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Maternal and Neonatal Outcomes in Late Preterm vs. Full-Term Deliveries: A Comparative Cohort Study

Dhrumil Shah[1*], Paramjeet Saini[2]

[1,2]Department of Obstetrics and Gynecology, S.B.K.S Institute and Research Center, Vaghodia, Gujarat, India

*Dr. Dhrumil Shah (Email: dhrumilshah7895@gmail.com)

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ABSTRACT

Introduction: Late preterm infants, born between 34 0/7 and 36 6/7 weeks of gestation, are often regarded as functionally similar to term infants. However, growing evidence suggests that these neonates experience higher risks of morbidity and mortality compared to term infants. This study aimed to compare maternal and neonatal outcomes of late preterm deliveries with those of full-term deliveries to highlight the clinical challenges and complications associated with late preterm births.

Methodology: This prospective cohort study included 312 pregnant women, with 104 delivering at late preterm and 208 at full term. Data were collected on maternal characteristics, labour onset, delivery mode, neonatal outcomes, and complications. Statistical analysis was performed to identify significant differences between the two groups.

Results: Late preterm infants demonstrated significantly lower birth weights (mean 1734 g vs. 2348 g) and higher rates of NICU admission (64.4% vs. 16.8%). Neonatal morbidities, such as respiratory distress (36.5% vs. 12.5%) and jaundice (26.9% vs. 9.6%), were more frequent in the late preterm group. Maternal outcomes varied, with higher rates of labour induction (70.2% vs. 38.5%) and caesarean sections (42.3% vs. 28.4%) in the late preterm group. Neonatal mortality was also higher in late preterm infants (8.7% vs. 1.9%).

Conclusion: Late preterm births are associated with increased neonatal and maternal complications compared to full-term deliveries. These findings underscore the need for specialized care and monitoring for late preterm pregnancies to improve maternal and neonatal health outcomes.

Keywords: Late preterm, Feto-maternal outcome, Prospective cohort, APGAR, NICU

INTRODUCTION

An estimated 15 million babies are born prematurely every year. That is more than 1 in 10 babies. Approximately 1 million children die each year due to complications of preterm birth.[1] Many survivors face a lifetime of disability, including learning disabilities and visual and hearing problems. The risks associated with very preterm birth (at less than 34 weeks) are well established. However, 75% of preterm births are delivered closer to term, between 34 and 36 weeks. These births, now labeled "late preterm," may be associated with heightened risks for poor neonatal and developmental outcomes.[2]

Premature babies are at risk of developing many short terms and long-term complications. Immediate (short term) neonatal complications include respiratory distress syndrome, hypothermia, hypoglycemia, jaundice, intraventricular hemorrhage, necrotizing enterocolitis, broncho-pulmonary dysplasia, sepsis and patent ductus arteriosus. Long-term complications include cerebral palsy, mental retardation and retinopathy of prematurity.[3]

Late Preterm labor defined as occurrence of regular uterine contractions (three or more contractions in ten minutes) with cervical changes (effacement more or equal to 80% and dilatation more or equal to 1 centimetre) in women with intact fetal membranes and gestational age between 34 to 37 weeks.[4]

Preterm labor may either a physiological process that has occurred too soon or pathological process following an abnormal stimulus. Preterm labour may have a multifactorial cause. The earlier the onset of labor, it is more likely that a pathological process is implicated.[5] The burden of child mortality accountable to preterm birth is reflected by pregnancy outcome. Preterm births are responsible for 75% of neonatal mortality & 50% of the long-term neurologic impairment in children.[6]

The various causes for preterm deliveries can be Infections, multiple gestations, PPROM, Pre-eclampsia, Eclampsia, Polyhydramnious, IUGR or Cervical incompetence.[7]

Preventive strategies revolve around efforts to reduce the background risk factors, screening symptomatic and asymptomatic women for the risk of preterm delivery, and treatment of women with threatened and established preterm labor. Intervention has been aimed at general improvement of nutrition, rest, hydration, and psychological support.[7]

The purpose of the study is to compare fetomaternal outcomes of late preterm deliveries with the patients having term deliveries.

