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Original Research Article

A prospective study comparing the morbidities of late preterm and term infants in the neonatal period in a tertiary care hospital

Sirajuddin Nazeer, Sivagurunathan Panchanathan, Karthikeyan Soundararajan*

Department of Pediatrics, KAPV Government Medical College, Trichy, Tamil Nadu, India

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***Correspondence:**
Dr. Karthikeyan Soundararajan,
E-mail: karthik.4920@gmail.com

ABSTRACT

Background: In obstetric practice, 34 completed weeks is considered as maturational milestone for the fetus. Despite relatively large size and apparent functional maturity, late preterm infants are at increased risk for neonatal morbidity compared with full term infants. Aim of the study was to study the incidence of late preterm births in a tertiary care hospital in Trichy, Tamil Nadu and to study the pattern of neonatal morbidities in late preterm infants and to compare it with term infants.
Methods: Hospital based prospective study was conducted from April 2019 to March 2020. Total 470 late preterm infants were included in our study. All infants enrolled in the study were followed up daily till discharge and after discharge, all infants were than reviewed at 15 and 28 days in a well-baby clinic.
Results: There were a total of 1941 live births during the study period. Of these, 470 (24.2%) were late preterm and 1263 (65%) were term births. Late preterm infants accounted for 71.1% of preterm birth. Late preterm infants were at significantly higher risk for overall morbidity due to any cause, respiratory 22.1%, neonatal jaundice 62%, sepsis 4%, hypoglycemia 8.9%, hospital readmission 8.1%. 63% of late preterm infants were readmitted for jaundice.
Conclusions: The incidence of late preterm birth was 24%. Late preterm infants had a higher incidence of jaundice, sepsis and respiratory morbidities. Late preterm infants had a longer hospital stay. They were also more likely to get readmitted in the hospital when compared to term infants.

Keywords: Late preterm, Term, Incidence, Morbidity

INTRODUCTION

Delivery of infants who are physiologically mature and capable of successful transition to the extrauterine environment is an important priority for obstetricians and pediatricians. A corollary of this goal is to avoid iatrogenic complications of prematurity and maternal complications from delivery.[1] Term is when any neonate whose birth occurs from the beginning of the first day of the 38th week (260th day) through the end of the last day of the 42nd week (294th day) following the onset of the last menstrual period.[2] It was designated that infants born between the gestational ages of 34 weeks and 0/7 days through 36 weeks and 6/7 days as late preterm and discontinuing the use of the phrase near term.[3] It was of the opinion that near term can be misleading conveying an impression that these infants are almost term resulting in under-estimation of risk and less diligent evaluation, monitoring and follow-up.[3] Several factors were considered in recommending the gestational age range of 34 0/6 to 36 6/7 weeks to define late preterm. In obstetric practice, 34 completed weeks began to be considered a maturational milestone for the fetus.[3,4] Yet compared with term infants, late preterm suffer from higher rates of

morbidity and mortality.[5,6] Only few studies have been conducted to study the morbidities in these group of late preterm infants. These have been done in developed countries and are retrospective in nature. Ours would be a prospective study comparing the morbidities between late preterm and term infants. The aim was to study the incidence of late preterm births in tertiary care government hospital in Trichy, Tamil Nadu and to study the pattern of neonatal morbidities in late preterm infants and to compare it with term infants.

METHODS

Hospital based prospective study was conducted from April 2019 to March 2020. Total 470 late preterm were included in our study.

Inclusion criteria

All live late preterm neonates (34 0/7 weeks to 36 6/7 weeks gestation) and term neonates (37 0/7 weeks to 41 6/7 weeks) born in the hospital during the study period were included in the study.

Exclusion criteria

Neonates with major congenital anomalies, babies with clinically identified chromosomal syndromes were excluded from the study.

