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Original Research Article

Comparison of risk factors and early morbidity in late preterm neonates and term neonates

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Abstract: Preterm is defined as babies born alive before 37 weeks of pregnancy have been completed. An estimated 15 million babies are born too early every year. 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, when the definition of late preterm was established as those infants born with gestational ages (GA) of 34 full weeks to 36 weeks and 6 days. late preterm group has 2 to 3 fold increased rates for mild to moderate morbidities, such as hypothermia, hypoglycemia, delayed lung fluid clearance and respiratory distress, poor feeding, jaundice, infection, and readmission rates after initial hospital discharge .Aim of this study was to identify the risk factors and pattern of neonatal morbidities and to compare it with term infants . A total of 110 live inborn late preterm infants and term infants were included in the study .Variables relating to the mothers, their pregnancies and their infants were analyzed. Analysis of the data showed that late preterm infants suffer a large number of complication during the neonatal period, especially low APGAR score , hypothermia, hypoglycemia, jaundice requiring exchange transfusion , respiratory pathologies, ,feeding difficulty , contributing to a neonatal mortality rate significantly greater than that of full term infants. Proportion of Gestational hypertension, Gestational diabetes, Resuscitation, oxygen support and mechanical ventilation were higher in late preterm infants than term infants but it was not significantly associated.
Keywords: Late preterm infants, term infants, neonatal morbidity.

INTRODUCTION:

Preterm is defined as babies born alive before 37 weeks of pregnancy have been completed. An estimated 15 million babies are born too early every year. That is more than 1 in 10 babies. More than 60% of preterm births occur in Africa and South Asia, but preterm birth is truly a global problem. In the lower-income countries, on average, 12% of babies are born too early compared with 9% in higher-income countries [1]. Prematurity is the principal cause of infant mortality and of several serious neurocognitive, respiratory and ophthalmic morbidities. As a result, prematurity has been recognized as a severe public health problem [2-4].

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 [5]. 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 [6], when the definition of LPTI was established as those infants born with gestational ages (GA) of 34 full weeks to 36 weeks and 6 days.

A number of factors have been linked with the increase in premature births: new fertilization methods have increased the number of twin and multiple pregnancies; an increasing number of women are having children after the age of 35 [7], infections and chronic conditions such as diabetes and high blood pressure; however, often no cause is identified. There could also be a genetic influence [1].

Late preterm infants have limited compensatory responses to the extra-uterine environment, compared with term infants. Although late preterm infants are the largest subgroup of preterm infants, there has been little research on this group until recently. This is mainly because of labelling them as

‘‘near-term’’, thus being looked upon as ‘‘almost mature,’’ with little need to be concerned. late preterm group has 2 to 3 fold increased rates for mild to moderate morbidities, such as hypothermia, hypoglycemia, delayed lung fluid clearance and respiratory distress, poor feeding, jaundice, infection, and readmission rates after initial hospital discharge [8].Aim of this study was to identify the risk factors and pattern of neonatal morbidities and to compare it with term infants .

MATERIAL AND METHODS :

Study type, institutional ethical committee permission and patient consent**:**

This cross sectional analytical study was carried out after obtaining ethical committee clearance from the institute. A written consent from the parents of all enrolled patients was taken prior to the study and the parents were briefed about the study in the language they understood. A total of 110 live inborn late preterm infants (34 -0/7 to 36 -6/7 weeks) and term infants (37-0/7 to 41-6/7 weeks) admitted in SMS Medical College, Jaipur, randomly selected to participate in this case control study during the period from June 2014 to April 2015.

Gestational age will be assessed by maternal last menstrual period and by ballard’s criteria. Infants with major congenital anomalies and those with clinically identified chromosomal syndromes will be excluded. Variables relating to the mothers, their pregnancies and their infants were analyzed.