The primary aim of this study was to compare feto-maternal outcomes between late preterm deliveries and term deliveries. The objectives of the study included monitoring and assessing the course of labor in late preterm deliveries, evaluating neonatal outcomes such as APGAR scores at one and five minutes and the need for resuscitation, and examining neonatal morbidity and mortality. Additionally, maternal morbidity associated with late preterm deliveries was analyzed. All these outcomes were compared with those observed in term deliveries to identify significant differences.

MATERIALS AND METHODS

This prospective cohort study was conducted in the Department of Obstetrics and Gynecology at Dhiraj Hospital, Pipariya, from January 2020 to August 2021, following approval from the institutional ethics committee. The study included two cohorts: one group consisted of women with late preterm deliveries (34 to 37 completed weeks of gestation), while the second group included women with term deliveries (37 to 42 weeks of gestation).

Study Population: The study population included all pregnant women attending the outpatient department, inpatient wards, or labor room of the hospital during the study period who met the eligibility criteria.

Inclusion and Exclusion Criteria: For the study cohort, eligible participants included primigravida or multigravida women with singleton pregnancies in cephalic presentation delivering between 34 and 37 completed weeks of gestation. The exclusion criteria included pregnancies below 34 weeks or beyond 37 weeks of gestation, malpresenta-

tions, multiple gestations, and medical conditions such as hypertension, diabetes, antepartum hemorrhage, pregnancy-induced hypertension, or Rh incompatibility.

For the control cohort, the inclusion and exclusion criteria were similar, except that participants were delivering between 37 and 42 weeks of gestation.

Sample Size: The total sample size of 303 was determined using OpenEpi software, with 101 participants in the late preterm cohort and 202 in the term cohort. The calculation was based on a two-sided significance level of 95%, a power of 80%, and a ratio of 2:1 between the term and late preterm cohorts.

Data Collection: Participants were enrolled after obtaining informed and written consent. Detailed information about the study, its purpose, and procedures was provided to each participant or their legally authorized representative in a language they understood. Upon recruitment, a detailed obstetric and medical history was taken, followed by a thorough general and obstetrical examination. The findings were systematically recorded in a pre-designed proforma.

Study Procedure: Participants in both cohorts were closely monitored during labor or cesarean section. The study recorded labor outcomes, including fetal distress (defined as a fetal heart rate of <110 or >160 beats per minute), the requirement for operative vaginal delivery (forceps or vacuum), or cesarean section. Neonatal outcomes such as APGAR scores at one and five minutes, the need for resuscitation, and morbidities requiring NICU admission were documented. Maternal outcomes, including any complications during or after delivery, were also recorded.

Both cohorts were followed until discharge. Data on neonatal and maternal morbidity and mortality were collected, and comparisons were made between the two groups to evaluate the differences in outcomes.

Statistical Analysis: The data collected were analyzed using statistical methods, including measures of central tendency (mean, median, and mode) and the chi-square test for categorical variables. These analyses were used to identify significant differences between the late preterm and term cohorts.

Feasibility: This study was conducted in a tertiary care hospital with adequate resources to support the research. Antenatal investigation packages were provided free of cost, ensuring that participants did not incur additional expenses. The hospital's high delivery rate (250–300 deliveries per month) ensured sufficient sample availability. Institutional facilities, including access to computers, the internet, and online journals, supported the data collection and analysis processes.

Ethical Considerations: Ethical approval was obtained from the Sumandeep Vidyapeeth Institutional Ethics Committee before initiating the study. Participants were assured that their care would not be affected by their decision to participate or withdraw from the study. Confidentiality was maintained at all stages, and data were securely stored. The results of the study were reported collectively to ensure anonymity and uphold ethical research standards.

RESULTS

Out of total 312 pregnant mother,104 cases were delivered at 34 to 37 weeks of gestation and 208 controls were delivered at 37 to 42 weeks of gestation.

Table 1 presents the demographic and gravidity characteristics of the study participants in the late preterm and full-term cohorts. The mean maternal age in both groups was comparable (24.6 ± 4.9 years for late preterm and 25.2 ± 6.3 years for full term), with no statistically significant difference (P = 0.395). The distribution of gravidity also showed no significant differences, with similar proportions of primigravida, second gravida, and multigravida women across the two groups (P = 0.429).

