late preterm birth (34-36 weeks) infants are at greater risk of (2-3 fold) compared to near term or term babies. The present study was done with the purpose to examine related morbidities and outcomes among late preterm infants.
Methods: The study included all late preterm babies (34 0/7 weeks-36 6/7 weeks) admitted to the Basaveshwar Teaching and General Hospital and Sangameshwar Hospital for a period of one and half year (December 2013-May 2015). Short term outcome was assessed in the form of neonatal morbidities and mortality during the study period.
Results: A total of 203 late Preterm neonates comprised the study group. Male preponderance was noticed with a ratio of 1.5:1. This study confirmed that late-preterm infants are a population at risk of increased neonatal morbidity. Neonatal hyperbilirubinemia requiring phototherapy forms the major one followed by sepsis, respiratory distress, and feed intolerance. Majority of late preterm neonates required more than 7 days hospital duration.
Conclusions: Late preterm infants suffer a large number of intercurrent medical problems during the neonatal period, especially increased likelihood of resuscitation in the delivery room, hypothermia, hypoglycemia, jaundice requiring phototherapy, respiratory pathologies, sepsis and feeding intolerance. Prolonging pregnancy to the maximum safest gestation will result in decrease in such morbidities.

Keywords: Late preterm neonates, Morbidity, Outcome

INTRODUCTION

Late preterm infants refer to those born between 34 weeks ($34^{0/7}$) and less than 37 completed weeks ($36^{6/7}$).[1] Infants born late preterm may be similar to term infants in appearance, weight, and size, and compared with preterm infants born at earlier gestations, they are generally healthier. However, late preterm infants are developmentally and physically immature compared with term infants. Consequently, they are at increased risk for medical complications such as hypothermia, hypoglycemia, respiratory distress and delayed lung fluid clearance, poor feeding, jaundice, infection, and readmission rates after initial hospital discharge and mortality, especially during the first week after birth.[2,3]

Understanding the morbidity related risks among late preterm infants is not only important for assisting newborn care providers to expect potential morbidity during the birth hospitalization and earlier follow-up after hospital discharge. The present study was done with the aim to evaluate the prevalence of neonatal morbidities and outcomes among late preterm neonates.

METHODS

This hospital based prospective study was conducted at the Basaveshwar Teaching and General Hospital and Sangameshwar Hospital for a period of one and half year (December 2013-May 2015).

After getting approval from Institutional ethics committee, all live born late preterm infants were selected for the study after getting consent from the parents. Gestational age was assessed by modified Ballard score which was done for all babies by a single person to avoid inter observer variation.[4] If neonate is admitted after 2 days of life, gestational age will be assessed from last menstrual period date and by first trimester ultrasound scan. Late preterm babies of parents who have not given consent and late preterm babies who had surgical conditions, congenital malformations, genetic disorders, metabolic disorders other than hypoglycaemia (suspected IEM), babies of multiple gestation were excluded from the study.

The infants in the sample were followed throughout their stays in the neonatal intensive care unit, up until hospital discharge. Data were collected from infants' and mothers' medical records and supplemented with additional information collected at discharge using a structured form covering the variables of interest which include age at admission, days in hospital, sex, birth weight, gestational age (calculated from modified Ballard's scoring), hypothermia or hyperthermia (hypothermia: body temperature below 36ºC, hyperthermia: temperature above 37.5ºC), hypoglycemia (glucose below 40 mg/dl), hyperbilirubinemia requiring phototherapy/exchange transfusion, feed intolerance, respiratory pathologies - transient tachypnea of the newborn (TTN), hyaline membrane disease, pneumonia, cardiovascular problems, sepsis, interventions done, deaths and rehospitalizations.

The data collected was analysed using Microsoft Excel and presented in number and percentages.