All the babies will be evaluated with detailed history of their mothers like mothers age, gestational age, interpregnancy period, presence of maternal malnutrition, gestational hypertension and gestational diabetes. The APGAR score, presence of respiratory distress, requirement of respiratory support and resuscitation, presence of hypoglycemia, hypothermia, feeding difficulties, dehydration, jaundice and presence of sepsis was evaluated.

Statistical Analysis :

Data were analyzed statistically to determine the frequencies and percentage of different variables. Qualitative data expressed in the form of percentage and proportions. Quantitative data expressed in the form of means and SD. Chi-square test was applied to determine the significance of difference in measurement of these variables and relationship between these variables and outcome. P-value of 0.05 or less was considered significant.

RESULTS:

The present study included two groups, first group consists of 110 cases of late preterm infants and second group consists 108 cases of term infants.

Data on variables relating to mothers and pregnancies and deliverys:

There were no differences between the two groups in terms of mean maternal age 23.88 ± 3.11 years in the late preterm infants group and 24.82 ± 3.04 years in the full term infants group ($p>0.05$).

The mean interpregnancy period (in years) of the mother in Late preterm group was 2.44 ± 0.78 years and in term group was 3.41 ± 0.75 years grams. Late preterm births were associated with shorter interpregnancy period as compared to term new born and the difference of was statistically significant ($p<0.05$).

Mothers of 37.3% late preterm neonates had malnutrition compared to only 9.3% in case of term neonates and the difference was statistically significant($p<0.05$) .

Mothers of 14.5% late preterm neonates had Gestational hypertension compared to 9.3% in case of term neonates and the difference was statistically insignificant ($p>0.05$).

Mothers of 10.9% late preterm neonates had Gestational diabetes compared to 7.4% in case of term neonates and the difference was statistically insignificant ($p>0.05$).

Table-1: Data on variables relating to mothers and pregnancies and delivery

Variables	Late preterm	Term	Significance
Maternal age (Years)	23.88 ± 3.11	24.82 ± 3.04	P >0.05
Interpregency period(Years)	2.44 ± 0.78	3.41 ± 0.75	P<0.05

Table-2: Data on variables relating to mothers and pregnancies and delivery

Variables	Late preterm	Term	Significance
Maternal malnutrition	41 (37.3)	10 (9.3)	P<0.05
Gestational hypertension	16 (14.5)	10 (9.3)	P >0.05
Gestational diabetes	12 (10.9)	8 (7.4)	P >0.05

Data on variables relating to neonates :

The mean APGAR score of the neonates in Late preterm group was 8.18 ± 1.61 and in term group was 9.1 ± 1.09. Regarding APGAR score the difference between late preterm and term neonate was statistically significant (p<0.05).

Resuscitation was needed in 7.3% Late preterm group compared to 5.6% term infants group and the difference was statistically not significant (p>0.05).

18.2% of late preterm infants required oxygen support and 7.3% required mechanical ventilation while 2.8% term infants required oxygen support and 2.8% required mechanical ventilation. Regarding respiratory support the difference between late preterm and term neonates was statistically insignificant (p<0.05).

The late preterm infants had had more frequent episodes of hypoglycaemia (8.2%) in comparison to term infants (4.6%) and the difference was statistically significant.

Feeding difficulties occurred in 16.4% of late preterm while 4.6% term infants had feeding difficulties and the difference was statistically significant (p<0.05) .

Parenteral nutrition was needed in 9.1% late preterm neonates while 5.6% term infants required parenteral nutrition. The difference was statistically insignificant (p >0.05).

The late preterm neonates had had more frequent episodes of hypothermia(18.2%) in comparison to term neonates (5.6%) and the difference was statistically significant (p<0.05).

Dehydration occurred in 5.5% of late preterm neonates while 3.7% term neonates suffered from dehydration and the difference was statistically insignificant (p>0.05).

Jaundice occurred in 31.8% of late preterm neonates while 14.8% term neonates suffered from jaundice and the difference was statistically significant (p<0.05).

Phototherapy was needed in 12.7 % Late preterm neonates compared 9.3% term neonates and the difference was statistically not significant (p>0.05).

