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Original Research Paper

Medical Science

IMMEDIATE NEONATAL OUTCOME OF LATE PRETERMS AND EARLY TERMS COMPARED TO TERMS

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ABSTRACT

Introduction: Increasing number of Late Preterm (LPT) babies are being born in recent years, and they suffer from increased neonatal morbidities and moralities.

Objective: To assess the immediate neonatal morbidities and mortalities of Late Pretrem - LPT - (34^{+0}-36^{+6} weeks) compared to those babies born at Early Term -ET- (37^{+0}- 38^{+6}weeks) and Term - T- (39^{+0}- 40^{+6} weeks) gestation.

Methodology: A retrospective review of delivery, admission, discharge and death registers and necessary case notes of all live in-born babies excluding those with congenital anomalies were done in RKM Seva Pratisthan Hospital, a teriray level University Hospital in the City of Kolkata, between 1st January 2018 till 31st December 2019. Data collected in a predesigned pro forma were analysed with SPSS vs 23 software, after obtaining necessary permission. All the major neonatal morbidities and morality were compared between the three groups.

Results: Total 6511 babies born between gestation 34^{+0} and 40^{+6} weeks were analysed of which 1021 were in LPT group (31.9%requiring NICU admission), 3408 in ET group (8.3% requiring NICU admission) and 2068 in T group (9.2% requiring NICU admission). There was no significant difference in mortality (LPT vs ET vsT : 0.5% vs 0.3% vs 0.1%). All the major morbidities (Respiratory, CNS, Infectious, Metabolic and Any morbidity) were significantly higher in LPT group. No significant difference were observed between ET and Term group in terms of any neonatal morbidity or mortality.

Conclusion: Late Pretrem newborns suffer from increased neonatal morbidity compared to their Early Term or Term counterpart in immediate neonatal period. No difference of morbidity or mortality were noted between Early Term and Term groups.

KEYWORDS : Late Pretrem, Early Term, Term, Neonatal Morbidity, Mortality

INTRODUCTION

Late preterm newborns are the fastest growing subset of neonates, accounting for approximately 74% of all preterm births and about 8% of total births[1].The World Health Organisation (WHO) defines preterm birth as any birth before 37 completed weeks of gestation, or fewer than 259 days since the first day of the woman's last menstrual period (LMP). This is further subdivided on the basis of gestational age (GA): extremely preterm (<28 weeks); very preterm (28–<32 weeks); moderate or late preterm (32–<37 completed weeks of gestation)[2]. This is the most extensively used and accepted definition of preterm birth. However, as neonatal morbidity and mortality differs significantly with the progress of gestation, infants born between 34 and 36 weeks and 6 days gestation, are further referred to as late preterm[3]. Similarly, 2012 international stakeholder working group are recommending sub-categorisation of term birth to more accurately describe deliveries and their outcomes. These sub-categories are: early term (37 0/7 weeks of gestation through 38 6/7 weeks gestation); full term (39 0/7 weeks of gestation through 40 6/7 weeks of gestation); late term (41 0/7 weeks of gestation through 41 6/7 weeks of gestation); and, post term (42 0/7 weeks of gestation and beyond)[4].

Preterm birth rate is rising since 1990's, owing to more easily available artificial reproductive techniques, multiple pregnancy and increasing popularity of Caesarian sections. Although there are many causes an woman may deliver prematurely, yet evidence may also suggest iatrogenic reason[5]. Amongst preterm births late preterm are both the largest proportion and the fastest growing subgroup[6]. Considerable evidence and expert opinion suggest that short-term morbidities are prevalent and that the neonatal mortality rate is higher compared to those born at term[7]. Recent advancement in the field of neonatology has no doubt enabled us to exert good care for those delivered 34 weeks of gestation or more with an excellent outcome! However it is often underestimated the impact of late preterm on the overall NICU burden and also on the family! Late preterms are different from the term counterparts in terms of maturity and physiology. Researches in this area suggest that infants born as late preterm are often at higher risk of increased respiratory morbidity, hypoglycaemia, sepsis, hyperbilirubinemia, and increased rate of hospital admission and length of the hospital stay[8].

OBJECTIVES:

The aim of this study was to evaluate the association and effect of gestational age on the morbidity and mortality of infants born at late preterm, early term compared to those born at term.

