

A Prospective Cohort Study to Record the Early Complications in Late Preterm Neonates and Maternal Factors Affecting Preterm Deliveries in a Tertiary Health Center

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ABSTRACT

Introduction: Late preterm newborns are at a higher risk of morbidity as compared to term infants, and as a result, they require additional attention and care during their early neonatal period in order to prevent probable complications. Late preterm infants are defined as those newborns born between 34 weeks and 36 weeks and six days of gestation. They do not acquire the significant and chronic illnesses that are commonly seen in infants born before 34 weeks of gestation. Late preterm babies are typically recognized and treated as though they are term babies and they develop issues during their initial days of life.

Methodology: This is a prospective cohort study conducted among newborns born during the study period of 18 months in a tertiary health center and their outcomes were studied. The newborns were observed and the general condition of the newborns was monitored during the initial 5 days of life in the hospital. Observation of common maternal factors leading to preterm births was also noted.

Results: In our study, the mean baby weight was recorded as 2.57 ± 0.55 . Among the preterm neonates, only 66% didn't have any complication, and 34% developed complications. In the preterm group, among mothers 16% had diabetes, 13% had hypertension and 5% had primary rupture of membranes (PROM). We also noticed that birth weight, and baby weight for diabetic mothers was significant in the preterm group, and hypoglycemia, hypothermia, hyperbilirubinemia, respiratory distress, and feeding difficulty were found to be statistically significant and the risk factor and gestational age were statistically significant. (p -value < 0.001).

Discussion and conclusion: We conclude that infants who are late preterm are more likely to experience various neonatal complications. The majority of preterm newborns delivered at secondary-care institutions are late preterm neonates. Hospitalizations for birth and morbidity are important risks for them. Regardless of their physical characteristics, late preterm infants should get the same level of medical care as other pre-terms.

Keywords: Feeding difficulty, Hyperbilirubinemia, Hypoglycemia, Hypothermia, Maternal risk factors, Preterm delivery, Respiratory distress.

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INTRODUCTION

Those who are born late preterm are at a greater risk than others for experiencing problems. When compared to term newborns, they also have a higher risk of acquiring morbidities and dying before the age of one year.¹ Late Preterm neonates are those who are born between the gestational ages of 34 weeks and 0/7 days and 36 weeks and 6/7 days (239th and 259th day).¹ Term newborns are those born after 36 weeks and 7 days of gestation.¹

A key factor in newborn death and morbidity, premature birth also has negative long-term effects on a person's overall health and well-being. Late preterm newborns are at a higher risk of morbidity as compared to term infants, and as a result, they require additional attention and care during their early neonatal period in order to prevent probable complications.²

According to World Health Organization (WHO) about 15 million babies born yearly prematurely, are also referred to as preterm (before 37 completed weeks of gestation). That is more than one in every ten babies. The difficulties that arise from premature birth are responsible for the deaths of approximately one million children each year.³ India is first on the list of the 10 countries that are responsible for all 60 percent of worldwide preterm births.⁴ The majority of babies born late preterm have better odds of developing normally.⁴

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Commonly witnessed early complications like low temperature (hypothermia), high serum bilirubin level (hyperbilirubinemia), Low glucose level (hypoglycemia), respiratory distress, and feeding difficulty.⁴

It is beneficial and also improves the prognosis outcomes of these infants to counsel and educate mothers and families about the risks of late preterm and early term births.⁴ Late preterm infants are defined as those born between 34 weeks and 36 weeks and 6 days of

gestation. They do not acquire the significant and chronic illnesses that are common in infants born before 34 weeks of gestation.⁵

On the other hand, there is mounting evidence to suggest that these infants as previously believed are not as healthy and, in fact, prone to increased risk of morbidity and mortality when compared to term neonates.⁵ Babies born late preterm are typically recognized and treated as though they are term babies; however, they develop issues.⁵ The purpose of this study was to investigate the early problems that were observed in late preterm newborns and to observe the common maternal factors leading to preterm deliveries at a Tertiary Care Center.

The objective of this study was to observe the early complications in late preterm neonates in a Tertiary Health Center and with note the common maternal risk factors associated to preterm births.

