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Original Research Article

SHORT-TERM CLINICAL OUTCOMES OF LATE PRETERM NEONATES: A PROSPECTIVE ANALYSIS OF HOSPITALIZATION AND INTERVENTIONS

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ABSTRACT

Background: Despite efforts to reduce premature births, rates continue to rise globally. Focus has primarily been on low-birth-weight infants and deliveries before 34 weeks. Late preterm births pose challenges, yet elective deliveries before 39-40 weeks are common. Present study aimed to assess the short-term clinical outcomes of late-preterm newborns, considering hospital and NICU stays, medical interventions, and maternal health.

Material and Methods: A prospective study (Jan 2021-Dec 2022) at Trichy SRM Medical College Hospital on babies born between 34-36 6/7 weeks gestational age. Major anomalies, out-born babies, and stillbirths were excluded. Data on gestational age, maternal health, and neonatal outcomes were collected and analyzed.

Results: Among 100 late preterm neonates, 68% were delivered by Caesarean section. Maternal risk factors included gestational diabetes (GDM), hypertension (GHTN), anaemia, and hypothyroidism. Most common indications for preterm labour were spontaneous onset and twin pregnancies. Neonatal outcomes included 29% with respiratory distress, 53% with jaundice, 19% with suspect sepsis, and 1% mortality. Mean hospital and NICU stays were 9.03 and 5.2 days, respectively.

Conclusion: Late preterm babies require longer hospital and NICU stays, increased medical interventions, and face higher risks of complications. Effective neonatal care setups are crucial for their management. Managing high-risk mothers is essential to reduce neonatal mortality and morbidity.

Key Words: Late preterm, neonatal outcomes, maternal risk factors, NICU, complications.

INTRODUCTION

Despite significant efforts and advancements in obstetric care aimed at reducing premature births, the rates of preterm births continue to rise across both developed and developing countries. [1,2] Historically, much of the focus in preventing and managing preterm births has centred around addressing issues related to extremely premature infants (born before 34 weeks of gestation) and those with low birth weight. However, there has been growing recognition of the challenges faced by late preterm infants—those born between 34 and 36 6/7 weeks of gestation.

Late preterm infants are at heightened risk for a range of complications compared to full-term infants, which has been a focal point of recent research. Although many healthcare providers are becoming increasingly comfortable with managing deliveries during this period, often opting for elective deliveries before the recommended 39 to 40 weeks' gestation, this practice raises concerns due to

the increased risks associated with late preterm birth. [3, 4]

Infants born between 34 and 35 weeks are particularly vulnerable to a host of medical issues, including respiratory distress syndrome (RDS), sepsis, and patent ductus arteriosus (PDA). The neonatal intensive care unit (NICU) admission rates are notably high at 34 weeks' gestation (16.3%) but drop significantly by 36 weeks' gestation (4.8%).[5]

Late preterm infants often face challenges that extend beyond immediate physical health issues. They are more susceptible to problems such as jaundice, temperature instability, and feeding difficulties. Moreover, there is increasing concern about potential long-term neurodevelopmental issues, such as academic underperformance and behavioural problems. [6]

Despite these recognized risks, late preterm infants are frequently managed similarly to full-term newborns due to a lack of extensive research specifically focused on this group. Consequently, our understanding of the unique developmental biology and the mechanisms underlying the illnesses experienced by these infants remains limited. This study aims to fill this gap by investigating the short-term clinical outcomes of late preterm newborns, with a focus on hospital and NICU stays, medical interventions, and maternal health factors.

MATERIAL AND METHODS

Study Design and Setting

This prospective observational study was conducted from January 2021 to December 2022 at Trichy SRM Medical College Hospital. The study population comprised infants born between 34 and 36 6/7 weeks of gestation. The study was approved by the Institutional Ethics Committee (TSRMMCH&RC/ME-1/2020-IEC No: 113), and informed consent was obtained from all parents or guardians.

Inclusion and Exclusion Criteria

Babies delivered between 34 to 36 (6/7) completed weeks of gestational age at Trichy SRM Medical College Hospital were included. Babies with major congenital anomalies detected antenatally or during post-natal period, out born babies, delivered within 34weeks and or equal of 37 weeks of gestation and still birth were excluded

Data Collection

Gestational age was primarily assessed using the first day of the last menstrual period (LMP). In cases where antenatal records were unavailable, gestational age was determined using the New Ballard's scoring system (NBS). Additionally, gestational age was cross-verified with antenatal ultrasound dating scans when available.

Maternal data were collected, including age, health conditions, and details of antenatal care. Relevant maternal risk factors included gestational diabetes mellitus (GDM), gestational hypertension (GHTN), hypothyroidism, and anemia. Data were collected on the use of antenatal steroids, indications for preterm labor, and mode of delivery.

Post-delivery, data were collected on newborn characteristics such as birth weight, need for resuscitation, duration of NICU stay, respiratory distress, breastfeeding initiation, and any complications such as jaundice, hypoglycemia, sepsis, and mortality. The need for resuscitation was categorized into initial steps, positive pressure ventilation (PPV), and intubation.

