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Respiratory morbidity in late preterms - A retrospective study in a tertiary care centre

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Abstract: *Introduction:* Late preterm births are defined as births at $34^{0/7}$ through $36^{6/7}$ weeks of gestation, and account for 6.87% of all births. Most often late preterms are considered as healthy as full term babies ignoring the fact that they are physiologically immature and are at a higher risk of morbidity and mortality. *Objective:* To study the respiratory morbidity in late preterms. *Methodology:* This is a retrospective study done at a medical college hospital in Mangalore. Data was obtained from case sheets in Medical Records Department of the hospital and entered into predesigned proformas. *Results:* There were 135 Late Preterm Births (LPB) admitted in the NICU in the study period of which 114 met the inclusion criteria. Out of the 114 LPB maximum belonged to the gestational age of 34 weeks (42%) and least in 37 weeks (10%) of gestation. Ninety three babies had NICU admissions for respiratory Morbidities. Retractions being the most common clinical presentation, with 69% (n=79)of babies presenting with this symptom followed by tachypnea and grunt both being present in 46%(n=52) of the babies. Each symptom was analysed for each corresponding Gestational week, and it was found that retractions and grunt were highly significant. Tachypnea was not found to be statistically significant. It was found that 67 babies required CPAP, 15 babies' required hood box oxygen, and 13 babies required to be mechanically ventilated to attain stable status. Maximum babies were diagnosed with RDS, followed by TTN and Apnea of prematurity. RDS compared to gestational week, showed the descending pattern with advancing gestational week. There were 2 mortalities of babies born in the gestational week of 34 weeks. No deaths were found in the subsequent weeks. Average length of stay was found to be less than 10 days in all weeks except LPB born by 34 weeks that needed longer lengths of hospital stay extending to 20 days. *Conclusions:* Our study shows increased respiratory morbidity with decreasing weeks of gestation. It is imperative that while dealing with late preterms these aspects need to be kept in mind.
Keywords: Respiratory, Morbidity, Late preterm.

Introduction

Preterm infants are sub categorised into early, moderate and late preterm based on gestational age. Late preterm births are defined as births at $34^{0/7}$ through $36^{6/7}$ weeks of gestation [1], and account for 6.87% of all births [2]. Most often late preterms are considered as healthy as full term babies ignoring the fact that they are physiologically immature and are at a higher risk of morbidity and mortality [1].

India was recorded as the country with the highest number of preterm births, at 35.19 Lakh children in the year of 2010 [3], indicating that a significant fraction of births in India are in need of intensive care during the initial period of life to prevent long term medical complication hampering their growth and development. Studies performed by Wang et al [4] show that higher proportion of late preterm neonates as compared to term neonates suffered from Respiratory Distress Syndrome (RDS) and other clinical problems. Studies conducted by Jaiswal et al [5] observed outcomes of respiratory distress amongst other morbidities and concluded that respiratory morbidities followed neonatal jaundice as the most frequently identified morbidities in the late preterm infants. There are only a few studies on late preterms, especially from India. Hence, this work was taken up with the objective to study the respiratory morbidity.

Material and Methods

This is a retrospective study done at a medical college hospital in Mangalore which is a tertiary care centre. The sample size calculated as minimum of 87. All live late

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preterm births i.e., Gestational Age $34^{0/7}$ to $36^{6/7}$ weeks admitted in the neonatal intensive care unit (NICU) from January 2015 to December 2016 were included. Gestational age was calculated as per LMP or first trimester scans. Babies born with congenital anomalies were excluded from this study. Retrieval and analysis of the data obtained from case sheets in Medical Records Department of the Hospital was entered into predesigned proformas. Data included were gestational age, APGAR score, respiratory symptoms, type of oxygen delivered, neonatal outcomes and duration of hospital stay. Collected data was analysed by frequency, percentage, Chi square test. Data entry and analysis was done using SPSS version 23.0.

Results

There were 135 Late Preterm Births (LPB) admitted in the NICU in the study period, of which 114 met the inclusion criteria. Remaining were excluded in view of congenital diseases. Out of the 114 LPB maximum belonged to the gestational age of 34weeks (42%) and least in 37 weeks (10%) of gestation (Table 1).

Table-1: Number of cases according to gestational age

Gestational age	Total number of cases	Percentage
34	48	42%
35	30	26%
36	25	22%
37	11	10%

Ninety three babies had NICU admissions for Respiratory Morbidities. Criteria for admission was as per NICU protocols, based on respiratory symptoms the baby presented with. Respiratory symptoms taken into account were retraction, grunt, tachypnea, requiring supplemental oxygen. Pattern of each symptom is shown in Table 2.

Table-2: Type of respiratory morbidity across gestational age

Gestational age	Type of Respiratory Morbidity				
	Respiratory Morbidity	Retraction	Grunt	Tachypnea	Requiring O_2
34	47	43	27	27	44
35	27	20	15	13	24
36	18	15	10	11	18
37	1	1	0	1	1
P value	<0.001	<0.001	<0.06	=0.0345	<0.001

Retractions being the most common clinical presentation, with 69% (n=79) of babies presenting with this symptom followed by tachypnea and grunt both being present in 46% (n=52) of the babies. Each symptom was analysed using Chi square test and Cramers V index for each corresponding Gestational week, and it was found that Retractions and Grunt were highly significant. Tachypnea was not found to be statistically significant.

Majority of cases required oxygen administration as part of their treatment, either initially or as the symptoms severity increased. Oxygen requirement was significantly higher at lower gestational age (p<0.001).The oxygen administration modes that were commonly used in the NICU were added in this study. It was found that 67 babies required CPAP, 15 babies' required hood box oxygen, and 13 babies required to be mechanically ventilated to attain stable status (table 3).