RESULTS

A total of 245 late preterm neonates were admitted during the study period, out of which 203 met the inclusion criteria. Majority of the babies (54.9%) were admitted within first three days of life. 53 babies were admitted between day 4-6 of life which constitutes about 26.4%. 29 babies were admitted between 7 to 10 days of life which constitute about 14.6%. 7 children were admitted between 11 to 15 days of life which constitute about 3.5%. 1 child was admitted at day 16 of life which constitute about 0.7%. In the present study, 106 neonates were admitted between the gestational age of $34^{1/7}$ to $35^{6/7}$ who constitute about 52.1% and 97 neonates were admitted between the Gestational age of $36^{1/7}$ to $36^{6/7}$ who constitute about 47.9% of the study group (Table 1).

Table 2 presents the morbidities observed in the study participants. Hypothermia was seen in 45 infants, hypoglycaemia in 21 infants, hyperbilirubinemia in 116 infants. Feed intolerance was noticed in 46 infants. Respiratory related morbidities was seen in 64 infants. Birth asphyxia was observed in 25 infants. Among 203 neonates, 36 neonates had Probable sepsis which accounts for about 18.1%. 17 of the neonates had culture proven sepsis which accounts for about 8.2%.

Table 1: Base line variables of the study population (n=203).

Variables	No. of patients (N)	Percentage (%)
Age at admission (days)		
1-3	113	54.9
4-6	53	26.4
7-10	29	14.6
11-15	7	3.5
15-20	1	0.7
Gestational age		
$34^{0/7}$ to $34^{6/7}$	44	21.67
$35^{0/7}$ to $35^{6/7}$	62	30.54
$36^{1/7}$ to $36^{6/7}$	97	47.9

Table 2: Morbidities among late preterm infants (n=203).

Morbidities	No. of patients (N)	Percentage (%)
Hypothermia	45	22.2
Hypoglycemia	21	10.4
Hyperbilirubinemia	116	57.3
Feed intolerance	46	22.9
Respiratory morbidities	64	
RDS	27	13.1
Pneumonia	33	16.3
TTN	4	2.0
Birth asphyxia		
HIE -1	15	12.5
HIE -2	09	
HIE -3	01	
Sepsis		
Culture proven sepsis	17	8.2
Probable sepsis	36	18.1

As shown in Table 3, 21 (10.4%) neonates required <3 days hospital stay, 57 (25%) neonates required duration of 4 to 7 days. 93 (45.8%) neonates required 7 to 14 days. 38 (18.8%) neonates required >14 days of hospital stay.

Table 3: Duration of hospital stay (n=203).

Duration of hospital stay (in days)	No. of patients (N)	Percentage (%)
<3	21	10.4
4-7	57	25.0
7-14	93	45.8
>14	38	18.8

The findings of the outcome of the study were depicted in Table 4. Among 203 neonates, 196 neonates were discharged after treatment (96.5%) and 7 (3.5%) neonates

died during hospital stay. Among admitted neonates 156 (77.08%) of them required some medical interventions. 40 neonates did not require any active medical intervention which accounts for about 19.44%. Among discharged neonates 15 (7.63%) of them had rehospitalisation.

Table 4: Outcome of the study population (n=230).

Outcome	No. of patients (N)	Percentage (%)
Discharged	196	96.5
Death	7	3.5
Morbidity	156	77.08
No intervention	39	19.44
Rehospitalisation	15	7.63

DISCUSSION

This study demonstrates the importance and magnitude of the risks of intercurrent conditions to which infants born at $34^{0/7}$ to $36^{6/7}$ weeks gestation are subjected. 203 late preterm neonates comprised this study. The frequency of preterm births is increasing in many countries and this increase is mainly due to rise in late preterm births. There is only limited published data from India related to morbidities of late preterm neonates. Many reasons were proposed to explain this increasing trend including increase surveillance of the mother and fetus, increasing maternal age and reproductive technologies which is associated with multiple pregnancies. It is suggested that as a result of increased surveillance, fetuses considered to be at risk of stillbirth, including those with intra uterine growth restriction, fetal anomalies, and intra partum asphyxia, may be identified earlier, which results in more deliveries at 34 to 36 weeks' gestation.[5]

