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Clinical Profile of Late Preterm Neonates Admitted to a Tertiary Care NICU

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Dinesh Kumar Vuppu[1] and Venugopal Reddy Iragamreddy[2]*

[1]*Consultant Pediatrician and Neonatologist, Ovum Hospital, Bangalore*

[2]*Medical Director and Consultant Pediatrician, Ovum Hospital, Bangalore*

***Corresponding Author:** Venugopal Reddy Iragamreddy, Medical Director and Consultant Pediatrician, Ovum Hospital, Bangalore.

Abstract

Introduction: In a study conducted at tertiary care center, Bangalore, a total of 144 late preterm neonates were studied. The majority of the neonates were born with a birth weight of more than 2 kg, and the study found that 28.33% of late preterm infants developed one or more complications leading to a hospital stay of more than 7 days. Most of the neonates required intravenous infusions, antibiotics, and were subjected to investigations for sepsis. In a study by Shapiro Mendoza et al, 22.8% of late preterms experienced at least one complication that could lead to prolonged hospital stay.

Methods: Late preterm infants are at high risk for neonatal morbidities, including neonatal hyperbilirubinemia requiring phototherapy, respiratory distress, sepsis, and feed intolerance. The duration of hospital stay was prolonged in late preterm neonates, with most requiring more than 7 days hospital duration. The rate of rehospitalization was also high.

Discussion: The study highlights the need for further studies to establish and evaluate strategies, routines, and protocols for premature interruption of pregnancy, reducing the number of premature births and developing obstetric protocols that increase the precision of methods for estimating gestational age (GA). Additionally, the study suggests using antenatal corticosteroid after 34 weeks to reduce respiratory pathologies and prevent a significant number of deaths in this group of neonates.

Conclusion: In conclusion, late preterm infants are at high risk for neonatal morbidities, including neonatal hyperbilirubinemia requiring phototherapy, respiratory morbidity, mechanical ventilation, sepsis, and hypoglycemia. Prolonging pregnancy to the maximum safest gestation can result in a decrease in these morbidities.

Introduction

Preterm infants refer to those born before 37 weeks of gestation from the first day of last menstrual period. Late preterm infants refer to those born between 34 completed weeks (340/7) and less than 37 completed weeks (366/7) [1].

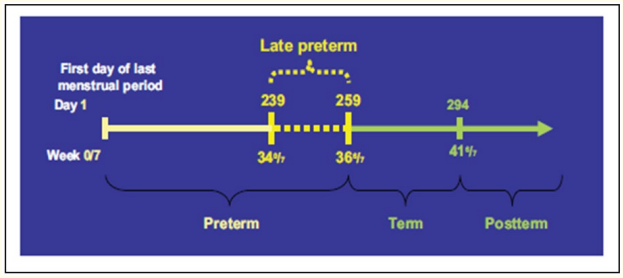


Figure 1: Representative Diagram of Late Pre-Terms [2].

Infants born late preterm may be similar to term infants (37 to 41 completed weeks gestation) in appearance, weight, and size, and compared with preterm infants born at earlier gestations, they are generally healthier. However, late preterm infants are developmentally and physically immature compared with term infants. Consequently, they are at increased risk for medical complications and mortality, especially during the first week after birth [3, 4].

Infants born at 340/7 through 366/7 weeks' gestation, or "late-preterm" infants, are often the same size and weight of some term infants (born at 370/7-416/7 weeks gestation). Because of this fact, late-preterm infants may be treated by parents, caregivers, and health care professionals as though they are developmentally mature and at low risk of morbidity. They are often managed in newborn level 1 (basic) nurseries or remain with their mother after birth [5].

The rate of preterm birth is increasing worldwide primarily at the expense of late preterm newborns. Late preterm infants are the fastest growing subgroup of neonates and constitute approximately 75% of all preterm births in 2009. The birth rate of late preterm newborns has increased by 25% from 1990 to 2005 in the United States [5]. The incidence of medical problems, either short-term or long-term, is higher among late preterm infants than term infants. Because late preterm infants comprise the majority of preterm newborns, caring for such a large population who are prone to have unfavourable outcomes can exert a profound impact on the society. This study focused on health facets of late preterm infants to understand the significant public health problem better and re-evaluate our obstetric and neonatal practice [6].

Aims and Objectives

- To study the clinical profile of late preterm neonates admitted to a tertiary care NICU for the period of one year (September 2014 to August 2015).
- Immediate outcome of late preterm neonates.