METHODOLOGY

A prospective cohort study to record the early complications in late preterm neonates born in a Tertiary Health Center and to observe the common maternal factors causing preterm births. A Study conducted and data collected of late preterm newborns born during the period of 18 months from January 2020 to June 2021. Their stay in the hospital was observed for 5 days and the complications that developed were recorded. Hence a total of 100 newborns were included in the study. Common maternal factors contributing to preterm in these neonates were recorded. Late preterm Neonates - 34 (0/7)–36 (6/7).

Study sampling size calculated based on previous studies. The proportion of complications in late preterm neonates is 18, using 5% level of significance and 80% power the total sample size 100, including 10% nonresponse error. The study sampling method was newborns born during the study period of 18 months which belongs to the inclusion criteria (convenience sampling) infants born within 34 (0/7)–36 (6/7) weeks of gestation – late preterm infants with matched LMP and first USG reports were included in the study. Extreme preterm and term neonates or infants born with congenital abnormalities or anomalies or any complications and mothers without first-trimester dating scans were excluded from the study.

Method of Data Collection

After getting consent from the parents of neonates born completing between 34 (0/7) and 36 (6/7) weeks of gestation during the study period of 18 months which belong to the inclusion criteria were taken. And data was collected from reliable bystanders and data of all three trimesters like age, blood group of the mother and last menstrual period noted, gestational age of newborn (only calculated using the first-trimester dating scan) other information like history of previous preterm births or previous neonatal death were asked for. Antenatal risk factors if present like pregnancy induced hypertension (PIH), gestational diabetes mellitus (GDM), urinary tract infections (UTI), primary rupture of members (PROM), or fever with rash were recorded.

Birth details like time and mode of delivery, baby blood group, Apgar score, if the baby cried immediately after birth if resuscitation was needed, and if it was late preterm delivery whether it's spontaneous or induced labor, and the cause for preterm delivery were noted. The newborns are by the mother's side and are observed during the initial 5 days in the hospital and the general

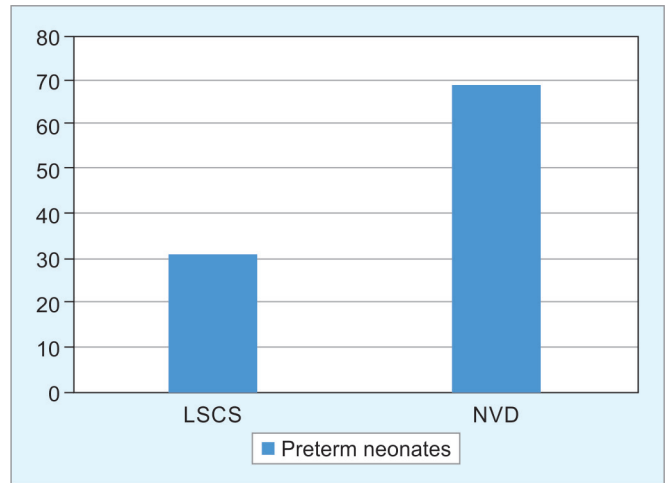


Fig. 1: Mode of delivery

condition of the newborn was monitored. The most commonly seen earliest complications are Hypothermia, Respiratory Distress, Hypoglycemia, Hyperbilirubinemia, and Feeding Difficulty.

Maternal Risk Factors

There are many maternal factors that leads to preterm births main risk factors are premature rupture of membranes and preterm labor. Other conditions than PROM that contribute are urinary tract infection, hypertensive disease gestational diabetes.

Data was entered in MS Excel and statistical analysis was done by statistical package for social sciences (SPSS) 23 software. The results were presented in descriptive statistics and an appropriate test of significance was applied with a 5% level of significance and a 95% confidence interval. Descriptive analysis was carried out by frequency and proportion for categorical variables. Data was also represented using appropriate bar chart diagrams and tables. The association of variables was assessed by the Chi-square test. The p -value < 0.05 is considered an association between variables. p -value < 0.05 was considered statistically significant. The International Business Machines (IBM) SPSS version 22 was used for statistical analysis.¹ IBM Corp. Released 2013. IBM SPSS Statistics for Windows, version 22.0. Armonk, NY: IBM Corp.

