

## Research Article

# Morbidity and mortality profile of late preterm neonates as compared to term neonates from a tertiary care centre in Mysore, India

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**Received:** 27 October 2015

**Accepted:** 17 December 2015

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## ABSTRACT

**Background:** Prematurity is a major cause of neonatal mortality and morbidity. Most of the studies are focused on outcomes among preterm neonates less than 34 weeks gestation which has the highest mortality and morbidity. The main objective was to study the morbidity and mortality pattern of late preterm neonates as compared to term neonates.

**Methods:** Neonates delivered at Cheluvamba hospital Mysore, India from March 2014 to September 2014 were subjected to gestation assessment. Gold standard for gestational assessment was early obstetric ultrasound (6-12 weeks). In the absence of which, the gestation was calculated from the clinical assessment of gestation by expanded new Ballard score. The enrolled babies were divided into two groups: Study group: Gestational age 34 0/7 to 36 6/7 weeks (Late Preterm) and Comparison group: Equal number of term (above 36 weeks 6 days of gestation and below 42 weeks of gestation) neonates born in our hospital during the study period. After including cases, details were entered in predesigned proforma which included detailed maternal history for risk factors and detailed natal and postnatal history for complications and late preterm were compared with term neonates.

**Results:** A total of 110 late preterm neonates were compared with 110 term neonates. As compared to term neonates, late preterm neonates were more at risk for need of resuscitation ( $p=0.013$ ), need for nutritional and supportive care ( $p=0.000$ ), respiratory distress ( $p=0.000$ ), birth asphyxia ( $p=0.032$ ), early onset sepsis ( $p=0.001$ ), neonatal jaundice ( $p=0.001$ ), hypothermia ( $p=0.000$ ) and feeding difficulties ( $p=0.000$ ). They also had prolonged duration of stay in hospital ( $p=0.000$ ) and also mortality was more in late preterm neonates as compared to term neonates ( $p=0.002$ ).

**Conclusions:** Late preterm neonates have a higher risk for morbidity and mortality as compared to term neonates and hence, need special attention.

**Keywords:** Late preterm neonates, Morbidity and mortality

## INTRODUCTION

Prematurity is a major cause of neonatal mortality and morbidity. Most of the studies are focussed on outcomes among preterm neonates less than 34 weeks gestation which has the highest mortality and morbidity. Not much is known about premature infants at higher gestations. Late-preterm infants are physiologically and metabolically immature.<sup>1-7</sup> As a consequence, late-

preterm infants are therefore at higher risk than term infants to develop medical complications that result in higher rates of mortality and morbidity during the hospitalization.<sup>5-7</sup> Late-preterm infants have not been studied and understanding of the developmental biology and mechanisms of disease experienced by these infants is largely incomplete.<sup>1,4,6-16</sup> Management strategies are based on general principles, clinical experience, and extrapolation from knowledge of early preterm and term

infants. Recently, descriptive studies that detailed the epidemiology, medical problems, and risk of mortality experienced by late-preterm infants have stimulated interest in exploring the mechanisms of disease in late preterms.<sup>1-7</sup>

The available literature on late preterm infants is mainly from the western nations. The obstetric and newborn care in these countries is different from a developing country like India. Most often late preterm babies are managed same as that of term neonates.<sup>17</sup> They are loosely termed as “near term” infants and assumed to do well and behave like term neonates in the immediate postnatal period. There is very limited data available on the problems regarding late preterm babies in India.<sup>17</sup> Thus, there is an urgent need to conduct a study, which deals with the problems of late preterm infants. Keeping these areas of concern in mind, this study was undertaken to study the morbidity and mortality pattern of late preterm infants as compared to term neonates.