Materials and Methods

Sources of Data

All late preterm babies (340/7weeks to 366/7 weeks) admitted to Narayana Hrudayalaya who meet the inclusion criteria for a period of one year (September 2014 to August 2015).

Type of the study: Prospective, descriptive, hospital based study.

Inclusion Criteria

- Neonatal Intensive Care Unit or Transitional care or Post natal care ward of a tertiary care centre
- Outborn and referred to Neonatal Intensive Care Unit of a tertiary care centre within 24 hours of life.

Exclusion criteria

- Outborn and referred to our centre at more than 24 hours of life.
- Parents who have not given consent.

Consent

An informed written consent was obtained from parents. They were provided with a patient information sheet and an explanation was given in the language they understood. If the parents were illiterate, the content of the patient information sheet was read to them and consent was documented by a thumb print impression of one of the parents in the presence of an unrelated witness. The parents were told that their discussion would not affect child's further clinical care in any manner [7].

Method of Collection of Data

The study assesses gestational age using the New Ballard score for all babies, with late preterm babies selected after parental consent. The study uses established definitions for hypothermia, hypoglycemia, hyperbilirubinemia, respiratory distress, IVH, birth asphyxia, sepsis, feed intolerance, and apnea of prematurity. Data on maternal risk factors and infants are collected through detailed history-taking and medical records. The neonatal variables studied include days in hospital, sex, birth weight, GA, hypothermia/hyperthermia, hypoglycemia, hyperbilirubinemia, feed intolerance, respiratory pathologies, sepsis, intervention done, deaths, and rehospitalization. Post-resuscitation care is documented as per NRP 2010 guidelines. The study aims to provide comprehensive information on maternal and gestational factors and neonatal outcomes [8].

Diagnostic criteria for each neonatal problem are applied concurrently by neonatologists as follows: [9]

Birth Asphyxia: Inability to initiate and sustain respiration at birth (WHO) or gasping and Inadequate /no breathing or with APGAR of <4 at 1 minute (NNF).

Neonatal Sepsis: Probable sepsis: Positive septic 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 >0.5mg/dL, platelets <1 lakh/mm^3); or ***Proven sepsis:*** Isolation of pathogens from Blood or CSF and pus.

Intraventricular Haemorrhage: Identified by serial cranial ultrasonography.

Hypoglycemia: Blood glucose level below 40 mg/dl.

Hypothermia: Rectal temperature <34^0 Celsius or <93^0 Fahrenheit.

Neonatal Hyperbilirubinemia: Clinically visible jaundice requiring phototherapy/exchange transfusion as per hour specific total serum bilirubin (TSB) normogram (AAP chart).

Apnea of prematurity: Prolonged respiratory pause (20 second or longer) or lesser if accompanied by cyanosis, pallor or bradycardia.

Respiratory Distress: Presence of atleast two criteria - Respiratory rate >60/min, Subcostal/ Intercostal retractions, Expiratory grunt/groaning, and requiring oxygen therapy.

Respiratory Distress Syndrome: Tachypnea, expiratory grunting, inspiratory retractions within 6 hours of life and gradual progressing till 48 hours of life. Chest x ray showing characteristic radiological features (reticulogranular / air bronchogram / ground glass appearance / complete whiteout) requiring oxygen, continuous positive airway pressure, ventilator.

TTN: clinical and radiographic features identified during the first hours of life, followed by characteristic resolution during the subsequent 24-48 hours.

Feed Intolerance: Delay in initiating and maintaining adequate oral milk intake was recorded as feeding difficulties in the absence of respiratory distress and septicemia.

Immediate outcome will be assessed in the form of morbidity, mortality (if any), other complications, rehospitalization following discharge.

Sample size

The prevalence of morbidities in preterm 10%, assuming the absolute precision of 5% with 95% Confidence interval, assuming 10% loss to follow up minimum required sample size is 152 [10].

Estimating single proportion (Absolute precision)

Assumptions

- The outcome variable measure should be binary (success/failure, alive/dead).
- P is probability of success in each trial; (1-p) is probability of failure.
- The sampling distribution of the sample proportion (p) is approximated to normal.