METHODOLOGY:

The study was undertaken in RKM Seva Pratisthan, a tertiary level University Hospital in the city of Kolkata. This hospital caters is a low to medium socio economic population residing in the city of Kolkata and in the surroundings. Being Private but charitable hospital, this hospital provides care for general population at a very nominal rate, yet with a well managed modern NICU manned by postgraduate paediatric trainees and consultants. NICU is equipped with Ventilators including HFOV, CPAP, Bubble CPAP, HHFNC, Warmers, LED Phototherapy, Syringe pumps etc.

The study was retrospective and period was from 1st January 2018 till 31st December 2019.

INCLUSION CRITERIA: all newborns admitted in NICU between 34 weeks + 0 days of gestation to 40 weeks + 6 days.

EXCLUSION CRITERIA: All out-born babies, babies born with congenital anomalies.

The data were collected From the NICU admission discharge and death register in a predesigned pro forma.

Gestational age – confirmed gestation by ultrasound scan
Birthweight – Martin electronic weighing scale

Neonatal Morbidities evaluated:

1. Respiratory morbidity – presented with RDS, TTN, PPHN, or maybe needing ventilatory support
2. Infectious morbidity – probable sepsis (where sepsis screen was positive and baby clinically unwell), or culture proven sepsis, or meningitis or pneumonia
3. CNS morbidity – baby presenting with HIE(Hypocaemic Ischaemic Encepalopathy), seizures or Intra ventricular haemorrhage(IVH)
4. Metabolic morbidities – such as hypoglycaemia anaemia, other electrolyte disturbances or NNH(Neonatal Hyperbilirubinemia) – requiring phototherapy, exchange transfusion.
5. Any morbidity - clubbing together all the above and others for example - LBW infants needing feed establishment

STATISTICAL ANALYSIS:

Analysis were performed using SPSS Vs 23 software and results were expressed as percentage with Median and IQR.

Ethical committee:

Necessary permission for data Collection and analysis were obtained from the concerned authorities.

RESULTS AND ANALYSIS:

Total number of inborn babies born alive between 1st January 2018 till 31st December 2019 in all gestation was 6766, amongst them 57 babies died still born or below 23 weeks of gestation. Of which a total 6511 babies born between 34 weeks to 40 weeks completed gestation and were included in the results and analysis.

Late Preterm(LP) - 34^{+0}-36^{+6} weeks - 1021 babies - of which 326 (31.9%) admitted in NICU

Early Term(ET) - 37^{+0} - 38^{+6} weeks - 3408 babies - of which 282 (8.3 %) admitted in NICU

Term(T) - 39^{+0} - 40^{+6} weeks - 2068 babies - of which 192 (9.2 %) admitted in NICU

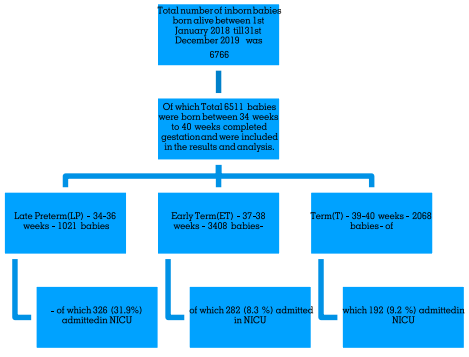

Fig 1: Distributions of babies

57 babies died still born etc below gestation

Table 1: Summary of basic profiles of babies admitted in NICU in each group. SD - Standard Deviation, IQR - Inter Quartile Range

Basic Details	34-36 weeks (LP)	37-38 weeks (ET)	39-40 weeks (T)
Total Number admitted	326	282	192
Male	167 (60%)	159 (56%)	116 (60%)
Birth weight Mean (SD) Median (IQR)	2.08 (±0.52) 1.93 (1.73-2.38)	2.69(±0.52) 2.7(2.36-3.03)	2.99(±0.48) 2.97(2.71-3.25)
Delivery ND CS(percentage)	41 (12%) 285 (88%)	83(29%) 199 (71%)	92(47%) 100 (53%)
Maternal Age Mean (SD) Median (IQR)	28.1(±5.03) 27 (25-31)	25.7(±4.13) 25 (24-30)	25.6(±3.8) 25(23-28)
Primi	228 (69%)	212(75%)	170(88%)
IUGR	130 (39%)	78 (27%)	53 (27%)
Average Hospital Stay in days Mean (SD) Median (IQR)	7.15(±4.97) 6(4-9)	5.9(±3.72) 5 (3-7)	4.02(±5.08) 5 (3-7)

