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Original Article

Maternal and Fetal factors and Short-Term Neonatal Outcomes Associated with Late Preterm Delivery

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Abstract

Background: The primary cause of infant mortality and morbidity is still preterm births (PTB). In our nation, little research has been done on the prevalence of late PTB and related perinatal outcomes for patients receiving treatment in the intensive care unit.

Aim: the aim of the current study was to determine predictors of unfavorable neonatal outcomes and to estimate the impact of gestational age on short-term neonatal morbidity and mortality in late preterm infants (LPIs) treated in the intensive care.

Patients and methods: This cross sectional included 322 women whose deliveries were performed at Al-Azhar University Hospital in Damietta, Egypt from August 2023 to August 2024. The following items were collected through interview meeting with the mother and her infant; sociodemographic (Age, Schooling and Residency), clinical-obstetric and perinatal characteristics

Results: According to the neurological morbidities, seizures represent 1.6%, hypoxic ischemic encephalopathy (HIE) represent 2.2%, and intra ventricular hemorrhage (IVH) represent 4.3%. The mortality rate in our study was 5.3%, all of them were from the age group 34 weeks (P =0.001). Logistic regression analysis revealed that, gestational age, gender, and maternal DM were the only predictors for the respiratory morbidity (P =0.001 for all). A statistically significant association was found between the mortality rate and respiratory morbidity, neurological morbidity, infections, blood transfusion, hypoglycemia (P =0.001 for all)

Conclusion: It is critical to determine the factors that predict unfavorable short-term outcomes in late preterm infants for evaluating clinical practices and guidelines aimed at reducing infant morbidity and mortality

Keywords: Fetal Risk Factors; Late Preterm Infants; Maternal Risk Factors; Preterm Births; Seizures

INTRODUCTION

According to the World Health Organization [WHO], the definition of prematurity encompasses all newborns born before 37 weeks of gestational age [GA]. Late premature infants are those born between 34 and 36 weeks and 6 days, and extreme premature infants are born before 28 weeks of gestational age [1].

Prematurity occurs in more than one in ten births, and it is the leading cause of morbidity and mortality among newborns, with about 1.1 million deaths per year worldwide. Of these deaths, most can be prevented with basic care and low-cost interventions [2].

The main maternal complications that lead to late preterm birth are premature labor [PL] and premature rupture of membranes [PROM]. Other obstetric conditions contribute to prematurity, such as urinary tract infection, hyper-tensive disease, gestational diabetes, and twin pregnancies. Among the main fetal factors are restricted intrauterine growth and the non-reassuring fetal status [3]

The risk of neonatal complications is inversely proportional to GA. Each week the fetus remains in the womb, its development improves and the frequency and severity of neonatal complications are improved. Early com-plications of late prematurity include respiratory distress syndrome, apnea, hypothermia, hypoglycemia, hyperbilirubinemia, feeding difficulties, central nervous system immaturity, and infections, with a risk of at least seven times more complications in this group compared to term infants [TI] [4, 5].

Morbidity and risk of hospitalization during the first year of life are also higher compared to term infants [6]. Long-term studies indicate that, when compared to preterm infants, late preterm infants are at an increased risk for neurodevelopmental disorders and learning disabilities, with neurocognitive changes that may persist into adulthood [7].

Because extreme preterm infants receive greater attention from health professionals for their high risk of complications, LPI infants are often neglected and treated the same as TI, which increases their risk for complications [8].

Therefore, the term “late premature” rather than “near term” is recommended in order to avoid the misinterpretation that preterm infants that are born close to term, share the same risks as a TI [9]. Knowledge of the factors that lead to the birth of late preterm infants can provide subsidies for health professionals and managers to prevent them, and reduce neo-natal morbidity and mortality related to prematurity.

Therefore, the purpose of this study is to determine predictors of poor neonatal outcomes and to estimate the impact of gestational age on short-term neonatal morbidity and mortality in LPIs treated in the intensive care unit.