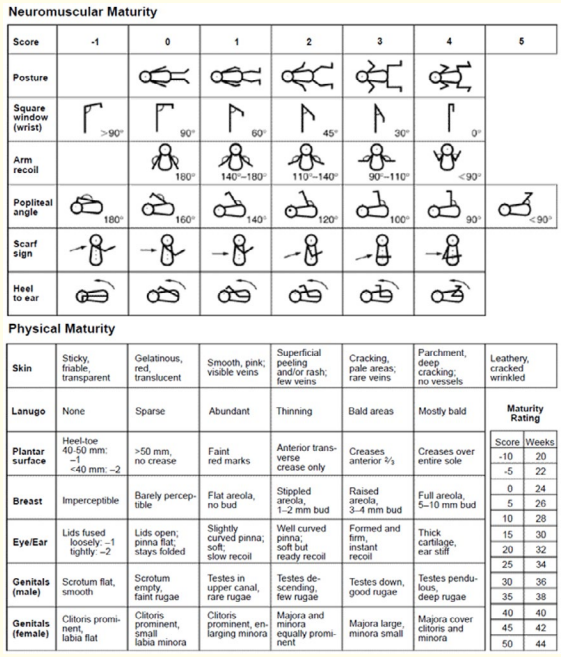
Formula

$$n = \frac{Z^2_{1-\alpha/2}\, p(1-p)}{d^2}$$

Where
p: Expected proportion.
d: Absolute Confidence level.

Statistical Methods

The statistical analysis will be performed by STATA11.1 (College Station TX USA). The following study variables will be analyzed. gestational age, maternal history, mode of delivery, birth weight, modified Ballard score, complications, Investigations- CBC, serum total bilirubin, ABG, blood culture, interventions and outcome. Descriptive statistics will be performed for all the study variables, continuous variables will be described as mean and standard deviation; Categorical variables will be described as frequency and percentage. Chi Square test or fisher exact test will be used to measure the association between the outcome with gestational age, cultures, complications etc. $P<0.05$ Considered as statistically significance [11].



Neuromuscular Maturity

Score	-1	0	1	2	3	4	5
Posture							
Square window (wrist)	>90°	90°	60°	45°	30°	0°	
Arm recoil		180°	140°–180°	110°–140°	90°–110°	<90°	
Popliteal angle	180°	160°	140°	120°	100°	90°	<90°
Scarf sign							
Heel to ear							

Physical Maturity

Skin	Sticky, friable, transparent	Gelatinous, red, translucent	Smooth, pink; visible veins	Superficial peeling and/or rash; few veins	Cracking, pale areas; rare veins	Parchment, deep cracking; no vessels	Leathery, cracked wrinkled
Lanugo	None	Sparse	Abundant	Thinning	Bald areas	Mostly bald	
Plantar surface	Heel-toe 40-50 mm: –1 <40 mm: –2	>50 mm, no crease	Faint red marks	Anterior transverse crease only	Creases anterior ⅔	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat areola, no bud	Stippled areola, 1–2 mm bud	Raised areola, 3–4 mm bud	Full areola, 5–10 mm bud	
Eye/Ear	Lids fused loosely: –1 tightly: –2	Lids open; pinna flat; stays folded	Slightly curved pinna; soft; slow recoil	Well curved pinna; soft but ready recoil	Formed and firm, instant recoil	Thick cartilage, ear stiff	
Genitals (male)	Scrotum flat, smooth	Scrotum empty, faint rugae	Testes in upper canal, rare rugae	Testes descending, few rugae	Testes down, good rugae	Testes pendulous, deep rugae	
Genitals (female)	Clitoris prominent, labia flat	Clitoris prominent, small labia minora	Clitoris prominent, enlarging minora	Majora and minora equally prominent	Majora large, minora small	Majora cover clitoris and minora	

Maturity Rating

Score	Weeks
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

Figure 2: New Ballard Score [12].

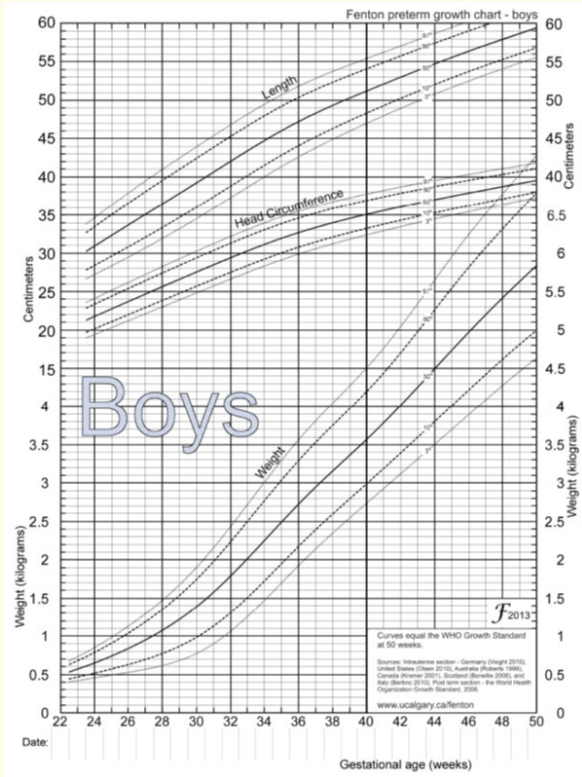


Figure 3: Fenton preterm growth chart for Boys [13].

