Original Article

Indian Journal of Trauma and Emergency Pediatrics
Volume 7 Number 2, April - June 2015

Comparison of Early Neonatal Morbidity and Mortality in Late Preterm Vs Term Neonates

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Abstract

Background: There has been a gradual rise in late preterm infant rates in recent years. Although the late preterm infants have a lower risk compared to smaller preterms, some recent studies have suggested an increased risk of mortality and morbidity in this group compared to term infants. *Methods:* This prospective cohort study was conducted in a rural medical college hospital. For this study, the gestational age of all infants born alive in our hospital during November 2013 to October 2014 was assessed using the mother's last menstrual period and the new Ballard test. Our study group consisted of 70 infants selected among infants born late-preterm (34 0/7 -36 6/7 weeks), while 70 consecutively born sex matched term newborns constituted our control group. Newborns with major congenital abnormalities and whose parents did not consent were excluded. The subjects were followed up for 7 days for morbidities and mortality. *Results:* During the study period there were 1260 total deliveries. Late preterms were more likely to have respiratory morbidity(14.3% vs 2.9%), need of resuscitation at birth (7.1% vs 1.4%), feeding problems (25.7% vs 4.3%), hypoglycemia (4.3% vs 2.9%), and sepsis (14.3% vs 2.9%).Late preterm infants more likely to be readmitted than term infants(7.4% vs 2.9%). *Conclusion:* Late-preterm newborn infants have higher rate of neonatal morbidities and mortality compared to term controls.

Keywords: Late Preterm Infants; Neonatal Morbidities; Term Infants.

Introduction

Prematurity is the principal cause of infant mortality and of several serious morbidities. As a result, prematurity has been recognized as a severe public health problem. The incidence of premature birth has been increasing over recent decades and in the United States incidence increased from 10.6% in 1990 to 12.8% in 2006 [1]. The observed increase is primarily the result of the inclusion of a group of borderline preterm infants who have been classified as late-preterm infants (LPTI) since 2005 [2].

Late Preterm infants are those who are born between the day after the end of 34th completed week (34 0/7) to on or before the end of the last day of 37th completed weeks (36 6/7)of gestation [3].

Babies born at this gestation were considered asnear term babies and equivalent to term babies. It was believed that these babies will have fewer problems postnatally and will do well with routine. Newborn care meant for a normal baby and therefore they never received the attention they deserved [4].

In 2005 in United States, The National Institute of Child Health and Human Development set the expert group to search the problems of late-preterm newborns. This group suggested to give a name to the newborns born between 34 - 36 weeks gestation (between 239-259 days gestation) as "late preterm", instead of "near term" or "almost term" neonates, to prevent a lack of attention to problems connected with this group of neonates [2]. Therefore, late preterm infants are those who are born between the days after the end of 34th completed week (340/7) to on or before the end of the last day of 37th completed week (366/7) of gestation. Term infants are those who are born between 37 0/7to 416/7 weeks.

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It is now realized that babies born at 34 to 36 weeks should not be considered as term babies as the magnitude of morbidities and mortality in these subset of babies is much higher compared to term neonates. These babies should therefore be considered as late preterms. It is important to anticipate problems in this category as majority of the time minimal infrastructure, monitoring and support would suffice to stabilize them. Much has been studied about problems of the early preterm (less than 34 weeks) but not much literature is available on babies above this gestation. The available literature is mainly from the western nations. In 2005, out of 9.1% preterm births in USA, more than 70% were late preterm. In the study done in south India, out of 13.5% preterm births 55% were late preterm [5]. The obstetric and newborn care in developed countries is different from developing countries. This projects large burden of late preterm infants in low income countries like India. Studies done in developed countries proved that late preterm infants are at higher morbidities and mortality than term infants. But most of them were retrospective in nature.

Few Indian studies have been conducted in this regard. There is very limited data available on the problems regarding late preterm babies in India. So there is an immense need to conduct a study which will provide an insight about the problems of the late preterm infant to make appropriate decisions to manage these problems.

Methodology

This prospective study was a conducted in a tertiary hospital in rural part of Karnataka i.e., Sri Adichunchanagiri Hospital and Research Centre, attached to Adichunchanagiri Institute of Medical sciences, Balagangadharanatha Nagara.

All consecutively born babies with gestational age between 34 to 42 weeks in Adichunchanagiri Hospital and Research Centre, attached to Adichunchanagiri institute of medical sciences, B.G. Nagara constituted the source of data.

Cases: Live inborn late preterm newborns (gestation 34 0/7 to 36 6/7 weeks).

Controls: Live inborn term newborn (gestation 37 0/7 to 41 6/7 weeks) of the same sex born immediately after each late preterm infant.

So to round off, a total of 70 cases and an equal number of sex matched controls were included in the study.

Sampling procedure

- Previous hospital statistics showed that there is an average of 1200 deliveries per year with 8 % late preterm deliveries.
- Prior published data indicate that the prevalence of morbidity in term infants is 5-8 % and the prevalence of morbidity in late preterm infants is 30 - 40 %.
- The sample size required for this study is calculated allowing for type I error probability (α) of 0.05 and power (1-β) of 0.8.