## METHODS

The present study was a cross-sectional study conducted at Cheluvamba hospital NICU attached to Mysore Medical College & Research Institute, Mysore, India. This is a tertiary care referral hospital. Preterm neonates born between 34 0/7 and 36 6/7 weeks of gestation in Cheluvamba hospital were compared with equal number of term neonates (37 0/7 to 41 6/7 weeks gestation) born in Cheluvamba hospital. Consent was obtained from the parents of all neonates included for the study and the study was approved by the institutional ethics committee. Sample size was calculated using the formula  $n = z^2 pq/d^2$ , where  $z=1.96$ ,  $p$ =prevalence of late preterm infants in Cheluvamba hospital as per the previous records,  $q=(1-p)$ ,  $d$ =95% confidence interval. Sample size as calculated by the above formula was 107. Hence a total of 110 late preterms and 110 term neonates were included in the study group from March 2014 to September 2014. Therefore, the inclusion criterion for late preterms was neonates born between the gestation age of 34 0/7 and 36 6/7 weeks. Exclusion criteria were neonates where in the gestational age was not confirmed by Ultrasound and neonates with neuromuscular disorder which prevented the proper assessment by Expanded New Ballard score. Neonates with major congenital malformations and clinically identifiable chromosomal anomalies were also excluded from the study. All the consecutively born babies who are delivered in the hospital during the study period were subjected to gestation assessment. Gold standard for gestational assessment was early obstetric ultrasound (6-12 weeks). In the absence of which, the gestation was calculated from the clinical assessment of gestation by expanded new ballard score.

The enrolled babies were divided into two groups as follows.

### Study group

Gestational age 34 0/7 to 36 6/7 weeks.

### Comparison group

Equal number of term (above 36 weeks 6 days of gestation and below 42 weeks of gestation) newborn babies born in Cheluvamba hospital, during the study period.

The following data was collected.

### Maternal data

#### Detailed antenatal history

- Age of mother at conception
- Pregnancy complications like pre-eclampsia, antepartum haemorrhage, premature rupture of membranes, polyhydramnios
- Uterine anomalies: Cervical incompetence, malformation of uterus
- Medical and surgical illness: Acute fever, acute pyelonephritis, diarrhoea, acute appendicitis and abdominal operations.
- Chronic diseases: Hypertension, diabetes, nephritis, decompensated heart lesion, severe anaemia
- Genital tract infection
- Use of antenatal steroids

#### Natal history

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- Presence of and duration of true labour pain
- Rupture of membrane
- Singleton/ multiple
- Indication for late preterm delivery (in case of study group)
- Mode of delivery (normal / LSCS/ assisted)

### Baby details

The following parameters were noted;(1) Gestation; (2) Sex; (3) Birth weight; (4) Resuscitation at birth and APGAR scoring; (5) All neonates included in the study were clinically examined twice a day till the time of discharge. The babies were evaluated for cry, activity, feeding, colour (cyanosis and jaundice), passage of stools, obvious external congenital malformations and for danger signs; (6) In case of NICU admission, the following details were studied in detail as following.

- Admission
- Duration of stay
- Complications
- Respiratory difficulties (Hyaline membrane disease, Pulmonary haemorrhage, pneumothorax, bronchopulmonary dysplasia, pneumonia)
- Activity of the baby

- Apnoea of prematurity
- Metabolic disturbances like Hypoglycaemia, Hypocalcaemia
- Feeding difficulties
- Neonatal jaundice
- Anaemia
- Sepsis
- Temperature instabilities
- Need for mechanical ventilation
- Need for intravenous medications
- Cardiovascular abnormalities like Patent Ductus arteriosus
- Intracranial complications like Intraventricular hemorrhage
- Mortality

### ***Need for resuscitation***

The extent of resuscitation was recorded as initial steps, need of oxygen, positive pressure ventilation (PPV), chest compressions and need of medication.

### ***Respiratory morbidities***

The need of respiratory support was recorded as;

1. Need of oxygen
2. Need of surfactant and /or ventilation

### ***Hypoglycemia***

Blood sugars were monitored for all those babies who show symptoms of hypoglycaemia and for those admitted to NICU. Blood glucose was monitored by glucometer. Blood glucose less than 40 mg/dl was considered as hypoglycaemia.

### ***Hypothermia***

Temperature was measured in the apex of the baby's axilla by holding the thermometer for 3 minutes. Axillary temperature  $<36.5^{\circ}\text{C}$  was considered as low temperature.

### ***Feeding***

Any feeding difficulties in the form of refusal of feeds, poor sucking, regurgitation of feeds was noted.