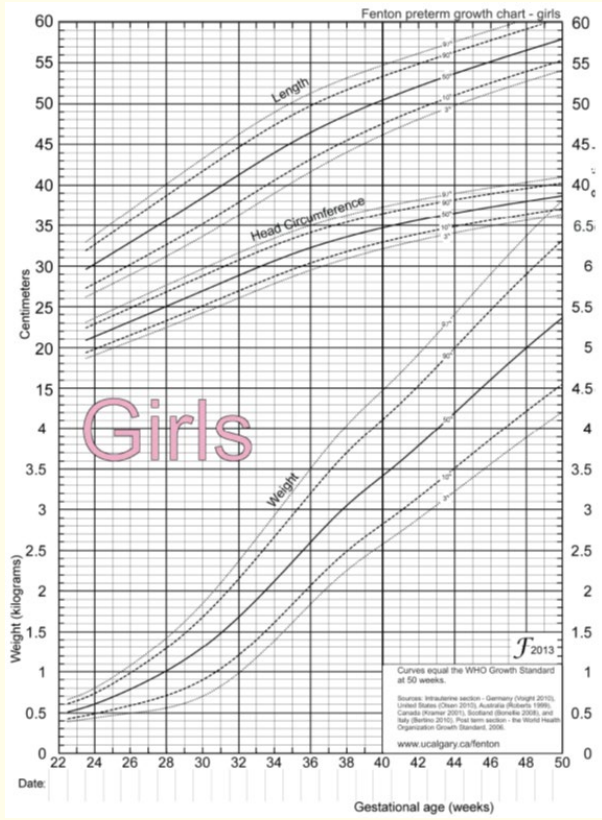


Figure 4: Fenton preterm growth chart for Girls [14].

Observations and Results

From September 2014 to August 2015, 1931 deliveries were conducted in our hospital. 198 late preterm neonates were admitted during the same period. 181 late preterms met the inclusion criteria. 37 late preterms lost follow up and were excluded from study. Remaining 144 late preterm were include in the study. Of 198 late preterm, 155 late preterm babies were inborn. Incidence of late preterm in our hospital was 8.02%.

Sex	***N=144***	***Percentage%***
Male	76	52.7
Female	68	47.3
Total	144	100

Table 1: Gender distribution of neonates studied.

Out Of the 144 neonates, 76 were male who constitute about 52.7% and 68 neonates were female who constitute 47.3%. Ratio of male to female is 1.1:1. Sex distribution showed male predominance.

Gestation age	*Number*	*Percentage*
34 week	33	22.9%
35 week	40	27.7%
36 week	71	49.3 %

Table 2: Gestational age in weeks.

The study classified newborns into gestational age groups based on New Ballard score and last menstrual period or first trimester ultrasound report. The highest number of late preterms occurred at 36 weeks gestation. 33 neonates were admitted between 34 0/7 to 34 6/7, 22.9%, 40 between 35 0/7 to 35 6/7, 27.7%, and 71 between 36 0/7 to 36 6/7, 49.3% of the study group.

Maternal history	*N=144*	*Percentage (%)*
No risk factors	17	11.80%
1.Previous LSCS	42	29.16%
2.PROM	40	27.7%
3.PIH	30	20.8%
4.Multiple pregnancy	22	15.27%
5.Assisted Reproductive Technology	14	9.72%
6.Diabetes	11	7.63%
7.Previous history of preterm	10	6.94%
8. Anemia	09	6.25%
9.Previous still birth/ BOH	05	3.47%
10.Antepartum haemorrhage	03	2.08%
11.Heart disease	02	1.38%
12. Elderly primi	01	0.69%

Table 3: Maternal high risk factors associated with late pre term delivery.

