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Short term outcome of late preterm neonates: A hospital based study

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Abstract
Background: Over the last decade, frequency of preterm births has increased in many countries and this has been mainly attributed to rise in late preterm births. In present scenario, late preterm neonates constitute more than half of all preterm births. Problems faced by these late preterm neonates have been given little importance due to the false notion that they are nearly mature. Whereas, late preterm neonates have a significant higher risk of complications, NICU admission rates, re-admission rates after initial hospital discharge and mortality as compared to their term counterparts.
Aim and Objectives: To study the risk factors, morbidity and mortality of late preterm neonates.
Methodology: We conducted a single centre prospective observational study at postnatal ward and NICU of NMCH, Patna over a period of 18 months from January 2019 to June 2020 including neonates born between 34-0/7 to 36-6/7 weeks of gestation.
Results: Total number of neonates born preterm was 249 out of which 139 (55.8%) were late preterm and the rest 110 (44.2%) were born at <34 weeks of gestational age. Out of these 139 late preterm babies, 81 (58.3%) were males and 58 (41.7%) were females. The three commonest risk factors for late preterm birth were PIH (30.2%), PPROM (21.1%) and APH (19.4%) and together these three contributed to more than 70% of late preterm births. The most common co-morbidities in late preterm neonates were jaundice (22.3%), respiratory distress (19.4%) and feed intolerance (15.1%). As compared to their term counterparts, late preterm neonates were more likely to suffer from jaundice, respiratory distress, sepsis, hypoglycemia, feed intolerance, polycythemia and TTNB. Also, the late preterm neonates had a significantly higher rate of NICU admission as well as mortality as compared to the term neonates. They were also more likely to need oxygen support, CPAP support, surfactant therapy and phototherapy as compared to their term counterparts.
Conclusions: Late preterm newborns form a vulnerable group who are at risk of a significantly higher morbidity and mortality as compared to their term counterparts.

Keywords: late preterm neonate, neonatal morbidity, mortality, risk factors, outcome

1. Introduction
Late preterm neonates refer to neonates born between 34-0/7 to 36-6/7 weeks of gestation [1]. These are not nearly same as term neonates as these babies are physiologically less mature and have inadequate compensatory responses to the challenges posed by extrauterine environment. Over the last few years, there has been a steady shift in the distribution of births from term and post-term toward earlier gestations because of maternal, fetal, or placental/uterine causes [2]. As a result, there has been a significant increase in late preterm birth in the last decade. Late preterm neonates account for nearly 3/4th of all preterm births in western countries [3]. However, there is paucity of data regarding the incidence of late preterm birth in India. Also, not many researchers focused on this subgroup of premature infants until recently because these were inappropriately labeled as "near-term" infants [4]. As a result, such neonates were considered as "almost mature", and hence thought of as neonates requiring little or no attention. This had led to them being managed as per protocols developed for full-term infants in present obstetric and pediatric practice. Based on this current understanding, limited efforts are taken to prolong pregnancy in cases of preterm labor beyond 34 weeks. Moreover, the current guideline on use of prophylactic steroids doesn't recommend it beyond 34 weeks. However, it has to be kept in mind that these practices are based on older studies that reported morbidity and mortality in such neonates to be only slightly higher than their 'term' counterparts whereas in the current scenario the difference is significant [5]. It has been reported lately that late preterm infants have 2–3-fold increased risk of complications like hypothermia, hypoglycemia, delayed lung fluid clearance, respiratory distress, poor feeding, jaundice, sepsis, and re-admission rates after initial hospital discharge [6, 7]. This has led to considerable impact on overall health care resources. With this background, we intended to conduct this study to cover the various aspects of these late preterm infants including the risk factors, morbidity, mortality and outcome.

2. Aim and Objective
Aim: To study the issues faced by late preterm neonates in neonatal period.

Objective
- To study the maternal risk factors for late preterm birth.
- To study the clinical profile of late preterm neonates.
- To study the morbidity and mortality in late preterm newborns in neonatal period.

3. Methodology

Study setting: NICU and postnatal ward of N.M.C.H, Patna.

Study duration: 1.5 years, from January 2019 to June 2020.

Study design: Prospective observational study.

Inclusion criteria: Neonates born between 34-0/7 to 36-6/7 weeks of gestation.

Exclusion criteria: Gestational age less than 34 weeks and more than 37weeks, neonates who left against medical advice were also excluded from final analysis.

Data Collection: After obtaining written informed consent, babies were enrolled in the present study. Information regarding maternal risk factors, antenatal care, mode and place of delivery, gestational age, birth weight, gender, diagnosis at admission, relevant investigations, duration of hospital stay and the final outcome was recorded in a structured Performa. Such neonates were either shifted to NICU or allowed to remain with their mother in Post-natal ward as per standard NICU criteria for admission. Daily follow up was done till discharge and complications that arose were managed as per protocol.