RESULTS

In the study, a total of 100 preterm neonates were included. Among the study population, the mean age group of mothers of the preterm neonates ranged from 26 to 32 years. All the cases didn't have a history of any complications in previous pregnancies. All cases received supplementation during this pregnancy and had a mean of 4.51 ± 1.13 hospital visits. Out of these 100 cases, 69% were delivered by normal vaginal delivery, and 31% were delivered by low-segment cesarean section (Fig. 1).

It was found that 79% of the newborns cried immediately after birth and 21% cried following tactile stimulation ($p < 0.05$ – significant). Birth weight of the newborns had a mean value of 1.83 ± 0.22 (highly significant $p = 0.0001$). It was also noted that the birth weight of newborns born to diabetic mothers had a mean of 1.850 ± 0.212 .

On observing the common newborn complications hyperbilirubinemia was seen in 38%, hypoglycemia was seen

Table 1: Newborn complications

Parameters	Yes		No		p-value
	Frequency	Percentage	Frequency	Percentage	
Hyperbilirubinemia	38	38%	62	62%	<0.001 (significant)
Hypoglycemia	18	18%	82	82%	<0.05 (significant)
Hypothermia	30	30%	70	70%	<0.05 (significant)
Respiratory distress	07	07%	93	93%	0.002 (significant)
Feeding difficulty	13	13%	87	87%	0.22 (significant)

Table 2: Neonatal risk factors of hyperbilirubinemia

Risk factors	Frequency	Percentage
ABO incompatibility	04	4%
Hypothermia	26	26%
Less feeds	10	10%
Rh incompatibility	04	4%
Nil	56	56%
Total	100	100%

Table 3: Maternal risk factors

Maternal risk factors	Preterm		χ^2 -value	p-value
	Frequency	Percentage		
Diabetes	16	16%	23.413	0.000
Hypertension	13	13%		
Prom	05	05%		
Nil	66	66%		
Total	100	100%		

in 18%, hypothermia was seen in 30%, Respiratory distress was observed in 7% of the cases which was more mild respiratory distress, and feeding difficulty was seen in 13 %. All the variables were found to be significant (Table 1).

Based on the neonatal factors causing hyperbilirubinemia it was observed that the highest was due to hypothermia (26%), followed by less feeds (10%), ABO incompatibility (04%), and Rh incompatibility (04%), and nil (54%) (Table 2).

Analysis of antenatal maternal risk factors affecting preterm deliveries it was observed that 16% due to Diabetes mellitus, 13% due to hypertension, 5% due to PROM, and 66% due to nil (Table 3).

DISCUSSION

Late preterm infants are those who are born between 34 and 36 weeks of gestation. The frequency of morbidity and mortality in late preterm infants is more than in term infants. The relative decrease in physiological as well as metabolic maturity in late preterm infants could be the reason behind the possible complications.

Due to their higher risk of morbidity than term infants, late preterm newborns require more care and attention during the early neonatal period in order to avoid potential complications.²

In our study, the mean age of the mothers was 25.95 ± 3.55 years. Similarly, Mathews et al. found that there was increase in the mean age of mothers between 2000 and 2014, with the first delivery from 24.9 years in 2000 to 26.3 years in 2014. The most noticeable the increase in average maternal age was noticed between 2009 and 2014.^{6,7}

In our study in the preterm category, around 34% were from the lower middle class, 35% were upper lower class and 31% were from the upper middle class. These values were found to be statistically significant.

We have observed that 10.5% of the mothers had diabetes, and 7.50% of the mothers had hypertension. According to a recent review conducted by Yanit et al., women with type I diabetes mellitus and women with type II diabetes mellitus were more likely to have chronic hypertension than the general population (2–11% vs 12–18%).⁸

Ylilehto E et al. found that Trial of Labor (TOL) ($N = 199$, 72.4%) and planned cesarean section (CS) ($N = 76$, 27.6%) were the planned modes of delivery. Similarly, in our study, we found that nearly two-thirds of the patients had normal vaginal delivery while one-third of the patients had cesarean section.⁹ In the preterm group 31% of lower segment caesarean section (LSCS).

When we compared the blood sugar of infants, preterm babies had an increased frequency of hypoglycemia. In the preterm group, 18% of infants had hypoglycemia. The random blood sugar in late preterm babies was 58.16 ± 18.0 .