### ***Neonatal jaundice***

Clinically all neonates were screened for jaundice. Any suggestion of jaundice below knee was further evaluated by serum bilirubin estimation. The mode of treatment (phototherapy and exchange transfusion) was recorded.

### ***Anaemia***

Any clinical suspicion of anaemia was confirmed as per the following criteria;(1) At birth: Cord blood-  $\text{Hb} < 13.5 \text{ g/dL}$  and (2) 1 to 3 days:  $\text{Hb} < 14.5 \text{ g/dL}$ .

### ***Sepsis***

- Suspect sepsis (where antibiotics are given for at least 2 days on the basis of clinical suspicion of signs and symptoms of baby)
- Probable sepsis on the basis of the positive sepsis screen ( $\text{CRP} > 1 \text{ mg/dL}$ ,  $\text{TLC} < 5000/\text{cumm}$ ,  $\text{I/T ratio} > 0.2$ ,  $\text{ANC} < 1800/\text{cumm}$ , abnormal mESR)
- Culture positive sepsis

### ***At discharge following parameters were recorded***

- Weight of the baby
- Length of baby
- Occipito-frontal circumference
- The number of days in the NICU

All the statistical methods (descriptive studies, chi square/contingency coefficient analysis, independent samples t-test) were carried out through the SPSS for windows (version 16.0). The p value  $< 0.05$  was taken as statistically significant.

## **RESULTS**

In the present study a total of 110 late preterm neonates were compared with 110 term neonates as shown in Table 1. Mean age of the mother in study group was  $23.37 \pm 3.95$  years and among the comparison group was  $23.45 \pm 3.72$  years which was not statistically significant. There were 53 neonates between 34 to 35 weeks gestation, 44 neonates between 35/1 to 36 weeks gestation and 13 neonates between 36/1 to 37 weeks gestation. The risk factors for preterm delivery were prolonged rupture of membranes (18 cases), oligohydramnios (13 cases), pregnancy induced hypertension (10 cases), uterine malformations, seizures in one case each and idiopathic in rest of the cases. Among the study group 82 neonates were delivered by vaginal delivery, 2 cases by forceps delivery and 26 by caesarean section. Among the late preterm neonates 79 neonates were appropriate for gestational age, 30 neonates were small for gestational age and 1 neonate was large for gestational age.

More late preterms (19) needed resuscitation at birth as compared to term neonates (7) which was statistically significant. Of the 19 neonates who required resuscitation, 12 late preterms required endotracheal intubation as compared to 4 term neonates which was statistically significant ( $p=0.04$ ). None of the babies required chest compressions or medications. APGAR score was abnormal in 14 late preterms as compared to 1 term neonate which was again statistically significant ( $p=0.001$ ). About 48.5% of late preterm neonates had difficulty in establishing feeding at birth and needed assistance for establishing feeding in the form of help by a counsellor or pallada feeds or nasogastric tube feeding as compared to only 13.8% of term neonates. This was statistically highly significant. More late preterms

(28.2%) had respiratory distress at birth as compared to 3.7% of term neonates which was again statistically highly significant. Overall 10 neonates had evidence of hypoxic ischemic encephalopathy as compared to 4 term neonates. Early onset sepsis (probable sepsis and culture positive sepsis) was more common amongst late preterm neonates (13.6%) as compared to 1.8% of term neonates which was statistically significant. About 19.1% of late preterm neonates had jaundice significant enough to require intervention in the form of phototherapy as against 4.6% of term neonates which was statistically

significant. Though the late preterm neonates were not more prone for hypoglycaemia as compared to term neonates, the incidence of hypothermia was very common among late preterm neonates (41 neonates) as compared to term neonates (9 neonates) which were statistically significant. The duration of stay in hospital was significantly more in late preterm infants as compared to term neonates (6.3 versus 3.9 days). Most important is the mortality which was significantly more among late preterm neonates (10.9%) as compared to term neonates (0.9%).