Maternal risk factors were present in 90.2% of mothers, with a high incidence of LSCS (29.16%). Prom (27.71%), PIH (20.8%), and multiple pregnancy (15.27% each were the most common. Assisted Reproductive Technology (ART) was found in 14.6% of mothers. Diabetes (7.63%), preterm delivery (7.63%), and anemia (7.63%, 6.94%, and 6.25%) were the most common. Antepartum hemorrhage and heart diseases were found in 2.08% and 1.38%, respectively. Other complications were less than 1%.

Mode of delivery	*Number*	*Percentage*
Normal Vaginal	37	25.69%
Caesarean	104	72.2%
Venthouse	01	0.69%
Forceps	02	1.38%

Table 4: Mode of delivery.

In our study, 25.69% of the late preterms were vaginally delivered and 72.2% were delivered by caesarean section.

Outcome at birth	*Number*	*Percentage*
BCIAB	127	88.19%
BNCIAB	17	11.8%

Table 5: Outcome of late preterm at birth.

At the time of delivery, late preterms were divided into two groups as babies who cried immediately after birth (BCIAB) and babies who did not cry immediately after birth (BNCIAB). Out of 144 late preterm babies, 127(88%) cried at birth, 17(12%) babies did not cry immediately after birth.

Need of resuscitation	*Numbers*	*Percentage*
No resuscitation	127	88.19%
Bag and mask	13	09.02%
IPPV	04	2.77%

Table 6: Need of resuscitation.

9% of the late preterm newborns needed resuscitation in the form of bag and mask and 2.77% late preterm babies needed. Intermittent positive pressure ventilation (IPPV), 88.19% of late preterm babies needed no resuscitation. 11.33% of the late preterm newborns needed resuscitation in the form of bag and mask or intermittent positive pressure ventilation (IPPV).

	Total	*Percentage*
<1.5 kg	8	5.5%
1.5-2.0 kg	31	21.52%
2.0-2.5 kg	58	40.27%
>2.5kg	47	32.63%

Table 7: Classification of late preterm on the basis of weight.

Regarding birth weight, 58neonates were born with birth weight between 2 and 2.5 kg which constitute about 40.27%. 47 neonates were born with birth weight above 2.5 kg which constitute about 32.63%. 31 neonates were born with birth weight between 1.5 and 2 kg which constitute about 21.52 %. 8 neonates were born with birth weight of <1.5 kg which constitute 5.55%.

Classification of late preterm according to the Fenton chart

Late preterm newborns were classified into small for gestational age (SGA), appropriate for gestational age (AGA) and large for gestational age (LGA). This classification of late pre term newborns was done on the basis of Fenton chart.

AGA	111	77.08%
SGA	31	21.52 %
LGA	02	1.38 %

Table 8: Classification of birth weight.

Out of 144 late pre term babies, 77.08% were AGA group and 21.52% constituted SGA group.

Hypothermia	*N=144*	*Percentage %*
Present	3	2.08
Absent	141	97.9
Total	144	100

Table 9: Hypothermia.

Regarding hypothermia, 3 neonates had hypothermia which accounts for 2.08%.

Hypoglycaemia	*N=144*	*Percentage %*
Present	15	10.41
Absent	129	89.5

Table 10: Incidence of hypoglycaemia in patients studied.

Regarding hypoglycaemia, 15 neonates had Hypoglycaemia which accounts for 10.4%.

Hyperbilirubinemia	*N=144*	*Percentage%*
Present	67	46.52
Absent	77	53.47

Table 11: Incidence of hyperbilirubinemia in patients studied.

Regarding hyperbilirubinemia, 67 neonates had hyperbilirubinemia which accounts for about 46.52%.

Feed intolerance	*N=144*	*Percentage%*
Present	6	4.16
Absent	138	95.83

Table 12: Incidence of feed intolerance in neonates studied.

Regarding feed intolerance, 6 neonates had feed intolerance which accounts for about 4.16%.

Respiratory system	*N=144*	*Percentage%*
Normal	113	78.47
TTNB	16	11.11
RDS	14	9.72
Pneumonia	1	0.69
Total	144	100

Table 13: Respiratory system.

Regarding respiratory system, 16 of the neonates presented as TTNB which accounts for about 11.1%. 14 neonates presented with respiratory distress secondary to RDS which accounts for about 9.72%. 1 neonate presented with respiratory distress secondary to pneumonia which accounts for 0.69% 113 neonates doesn't have any respiratory distress which accounts for about 78.47%.