Data Analysis

Data were recorded in a proforma and analyzed using SPSS version 22. Categorical data were presented as proportions, while continuous data were summarized using means and standard deviations.

RESULTS

The study included 100 late preterm neonates delivered at Trichy SRM Medical College Hospital during the study period.

Table 1: Showing pregnancy related parameters distribution

		Frequency	Percentage
Age in weeks	34-34 6/7 weeks	27	27
	35-356/7 weeks	30	30
	36-36 6/7 weeks	43	43
Maternal age in years	<20	9	9
	21-25	36	36
	26-30	41	41
	31-35	11	11
	>35	3	3
Gender of newborn	Female	41	41
	Male	59	59
Maternal Risk factors	Gestational Diabetes Mellitus	12	12
	Gestational hypertension	18	18
	Hypothyroidism	7	7
	Anaemia corrected pregnancy	16	16
Use of antenatal steroids	Complete course	41	41
	Incomplete course	32	32
	Nil	27	27
Indication of preterm	Failed Induction	3	3

labour	Oligohydramnios	12	12
	Fetal Distress	7	7
	Gestational Diabetes Mellitus	4	4
	Gestational Hypertension	10	10
	Intrauterine growth retardation	5	5
	Labour Preterm	21	21
	Meconium-stained amniotic fluid	3	3
	Previous Lower segment caesarean section	15	15
	Premature rupture of membrane	4	4
	Twin (set of twins)	16	16
	Maternal Infection / Chorioamnionitis	Nil	Nil
Mode of delivery	Normal	28	28
	Assisted	4	4
	Lower segment Caesarean section	68	68

Table 2: Showing the Pregnancy and neonatal outcome

		Frequency	Percent
Gestational age 34-36 6/7 weeks	I trimester USG	44	44
	LMP	37	37
	NBS	19	19
Birth weight category	AGA	75	75
	SGA	20	20
	LGA	5	5
Passed meconium within 24 hours	Yes	88	88
	No	12	12
Need of resuscitation	Initial steps	96	96
	PPV	3	3
	Intubation	1	1
Neonatal jaundice	Yes	53	53
	No	47	47
Treatment of neonatal jaundice	Exchange transfusion	1	18.8
	Single surface phototherapy	40	75.4
	Double surface/intensive phototherapy	12	22.5
Cause of neonatal jaundice	Physiological jaundice	26	26
	Rh / ABO incompatibility	11	11
	Inadequate / delayed initiation of breastfeeding	12	12
	Cephalhematoma/IVH	3	3
	Polycythemia	1	1
Sepsis	Culture Positive	1	1
	Probable	5	5
	Suspected	13	13
Mortality	Yes	1	1
	No	99	99
Hypoglycaemia	Yes	17	17
	No	83	83
Respiratory distress after birth	Transient tachypnea of newborn(TTNB)	28	28
	RDS	1	1

DISCUSSION

This study provides valuable insights into the clinical outcomes of late preterm infants, highlighting several key areas of concern and comparison with existing literature.

Sex Distribution and Implications

In our study, 59% of late preterm infants were male and 41% were female, reflecting broader trends identified by Myrthe et al. They found that male fetuses have a higher risk of spontaneous preterm birth and preterm premature rupture of membranes, particularly between 27 and 31 weeks of gestation.[7] This aligns with our observation, suggesting that male gender may be a significant risk factor for late preterm birth.

Despite advancements in antenatal corticosteroids and postnatal surfactant therapy, gender disparities in preterm birth outcomes persist. Male foetuses generally have more alveoli and surface area than females of the same gestational age, partly due to their typically higher weight.8 However, research shows that females develop surfactant earlier, which prevents premature closure of alveoli and small airways.[9-11] Specifically, the 2:1 lecithin/sphingomyelin (L/S) ratio and the appearance of phosphatidylglycerol—a surfactant component—occur about one week earlier in females compared to males, according to Fleisher et al.[12] This early surfactant development enhances respiratory function in female preterm infants, contributing to their relative advantage in respiratory health compared to males.

Etiology of Late Preterm Births

Our research offers a comprehensive view of preterm birth etiology, highlighting key factors contributing to early delivery. We found that most mothers in our study were between 26 and 30 years

old, with fewer in the 21 to 25 and 31 to 35-year age groups. This suggests that women in their late twenties to early thirties may face a higher risk of preterm labour.

The most frequent indication for preterm birth in our cohort was spontaneous labour, followed by twin pregnancies, previous caesarean sections, and oligohydramnios. Less common causes included intrauterine growth restriction (IUGR), meconium-stained amniotic fluid (MSAF), and failed induction. These findings underscore the variety of clinical scenarios leading to preterm birth, reflecting a mix of maternal and fetal factors.