The basic details of those babies admitted in NICU are laid in Table:1. There is a little male preponderance (56-60%) in all the groups. Birth weights obviously show higher with the increasing gestation. Higher percentage of Caesarian deliveries are also noted in lower gestational group (88% in LP and 71% in ET compared to 53% in T). Maternal age does not show much difference in all the three groups, however higher percentage of primipara mothers are noted in Early Term and Term compared to Late preterm (69% LP vs 75% ET vs 88% T). Slight increase incidence of IUGR is also noted in Late Preterm group (39% in LP, 27% in ET and T). Average days of hospital stay is also higher in lower gestation (7.15 days in LP vs 5.9 days in ET vs 4.02 days in T).

Association between different gestation categories(LPT, ET and T) and neonatal characteristics has been described in Table 2. Data analysis in this table and subsequent are done calculating per thousand live births to accurately measure the effect of gestation bands on the neonatal morbidities. Late preterm obviously requires more NICU admissions compared to ET or Term (31.9% vs 8.3% vs 12.3%) with a significant difference existing between LPT vs ET (p value<0.001) and also LPT vs Terms (p value <0.001). No statistically significant differences exist between the incidence of IUGR in each category. Similarly in case of neonatal mortality also no significant difference is noted between the three groups (LPT vs ET vs T : 0.5% vs 0.3% vs 0.1%).

Table 2: Association Between Gestation and Neonatal morbidity (n = 6511) calculated per thousand live births

Category	Present	Gestation				Chi-Squared Test		34-36 Weeks vs. 37-38 Weeks	34-36 Weeks vs. ≥39 Weeks	37-38 Weeks vs. ≥39 Weeks
		34-36 Weeks	37-38 Weeks	≥39 Weeks	Total	$\chi 2$	P Value	P Value	P Value	P Value
NICU Admission	Yes	326 (31.9%)	282 (8.3%)	192 (9.2%)	800 (12.3%)	434.5	<0.001	<0.001	<0.001	0.235
	No	695 (68.1%)	3126 (91.7%)	1890 (90.8%)	5711 (87.7%)					
IUGR	Yes	4 (0.4%)	5 (0.1%)	2 (0.1%)	11 (0.2%)	3.761	0.147	0.338	0.287	0.716
	No	1017 (99.6%)	3403 (99.9%)	2080 (99.9%)	6500 (99.8%)					
Discharged alive	Yes	1014 (99.5%)	3398 (99.7%)	2079 (99.9%)	6491 (99.8%)	4.439	0.109	0.335	0.127	0.335
	No	5 (0.5%)	9 (0.3%)	2 (0.1%)	16 (0.2%)					

Fig 2 depicts the graphical representation of major neonatal morbidities in different gestational bands. The same data is presented in tabular form in Table 3 with statistical calculations. Respiratory morbidity is noted to be significantly higher in the LPT group compared to other two (LPT vs ET vs T : 14% vs 1.9% vs 2.5%) with significant difference exists between LPT vs ET and LPT vs T(p <0.001 and p <0.001 consecutively). For CNS morbidity only significant difference

exist between LPT vs ET (6.7% vs 3% p <0.001). Infectious morbidities are also noted to be higher in LPT group compared to ET or T (7.2% vs 1.4% vs 1.2%) with significant difference observed between LPT vs ET and LPT vs T (both p value <0.001). Similar difference is present between LPT vs ET vs T (12.4% vs 2.3% vs 2% p <0.001 on both the groups) in cases of metabolic morbidity. Looking at the any morbidity where all the morbidities including other reasons for NICU stay such as babies hav-ing feeding difficulties etc being clubbed together also show similar pattern (LPT vs ET vsT - 30.4% vs 7.7% vs 8.4%) with p value (LPT vs ET vs LPT vs T showing p <0.001 on both occasions). Analysis of groups of Early Term and Terms do not show any statistically significant difference in term of major morbidity.

