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A STUDY OF EARLY NEONATAL MORBIDITY IN LATE PRETERM

KEYWORDS

Morbidity, Late Preterm, Term, Respiratory distress, Hypoglycaemia, Probable sepsis, Proven sepsis, Hyperbilirubinemia.

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ABSTRACT There has been a lot of interest in the late preterm infants in the recent years. Due to the built in assumption of the late preterm infants as the term infants, these babies are roomed in with the mother immediately after delivery and are being discharged as the full term infants. Studies revealed that late preterm infants are at risk of morbidity. The most common morbidities observed in the late preterm infants were respiratory distress, hypoglycaemia, sepsis and hyperbilirubinemia. This study is being done to assess variables such as respiratory distress, hypoglycaemia, probable and proven sepsis and hyperbilirubinemia, in the first week of life, and the risk of these morbidities as the gestational age regresses compared to the full term newborns .It also focuses on the associated maternal complications.

INTRODUCTION

There has been a lot of interest in the late pre- term infants in the recent years. They have been called as the near term infants as they were closer to the term gestation. They have been seen as almost mature infants requiring no attention as the term infants. The Workshop panel intended to coin the infants born from 34 0/7 to 36 6/7 weeks of gestation as late preterm instead near term, owing to the immaturity of these infants1. Advances in neonatology have improved the focus on extreme preterm newborns diverting away from the late preterm who are prone to have 2 to 3 times2 more morbidity compared to the term infants. Studies in the near past has found an increasing number of this subset of neonates due to raise in the pregnancy related complications such as increasing maternal age, and other maternal morbid conditions such as Hypertension, Abruptio placenta, Diabetes, Oligohydramnios, Infertility3. Due to the built in assumption of the late pre- term infants as the full term infants, these babies are roomed in with the mother immediately after delivery and are being discharged as the full term infants4 .Studies revealed that late preterm infants are at risk of morbidities. Hence these infants require more attention in order to anticipate the morbidity. It has been observed that these late pre- term infants needed prolonged hospitalization and those who were being discharged as the term infants, 72 hours post delivery needed re admission due to some morbidity4. The most common morbidities observed in the late preterm infants were respiratory distress, hyperbilirubinemia, and hypoglycaemia, probable and proven sepsis.

METHODOLOGY

This is a Prospective Cohort Study All term and late preterm infants born in Old government hospital, Vijayawada from February 2015 to November 2016. Ethics committee approval was obtained prior to the study.

EXCLUSION CRITERIA:

Newborns with major congenital anomalies. Newborns with clinically identified chromosomal syndromes. Newborns born in a different hospital and admitted in our hospital from February 2015 to November 2016.

Informed consent was obtained from the parents. Data was collected from the parents and case sheets. Maternal details included last menstrual period, risk factors like hypertension, antepartum haemorrhage, and premature rupture of membranes. Newborn details included birth weight, gestational age, morbidity variables discussed below.

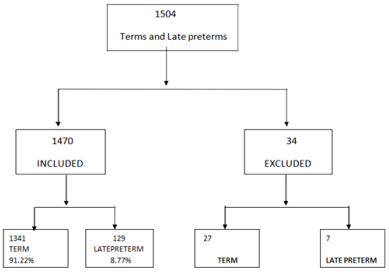
All these infants were observed for the morbidities explained below during the hospital stay.

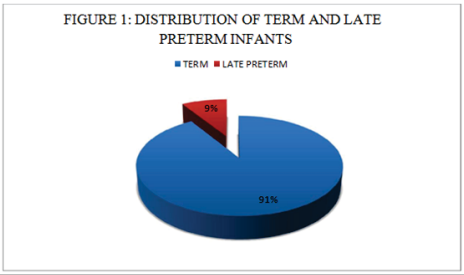
New born is considered as late preterm if it is born at 34 0/7 through 36 6/7 weeks according to the AAP guidelines. Gestational age for the late preterm is assessed by LMP. First trimester ultrasound abdomen or New Ballard's scoring. Both the term and late preterm are classified as AGA/SGA/LGA by Fenton's chart.