Table 2 outlines labor characteristics, mode of delivery, and postnatal maternal complications. Spontaneous labor was significantly more common in full-term deliveries (61.5%) compared to late preterm deliveries (29.8%), while induced labor was more frequent in late preterm deliveries (70.2%) (P < 0.001). Late preterm deliveries had a higher rate of cesarean sections (42.3% vs. 28.4%, P = 0.047).

Table 1: Maternal Demographic and Gravidity Characteristics

Variables	Late Preterm (n=104)	Full Term (n=208)	P value
Age of mother (mean ± SD)	24.6 ± 4.9	25.2 ± 6.3	0.395
Gravidity			
Primigravida	59 (56.7)	102 (49)	0.429
Second gravida	31 (29.8)	75 (36.1)	
Multigravida	14 (13.5)	31 (14.9)	

Table 2: Labor, Delivery, and Postnatal Maternal Outcomes

Variables	Late Preterm (%)(n=104)	Full Term (%) (n=208)	P value
Onset of labour			
Spontaneous labour	31 (29.8)	128 (61.5)	<0.001
Induced labour	73 (70.2)	80 (38.5)	
Mode of Delivery			
LSCS	44 (42.3)	59 (28.4)	0.047
Vaginal Instrumental Delivery	3 (2.9)	8 (3.8)	
Normal Vaginal Delivery	57 (54.8)	141 (67.8)	
Duration of Labour			
Duration of First Stage of Labour hours (mean ± SD)	10.9 ± 2.7	12 ± 4.2	0.015
Duration of Second Stage of Labour hours (mean ± SD)	23.3 ± 5.9	22.6 ± 7.3	0.397
Post-natal Maternal Complications			
Post-partum hemorrhage	11 (10.6)	16 (7.7)	0.354
Retained placenta	3 (2.9)	4 (1.9)	0.588
Foul smelling lochia	8 (7.7)	13 (6.3)	0.631
Fever	7 (6.7)	15 (7.2)	0.875
Breast complications-engorgement, nipple retraction, mastitis	27 (26)	56 (26.9)	0.856

The duration of the first stage of labor was significantly shorter in late preterm deliveries (10.9 ± 2.7 hours) compared to full-term deliveries (12 ± 4.2 hours, P = 0.015). Postnatal complications, including postpartum hemorrhage, retained placenta, and fever, showed no significant differences between the two groups.

Table 3 details the indications for cesarean section in the two groups. Oligohydramnios was the most common indication in both late preterm (34.1%) and full-term (27.1%) deliveries. Other indications, including severe preeclampsia, placenta previa, obstructed labor, and previous cesarean section, had similar distributions between the two groups.

Table 3: Indications for Cesarean Section

Indication for LSCS	Late Preterm (%) (n=44)	Full Term (%) (n=59)
Oligo hydramnios	15 (34.1)	16 (27.1)
Sever Preeclampsia	9 (20.5)	11 (18.6)
Placenta Previa	6 (13.6)	7 (11.9)
Obstructed labour	5 (11.4)	8 (13.6)
Previous CS	8 (18.2)	13 (22)
Maternal Request	1 (2.3)	4 (6.8)

Table 4: Neonatal Outcomes

Neonatal Outcome	Late Preterm (n=104) (%)	Full Term (n=208) (%)	P value
Birth Weight (mean ± SD) gm	1734 ± 588	2348 ± 603	<0.001
APGAR@ 1min			
<7	9 (8.7)	6 (2.9)	0.024
≥7	95 (91.3)	202 (97.1)	
APGAR @ 5 min			
<7	3 (2.9)	1 (0.5)	0.075
≥7	101 (97.1)	207 (99.5)	
NICU Admission required			P value
Yes	67 (64.4)	35 (16.8)	<0.001
No	37 (35.6)	173 (83.2)	
Duration of NICU stay (days)	6.32 ± 4.25	3.92 ± 2.16	<0.001
Neonatal Death			
Died	9 (8.7)	4 (1.9)	0.005
Survived	95 (91.3)	204 (98.1)	

Table 4 compares neonatal outcomes between the two cohorts. The mean birth weight of late preterm neonates (1734 ± 588 grams) was significantly lower than that of full-term neonates (2348 ± 603 grams, P < 0.001). APGAR scores at one minute were significantly lower in late preterm neonates, with 8.7% scoring <7 compared to 2.9% of full-term neonates (P = 0.024). NICU admissions were significantly higher in late preterm neonates (64.4% vs. 16.8%, P < 0.001), with a longer average duration of NICU stay (6.32 ± 4.25 days vs. 3.92 ± 2.16 days, P < 0.001). Neonatal mortality was also higher in the late preterm group (8.7%) compared to the full-term group (1.9%, P = 0.005).