Statistical analysis: The data so collected was entered in Microsoft excel and analyzed using SPSS version 20 software. Variables were presented as mean, median, percentage, standard deviations as appropriate. Chi square test or student's t test was applied for testing significance of difference. P value less than 0.05 was considered significant.

4. Observation and Results

Over the entire study period, the proportion of neonates born at term was 80.6%, preterm birth was 18.1% and post-term birth was 1.3%. Total number of neonates born preterm was 249 out of which 139 (55.8%) were late preterm and the rest 110 (44.2%) were born at <34 weeks of gestational age. Out of these 139 late preterm babies, 81 (58.3%) were males and 58 (41.7%) were females. Majority of them were LBW (n= 86, 61.9%), while VLBW (n=33, 23.7%), ELBW (n=7, 5%) and normal birth weight (n=13, 9.4%) were less common. 23% (32) of such late preterm neonates were born at 36^{+} weeks of gestation, 39% (54) were born at 35^{+} weeks and 38% (53) babies were born at 34^{+} weeks of gestation. 86 (61.9%) of such neonates were born by normal vaginal delivery, 9 (6.5%) required instrumental vaginal delivery whereas 44 (31.6%) required LSCS.

Maternal risk factors for late preterm birth

The commonest risk factors for late preterm birth were PIH (30.2%), PPROM (21.1%) and APH (19.4%) and together these three contributed to more than 70% of late preterm births. There was more than 1 risk factor in 19 babies (13.7%). Table 1 depicts the maternal risk factors in these late preterm babies.

Table 1: Maternal risk factors

Sl No.	Risk factor	Number	Percentage
01	Pregnancy induced hypertension (PIH)	39	30.2%
02	Antepartum hemorrhage (APH)	25	19.4%
03	Preterm premature rupture of membranes (PPROM)	26	20.1%
04	Eclampsia	11	8.5%
05	Twin gestation	13	10.1%
06	Maternal diabetes	11	8.5%
07	Oligohydrambnios	12	9.3%
08	Eldrely mother (age >35 years)	6	4.6%
09	Multipara mother	8	6.2%
10	UTI in mother within 2 weeks preceding delivery	7	5.4%
11	History of preterm delivery in previous pregnancy	4	3.1%
12	Risk factor unknown	6	4.6%

Problems faced by the two groups

The most common co-morbidities in late preterm neonates were jaundice (22.3%), respiratory distress (19.4%) and feed intolerance (15.1%). As compared to their term counterparts, late preterm neonates were more likely to suffer from jaundice, respiratory distress, sepsis, hypoglycemia, feed intolerance, polycythemia and TTNB. Also, the late preterm neonates had a significantly higher rate of NICU admission as well as mortality as compared to the term neonates.

Table 2: Comparison of morbidity and mortality in term and late preterm babies

Sl no.	Condition	Late preterm babies (n=139)	Term babies (n= 1375)	p value
01	NICU admission	38(27.3%)	241(17.5%)	0.005
02	Investigated for jaundice	31(22.3%)	122 (8.9%)	0.0001
03	Respiratory distress	27(19.4%)	162(11.8%)	0.01
04	Sepsis	14(10%)	76 (5.5%)	0.03
05	NEC	3(2.1%)	9(0.65%)	0.65
06	Hypoglycemia	19(13.7%)	52(3.8%)	0.0001
07	Neonatal seizures	12(8.6%)	73(5.3%)	0.107
08	Feed intolerance	21(15.1%)	47(3.4%)	0.0001
09	Apnoea	6(4.3%)	27(2%)	0.078
10	PDA	5(3.6%)	22(1.6%)	0.089
11	Symptomatic anemia	13(9.3%)	78(5.7%)	0.089
12	Polycythemia	9(6.5%)	28(2%)	0.001
13	Congenital pneumonia	7(5.04)	31(2.3%)	0.056
14	Birth ashphyxia	11(7.9%)	74(5.4%)	0.223
15	TTNB	8(5.7%)	17(1.2%)	0.0001

16	Mortality	12(8.6%)	65(4.7%)	0.045

Interventions needed by the two groups

Neonates in both the groups required some form of respiratory support, phototherapy or inotrope support, but the late preterm neonates were more likely to need oxygen support, CPAP support, surfactant therapy and phototherapy as compared to their term counterparts.