VARIABLES MEASURED ARE: RESPIRATORY DISTRESS, HYPOGLYCEMIA, PROBABLE SEPSIS, PROVEN SEPSIS, HYPERBILIRUBINEMIA.

Blood samples were collected and assessed for various parameters like C-reactive protein, complete blood count, blood glucose, plasma glucose, serum bilirubin, blood culture. Urine culture and CSF culture were also done. These results were subjected statistical analysis.

RESULTS





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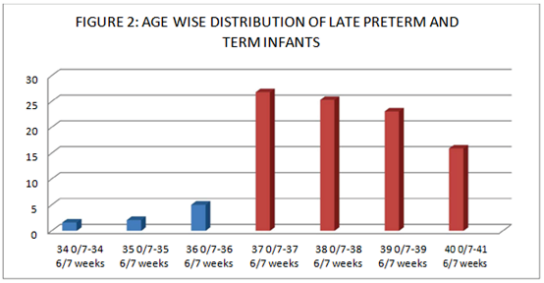
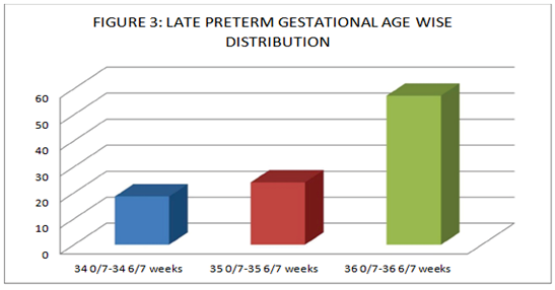
Out of 1470 newborns included, there were 1341 term infants (91.22%) and 129 late preterm (8.77%).

- Late pre-terms had a mean gestational age of 35 weeks
- Term infants had a mean gestational age of 38 weeks
- Late pre- terms had a mean birth weight of 2.39 kg
- Term infants had a mean birth weight of 2.97 kg





Most of the term infants are adequate for gestational age, most of the late preterm are small for gestational age.

TABLE 1: MATERNAL RISK FACTORS ASSOCIATED WITH PRETERM DELIVERY

MATERNAL RISK FACTORS	FREQUENCY	PERCENTAGE
PROM	**30**	**24.1**
Preterm labour	**39**	**31.4**
Hypertensive disorders	**31**	**24.1**
Bad obstetric History	**12**	**9.6**
Abruption	**3**	**2.4**
APH	**3**	**2.4**
Oligohydramnios	**3**	**2.4**
Polyhydramnios	**3**	**2.4**

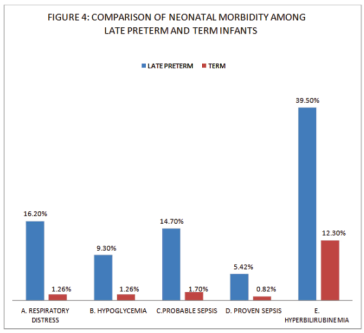
RDS: 16.2 % of late preterms have respiratory distress compared to 1.26 % of term infants which is statistically significant and they are 15 times more likely to develop respiratory distress compared to the term infants

Hypoglycemia: 9.3% of late preterms have hypoglycemia compared to 1.26% in term infants which is statistically significant and they are 8 times more likely to develop hypoglycaemia compared to the term infants.

Probable Sepsis: 14.7% of late preterms have probable sepsis compared to 1.71% in term infants which is statistically significant they are 10 times more likely to develop probable sepsis compared to the term infants.

Proven Sepsis: 5.4% of late preterm had proven sepsis compared to 0.82% of term infants which is statistically significant, and they are 7 times more likely to develop sepsis compared to the term infants.