An informed written consent was obtained from parents of all neonates who were included in the study. After getting informed consent, predesigned proforma was used to record the relevant information from individual patient selected for the study. Gestational age was assessed by the maternal LMP (last menstrual period), first trimester ultrasound scan and by physical assessment using the new Ballard score. Infants were resuscitated as per the NRP 2010 guidelines. Birth weight, length and head circumference were recorded for all neonates. The examination also included color, respiratory rate, respiratory distress and heartrate. Respiratory distress syndrome (RDS) is when respiratory rate of more than 60 per minute, grunt, intercostal or subcostal indrawing, sternal retraction with cyanosis occurring within first 4-6 hours of life.[7] PROBABLE SEPSIS is when total leucocyte count is <5000 /cu.mm.[8] Absolute neutrophil count- low count as per Munroe chart for term infants and Mouzinho chart for VLBW babies, immature (band cells) to total neutrophil ratio: >0.2, micro ESR: >15 mm 1st hour, C-reactive protein (CRP): positive, sepsis screen is considered as positive when 2 or more parameters are positive. Proven sepsis is when isolation of pathogens from blood or CSF or urine.[8] Hypoglycemia is when blood glucose <40 mg/dl, hypocalcemia is when serum calcium <7 mg/dl, hypernatremia is when serum sodium >150 meq/l, low APGAR score: <6 at 5 minutes, hyperbilirubinemia: clinically visible jaundice requiring phototherapy/exchange transfusion as per hour specific total serum bilirubin (TSB) nomogram (AAP chart). Criteria for 35 weeks were used for infants with 34 weeks gestation. Serum bilirubin were done at day 3 of admission. Blood sugar was done by glucostick method. Blood culture and sensitivity was done in suspected cases of septicemia. All infants enrolled in the study were followed up daily till discharge and after discharge, all infants were than reviewed at 15 and 28 days in a well-baby clinic.

Statistical analysis

Assuming 5% prevalence of morbidities in term infants with relative risk of 2 times in late preterm compared with term infants and allowing standard α (0.05) and β (0.2) error, 317 late preterm infants were to be recruited. The data collected from the patients were entered in Microsoft excel. Incidence of late preterm were calculated from the data. Neonatal morbidities were compared between late preterm and term infants. Chi square test was used to analyse categorical (non-parametric) variables. Quantitative variables were compared using unpaired student t-test. Data was analyzed using the SPSS software (version 16.0).

RESULTS

There were a total of 1941 live births during the study period of 12 months. Of these, 470 (24.2%) were late preterm, 208 (11%) were other preterm birth and 1263 (65%) were term births. 17 infants were excluded due to congenital anomalies and chromosomal syndromes. Late preterm accounted for 71.1% of preterm birth.

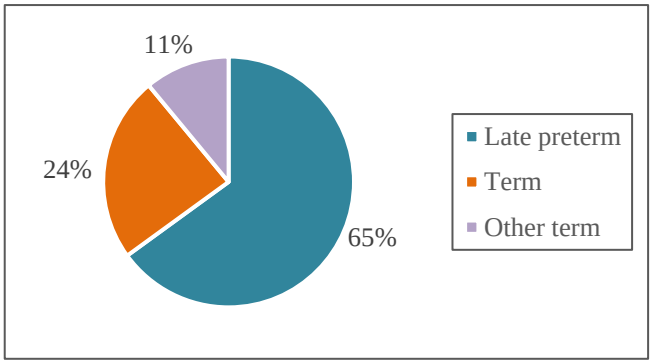

Figure 1: Incidence of late preterm.

Majority of late preterm infants were between 36 weeks to 36 weeks 6 days of gestational age. Most of the term infants were between 38 weeks to 38 weeks 6 days of gestational age. Approximately 45% of late preterm infants weighed between 2 kg to 2.5 kg, whereas majority of term infants (42%) weighed between 2.5kg to 3 kg. 66% of late preterm infants were appropriate for gestational age, 34% were small for gestational age. 90% of term infants were appropriate for gestational age. Most of the late preterm infants were delivered by LSCS (53.4% compared to 14.4) whereas most term infants

were delivered through the vaginal route. This was found to be statistically significant with a p value of <0.05.