Exchange transfusion was required in 7.3 % of Late preterm neonates while none of the term neonates required Exchange transfusion and the difference was statistically significant (p<0.05) .

Sepsis occurred in 12% of late preterm neonates while 4% term neonates suffered from sepsis and the difference was statistically significant (p<0.05).

Table-3: Data on variables relating to neonates

Variables	Late preterm	Term	Significance
Mean APGAR score	8.18 ± 1.61	9.1 ± 1.09.	P<0.05
Resuscitation in delivery room	8 (7.3)	6 (5.6)	p>0.05
Respiratory distress	27 (24.5)	5 (4.6)	P<0.05
Hypoglycaemia	20 (18.2)	5 (4.6)	P<0.05
Feeding difficulty	18 (16.4)	5 (4.6)	P<0.05
Parenteral nutrition	10 (9.1)	6 (5.6)	P>0.05
Hypothermia	20 (18.2)	6 (5.6)	P<0.05
Dehydration	6 (5.5)	4 (3.7)	P>0.05
Jaundice	35 (31.8)	16 (14.8)	P<0.05
Phototherapy	14 (12.7)	10 (9.3)	P>0.05
Exachange transfusion	8 (7.3)	0 (.0)	P<0.05
Sepsis	21 (19.1)	7 (6.5)	P<0.05

DISCUSSION:

The increased incidence and accompanying risks of late preterm deliveries represent a foremost concern in the world. It is well known that higher rates of neonatal morbidities accompany delivery at early gestational ages. Late preterm newborns are the fastest growing subset of neonates, accounting for approximately 74% of all preterm births and about 8% of total births [9].

The late preterm birth rate has risen 25% since 1990[10] . Furzán and Sanchez *et al*., [11] , McIntire *et al*.,[12] and Guasch *et al* .,[13] observed that, of the population of premature infants, 63.2%, 76%, and 79% were late preterm infants , respectively. Carter *et al* .,[14] found a prevalence of 9% of preterm births for the entire United States from 2000 to 2006, and the LPTI accounted for the vast majority of preterm infants.

Several reports indicate an increase in the late preterm infants over time. Davidoff *et al*., showed a change in the mean gestational age at birth from 40 weeks in 1992 to 39 in 2002, among all spontaneous deliveries the United States and this was attributed to the increase in the rate of late preterm infants [15].

The aetiology of late preterm infants births needs to be studied in greater depth. Reddy *et al*., classified premature births in a United States cohort into one of the four groups according to cause of premature delivery: maternal medical conditions, obstetric complications, major congenital anomalies or isolated spontaneous deliveries, assigning the remaining 23% of births that did not fit any of these categories to a fifth group entitled "no recorded indications [16].

This study analyses morbidity as well as the need for support and adjunctive therapies in a group late Preterm Infants and term infants.

Our study found that late preterm births were significantly not associated with mothers age , with maternal pathologies during pregnancy, including hypertension diabetes , our results were in against with all of which have also been described by other authors [7,17-19].

Respiratory distress occurred in 24.5% of late preterm infants while 4.6% term infants suffered from respiratory distress and the difference was statistically significant ($p<0.05$) . Our findings were in agreement with previous studies; Melamed *et al*.,[20] who reported a 4.2% rate of RDS in an Israeli case–control study of late preterm infants . Moreover a recent systematic review.,[21] including 22 different studies on late preterm infants morbidity, recorded respiratory distress at 5.3%.

18.2% of late preterm neonates required oxygen support and 7.3% required mechanical ventilation while 2.8% term neonates required oxygen support and 2.8% required mechanical ventilation. Regarding respiratory support the difference between late preterm and term neonates was statistically insignificant ($p<0.05$).