Table-3: Gestational age and mode of oxygen supply

Gestational age	Mode of O_2 Supply		
	CPAP	Hood Box	Mechanical Ventilation
34	36	6	7
35	16	4	5
36	14	4	1
37	1	1	0

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Maximum babies were diagnosed with RDS, followed by TTN and Apnea of prematurity. RDS compared to Gestational week, showed the descending pattern with advancing gestational week (table 4).

Their outcome and average duration of stay was noted. There were 2 mortalities of babies born in the gestational week of 34 weeks. No deaths were found in the weeks subsequently.

Average length of stay was found to be less than 10 days in all weeks except LPB born by 34 weeks that needed longer lengths of hospital extending to 20 days (table 5).

Table-4: Gestational age and final diagnosis

Gestational Age	Final Diagnosis		
	Respiratory distress syndrome	Transient tachypnea of newborn	Apnea of prematurity
34	47	0	0
35	20	2	2
36	14	1	1
37	1	0	0

Table-5: Comparison between gestational age, outcome and duration of stay

Gestational age-weeks	Outcome			Duration of Stay			Average stay
	Improved / Recovered	Expired	LAMA/ DoR	<10 days	10-20 days	>20 days	
34	34	2	11	26	20	1	10 days
35	22	0	5	19	8	0	7 days
36	14	0	4	15	3	0	8 days
37	1	0	0	1	0	0	5 days

LAMA-Left Against Medical Advice; DoR-Discharge on Request

Discussion

Over the past few decades, the trends in maternal and neonatal care have improved drastically due to advancements in the standards and technologies in the medical field. This has led to a good decrease in mortality rates, but also on the other hand given freedom to medical practitioners and patients to more convenient options. Particularly that of increased elective caesarean sections without valid indications at a date that's suitable as per patient request and to the convenience of the medical practitioner [6]. This has led to a gradual increase in the incidence of Preterm Births.

Our study included 114 LPB admitted in the Neonatal Intensive Care Unit (NICU) during the study interval, out of which 93 had respiratory symptoms. This sample size is similar to the study done by Nazia et al [7], which included 120 LPB having respiratory morbidity in an interval of 6 months. But another study done by Judith et al [8], was on a much larger scale. It included 7055 LPB NICU admissions out of which 2032 LPB suffered from respiratory distress. Out ofthe LPB that were admitted in the NICU, 81.5% suffered from some form of respiratory compromise. Studies done by Nazia et al [7], Judith et al [8], Jaiswal et al [5], and Wagh et al [4], showed 35%, 9%,10.5% 29.8% LPB suffering from respiratory distress out of the total number of Late Preterm births that occurred during their respective study interval.

Our study shows increased respiratory morbidity with decreasing weeks of gestation similar to studies done by Judith et al [8], Jaiswal et al, Wang et al [4] and Mandruzzato

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et al [9] as we progress from 36 to 34 weeks of gestational age. But the study done by Nazia et al [7] showed increased incidence of respiratory distress in 36 weeks than that during 34-35 weeks, but they were mild in severity compared to those of the latter group. Amongst the diagnosis made, the most common was RDSfollowed by TTN. Similar results were found in studies done by Cindy et al [10], Judith et al [8] and Soumya Patil et al [11]. The incidence of RDS and TTN showed decreasing trend with increase in gestational age by each week. Judith et al [8] study showed a decline of incidence in RDS from 10.5% to 0.3% and that of TTN from 6.4% to 0.3% as we progress from 34 to 36 weeks.

Results showed that most babies suffering from respiratory symptoms required some form of oxygen. In our study 87 out of the 114 LPB admitted in the NICU required oxygen supplementation in the form of CPAP, Hood box or Mechanical ventilation. Majority of babies in each week of gestation required CPAP as compared to Hood box or mechanical ventilation. Some babies required overlapping modes such as CPAP initially followed by Hood box or vice versa if the condition got worse. Mechanical ventilation was given in the more severe cases.

Requirements in oxygen supply showed a decline with increasing weeks of gestation. Study done by Nazia et al [7] showed 78% required oxygen supplementation at 34 weeks compared to only 15% at 36 weeks gestational age. Study done by Judith et al [8] compared modes of resuscitation and it was found that babies delivered at 34 weeks were more aggressively treated for respiratory compromise as compared to each successive week until 39 weeks. 8.4% babies required oxygen supplementation at 34 weeks as compared to the subsequent weeks of which 4% received bag and mask ventilation, 2.9% were intubated and 0.2% required administration of chest compressions.

In our study, average duration of hospital stay was found to be 10 days except in 34 weeks where the duration of stay extended between 10-20 days. This was found to be similar to study done by Judith et al [8]. Longer duration of stay was found to have long term adversities. These babies must be followed up in later stages of childhood to look for abnormalities such as respiratory infections, asthma etc and treated promptly [12].

The mind-set of many is that healthy babies born near-term as almost as healthy as their term counterparts. Study done by Cindy McEnvoy et al [10] clears the misconception. This makes late preterm births a subgroup that needs special attention. They are neither too immature to withstand the outside world, nor are they at par with babies at term. They lag behind in systemic development, especially respiratory system, as shown in a study done by Cindy McEnvoy et al [10], where Pulmonary Function Tests (PFT) were compared between the two groups. Due to their lag in respiratory development they are more prone to respiratory morbidities in their early days of life [7]. In a child, the first 10 days of life reflect the next 10 years of his health into childhood and adulthood. This throws emphasis on the vital role of a practicing physician to follow up such cases to ensure good health in the future.

Conclusions

Our study shows increased respiratory morbidity with decreasing weeks of gestation. It is imperative that while dealing with late preterms these aspects need to be kept in mind.

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