Past studies have revealed that late preterm babies are more prone to hypoglycemia.^{10,11} This is due to the dysregulation of liver metabolism of immature glycogenolysis, lipolysis of adipose tissue, gluconeogenesis, and ketogenesis.

We have observed that, among preterm babies, only 79% of babies cried immediately after birth. The preterm group only 69% didn't have respiratory distress. 10% in group 1 had an respiratory distress syndrome (RDS) score of 1, 13% had RDS score of 2, 5% had an RDS score of 3, 2% had RDS score of 4 and 1% had an RDS score of 5.

Sahana et al. have reported that late preterm babies have significantly higher frequency of respiratory distress than the term neonates.¹² When compared to term infants, preterm infants are more susceptible to morbidities such as respiratory issues, unstable temperatures, hypoglycemia, kernicterus, feeding issues, admissions to neonatal intensive care units, and negative neurological sequelae. It causes a significant impact on long-term neurological and school-age outcomes of late preterm infants.¹³

Man K et al. conducted a study where they noticed that mild to moderate hypothermia, which is frequently present in preterm infants admitted to the NICU in the first 3 hours after admission. Infants with hypothermia at admission not only had a five times higher risk for hypothermia in the first three hours after admission, but the hypothermia also lasted longer.¹⁴ We have observed that in preterm around 30% had hypothermia.

In preterm babies 38% had hyperbilirubinemia. This was corroborated by the study conducted by Khowaja et al. where they found hyperbilirubinemia in 17.5% of the patients.¹⁵

In our study, among risk factors for hyperbilirubinemia in the preterm group, 26% of them had hypothermia, 10% had decreased feeding, 4% had ABO incompatibility and 4% had Rh incompatibility.

Adding on to that in the preterm category, 13% had feeding difficulty. Wagh AS et al. have reported that only half of the late preterm babies had feeding difficulties even during discharge when compared to term babies. Our results were similar to the above findings.

In the preterm group, only 66% didn't have any complications and 34% of the cases developed complications, among those mothers 16% had diabetes, 13% had hypertension and 5% had PROM. The difference in the proportion of risk factors associated with gestational age was statistically significant (p -value < 0.001).

This was supported by the study conducted by Singh et al. where they found that nearly one-fifth of late preterm deliveries required NICU care, and hypertensive disorders of pregnancy and preterm premature rupture of membranes were associated with increased incidences of late preterm birth.¹⁶

Mehta et al. found that when compared to term newborns, late preterm babies had a significantly higher incidence of complications like hyperbilirubinemia (62.7% vs 13.3%), respiratory morbidities (16% vs 4%), inadequate feeding, hypothermia, hypoglycemia, and sepsis (p 0.01).¹⁷

We have also found that preterm babies have an increased frequency of hypothermia, hyperbilirubinemia (due to various risk factors), respiratory distress, and difficulty feeding in the present study.

We also noticed that birth weight, baby weight for diabetic mothers, temperature, RBS, serum bilirubin, and Respiratory rate (co-related with respiratory distress) were lower in the preterm group and it was found to be statistically significant.

Therefore, we conclude that late preterm neonates are more prone to early complications; hence preterm neonates should be monitored closely immediately after birth. The limitations were that the results from this study only compared a few early complications and the study compared only the newborns in a small location and cases were followed up only for a period of 5 days hence the results can't be relevant to all late preterm newborns.

CONCLUSION

This study aimed to find out the occurrence of early complications in late preterm in tertiary care, which are commonly seen are hypoglycemia, hypothermia, hyperbilirubinemia, respiratory distress, and feeding difficulty. After data collection and careful analysis, I conclude that late preterm neonates have an increased risk of early complications when compared to term neonates. Due to the very little difference in the gestational age. Not much care and attention is given to the late preterm newborn, as it is given to other preterm newborns. Hence utmost care and attention is required for this group of late preterm neonates. Further possibilities for comparison of complications could be watched for a longer period of time and the study should involve a bigger population. Using the data, importance should be taught regarding early detection of complications and awareness should be spread not only among the parents but also to the healthy faculties regarding giving high importance to late preterm newborns.

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