Table 5 highlights the neonatal morbidities observed in the study. Respiratory distress was significantly more common in late preterm neonates (36.5%) compared to full-term neonates (12.5%). Late preterm neonates also experienced higher rates of neonatal jaundice (26.9% vs. 9.6%), hypocalcemia (17.3% vs. 5.3%), and feeding difficulties (13.5% vs. 3.8%). Other morbidities, such as sepsis and hypoglycemia, were also more prevalent in late preterm neonates, indicating a higher burden of neonatal complications in this group.

Table 5: Neonatal Morbidities

Neonatal Morbidities	Late Preterm (%) (n=104)	Full Term (%) (n=208)
Respiratory distress	38 (36.5)	26 (12.5)
Neonatal jaundice	28 (26.9)	20 (9.6)
Hypocalcaemia	18 (17.3)	11 (5.3)
Hypoglycaemia	5 (4.8)	1 (0.5)
IVH	3 (2.9)	1 (0.5)
Feeding difficulty	14 (13.5)	8 (3.8)
Pneumonia	4 (3.8)	2 (1)
Culture proven sepsis	6 (5.8)	1 (0.5)
Early onset sepsis	1 (1)	1 (0.5)
Late onset sepsis	5 (4.8)	1 (0.5)
Birth asphyxia	13 (12.5)	24 (11.5)
PDA	2 (1.9)	0 (0)

DISCUSSION

Late preterm infants, born between 34 0/7 and 36 6/7 weeks of gestation, represent a critical subgroup within the spectrum of preterm births. While the mortality and morbidity associated with prematurity are well-established, the clinical outcomes of late preterm infants have only recently gained attention. Historically, these infants were often treated as functionally equivalent to full-term neonates in obstetric and pediatric practice, with the assumption that their health risks were minimal. However, accumulating evidence has highlighted their susceptibility to a range of medical complications. This has necessitated a shift in terminology from "near-term," which implied minimal health concerns, to "late preterm," underscoring the immaturity and associated risks of this group.[8,9] In 2005, the National Institutes of Health workshop formally recommended this terminology, recognizing the need for targeted medical care for these infants.[10]

The current prospective cohort study compared maternal and neonatal outcomes between women delivering during the late preterm period and those delivering at full term. Among 312 pregnant women, 104 delivered during the late preterm period, and 208 delivered at full term. The demographic characteristics of the mothers, such as age and gravidity, were comparable between the groups. A majority of mothers in both groups were aged 20–24 years at registration, with no significant difference in maternal age. Similarly, the distribution of primigravida and multigravida mothers showed no significant variation. These findings align with previous studies, such as Bouchet et al. [11] and Visruthan et al. [12], which reported similar maternal characteristics in late preterm and full-term deliveries.

In terms of labour onset, significant differences were observed between the groups. In the late preterm group, labour was induced in 70.2% of cases, whereas 61.5% of women in the full-term group experienced spontaneous onset of labour. This finding mirrors results from studies like Tsai et al. [13], which also reported a higher prevalence of induced labour among late preterm deliveries. The mode of delivery further differed between the groups, with 42.3% of late preterm deliveries requiring caesarean sections

compared to 28.4% in the full-term group. The most common indications for caesarean section in the late preterm group were oligohydramnios (34.1%), severe preeclampsia (20.5%), and placenta previa (13.6%), while in the full-term group, the leading indications were oligohydramnios (27.1%), previous caesarean section (22%), and obstructed labour (13.6%). These findings are consistent with studies by Saji et al. [14] and Bulut et al. [15], which also identified higher caesarean section rates and distinct indications in late preterm deliveries.