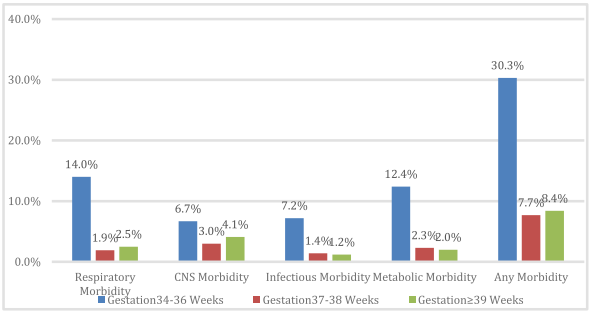

Fig2: Graphical representation of major neonatal morbidity in 3 groups presented in percent-age of total live births

Table 3: Association Between Gestation and Neonatal morbidity (n = 6511) calculated per thousand live births

Category	Present	Gestation				Chi-Squared Test		34-36 Weeks vs. 37-38 Weeks	34-36 Weeks vs. ≥39 Weeks	37-38 Weeks vs. ≥39 Weeks
		34-36 Weeks	37-38 Weeks	≥39 Weeks	Total	$\chi 2$	P Value	P Value	P Value	P Value
Respiratory morbidity	Yes	143 (14.0%)	66 (1.9%)	53 (2.5%)	262 (4.0%)	313.64	<0.001	<0.001	<0.001	0.152
	No	878 (86.0%)	3342 (98.1%)	2029 (97.5%)	6249 (96.0%)					
CNS Morbidity	Yes	68 (6.7%)	103 (3.0%)	86 (4.1%)	257 (3.9%)	27.69	<0.001	<0.001	0.004	0.032
	No	953 (93.3%)	3305 (97.0%)	1996 (95.9%)	6254 (96.1%)					
Infectious morbidity	Yes	74 (7.2%)	49 (1.4%)	26 (1.2%)	149 (2.3%)	133.39	<0.001	<0.001	<0.001	0.632
	No	947 (92.8%)	3359 (98.6%)	2056 (98.8%)	6362 (97.7%)					
Metabolic morbidity	Yes	127 (12.4%)	80 (2.3%)	41 (2.0%)	248 (3.8%)	246.63	<0.001	<0.001	<0.001	0.394
	No	894 (87.6%)	3328 (97.7%)	2041 (98.0%)	6263 (96.2%)					
Any morbidity	Yes	309 (30.3%)	261 (7.7%)	174 (8.4%)	744 (11.4%)	425.17	<0.001	<0.001	<0.001	0.354
	No	712 (69.7%)	3147 (92.3%)	1908 (91.6%)	5767 (88.6%)					

DISCUSSION:

Late preterm and early Term are always at a disadvantage compared to their Term counterparts as shown in many published literatures[9,10]. These group of babies are always at increased risk of having respiratory distress, hypoglycaemia, infection and even higher mortality. The use of tertiary preventive strategies such as antenatal corticosteroids (ACS) and tocolysis does not prevent preterm birth, but may improve associated neonatal outcomes[11].

In this study we examine a particularly group of babies who are inborm without any congenital anomaly and admitted in a well equipped NICU. Like all other studies our study also shows very high incidence of NICU admission in Late Preterm group compared to Early Term or Term. However with adequate care more than 99% of babies are discharged home with no significant difference in mortality observed in LPT babies compared to ET or T. Like other published literature[12], our study also shows higher incidence of overall respiratory morbidly in LPT group compared to ET or T. Similar observations are also noted in cases of infectious neurological as well as metabolic morbidities. LPT babies are also at disadvantage position when all morbidities are combined together.

All these above observations demonstrate that Late Preterm babies are more prone to suffer from neonatal morbidities compare to their Early Term or Term counterparts. However, quite interestingly our study does not show any significant difference between Early Term and Term groups of babies in case of any of the major morbidities or mortality.

Strength and limitation:

Our study has been conducted in a private hospital with excellent NICU facility. Records are also pretty reliable with negligible missing data. Although we have not shown the data, it is a usual practice in this hospital that all pregnant women receive good and regular antenatal check up. However, we must admit that we analysed rather a small sample and hence a bigger sample size might be able to demonstrate our findings more convincingly.

CONCLUSION:

Our study shows that Late Preterm babies suffer from increased neonatal morbidities compared to Early Term or Term newborns. However their mortality rate remains very low and are not different from Early Terms or Terms. Our study also finds no difference between the babies born in the gestation group of Early Terms and Terms in respect of any morbidity or mortality in the immediate neonatal period.

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