Method of data collection

- All late preterm and term babies delivered in Sri Adichunchanagiri Hospital and Research Centre, attached to Adichunchanagiri Institute of Medical sciences, B.G. Nagara were taken in to the study.
- Informed consent was taken from the parents.
- Gestational age was calculated from mothers LMP and New Ballard score.
- Babies were weighed using electronic weighing machine present in our NICU with standard error of ±5grams.
- Babies were categorized into small for gestational age (SGA), appropriate for gestational age (AGA) and large for gestational age (LGA) by plotting on intrauterine weight chart for both the sexes.
- Babies with birth weight less than 10th percentile were categorized as SGA, between 10th & 90th percentile as AGA and above 90th percentile as LGA.
- A total of 70late preterm babies and 70 term babies were evaluated for morbidities and mortality for the first seven days of life.

Statistical analysis

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done using ANOVA T test, and chi-square test. It was used to test the significance of difference between quantitative variables. A 'p' value less than 0.05 is taken to denote significant relationship. If value of p is more than 0.05 then it is taken to denote absence of relationship between the two variables.

Results

During the study period from November 2013 to October 2014, there were a total of 1260 live births.

This constituted 140 (11.11% of total deliveries) preterm infants, in which 36 (25.71% of preterm) were early preterm and 104 (74.29%) were late preterm infants. Late preterm infants accounted for 8.25% of total deliveries and 74.29% of preterm deliveries

Table 1: Comparison of Gender in Late preterm and Term Infants

Gender	Late preterm(%)	Term(%)	Total(%)	
Male	42 (60)	42 (60)	84	(60)
Female	28 (40)	28 (40)	56	(40)
Total	70 (100)	70 (100)	140	(100)

The study included equal number of male and female late preterm and term infants, because of sex matching while selecting cases and controls to avoid bias. However there were more male (42 i.e. 60%) infants than the female (28 i.e. 40%) in study group.

Table 2: Comparison of Mean APGAR score in Late preterm and Term Infants

	Gestational age	Mean	Std. Deviation	T	P value
APGAR Score (1min)	Late preterm	6.84	0.94	1.63	0.104
	Term	7.06	0.56		
APGAR Score (5min)	Late preterm	8.83	0.64	1.47	0.143
	Term	8.9	0.35		

Mean APGAR score at 1 and 5 minute was 6.84 vs 7.06 and 8.83 vs 8.9 minute in late preterm and term neonates respectively. There was no significant difference in APGAR score at one and five minute among the two groups (p=0.104 and p= 0.143 respectively).

Table 3: Comparison of Anthropometric variables in Late preterm and Term Infants

Anthropometric variable	Gestational age	Mean	Std. Deviation	T	p value
Birth Weight (Kgs)	Late preterm	2.41	0.47	6.57	<0.001
	Term	2.93	0.47		
Length (Cms)	Late preterm	46.46	2.36	6.01	<0.001
	Term	48.42	1.38		
Head Circumference	Late preterm	32.14	1.72	6.43	<0.001
(Cms)	Term	33.66	0.96		

The mean birth weight in term infants (2.93 $\pm$ 0.47kgs) was significantly higher than in late preterm infants (2.41 $\pm$ 0.47 kgs) (t = 6.57, p<0.001).

The mean length at birth in term infants (48.42 $\pm$ 1.38cms) was significantly higher than in late preterm infants (46.46 $\pm$ 2.36 cms) (t = 6.01, p<0.001).

The mean head circumference at birth in term infants (33.66 $\pm$ 0.96cms) was significantly higher than in late preterm infants (32.14 $\pm$ 1.72 cms) (t = 6.43, p<0.001).

Table 4: Comparison of Incidence of Morbidities in Late preterm and Term

Morbidity	Late preterm(%) (n=70)	Term(%) (n=70)	Total(%) (n=140)	p value	Relative Risk (CI)
Resuscitation	05(7.1)	01(01.4)	6(4.3)	0.095	1.7(1.2-2.6)
NICU Admission	39 (55.7)	13 (18.6)	52 (37.1)	<0.001	2.1(1.5-2.9)
Feeding difficulties	18 (25.7)	03 (04.3)	21(15.0)	<0.001	1.9(1.5-2.6)
Hypoglycemia	03 (04.3)	02 (02.9)	5 (3.6)	0.65	1.2(0.6-2.5)
Respiratory morbidity	10 (14.3)	02 (02.9)	12 (8.6)	0.016	1.8(1.3-2.4)

Jaundice	33(47.1)	11(15.7)	44 (31.4)	<0.001	1.9(1.4-2.6)
Sepsis	10 (14.3)	02(02.9)	12 (8.6)	0.016	1.8(1.3-2.4)
Readmission	05(07.4)	02 (02.9)	7 (5.1)	0.23	1.4(0.9-2.4)
Any Morbidity	41 (58.6)	13(18.6)	54 (38.6)	<0.001	2.3 (1.6 -3.1)

Overall morbidity in late preterm infants was 58.6% and in term infants it was 18.6%. This was 3.1 times more in late preterm compared to term infants. This was statistically significant with p value less than 0.001and a relative risk of 2.3 (1.6-3.1).