Unfortunately there was no data on the administration of antenatal corticosteroids prior to the 34th week. Once respiratory distress has arisen, the risk of undergoing mechanical ventilation is no different between the late preterm infants group and the term infant. This could be read as an effect of a similar, unexpected, pathogenetic mechanism underlying the respiratory disease in both groups. This finding may suggest the introduction of preventive practices (such as antenatal corticosteroids) common to the two groups. The reduced use of nasal oxygen in the late preterm neonates group compared to that in the term infants probably reflects the unit's preference for N-continuous positive airway pressure instead of oxygen by nasal cannulae the lower the gestational age. Kamath *et al*., showed a higher frequency of supplemental oxygen with an odds ratio (OR) of 19.14 (95% CI: 1.62-226), phototherapy (OR: 6.67; 95% CI: 1.52-29), and hypoglycemia (OR: 3.95; 95% CI: 1.76 to 8.85) in late preterm infants infants with confirmatory lung maturity tests, in comparison to those born at term [22].

A significant number of infants had hypothermia, hypoglycemia and hyperbilirubinemia requiring exchange transfusion. Similar to our findings, in a retrospective study by Wang, *et al*., 77.8% near term infants compared with 45.3% of term infants had at least one clinical problem and nearly all clinical outcomes differed significantly between near-term and term neonate *viz*. temperature instability, hypoglycemia, respiratory distress, and jaundice. They found that during the initial birth hospitalization, late preterm infants were 4 times more likely than term infants to have at least one medical condition diagnosed and 3.5 times more likely to have two or more conditions diagnosed [8].

A significant number of infants had sepsis and feeding problems caused by neonatal pathologies, the immaturity of preterms' gastrointestinal tracts and the consequent lack of coordination of suction and deglutition mechanisms are often barriers to establishing successful breastfeeding, which in turn leads to excessive weight loss and dehydration during the first days of life. Melamed, *et al*., also found that compared with full-term infants, spontaneous late preterm delivery was independently associated with an increased risk of neonatal morbidity, including respiratory distress syndrome, sepsis, intraventricular hemorrhage, hypoglycemia, and jaundice requiring phototherapy[20].

The incidence of morbidity increased from 24% at 40 weeks to 90% at 34-35 weeks showing an inverse relationship with gestational age. There was a 10% increase from 38 weeks to 37 weeks, 20% increase from 37 weeks to 36 weeks and 30% from 36 weeks to 35 weeks. With 40 weeks as reference standard, all gestations except 39 weeks were at significantly higher risk for morbidity. Bradley, *et al*., concluded previously that clinically significant respiratory morbidities are least common at 39-40 weeks [23]. Roberta De Luca, *et al*., similarly found that mortality and morbidities had a strong gestational age related trend with the lowest incidences consistently found between 38 and 40 weeks of gestation [24]. Shapiro-Mendoza, *et al*., found that the newborn morbidity rate doubled in infants for each gestational week earlier than 38 weeks [25].

The erroneous concept of late preterm as almost full term infants means that they are discharged prematurely, following the routine protocols set out for full term infants . Discharging these infants before 48 hours precludes the opportunity of identifying morbidities early enough to allow timely intervention. It is not therefore surprising that these infants have a much higher rate of hospital readmission. Common causes of readmission are jaundice, infection, feeding problems and excessive weight loss [26].

Analysis of the data showed that late preterm infants suffer a large number of complication during the neonatal period, especially low APGAR score , hypothermia , hypoglycemia, jaundice requiring exchange transfusion , respiratory pathologies, ,feeding difficulty , contributing to a neonatal mortality rate greater than that of full term infants . Proportion of Gestational hypertension, Gestational diabetes, requirement of resuscitation, oxygen support and mechanical ventilation were higher in late preterm infants than term infants but the association was not significantly associated.

CONCLUSION:

Because of the excess short- and long-term neonatal morbidity and associated costs, obstetric care providers should revaluate the need for delivery during the late preterm period (34-0/7 to 36-6/7 weeks). A reduction in the number of newborns exposed to unnecessary risks due to elective delivery in the later preterm period would have great societal benefit. Late-preterm infants are therefore a high-risk group of children and need special attention while in hospital, including delayed discharge and paediatric follow-up very soon after discharge.

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