The duration of labour stages differed slightly between the groups. In the late preterm group, the mean duration of the first stage of labour was shorter (10.9 hours) compared to the full-term group (12 hours), while the duration of the second stage was nearly identical. This observation could be attributed to the clinical management strategies employed for late preterm deliveries, which often prioritize expedited delivery to mitigate complications.

Maternal complications were also analyzed, with breast complications and postpartum hemorrhage (PPH) being most common in the late preterm group. In contrast, fever and PPH were the predominant complications in the full-term group. These results align with Visruthan et al. [12], who noted variations in maternal complications based on gestational age.

Neonatal outcomes showed substantial differences between the late preterm and full-term groups. The mean birth weight of late preterm infants (1734 grams) was significantly lower than that of full-term infants (2348 grams). This discrepancy is consistent with findings from Bulut et al. [15], who reported lower birth weights among late preterm neonates. Additionally, the higher prevalence of neonatal morbidities, such as respiratory distress (36.5%), neonatal jaundice (26.9%), and hypocalcemia (17.3%), in late preterm infants emphasizes their vulnerability. In comparison, full-term neonates had significantly lower rates of these conditions. These observations align with the work of Tsai et al. [13] and Bouchet et al. [11], who similarly documented higher morbidity rates in late preterm infants.

The need for neonatal intensive care unit (NICU) admission was notably higher among late preterm infants (64.4%) compared to full-term neonates (16.8%). This finding is supported by previous studies, including those by Bouchet et al. [11] and Tsai et al. [13], which highlighted the increased NICU admission rates among late preterm neonates, primarily due to respiratory complications. The higher NICU admission rates in the late preterm group underscore the need for specialized care during this critical period.

Neonatal mortality rates also differed significantly between the groups, with late preterm infants experiencing a mortality rate of 8.7% compared to 1.9% in full-term neonates. This disparity mirrors findings from studies like Saji et al. [14], which reported elevated mortality rates among late preterm infants. These results reinforce the importance of recognizing late preterm infants as a high-risk group requiring focused medical attention.

The Apgar scores further highlighted differences in neonatal outcomes. At one minute, 91.3% of late preterm infants had scores greater than seven, compared to 97.1% of full-term neonates. However, by five minutes, the scores were comparable between the groups, indicating a potential catch-up in physiological adaptation. These findings are consistent with the study by Visruthan et al. [12], which observed similar patterns in Apgar scores among late preterm and full-term infants.

STRENGTHS AND LIMITATIONS OF THE STUDY

The study offers valuable insights into the maternal and neonatal outcomes of late preterm and full-term deliveries through a prospective cohort design, ensuring systematic data collection and minimizing recall bias. The sample size and direct comparison between two gestational age groups provide robust evidence for identifying differences in outcomes. Furthermore, aligning the findings with previous studies enhances their reliability and generalizability. However, the study has limitations, including its focus on a single center, which may limit the external validity of the findings to other populations or healthcare settings. Additionally, it does not account for long-term outcomes in neonates, which could provide a more comprehensive understanding of the implications of late preterm birth. The lack of detailed analysis on the socioeconomic and psychosocial

factors influencing maternal and neonatal outcomes is another limitation that warrants further exploration.

Conclusion

This study highlights the significant differences in maternal and neonatal outcomes between late preterm and full-term deliveries. Late preterm infants face higher risks of neonatal morbidity and mortality, lower birth weights, and increased need for NICU admission, emphasizing their vulnerability compared to full-term counterparts. Maternal outcomes also differ, with variations in labour induction rates, delivery modes, and complications. These findings underline the importance of targeted medical care and monitoring for late preterm deliveries to optimize health outcomes. Future research should aim to address long-term neonatal outcomes and explore interventions to mitigate the risks associated with late preterm birth.

Ethical Approval: The study received ethical clearance from the Sumandeep Vidyapeeth Institutional Ethics Committee, Gujarat, India.

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Data Availability: The data underlying this study are available upon reasonable request from the corresponding author. Due to privacy considerations, the data are not openly accessible.

Use of AI Tools: No generative AI tools were employed in the research, analysis, or manuscript preparation for this study.

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