Among late preterm infants incidence of NICU admission was 55.7 % and among term infants it was 18.6%. The difference was statistically significant (p<0.001) with a relative risk of 2.1 (1.5-2.9).

25.7 % of late preterm infants and 4.3% of term infants had feeding difficulties. The difference was statistically significant (p<0.001) with a relative risk of 1.9 (1.5-2.6).

Respiratory morbidity was seen in 14.3 % late preterm and 2.9% of term infants. The difference was statistically significant with p=0.016 and relative risk of 1.8 (1.3-2.4).

Jaundice requiring intervention was seen in 47.1% late preterm infants and 15.7% of term infants, which was significantly higher late preterm than in term infants. (with a relative risk of 1.9 (1.4-2.6) and (p<0.001).

Incidence of sepsis in late preterm infants (14.3 %) was significantly higher than in term infants (2.9%) with a relative risk of 1.8 (1.3-2.4) (p=0.016).

In our study 7.1% late preterm babies (n=70) required some resuscitation as compared to 1.4%(n=70) term babies which was not significant statistically. In present study hypoglycaemia was diagnosed in 4.3% and 2.9% of late preterm and term infants respectively. This was insignificant with p value of 0.65, though it was higher in late preterm infants.

Readmission rate in the first 7 days of life in late preterm and term neonates was 7.4% and 2.9% respectively. This was also insignificant with p value 0.23.

Table 5: Comparison of Outcome (Mortality) in Late preterm and Term Infants

Outcome	Late preterm (%)	Term (%)	Total (%)
Improved	68(97.1)	70 (100)	138 (98.6)
Expired	2(2.9)	0 (0)	2 (1.4)
Total	70 (100)	70 (100)	140 (100)

X^2 = 2.03, d.f=1, p=0.1548

There was no significant association between gestational age of infants and their Clinical outcome in terms of improvement or mortality.

Discussion

In our study, 58.6% of late preterm and 18.6% of term infants had at least one neonatal morbidity requiring inpatient hospital observation, admission or readmission during the first 7 days of life. Compared with term infants, late preterm infants were at 3.1 times higher risk for overall morbidity due to any cause.

Similar to our findings, in a prospective study by Jaiswal et al [6], 70.8% late preterm infants compared with 29.1% had at least one clinical problem. In study done by Wagh AS et al [4], late preterm babies had more neonatal morbidities compared to term babies (85 % vs 16.3 %). In their study, Femitha P et al [5] concluded that overall morbidity in late preterm and term infants was 63.2% and 15.2% respectively. Morbidity in study by Pinar B et al [7] was 54.5% in late preterm and 14 % in term infants. Morbidities

Comparison of Overall morbidity with other studies

Study	Late preterm (%)	Term (%)	Times
Jaiswal et al [6]	70.8	29.1	2.4
Wagh AS et al [4]	85	16.3	5.2
Femitha P et al [5]	63.2	15.2	4.1
Pinar B et al [7]	54.5	14	3.9
Shapiro Mendoza et al [8]	22	03	07
Present study	58.6	18.6	3.1

were still higher in population based study done by Shapiro Mendoza et al [8] which was 7 (22% vs 3%) times more in late preterm than term neonates. In the study by Santos et al [9], the risk of neonatal morbidity was 3 times higher in 34 to 36 week gestational age infants than 37 to 41 week gestational age infants (25.6% vs 8.1%).

The workload needed to provide care to late preterm is a significant portion of the work load of any neonatal unit as most of late preterm infants require hospitalization. In the study performed by Raju TN et al [2] in 2006, the rate of internalization in the intensive care unit was found to be 51% in late preterm infants and 16% in term infants, which is also similar to our study in which rate of internalization in NICU was 55.7% and 18.6% in late preterm and term neonates respectively. Pinar B et al [7] had similar results.

Diseases of late preterm infants lead to loss of lives. Although the morbidity and mortality rates in these infants are lower compared to small preterm infants, they constitute a higher percent of the neonatal mortality rate because of their higher number. In our study early neonatal mortality was 2.9% in late preterm and there was no death in term infants. Tomashek et al [10] conducted a study that showed that early neonatal mortality was 6 times higher in late preterm infants than term. Other authors have reported relative risks of death ranging from 1.5 to 6.3 [11,12]. Mortality in our study was lower compared to study done by Tomshek et al, This could be due to inclusion of late preterm infants with congenital malformations in their study Our study did not include the long term morbidity and mortality of the late preterm infants. Previous studies, showed that the risks associated with late preterm births extend to beyond the neonatal period. One such study, reported a three fold increase in mortality in the first year of life [13]. Other studies, reported an increase in various morbidities, including behavioural problems, cerebral palsy, intellectual disability and learning difficulties[14,15].

Conclusion

Conclusively, neonatal morbidity and mortality rates are higher in late preterm infants compared to term infants. It is very important that these infants should be evaluated and closely monitored in terms of conditions including postnatal respiratory distress, jaundice, hypothermia, feeding problems, hypoglycemia and risk of infection.

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