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Original Research Article

Neonatal outcomes as per gestational age in late preterm births: a retrospective study

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ABSTRACT

Background: Late preterm infants (34 week to 36 week + 6 days of gestation) are physiologically immature and have limited compensatory responses to the extra-uterine environment. Aim of the study was to compare the incidence of neonatal complications of late preterm infants compared to those born at term gestation and admitted in neonatal intensive care unit in a tertiary care hospital in south India.
Methods: We retrospectively analyzed late preterm deliveries reported in 24 months period. Late preterm were divided in 3 sub-groups according to gestational age at delivery: 34 week + 6 days, 35 week + 6 days, 36 week + 6 days of gestation. The incidence of major clinical complications was evaluated. Statistical analysis was performed by using the Z- test. All babies admitted from March 2014 to February 2016 were retrospectively studied.
Results: Among late preterm deliveries 53% were admitted to the neonatal intensive care unit. Out of which 35% presented with neonatal jaundice, 27% Respiratory distress syndrome (RDS), and sepsis 18 % .The incidence of RDS, jaundice and sepsis was significantly higher at 34 0/6 and 35 0/6 weeks of gestation, compared to full-term infants. Finally, the incidence of jaundice and RDS results significantly higher in all the 3 subgroups of late preterm, in contrast to full term infants.
Conclusions: Results demonstrated an increased risk of morbidity in the late preterm period in contrast with term infants. Results also displayed that the gestational age at delivery of late preterm can influence the risk of adverse neonatal outcomes.

Keywords: Hypoglycemia, Late preterm, Neonatal jaundice, RDS, Sepsis

INTRODUCTION

Preterm labour is defined as regular, painful, synchronous uterine contractions resulting in cervical changes that start before 37 weeks of pregnancy.[1] Late preterm births defined as births between 34 week and 36 week + 6 days of gestation.[2] Even though late preterm infants contribute the largest percentage of preterm infants, there has been less research documented. However, recent research has revealed an opposite trend.[3-6] While serious problems are rare, the late preterm group has 2 to 3 fold increased morbidities, such as hypoglycemia, respiratory distress, poor feeding, neonatal jaundice, and readmission rates after initial hospital discharge.[3,4]

These infants are often considered metabolically "functionally mature" because they are of similar size and weight at birth as infants born at term, actually they seem to have less severe neonatal complications compared to infants born before 34 weeks of gestation.[7] The available evidence suggest that, in comparison with term neonates, late-preterm are at high risk of developing complications

such as respiratory distress syndrome (RDS), Jaundice, hypoglycemia, apnea. We also analyzed the incidence of neonatal complications in three different subgroups, stratified for gestational age, in order to evaluate the contribution of each week of gestation at delivery to neonatal morbidity (Table 1).

METHODS

We analysed retrospectively all late preterm deliveries (34 weeks to 36 weeks+6 days of gestation) occurred in the NICU, K. S. Hegde Hospital, Mangalore, Karnataka in 24 month period. The study group was compared with a control group comprising of full-term deliveries. Gestational age was determined by the first day of mother's last normal menstrual period (LMP) with confirmatory ultrasonography. The late preterm group was divided in 3 sub-groups: group A: 34 0/6, group B: 35 0/6, group C: 36 0/6.

Abnormal pregnancies such as gestational diabetes, pregnancy related hypertension, placenta previa and other medical disorders were excluded from the study. Admission criteria to the neonatal intensive care unit (NICU) include any of the following: neonatal jaundice, respiratory distress requiring respiratory support for longer than 24 hours, suspected sepsis, hypoglycaemia, requirement for close observation as assessed by a neonatologist. First, it was evaluated if late preterm infants have a higher admission rate in NICU. Then, among late preterm sub-groups and full-term infants, it was analysed the rate of the major adverse outcomes as follows: Neonatal jaundice: Clinically visible jaundice requiring phototherapy/exchange transfusion as per hour specific total serum bilirubin (TSB) normogram (AAP chart). Respiratory distress syndrome/hyaline membrane disease was typically defined as: presence of at least 2 of the following criteria: respiratory rate >60/min, subcostal/ intercostal recessions, expiratory grunt/ grunting, and requiring oxygen therapy, and NICU admission for further respiratory support, with the diagnosis verified by chest radiograph findings of reticulogranular patterns and air bronchograms, sepsis: probable sepsis: positive sepsis screen (two of the five parameters namely

- TLC <5000/mm^3 or >15000/mm^3
- Band to total polymorph ratio of >0.2
- Absolute neutrophil count less than 1800/mm^3 or >7200/mm^3
- C reactive protein >0.5 mg/dL
- Platelets <1 lakh or proven sepsis: isolation of pathogens from blood or CSF or urine
- Weight loss: If weight loss >10% of birth weight
- Readmission: any readmission after post-delivery discharge from hospital
- Hypoglycemia: blood glucose of less than 40 mg/dL.[4,8]

Statistical analysis

Statistical analysis was done by using the Z- test. An alpha value of 0.05 was used for assessing statistical significance. The power analysis was performed in order to measure how the test is able to discriminate the groups. The statistical analysis was completed by assessing the power analysis on Z-test. Finally, the 95% confidence interval (CI) of the differences in the analysed proportions was also calculated to evaluate the lower and upper bounds of the estimations.

RESULTS

Table 1: Morbidity risk stratified for gestational age in late preterm neonates.

Gestational age at birth (weeks)	Total number (%)	Discharged (%)	Died	Survival rate (%)
34 (group A)	27 (35%)	24 (89%)	3 (11 %)	89%
35 (group B)	25 (32%)	24 (96%)	1 (4%)	96%
36 + 6 days (group C)	26 (33%)	26(100%)	0	100%
Total	**78 (100%)**	**74 (95%)**	**4 (5%)**	**95 %**

Table 2: Morbidity and mortality pattern in late preterm neonates.