**Table 1: Comparison of clinical features of late preterm neonates with term neonates**

Clinical feature	Late preterm neonates	Term neonates	P value
Need for resuscitation	19 (17.3%)	7 (6.4%)	0.013
Need for nutritional and supportive care	53 (48.2%)	15 (13.8%)	0.000
Respiratory distress	31 (28.2%)	4 (3.7%)	0.000
Birth asphyxia-HIE 1	7 (6.4%)	1(0.9%)	0.032
Birth asphyxia-HIE 2	0 (0%)	2 (1.8%)	0.154
Birth asphyxia-HIE 3	3 (2.7%)	1 (0.9%)	0.317
Early onset sepsis	15 (13.6%)	2 (1.8%)	0.001
Late onset sepsis	5 (4.5%)	2 (1.8%)	0.254
Neonatal jaundice	21 (19.1%)	5 (4.6%)	0.001
Hypoglycaemia	0 (0%)	3 (2.8%)	0.080
Hypothermia	41 (37.3%)	9 (8.3%)	0.000
Hyperthermia	1 (0.9%)	0 (0%)	0.318
Feeding difficulties	38 (34.5%)	10 (9.2%)	0.000
Congenital anomalies	2 (1.8%)	0 (0%)	0.157
Duration of stay in hospital	6.3182+/-4.25545	3.9174+/-2.16508	0.000
Death	12 (10.9%)	1 (0.9%)	0.002

## DISCUSSION

Contrary to the belief that late preterms are nearly mature, the present study proves that late preterms suffer significant morbidity and significant mortality. In the present study, the most common risk factors for late preterm delivery were prolonged rupture of membranes, oligohydramnios and pregnancy induced hypertension. Same risk factors were identified by Khashu M et al and Sahana et al.<sup>18,19</sup> Shapiro-Mendoza et al in their study on effect of late preterm birth and maternal medical conditions on newborn morbidity risk concluded that maternal medical conditions are self determining risk factors for newborn morbidity in the late preterms.<sup>20</sup>

In the present study late preterms had more feeding difficulties with need for nutritional and supportive management as compared to term neonates. Similar results were found by Wagh AS et al.<sup>17</sup> They concluded that only 53.5% of late preterm babies were fed only breast milk even at discharge due to feeding difficulties contrary to 93.7% of term neonates. Respiratory distress was significantly more common amongst late preterm neonates in the present study. Similar results were

obtained by Sahana et al.<sup>19</sup> This may be due to delayed transition to air breathing, delayed fluid clearance and surfactant deficiency<sup>19</sup>. Significantly more number of late preterm neonates had jaundice requiring phototherapy than term neonates. Similar results were obtained by Jaiswal A et al.<sup>21</sup> This may be because of feeding difficulties and developmental immaturity of the liver. In the present study hypothermia was more common in late preterm neonates than term neonates. This aspect is not much documented in other studies on late preterm neonates. This may be because of associated comorbidities like sepsis and also because of reduced subcutaneous fat. In the present study the incidence of sepsis was 13.6% in late preterm neonates as compared to 1.8% in term neonates. Similar incidence of 10.3% versus 1.37% was found in a similar South Indian study by Sahana et al.<sup>19</sup> Jaiswal A et al, concluded that late preterms are at 3.2 times higher risk of probable sepsis as compared to term neonates.<sup>21</sup> In the present study the mortality in late preterms was also significantly higher than term neonates. Mortality in a study by Sahana et al, was 1.2%.<sup>19</sup> The high mortality in our study may be because our hospital is a tertiary care referral centre and hence, we had more sick late preterm neonates. Most of



the neonates in our cohort had serious morbidities like need for resuscitation at birth, respiratory distress and sepsis. The overall duration of stay amongst late preterm neonates was twice that of term neonates in the present study thus, adding a burden to health care resources. Hence, considering that late preterms are more prone for morbidity and mortality, clinicians should closely monitor late preterms immediately after birth and also, obstetricians should use this information in weighing the risks and benefits of late preterm delivery.

## CONCLUSION

Late preterm neonates have a higher risk of morbidity and mortality as compared to term neonates and hence, need special attention.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Savitha MR, Sanjee SS. Morbidity and mortality profile of late preterm neonates as compared to term neonates from a tertiary care centre in Mysore, India. *Int J Contemp Pediatr* 2016;3:164-8.