When comparing our results with studies by Ananth et al. and Meis et al., we noted both similarities and differences. Ananth et al. identified spontaneous preterm labor and premature rupture of membranes as major causes, while Meis et al. highlighted specific conditions such as preeclampsia, non-reassuring fetal tests, IUGR, placental abruption, and fetalmortality. [13, 14]

Our study enhances understanding of preterm birth causes by revealing the complex interplay of maternal, fetal, and obstetric factors. Identifying these diverse indications allows for targeted interventions to reduce preterm birth rates and improve outcomes for both mothers and infants.

Interventions and Complications

Our study documented that 3% of infants required positive pressure ventilation, and 1% required intubation, highlighting the severity of some respiratory issues among late preterm infants. These rates are lower compared to studies such as those by Jones et al. and Robertson et al., which reported higher incidences of respiratory distress syndrome (RDS) in late preterm infants.16,17Our study found that transient tachypnea of the newborn (TTNB) was more common, affecting 28% of infants, while RDS was noted in only 1% of cases.

Our findings on necrotizing enterocolitis (NEC) and intracranial hemorrhage contrast with studies like those by McIntire et al., which observed significant cases of NEC and intracranial hemorrhage among late preterm infants.15 Our study did not identify any cases of NEC or intracranial hemorrhage, suggesting that the incidence of these severe complications.

Sepsis was observed in 19% of infants, combining culture-positive, probable, and suspected cases. This rate is consistent with findings from studies by Stoll et al. and Ohlsson et al., which indicate that late preterm infants are at increased risk for sepsis compared to their term counterparts.[18,19] Jaundice was another common issue, affecting 53% of our cohort, which aligns with existing literature on the prevalence of jaundice in late preterm infants. The treatment approaches for jaundice included single surface phototherapy for the majority and intensive phototherapy for a smaller proportion, reflecting standard practices as outlined by Maisels and Kringet al.[20]

Hypoglycemia was observed in 17% of infants, a figure consistent with other studies highlighting the increased risk of metabolic issues in late preterm infants. The low mortality rate of 1% is notable and aligns with recent improvements in neonatal care and management.

The average hospital stay was 9.03 days, with an average NICU stay of 5.2 days. These figures reflect the extended care often required for late preterm infants, which is supported by other studies highlighting the prolonged hospitalizations and NICU admissions associated with this population. [Table 4]

Table 3: Shows the comparison of various studies with incidence of complication at 34, 35, and 36completed weeks of gestation

Reference	Gestational age	N	NEC	RDS	Intracranial Hemorrhage	Sepsis	NICU Stay	PDA
McIntire and Leveno[15]	34weeks	3498	3	116	16	18	165	-
	35weeks	6571	1	109	14	23	137	-
	36weeks	11702	1	89	8	26	126	-
Jones et al[16]	34weeks	370	-	45	-	-	202	-
	35weeks	783	-	71	-	-	225	-
	36weeks	1696	-	92	-	-	283	-
Robertson et al[17]	34weeks	229	7	31	0	8	161	4
	35weeks	298	1	19	0	7	124	4
	36weeks	544	5	18	0	7	131	2
Arnon et al[21]	34weeks	60	-	9	-	3	27	-
	35weeks	54	-	7	-	3	8	-
	36weeks	93	-	3	-	0	7	-
Elliott et al[22]	34weeks	193	-	18	-	-	103	-
	35weeks	398	-	28	-	-	128	-
	36weeks	947	-	34	-	-	165	-
Konte et al[23]	34weeks	40	0	9	0	2	29	5
	35weeks	36	0	1	0	2	8	0
	36weeks	-	-	-	-	-	-	-
Lubow et al[24]	34weeks	49	-	3	-	4	33	-
	35weeks	50	-	4	-	2	30	-
	36weeks	50	-	2	-	0	12	-
Lewis et al[25]	34weeks	121	-	18	-	-	24	-
	35weeks	156	-	1	-	-	3	-
	36weeks	156	-	0	-	-	2	-

Table 4: Shows the results of our study, measured in similar subcategories of gestational age and their early complication

Gestational age	N	NEC	Sepsis	Hypoglycemia	Sepsis	NICU Stay
34weeks	27	-	7	9	7	5.25
35weeks	30	-	6	5	6	4.25
36weeks	43	-	6	3	6	3

CONCLUSION

Late preterm infants, born between 34 and 36 6/7 weeks of gestation, face a range of medical challenges that necessitate careful management and extended care. Our study underscores the importance of tailored neonatal care strategies to address the unique needs of late preterm infants, including respiratory support, management of jaundice, and monitoring for sepsis and metabolic issues.

The findings highlight the need for continued research and clinical vigilance in managing late preterm infants. Despite advancements in neonatal care, these infants remain vulnerable to a range of complications, and a better understanding of their specific needs can help improve outcomes. Targeted interventions, ongoing research, and the implementation of best practices in neonatal care can contribute to enhancing the survival and quality of life for late preterm infants.

Our study contributes to the growing body of literature on late preterm births and provides a foundation for future research aimed at optimizing care and outcomes for this vulnerable population. By addressing the unique challenges faced by late preterm infants, healthcare professionals can better support these infants and their families, ensuring the best possible start in life.

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