Hyperbilirubinemia : 39.5% of late preterm's have hyperbilirubinemia compared to the 12.3% in term infants which is statistically significant, and late preterm have 4 times more risk of developing hyperbilirubinemia than term infants.



The common morbidities seen in late preterm compared to the term newborns are respiratory distress, hypoglycaemia, sepsis and hyperbilirubinemia. Respiratory distress is seen in 29.1% of late preterm infants born in 34-34 6/7 weeks compared to 1.26% in term infants which is statistically significant and they are 32 times more likely to develop respiratory distress compared to the term infants. Respiratory distress is seen in 16.1% of late preterm infants born in 35 weeks compared to 1.26% in term infants which is statistically significant and they are 15 times more likely to develop respiratory distress compared to the term infants.

COMPARISON OF RESPIRATORY DISTRESS IN LATE PRETERM AND TERM:

Respiratory distress is seen in 12.1% of late preterm infants born in 36 weeks compared to 1.26% in term infants which is statistically significant and they are 10 times more likely to develop respiratory distress compared to the term infants. There is an increase in the risk of respiratory morbidity as the gestational age decreases. There is an increase in the risk of respiratory morbidity as the gestational age decreases.

COMPARISON OF HYPOGLYCEMIA IN LATE PRETERM AND TERM:

16.6% of the late preterm born in 34 weeks had hypoglycemia compared to 1.26% in term infants which is statistically significant and they are 15.5 times more likely to develop hypoglycemia compared to the term infant. 12.9% of the late preterm born in 35 weeks had hypoglycemia compared to 1.26% in term infants which is statistically significant and they are 11 times more likely to develop hypoglycemia compared to the term infant. 5.4 % of the late preterm born in 36 weeks had hypoglycemia compared to 1.26% in term infants which is statistically significant and they are 5 times more likely to develop hypoglycemia compared to the term infant. There is an increase in the risk of hypoglycaemia as the gestational age decreases.

COMPARISON OF PROBABLE SEPSIS IN LATE PRETERM AND TERM:

25% of the late preterm born in 34 weeks had probable sepsis compared to 1.71% in term infants which is statistically significant and they are 19 times more likely to develop probable sepsis compared to the term infant. 19% of the late preterm born in 35 weeks had probable sepsis compared to 1.71% in term infants which is statistically significant and they are 13.75 times more likely to develop probable sepsis compared to the term infant. 10% of the late preterm born in 36 weeks had probable sepsis compared to 1.71% in term infants which is statistically significant and they are 6 times more likely to develop probable sepsis compared to the term infant. There is an increase in the risk of Probable sepsis as the gestation age decreases.

COMPARISON OF PROVEN SEPSIS IN LATE PRETERM AND TERM:

8.3% of the late preterm born in 34 weeks had proven sepsis compared to 0.82% in term infants which is statistically significant and they are 10.9 times more likely to develop proven sepsis compared to the term infant. 6.4% of the late preterm born in 35 weeks had proven sepsis compared to 0.82% in term infants which is

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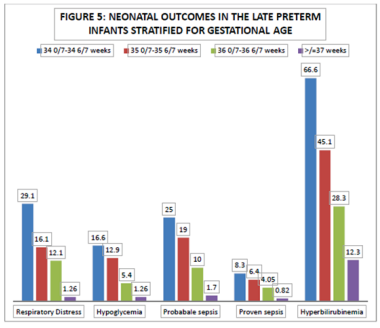
statistically significant and they are 8.3 times more likely to develop proven sepsis compared to the term infant. 4.05% of the late preterm born in 36 weeks had proven sepsis compared to 0.82% in term infants which is statistically significant and they are 5.1 times more likely to develop proven sepsis compared to the term infant. There is an increase in the risk of proven sepsis as the gestational age decreases.