	LSCS	*NvGD*	*Forceps*	*Total*	*P-Value*
TTN	12	4	0	16	0.276
RDS	11	2	01	14	
Pneumonia	0	1	0	1	
Total	33	7	1	31	

Table 14: Relation between mode of delivery and respiratory morbidities in late preterm newborns.

Respiratory morbidities in late preterm newborns

According to this study, 33 late preterm babies out of 104 delivered by LSCS were found to have respiratory distress. Thus, incidence of respiratory distress in caesarean delivery was 31.73% and 8 late preterm babies out of 40 delivered by normal vaginal delivery were found to have respiratory distress. Incidence of respiratory distress in vaginal delivery was 20%. Thus, incidence of respiratory distress was not significantly affected by the mode of delivery.

Cardiovascular system	*N=144*	*Percentage%*
Normal	130	90.27
ACHD	13	9.02
CCHD	1	0.69
TOTAL	144	100

Table 15: Cardiovascular system.

In cardiovascular system, 13 neonates had ACHD accounts for 9.02% and 1 had CCHD which accounts for about 0.69%.

Birth asphyxia	*N=144*	*Percentage%*
Present	6	4.61
Absent	138	95.83

Table 16: Birth asphyxia.

Regarding birth asphyxia, 6 neonates had birth asphyxia which accounts for about 4.61%.

Apnea of prematurity	*N=144*	*Percentage%*
Present	1	0.69
Absent	143	99.3

Table 17: Apnea of prematurity.

1 neonate had apnea of prematurity which accounts for about 0.69%.

Intraventricular haemorrhage	*N=144*	*Percentage%*
Present	1	0.69
Absent	143	99.3

Table 18: Intraventricular haemorrhage.

1 neonate had intraventricular haemorrhage which accounts for about 0.69%.

Sepsis	*N=144*	*Percentage%*
Absent	128	88.88
Probable sepsis	13	9.02
Culture proven	3	2.08
Total	144	100

Table 19: Sepsis of patients studied.

Among 144 neonates, 13 neonates had probable sepsis which accounts for about 9.02%. 3 of the neonates had culture proven sepsis which accounts for about 2.09%.

Interventions	*N=144*	*Percentage %*
1. No intervention	60	41.6
2. Oxygen	38	26.88
3. Phototherapy	66	45.8
4. Exchange transfusion	1	0.69
5. Surfactant	7	4.86
6. Inotropes	4	2.77
7. NIPPV	29	20.0
8. Invasive ventilation	10	6.94
9. Therapeutic hypothermia	1	0.69

Table 20: Intervention done.

Out of 144 neonates, 60 did not require any interventions, while 39 needed oxygen, 45.8% needed phototherapy, 6.94% needed invasive mechanical ventilation, 20% needed NIPPV, 4.86% needed surfactant administration, 2.77% needed ionotrope support, 0.7% needed exchange transfusion, and 1% needed therapeutic hypothermia.

Duration of hospital stay	*N=144*	*Percentage%*
< 3 days	48	33.33
3-7 days	56	38.8
7-14 days	31	21.98
>14 days	9	6.25
Total	144	100

Table 21: Duration of hospital stay in days.

Regarding duration of hospital stay, 48 neonates required <3 days hospital stay which accounts for about 33.33%, 56 neonates required duration of 4 to 7 days which accounts for about 38.8%. 31 neonates required 7 to 14 days of hospital stay which accounts for about 21.98%. 9 neonates required >14 days of hospital stay which accounts for about 6.25%.

Discharge	*0-3 days*	*3-7 days*	*7-14 days*	*>14 days*	*Percentage discharged within 7days*	*P-Value*
34 weeks	01	11	15	06	36.3	<0.001
35 weeks	12	16	11	01	70	
36 weeks	35	29	05	02	90.1	

Table 22: Comparison of discharged late preterms according to their weeks of gestation.

Shows that 36.3% of the late preterms born at 34 weeks of gestation were discharged within 7 days of hospital stay as compared to 90.1% of late preterms born at 36 weeks of gestation.

Outcome	*N=144*	*Percentage %*
Discharge	140	97.2
DAMA	4	2.7
Death	0	0
No intervention	60	41.6
Morbidity	84	58.3
Rehospitalisation	10	6.94

Table 23: Outcome of patients studied.

Among 144 neonates, 140 neonates were discharged after treatment which accounts for about 97.2 % and 4 neonates were discharged against medical advice which accounts for about 2.7%. Among admitted neonates, 84 of them required medical interventions which accounts for about 58.3%. 60 neonates doesn't required any active medical intervention which accounts for about 41.6%. Among discharged neonates 10 of them had rehospitalisation which accounts for about 6.94%.