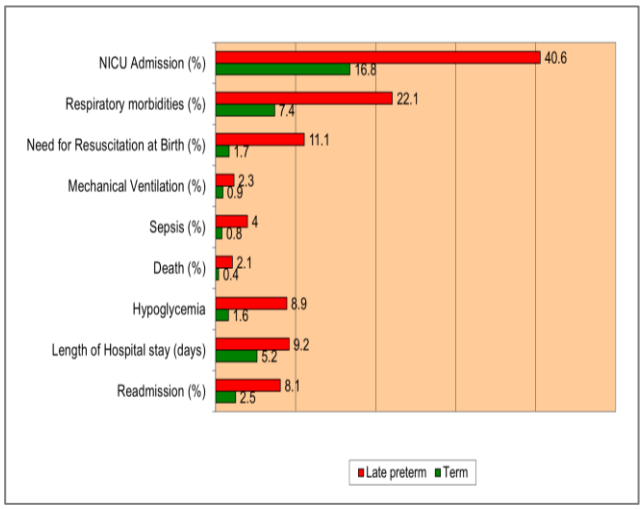

Figure 2: Morbidities in late preterm and term.

PIH and oligohydramnios were the most common maternal risk factors associated with late preterm delivery. 4% of late preterm infants had low APGAR score at 5 minutes compared to only 0.7% of term infants. However, this difference was not statistically significant.

Resuscitation was required in 11% of late preterm infants as compared to only 1.7% of terms, which was found to be statistically significant. Majority of late preterm infants required bag and mask resuscitation (10%) and 1% required intubation. 41% of late preterm infants required NICU admission compared to 17% of term infants. This was found to be statistically significant.

Respiratory morbidities were more in the late preterm as compared to term infants. This was found to be statistically significant.

Respiratory support (22.1% compared to 6.6%), jaundice (62.3% compared to 20%), sepsis (4% compared to 0.8%), hypoglycemia (8.9% compared to 1.6%), hospital readmission (8.1% compared to 2.5%) were all statistically significant in late preterm babies as compared to term babies. Jaundice was seen to resolve within 48 hours in 79.4% of term neonates as compared to 54% of late preterm infants. The mortality in late preterm babies (2.1%) was also significantly higher than term babies (0.4%).

Table 1: Maternal risk factors associated with late preterm birth.

Maternal risk factors	Preterm	%
Pregnancy induced hypertension	114	24.3
Oligohydramnios	95	20.2
Premature rupture of membranes	86	18.3
Antepartum hemorrhage	30	6.4
Gestational diabetes mellitus	82	17.4
Eclampsia+oligohydramnios	32	6.8
PIH+oligohydramnios	31	6.6

Table 2: Apgar score.

Apgar score	Late preterm (n=470) (%)	Term (n=1263) (%)	Total	p value
Low 5 min Apgar	21 (4)	10 (0.7)	31	0.16
Normal	449 (95.5)	1253 (99.2)	1702	not significant

Table 3: Need for resuscitation.

Need for resuscitation	Late preterm (n=470) (%)	Term (n=1263) (%)	p value
No resuscitation	418 (88.9)	1242 (98.3)	<0.001 significant
Bag and mask	47 (10)	11 (0.9)	
Intubation	5 (1.1)	10 (0.8)	

The mean length of hospital stay among late preterm was significantly higher when compared to term infants. This was found to be statistically significant.

Neonatal hyperbilirubinemia was the most common cause for readmission in both the groups. 63% of late preterm infants were readmitted for NNH. Hypernatremic dehydration and sepsis were the other reasons for hospital readmission.

Table 4: Respiratory morbidity among late preterm and term infants.