COMPARISON OF HYPERBILIRUBINEMIA IN LATE PRETERM AND TERM:

66.6% of the late preterm born in 34 weeks had hyperbilirubinemia compared to 12.3% in term infants which is statistically significant and they are 14.1 times more likely to develop hyperbilirubinemia compared to the term infant. 45.1% of the late preterm born in 35 weeks had proven sepsis compared to 12.3% in term infants which is statistically significant and they are 5.8 times more likely to develop hyperbilirubinemia compared to the term infant. 28.3% of the late preterm born in 36 weeks had proven sepsis compared to 12.3% in term infants which is statistically significant and they are 2.8 times more likely to develop hyperbilirubinemia compared to the term infant. There is an increase in the risk of hyperbilirubinemia as the gestation age decreases.

COMPARISON OF HOSPITAL DAYS STAY IN LATE PRE TERM AND TERM :

Late preterms had a mean hospitalization of 5 days. Term infants had a mean hospitalization of 3.5 days



All the common morbidities have highest risk for infants born at 34 weeks followed by 35, 36 and 37 weeks.

DISCUSSION

Out of 1504 live term and late preterm deliveries in our hospital, there were 136 late preterm births (9 %) and the remaining were 1368 (90.9 %) term infants. Out of 1504, 27 term babies and 7 late preterm were excluded from the study, 11 of them had congenital malformations noted clinically. Late preterm births account for about 9% of term and late preterm infants at our hospital. In a prospective cohort study by Jaiswal et al[2] 2010 had 11.2% of late preterm births. Similarly study by Donald D. et al[5] 2008 had 9% late preterm births. In study at United States by Cande V. Ananth et al[6] which is a population based study in 2008 found late preterm births to be around 7.5%. So it is essential to look upon this group as this population was found to be prone to neonatal morbidity like a preterm infant than a term infant.

In our study, 76.6% had at least one morbidity compared to the term infants who had 20.4% morbidity which is in concordance with the study done by Jaiswal et al[2] showed at least one morbidity in 70.8% of late preterm.

In our study respiratory morbidity accounts for 16.2% in late preterm infants. A Study by Jaiswal et al[2] 2010 found a similar morbidity pattern (10.5%) with a significant P value and OR of 7.5 suggesting that the near terms are at 7 times more higher risk than the term infants. In our study when these late preterm were split into sub groups, preterm that fall under 34 0/7-34 6/7 weeks of gestation had respiratory morbidity in 29.1% of them, and they are at 32 times more higher risk of having a respiratory morbidity compared to the term infants. On seeing the odds respiratory distress for individual gestational age the risk was 14.9, 10.7 times in late preterm infants at 35 0/7-35 6/7, 36 0/7- 36 6/7 weeks compared to the term infants respectively.

Study by Femintha et al[7] which is a case control study of 250 late preterm and term infants analysed the various respiratory morbidities in both groups and found that 13.8% of late preterm had RDS and half of them needed surfactant therapy .This signifies that late preterm infants are at high risk of developing respiratory distress and need to be monitored closely like the preterm infants.

In our study hypoglycemia affects 9.3% of late preterm compared to the 1.26% in the term infants. In a Study by Maria Altmanet al[8] a population based study found 16% of late preterm had hypoglycemia when compared to the term infants. Jamie.A et al[9] in a retrospective study has a higher incidence of hypoglycemia. In our study 34.8% of late preterm had hypoglycemia when compared to 6% of the term infants. Most studies have not described the etiology for hypoglycemia in the late preterm infants. It's understood from literature that the etiology of hypoglycemia is probably due to the poor Oro-motor tone of late preterm infants, and poor feeding by the mother. Other morbidities may also contribute to the hypoglycemia. On seeing the odds of hypoglycemia for individual gestational age the risk was 15.5, 11.53, 4.45 times in late preterm infants at 34 0/7-34 6/7, 35 0/7-35 6/7, 36 0/7- 36 6/7 weeks respectively.