Morbidities	*N=144*	*Percentage %*
NNHB	67	46.52
Respiratory distress	31	21.52
Sepsis	16	11.11
Hypoglycaemia	15	10.41
Hypothermia	3	2.08
Birth asphyxia	6	4.16
Cardiovascular problems	16	11.11
Feed intolerance	6	4.16
IVH	1	0.7
AOP	1	0.7
TOTAL	144	100

Table 24: Overall morbidities.

Graph shows, NNHB and respiratory distress constitute the major neonatal morbidity which accounts for 46.52%, 21.52% respectively.

Risk factors	*34 weeks Number (%)*	*35 weeks Number (%)*	*36 weeks Number (%)*	*P value*
Previous LSCS	09(27)	16(40)	17(23)	0.195
Anemia	0(0)	0(0)	09(12)	0.007
PIH	12(36)	09(22)	09(13)	0.021
Previous history preterm delivery	06(18)	01(2)	03(4)	0.014
Antepartum haemorrhage	01(3)	01(2)	01(1)	0.845
Diabetes	02(6)	03(7)	06(8)	0.912
PROM	12(36)	09(22)	19(27)	0.406
Bad Obstetric History	01(3)	00(0)	03(4)	0.427
Elderly Primi	00(0)	01(2)	00(0)	0.270
Multiple Pregnancy	06(18)	04(10)	08(11)	0.522
Maternal Heart Disease	01(3)	01(2)	00(0)	0.366
Assisted Reproductive Technology	02(6)	04(10)	08(11)	0.704

P value < 0.05 is significant.

Table 25: Maternal risk factors with "p" value.

Maternal risk factors in the late preterms was further classified on the basis of gestational age. Above table shows incidence of maternal risk factors at 34, 35 and 36 weeks of gestation. The Fisher exact test was applied to this data to test its significance. According to this study, incidence of anaemia, PIH and previous history of preterm delivery more towards the 34 weeks of gestation. After applying Fisher test, this difference was found to be statistically significant.

Morbidity	*34 weeks Number (%)*	*35 weeks Number (%)*	*36 weeks Number (%)*	*P value*
Hyperbilirubinemia	21(67)	20(50)	26(36)	0.032
Sepsis culture positive	03(9)	00(0)	00(0)	0.013
Sepsis probable sepsis	05(15)	03(7)	05(7)	
TTNB	04(12)	03(7)	09(12)	0.691
RDS	11(33)	02(5)	01(1)	0.579
Pneumonia	01(3)	00(0)	00(0)	0.184
Hypoglycemia	05(15)	05(12)	05(7)	0.397
Hypothermia	01(3)	00(0)	02(2)	0.553
Feed Intolerance	03(9)	03(7)	00(0)	0.045
Intraventricular Haemorrhage	00(0)	00(0)	01(1)	0.596
Birth Asphyxia	04(12)	01(2)	01(1)	0.032
AOP	01(3)	00(0)	00(0)	0.184
Duration of Hospital stay >7 days	21(63)	12(30)	07(9)	<0.001
Rehospitalisation	00(0)	04(10)	06(8)	0.193

P value < 0.05 is significant.

Table 26: Late preterm morbidities with "p" value.

Early morbidities in late preterm were further classified on the basis of gestational age. Above table shows incidence of different morbidities at 34, 35 and 36 weeks of gestation. The Fisher exact test was applied to this data to test its significance. According to this study, incidence of sepsis, hyperbilirubinemia, birth asphyxia, and feed intolerance is more towards the 34 weeks of gestation. This study shows that as the gestational age decreases, the late preterms are more prone for sepsis, hyperbilirubinemia, birth asphyxia, and feed intolerance. After applying Fisher test, this difference was found to be statistically significant.

Intervention	*34 weeks Number (%)*	*35 weeks Number (%)*	*36 weeks Number (%)*	*P value*
Oxygen	19(57)	05(12)	14(19)	<0.001
Phototherapy	20(60.6)	20(50)	26(36)	0.061
Exchange Transfusion	00(0)	00(0)	01(1)	0.596
Surfactant	05(15)	01(2)	01(1)	0.007
Inotropes	04(12)	00(0)	00(0)	0.001
NIPPV	16(48)	05(12)	07(10)	<0.001
Invasive Ventilation	07(21)	01(2)	02(2)	0.001
Therapeutic Cooling	00(0)	00(0)	01(1)	0.596

P value < 0.05 is significant.