Respiratory complications	Late preterm (n=470) (%)	Term (n=1263) (%)	P value
TTN	32 (6.8)	71 (5.6)	
RDS	72 (15.3)	20 (1.6)	<0.001
MAS	0	2 (0.2)	

Table 5: Neonatal hyperbilirubinemia (NNH).

	Late preterm (n=470) (%)	Term (n=1263) (%)	P value
NNH	293 (62.3)	252 (20)	<0.001

DISCUSSION

There were a total of 1941 live births during the study period of 12 months. Of these, 470 (24.2%) were late preterm, 208 (11%) were other preterm birth and 1263 (65%) were term births. 17 infants were excluded due to congenital anomalies and chromosomal syndromes. Late preterm infants accounted for 71.1% of preterm birth. In USA in 2005 late preterm babies constituted 70% of premature births and only 30% were born before 34 weeks.[9] Our hospital serves as a referral centre for neighboring districts and the high incidence of prematurity may reflect selective referral of high-risk pregnancies. In our study, PIH and oligohydramnios were the most common maternal risk factors associated with late preterm delivery. McIntire et al study showed that approximately 80% of late preterm births were attributed to idiopathic preterm labor or ruptured membranes and 20% to obstetric complications.[10] Raju et al study showed that maternal obesity, preeclampsia and diabetes were associated with late preterm delivery.[11,12]

In our study 41% of late preterm infants required NICU admission compared to 17% of term infants. Carrie K, Shapiro-Mendoza et al study showed that 22% of late preterm infants required NICU admission than 3% of term infants.[13] Respiratory morbidities were more in the late preterm as compared to term infants. In our study, 15% of late preterm infants and 1.6% of term infants was suffered from RDS. Gilbert et al study found that the incidence of RDS was 7.4% at 34 weeks, 4.5% at 35 weeks and 2.3% at 36 weeks with 6.3% infants requiring mechanical ventilation at 34 weeks, 3.6% at 35 weeks and 2.3% at 36 weeks.[14] In our study, 62% of late preterm infants developed neonatal jaundice requiring phototherapy, compared to only 20% of term infants. Wang et al study observed that 54% of late preterm infants had hyperbilirubinemia compared to 37% in term infants.[15] In our study, incidence of sepsis was found to be higher in late preterm infants (4%) as compared to term infants (0.8%). McIntire and colleagues found that 33% versus 12% of infants were screened for sepsis at 34 and 39 weeks respectively and only 0.4% of those screened had culture proven sepsis.[16] In our study the incidence of hypoglycemia was 8.9% in late preterm infants compared to 1.6% in term infants. In a study by Wang and colleague's hypoglycemia (blood glucose <40 mg/dL) was three times more common in late preterm infants than term infants and nearly 27% of them required intravenous fluids when compared to 5% among term infants.[15] In our study 38 late preterm infants (8.1%) and 31 term infants (2.5%) required hospital readmission. Escobar et al study found that 4.4% of all late-preterm infants were readmitted within 2 weeks after the birth hospitalization, compared with 3% of infants less than 34 weeks gestation and 2% of infants born at or after 37 weeks gestation.[17] In our study neonatal hyperbilirubinemia was the most common cause for readmission in both the groups. 63% of late preterm and 67.7% of term infants were readmitted for NNH. Hypernatremic dehydration and sepsis were the other reasons for hospital readmission. Tomashek et al study found that jaundice and infection accounted for 77.1% of readmissions among late-preterm infants and 60.3% of readmissions among term infants.[18]

CONCLUSION

The incidence of late preterm birth was 24%. Late-preterm infants are at greater risk of neonatal morbidity and mortality than are term infants, parents of late-preterm infants may need special instruction and guidance before hospital discharge and closer follow-up after discharge. It is especially important to educate first-time mothers of late-preterm infants how to evaluate feeding success and what signs to look for to detect dehydration and hyperbilirubinemia. This study included babies born in a tertiary care hospital and hence was not a true reflection of the community. Patients were followed up for a period of a month. Hence long term outcomes were not studied.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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