A study by Femintha et al[7] which is a case control study found a higher incidence than our study . In this study asymptomatic hypoglycemia was seen in 71% of the late preterm compared to 42.8% of the term infants suggesting the physiological immaturity of the late preterms compared to the term infants.

In our study probable sepsis was found in 14.7% of late preterm compared to the 1.7% of term infants. In the study by Minesh khashu et al[3] infectious morbidity was 5.2 times more in late preterm than term infants. In the study by Jaiswal et al[2] had similar results as our study. All of these studies support the fact that late preterm need careful monitoring. While looking at age wise sepsis morbidity infants at 34 0/7-34 6/7 weeks are at 19 times more risk of developing probable sepsis .This becomes 13.7times at 35 0/7-35 6/7weeks and 5.98 times at 36 0/7- 6/7 weeks. Hence compared to the term infants, and at each decreasing gestational age infectious morbidity was noted to be 6 to 7 times more.

A Study by Melamed et al10 found a 30 fold increase in infectious morbidity which was more than our study .Higher incidence of infection reported may be due to the difference in the population and the definition of morbidities.

In the study by Hauth J et al[11] it was found that maternal complications such as chorioamnionitis and premature rupture of membranes contribute to the infectious morbidity in late preterms. This study did not specifically look at maternal risk factors.

Proven sepsis or confirmed sepsis was seen in 5.42% of late preterm infants when compared to 0.82% of term newborns in our study.

In a study by Jaiswal et a[12] found that proven sepsis was present in 1.1% of late preterm compared to 0.67% in the term infants. In our study infants at 34 0/7-34 6/7 weeks are 10.9 times more prone to develop sepsis than the term infants and infants at 35 0/7- 35 6/7,36 0/7-36 6/7 weeks are 8.3, 5.1 times more likely to develop sepsis than term newborns respectively.

In a study by RK Whyte et al[12] recommends complete work up for infants born less than 36 weeks whose maternal status is not known and have not received intrapartum antibiotic prophylaxis. Hyperbilirubinemia was found in 39.5%of late preterm compared to

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the 12.3% in term newborns in our study.

In a Study by Jamie et al[9] 40.6% of late preterm had hyperbilirubinemia compared to9.7% term newborn. In a retrospective study by Marochella et al[13] found 25.35% of late preterm infants had hyperbilirubinemia compared to 2.5% of the term infants .In a retrospective study done in a well infant population of 35-36 weeks, 36-37 weeks who needed readmission for hyperbilirubinemia was found to be 13.2, 7.7 times more respectively. In this study, infants at 34 0/7-34 6/7 weeks were 14.1 times more likely to have hyperbilirubinemia when compared to the term infants. Infants at 35 0/7- 35 6/7,36 0/7-36 6/7 weeks were 5.8, 2.8 times respectively more likely to develop hyperbilirubinemia than the term infants. This morbidity pattern was obtained after excluding the confounding factors such as instrumental deliveries and blood group incompatibility.

The study by marochella et al[13] did not exclude these risk factors and that probably explains the higher morbidity. Incidence of hyperbilirubinemia in the late preterm infants is due to the reduced hepatic enzyme inactivity and reduced efficacy to handle the bilirubin load and uptake.

Study by Lavanya et al[14] found that late preterm infants experienced hyperbilirubinemia more at 24 to 48 hours, necessitating the importance of pre discharge assessment of bilirubin levels. This study does not include the infants between 32 to 34 weeks, but there are studies comparing moderate preterm, late preterms and term infants. Boyce and colleagues[49] studied infants born from 33 to 36 weeks and had admission rates similar to the term infants for respiratory morbidity.

Study by Ananth et al[6] found that infants born at 32-36 weeks are at risk for mortality and morbidity compared to the term infants. Cohort study done by Jamie et al, in infants born between 22 0/7 and 33 6/7 weeks of gestational age had increased risk ratio of morbidity, when compared to term infants. The adverse outcome range in late preterm in this study was comparable to the infants born at 32 to 33 weeks.