Table 3: Comparison of requirement of interventions in the two groups

Sl no.	Intervention	Late preterm babies (n=139)	Term babies (n= 1375)	p value
01.	Oxygen requirement by Hood	22(15.8%)	137(9.9%)	0.030
02	CPAP support	12(8.6%)	43(3.1%)	0.0001
03	Ventilator support	8(5.8%)	39(2.8%)	0.0510
04	Surfactant therapy	6(4.3%)	8(0.6%)	0.0001
05	Phototherapy	13 (9.4%)	45 (3.3%)	0.0004
06	Exchange transfusion	3 (2.2%)	12(0.9%)	0.146
07	Inotropes support	13(9.4%)	84(6.1%)	0.130

Outcome of late preterm neonates:

Mortality in late preterm neonates was 12(8.6%), whereas it was 65(4.7%) in term neonates. Among late preterm neonates, mortality increased with decreasing birth weight as well as decreasing gestational age. Primary cause of death in late preterm group was sepsis (4), HIE stage-3 (3), pulmonary hemorrhage in RDS (3), NEC (1), IVH (1).

Table 4: Outcome based on gestational age

Gestational age	Total number	Mortality	Survival	Survival percentage
34 - <35	53	7	46	86.8%
35 - <36	54	4	50	92.6%
36 - <37	32	1	31	96.9%
>37 weeks	1375	65	1310	95.3%

Table 5: Outcome of late preterm neonates based on birth weight

Birth weight	Number	Mortality	Survival	Survival percentage
<1 Kg	7	3	4	57.1%
1- 1.5 Kg	33	5	28	84.8%
1.5-2.5Kg	86	3	83	96.5%
>2.5 Kg	13	1	12	92.3%

5. Discussion

Over the last decade, frequency of preterm births has increased in many countries and this has been mainly attributed to rise in late preterm births. Problems faced by these late preterm neonates have been given little importance due to the false notion that they are nearly mature. This prospective study was conducted with the aim to study short term outcome of late preterm neonates as compared to term neonates.

In the present study, total number of neonates born preterm was 249 out of which 139 (55.8%) were late preterm and the rest 110 (44.2%) were born at <34 weeks of gestational age. This is comparable to the study of Selvan T *et al*. [8] where they found that nearly 2/3rd of all preterm neonates were actually late preterm neonates. We found a male predominance in this study (58.3% males Vs 41.8%) which is comparable with the study done by Jaiswal *et al*. [9]. The three commonest risk factors for late preterm birth were PIH (30.2%), PPROM (21.1%) and APH (19.4%) and together these three contributed to more than 70% of late preterm births. There was more than one risk factor in 13.7%, but we couldn't identify a risk factor in 4.6% neonates. Similar findings were published by Dobak *et al*. [10] and Laughon *et al*. [11]

As compared to term neonates, late preterm neonates suffered from comorbidities more frequently. And in our study we found that there was a significantly higher incidence of jaundice, respiratory distress, sepsis, hypoglycemia, feed intolerance, polycythemia and TTNB in late preterm neonates as compared to the term neonates. High incidence of neonatal jaundice in such neonates has also been reported by many researchers including the classic study of Leone *et al*. [12] and this can be explained by developmental immaturity of liver and feeding problems in such neonates. The second most common comorbidity in such neonates was respiratory distress (19.4%) which can be attributed to delayed transition to air breathing, delayed lung fluid clearance and surfactant deficiency [13]. Comparable high incidence of respiratory problems have been reported by Mendoza *et al*. [14]. We also found a statistically higher incidence of NICU admission and mortality in late preterm neonates. This can be explained by the fact that ours being a tertiary centre caters to many referred cases from nearby hospitals and neighboring districts, most of them being quite sick when they actually arrived at our hospital. Various studies have reported mortality ranging from 1.5 to 6.3 [15, 16] which is comparable to our study.

6. Conclusion

Our study supports the notion that late preterm newborns form a vulnerable group who are at risk of a significantly higher morbidity and mortality as compared to their term counterparts. Our study shows that late preterm neonates have a significantly higher incidence of NICU admission, co morbidities (jaundice, respiratory distress, sepsis, hypoglycemia, feed intolerance, polycythemia & TTNB) and mortality. Considering the fact that majority of these neonates have one or more maternal risk factors for preterm birth, adequate antenatal and postnatal care is needed to improve their outcome.

7. Limitations

Our study has few limitations. First, it is a single centre study. Second, ours is a hospital based study and so we also included cases referred from other hospitals which could have inflated the incidence of comorbidities and interventions in late preterm neonates. Third, we didn't study the long term outcome of late preterm neonates.

8. Conflict of interest: None

9. Financial disclosure: The authors declare that this study hasn't received any financial support.

10. References

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