Table 27: Intervention done late preterm with "p" value.

Intervention in the late preterms was further classified on the basis of gestational age. Above table shows incidence of Intervention at 34, 35 and 36 weeks of gestation. The Fisher exact test was applied to this data to test its significance. According to this study, intervention with NIPPV, inotropes and surfactant more towards the 34 weeks of gestation. This study shows that as the gestational age decreases, the late preterms need more NIPPV, inotropes and surfactant. After applying Fisher test, this difference was found to be statistically significant.

Discussion

This study examines the risks of intercurrent conditions in infants born at 34 to 36 weeks gestation. Out of 144 late preterm babies, 52.7% were male and 47.3% were female, with a male to female ratio of 1.11:1. The study found that 22.9% of the babies were born at 34 weeks, 27.7% at 35 weeks, and 49.3% at 36 weeks of gestation. 22.5% of the babies were born with birth weight more than 2.5 kg, which can be attributed to increased maternal risk factors [14, 15].

Late preterm infants are considered functionally mature, but they are at increased risk for medical complications and death, especially during the first week after birth. There is a relative lack of attention to neonatal considerations when deliveries at these gestations are being contemplated, and up to 50% of infants at 34 weeks gestation may require intensive care [16].

Maternal risk for preterm births is elicited in 130 cases, accounting for about 90.27% of cases. Previous LSCS constitutes 29.16%, followed by PROM, PIH, multiple pregnancy, IVF/OI, diabetes, previous history of preterm delivery, and anaemia. Other risk factors include antepartum hemorrhage, heart disease, and no recorded indication [17].

Reddy et al's study found that 23% of late preterm births had no recorded indication for delivery, and patient factors may be playing a role in these deliveries. Late preterm births are more likely to be the result of spontaneous idiopathic preterm labor or PPROM than medical or pregnancy indications [18].

The study analyzed the morbidity of late preterm infants, focusing on hyperbilirubinemia, respiratory distress, and sepsis. The majority of neonates had vaginal deliveries, with LSCS being performed in 72.2% of cases. The incidence of deliveries conducted by caesarean section was 67.8%, while 32.2% were delivered by normal vaginal delivery. Hyperbilirubinemia was the major group affected, accounting for 46.52% of the cases [19].

Negative neonatal morbidities in late preterm infants include neonatal jaundice requiring phototherapy (55.1%) and respiratory morbidity (10.5%). Other morbidities include sepsis, hypoglycaemia, and mechanical ventilation.

In a study in Jordan, late preterm infants were at higher risk of morbidity and hospitalization than term infants. Late prematurity is associated with significant neonatal morbidity in spontaneous low-risk singleton deliveries, which is important for appropriate counseling and efforts to decrease the rate of late preterm deliveries [20-22].

Rehospitalization among late preterm infants is common, with respiratory problems, jaundice, infection, feeding problems, and excessive weight loss being common causes. Further studies are needed to establish more rigorous strategies and protocols for premature interruption of pregnancy and develop obstetric protocols that increase the precision of estimating gestational age (GA).

Recommendations

Multicentric prospective studies should be conducted in India to evaluate late preterm morbidities and risk factors. Timely intervention can help decrease late preterm birth and early morbidities. Guidelines for late preterms should be formulated, including discharge criteria for hospital stays, breast feeding assessments, and hyperbilirubinemia risk assessments. Parents should be informed about the vulnerabilities of fragile neonates and the importance of monitoring them later. Studies should be conducted to better understand the pathophysiology of conditions leading to SGA in late preterms and their optimal delivery time. Greater awareness of newborn morbidity risks in medical fraternity is also needed.

Limitations of the Study

- Clinical profile of late preterm is not compared with the Term Neonates.
- Indication for giving supplementary feeds was not investigated.

Conclusion

Late preterm babies are at risk for complications like hyperbilirubinemia, respiratory distress, sepsis, feed intolerance, hypoglycaemia, and hypothermia. The incidence of these complications increases as gestational age decreases. Respiratory distress syndrome and transient tachypnea are common causes. 22% of late preterms are small for gestational age, making them vulnerable to early morbidities. Maternal risk factors like previous LSCS and PROM are common. Delivery mode does not significantly affect respiratory distress. High-risk infants require special attention, including delayed discharge and follow-up. Limiting deliveries to those with clear indications is crucial.

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