These studies show that late preterm have morbidity similar to preterm hence late preterm also need to be considered as preterm and need to be carefully monitored.

CONCLUSION

Infants born at 34 0/7-36 6/7 weeks gestation (239-259 days since the first day of last menstrual period) are referred to as late preterm. Late pre- terms physiologically immature and are at significantly higher risk of morbidity during the early neonatal period compared to term infants, the morbidities noted were hyperbilirubinemia, respiratory distress, sepsis and hypoglycemia. Considering significant morbidity in late preterm compared to the term infants they must be considered as preterm infants and need to be monitored carefully. Appropriate discharge criteria and discharge advice, follow up plan are required for late preterm infants.

There is a need to educate health care providers and parents about the vulnerability of the late preterm infants to various morbidities during the first week of life and seeking appropriate medical attention for these morbidities.

REFERENCES:

1. Engle WA. A recommendation for the definition of "late preterm" (near-term) and the birth weight– gestational age classification system. Semin Perinatol 2006;30:2–7.
2. Ashish Jaiswal, Srinivasmurkhi, PramodGaddam and Anupama Reddy: Early Neonatal Outcome in Late Preterm Infants, 2011;Vol:48:607-11.
3. Khashu M, Narayanan M, Bhargava S, Osiovich H. Perinatal outcomes associated with preterm birth at 33 to 36 weeks' gestation: a population-based cohort study. Pediatrics. 2009;123: 109-13.
4. Tomashek KM, Shapiro-Mendoza CK, Weiss J, Kotelchuck M, Barfield W, Evans S, et al. Early discharge among late preterm and term newborns and risk of neonatal mortality. Semin Perinatol. 2006;30:61-8.
6. Mc Intire DD, Leveno KJ. Neonatal mortality and morbidity rates in late preterm births compared with births at term. Obstet Gynecol. 2008;111:35-41.
6. Cande V. Ananth, Alexander M. Friedman, Cynthia Gyamfi-Bannerman, ClinPerinatol Epidemiology of Moderate Preterm, Late Preterm and Early Term Delivery.2013 vol 40:601–610.
7. Femitha P, Bhat BV Early neonatal outcome in late preterm., Indian J Pediatrics. 2012 Aug; 79(8):1019-1024.
8. Maria Altman et al, Neonatal Morbidity in Moderately Preterm Infants: A Swedish National Population-Based Study, Journal of Pediatrics 2011; 158:239-44.
9. Jamie A. Bastek, MD; Mary D. Sammel, ScD; Emmanuelle Paré,Sindhu K. Srinivas, MD Adverse neonatal outcomes: examining the risks between preterm, late preterm, and term infants, Am Jou ObstetGynecol 2008;199:367.e1-367.
10. Melamed N, Klinger G, Tenenbaum-Gavish K, et al. Short-term neonatal outcome in low-risk, spontaneous, singleton, late preterm deliveries. Obstet Gynecol 2009; 114: 253–60.
11. Caritis S, Sibai B, Hauth J, Lindheimer M, VanDorsten P, Klebanoff M, ThomAm J Obstet Gynecol Predictors of pre-eclampsia in women at high risk. National Institute of Child Health and Human Development Network of Maternal-Fetal Medicine Units. 1998 Oct;179(4):946-51.
12. Whyte RK, Ann L Jefferies, and Canadian Paediatric Society, Fetus and Newborn Committee PaediatrIC Child Health. 2014 Apr; 19(4): 213–217.
13. Late preterm births: a retrospective analysis of the morbidity risk stratified for gestational age Sonia Marrocchella, VeronicaSestilli, Ugo IndraccoloMarrocchella et al. Springer Plus 2014, 3:114.
14. Predictors of Significant JaundiceK.Radha, K.Lavanya, Ashish Jaiswal, Pramod Reddy , Srinivas Murki, IndianPaediatrics Volume 49,September16, 2012:717-20.