Problem	Number	Percentage (%) n = 78	Number who died	Case fatality rate
Jaundice	27	35	0	0
Respiratory problems	21	27	3	5
Sepsis	14	18	0	0
Congenital heart disease	6	8	0	0
Seizures	4	5	1	25
Anemia	4	5	0	0
Hypoglycemia	2	2.5	0	0

1335 full-term deliveries and 78 late preterm deliveries occurred in our division, during the sampling period. 504 infants (38%) among term deliveries, and 41 infants (53%) among late preterm were admitted to the NICU. Among 1335 full-term infants, 480 cases of neonatal jaundice (36%), 21 cases of hypoglycemia (1.5%), 14 cases of RDS (1.04%), 8 cases of anemia (0.5%). Among 78 late preterm infants: 27 cases (35%) of neonatal jaundice, 21cases (27%) of respiratory distress syndrome, 2 cases (2.5%) of hypoglycemia, 4 cases (5 %) of anemia. (Table 2) the Z-test analysis showed a significant increase in the incidence of neonatal jaundice in all the 3 late preterm sub-groups and significant increase in respiratory distress syndrome till 36 weeks of gestation compared to the term infants group (p <0.0001). The incidence of neonatal jaundice and of RDS was significantly increased in group A (p <0.0001; p <0.0001 respectively) and in group B (p <0.0001; p < 0.0002 respectively). (Figure 1) (Table 3) a power of 70% was calculated, indicating the ability of the test to highlight true differences among the analyzed groups.

Table 3: Statistical analysis of incidence of neonatal major complications in late preterms compared to born at term in total and stratified for gestational age.

Preterm versus term variables	34 0/6 weeks	35 0/6 weeks	36 0/6 weeks	Total
Jaundice	<0.0001 22%	<0.0001 14%	<0.0001 9 %	<0.0001 45%
RDS	<0.0001 26%	<0.0002 8%	<0.570 1%	<0.0001 35%
Hypoglycemia	<0.0001 2.1 %	<0.0001 0.40 %	<0.0001 0%	<0.0001 2.5 %
Anemia	0.008 2.2 %	<0.0001 2.6 %	0.106 0%	0.027 4.8%

p value < 0.05 was considered statistical significant.

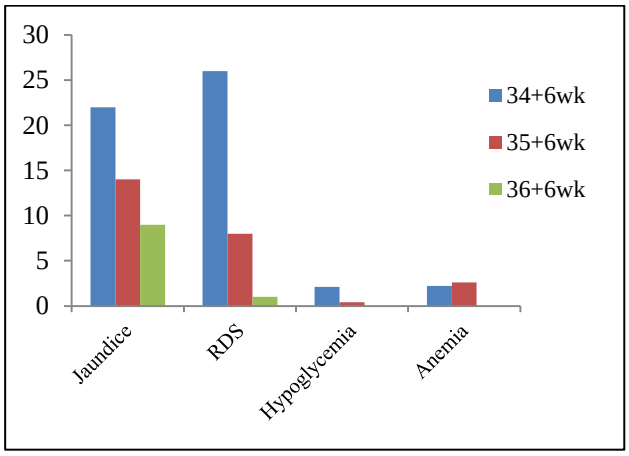

Figure 1: Incidence of neonatal major complications in late preterm neonates compared to born at term in total and stratified for gestational age

DISCUSSION

The late preterm infants have similar risks for developmental problems as neonates born at term. However several studies, which analyzed clinical outcomes of late preterm births, have raised concern that these infants are at considerably increased risk, compared to born at term, with medical complications such as neonatal jaundice, respiratory distress, hypoglycemia, anemia.[3] In this study we analyzed neonatal outcomes in late preterm infants born in our NICU, and we found, according to data published in literature an increased morbidity pattern on comparing with those born at term.[8] Melamed et al also found that compared with full-term infants, spontaneous late preterm delivery was associated with an increased risk of neonatal morbidity, including respiratory distress syndrome, sepsis, intra-ventricular hemorrhage, hypoglycemia, and jaundice requiring phototherapy.[9] Shapiro-Mendoza, et al. found that the newborn morbidity rate doubled in infants for each gestational week earlier than 38 weeks.[10]

Our data furthermore have been stratified for gestational age at birth, for better analysis and contribution of each gestational age to neonatal morbidity and we found that the incidence of neonatal jaundice and RDS was significantly higher in between 34 to 35 weeks of gestation when compared to full-term infants. Finally, the incidence of RDS and jaundice results considerably higher in all 3 sub group of late preterm, compared to full term infants (Table 1).

(Table 1) So we can analyze that the gestational age at delivery of late preterms scan be correlated with risk of major complications. A recent multicentric study, conducted in the United States (Consortium on Safe Labor et al) analyzed the short term neonatal outcomes in late preterm, is associated with the increased risk of respiratory problems compared with term infants. In this study children were stratified for gestational age and results showed an increased risk of respiratory distress syndrome in all the subgroups of preterm gestational

age.[8] Our data are quite similar with the above quoted study. Even results showed an increased risk of RDS in late preterm of group A and B which is as similar to our study.

CONCLUSION

Results of our study showed that in comparison with term infants, late preterm infants are at high risk for early neonatal morbidities especially respiratory morbidity, need of ventilation, jaundice, hypoglycemia and probable sepsis but in late preterm groups as the gestational age increases, the risk of neonatal morbidity decreases. Our findings underline the significant risk of RDS in infants born till 36 weeks of gestation and significant risk of neonatal jaundice in infants born till 36 week + 6 days of gestation.

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