In the present study, hyperbilirubinemia constitute the major group with 116 neonates (57.3%) affected. All of them required phototherapy and one neonate required exchange transfusion to reduce hyperbilirubinemia along with phototherapy. 12 neonates (10.67%) had ABO incompatibility and 4 (3.25%) had Rh incompatibility. Similar findings were observed in the study done by Jaiswal et al.[6]

Respiratory distress constitutes the second most morbidity with 64 (31.4%) neonates affected. A large number of the infants in this study had respiratory distress, secondary to pneumonia predominating followed by respiratory distress, TTN respectively, which demonstrates the immaturity of these newborns' respiratory systems. Pneumonia was found as the cause of respiratory distress in 33 (16.3%) neonates and RDS in 27 (13.1%) neonates. Surfactant was given to all RDS neonates and required mechanical ventilation during the hospital stay. Third common morbidity was sepsis which was found in 53 neonates which constitute 26.3%. Among 53 neonates 17 of them had culture proven sepsis and 36 of them had probable sepsis which constitutes 8.2%, 18.1% respectively. A significant number of infants had hypothermia, hypoglycemia, feed intolerance, apnea of prematurity and IVH.

Mechanical ventilation was done in 31 Neonates which constitute 15.27%. 27 Neonates were mechanically ventilated in view of respiratory distress, 3 neonates were mechanically ventilated for severe sepsis. One baby with severe birth asphyxia was also mechanically ventilated.

Similar to our study findings, in a retrospective multi-centre study done by Leone et al, 30 late preterm neonates were analysed.[7] Respiratory distress was observed in 4.6% neonates, hyperbilirubinaemia in 3.4% infants, hypoglycemia and hypothermia in 0.6% infants and the mean duration of hospitalization of the patients was 5.2 days.

In another review study conducted by Teune et al, in 2011 identified 22 studies studying 29,375,675 infants.[8] They concluded that compared with infants born at term, infants born late preterm were more likely to suffer poorer short-term outcomes such as respiratory distress syndrome, intraventricular hemorrhage, hyperbilirubinemia, sepsis, feeding difficulty and death. Beyond the neonatal period, late preterm infants were more likely to die in the first year and to suffer from cerebral palsy. They concluded that although the absolute incidence of neonatal mortality and morbidity in infants born late preterm is low, its incidence is significantly increased as compared with infants born at term. In the present study morbidities related to sepsis, hypoglycemia, feeding intolerance, intraventricular hemorrhages are comparable with the above study. Higher morbidity related to hypothermia in the present study can be explained by the time lag while transportation of these neonates to our Institute. Number of late preterm neonates requiring mechanical ventilation was also high in the present study due to more respiratory distress syndrome and sepsis cases referred to our institute of which most of them required mechanical ventilation. In the present study neonatal hyperbilirubinemia was high. This can be explained by the fact being referral institute most of the cases are referred exclusively for phototherapy and most of the cases are sick. There will also be delay in initiation of enteral feeds which will further exaggerate the Jaundice.

In addition to feeding problems caused by neonatal pathologies, the immaturity of preterms' gastrointestinal tracts and the consequent lack of coordination of suction and deglutition mechanisms are often barriers to establishing successful breastfeeding, which in turn leads to excessive weight loss and dehydration during the first days of life. In the present study feed intolerance is seen in 22.9%. This is comparable with study conducted by Teune et al.[8] In his study feeding problem was observed in 34% of the late preterms and the feeding problems decreases with the increase in gestational age. Feeding

problem was observed in 51%, 34%, 22% with gestational age of 34 weeks, 35 weeks and 36 weeks respectively.

Similarly, in study conducted by Leone et al, showed 19.1%, 11.1%, 1.9% of neonates with feeding difficulty with gestational age of 34 weeks, 35 weeks and 36 weeks respectively.[7]

CONCLUSION

The findings of the study conclude that late preterm infants are at considerable risk for neonatal morbidities and mortalities. The data emphasises the significance of judicious obstetrical decision-making when considering late preterm deliveries and the necessity to setup anticipatory clinical guidelines for the care of late preterm infants.

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