PATIENTS AND METHODS

This cross-sectional study included 322 women whose deliveries were performed at Al-Azhar University Hospital in Damietta from August 2023 to August 2024. Our study was guided by the Helsinki declaration principals. Ethical approval as obtained from the Institutional review board of Damietta Faculty of Medicine, Al-Azhar University. An Informed written consent was obtained from the parents of the infants before the recruitment. We included the patients according to the following criteria:

The inclusion criteria:

- Newborns met the gestational age criteria for late preterm birth.

The Exclusion criteria:

- Age less than 34 weeks or more than 37 weeks.
- Cases of fetal deaths
- Cases with major malformations

Data collection

- Sex, gestational age, parity, birth weight, Apgar score (i.e., vitality assessment at birth within the first five minutes after birth), and length of hospitalization in the intensive care unit were among the data analyzed.

- Among the maternal risk factors, we identified were the mother's age, parity, pregnancy complications, maternal morbidity, and pregnancy treatment.

- The data on short-term outcomes were separated into four groups: neurological, infectious, respiratory, and other outcomes.

- The presence of respiratory distress syndrome, transient tachypnea of the newborn, persistent pulmonary hypertension in the neonate (PPHN), neonatal pneumothorax (NP), or the requirement for ventilatory support, such as mechanical ventilation and continuous positive airway pressure, were all considered respiratory morbidity.

- Meningitis, pneumonia, and Culture-proven sepsis were categorized as infectious morbidities.

- Intraventricular hemorrhage (IVH) and neonatal convulsions were categorized as central nervous system morbidities.

- Hypoglycemia, anemia needing a blood transfusion, and jaundice necessitating phototherapy were among the other morbidities.

- The Department of Pediatrics defined the ranges for clinical diagnoses made by a pediatrician in compliance with diagnostic protocols, which served as the basis for infant outcomes.

- For neurological and respiratory pathologies, radiological diagnostic techniques were employed in addition to clinical evaluation.

- Laboratory and microbiological results were utilized in the evaluation of infection and entities categorized as additional morbidities.

Statistical analysis

Statistical analysis was performed with SPSS statistical software, version 25 (IBM, Chicago, Illinois, USA). The normality of the data was tested by the Kolmogorov-Smirnov test. Qualitative data were presented as numbers and percentages and were compared by the Chi square test, while quantitative data were presented as mean and standard deviations and were compared by the independent t test. Binary logistic regression analysis was done to determine the predictors of late preterm labor. As a result, the p-value was considered significant at the level of <0.05

RESULTS

A total number of 322 late preterm infants were included in our study. The gestational age ranged from 34 to 36 weeks, with a mean of 35 ± 0.8 weeks. The male gender represents 51.6% versus 48.4% females (Table 1). The birth weight ranged from 1.2 to 3.4 kg, with a mean of 2.4 ± 0.5 kg. The mean head circumference was 32.5 ± 1.4 cm with a range of 42 – 50. The mean length was 45.2 ± 2.4 cm with a range of 42 – 50 cm. In terms of the BW – GA, 10.9% were SGA, 81.1% were AGA, and 8.1% were LGA (Table 2).

According to the maternal demographic data, the mean maternal age was 27.8 ± 6.3 years with a range of 19 – 40 years. According to their residency, 59.6% were from urban areas, and 40.4% were from rural areas. As regards the maternal work or employment, 28.3% were worker. According to the smoking status, 6.8% were smoker. In terms of the parity, 69.9% were multipara and 30.1% were nullipara (Table 3).

As regards the maternal obstetric data, the delivery indications were as follow; 18.3% maternal diseases, 44.7% obstetric complications, 37.0% were isolated spontaneous delivery. According to the antenatal care (ANC), 86.6% had underwent proper ANC (Table 4) According to the pregnancy morbidities, the most common morbidities were Anemia (44.7%), UTI (31.4%), and Uterine bleeding (30.1%). As regards the type of delivery, 82.6% underwent CS, and 17.4% underwent NVD. According to the pregnancy outcomes, 96.6% delivered single infant and 3.4% delivered twins (Table 4).

In our study, 3.1% of the infants whose gestational age was 34 weeks had major congenital anomalies, however those in the age categories 35 or 36 had no congenital anomalies (P=0.001). According to the NICU admission, 35.1% of the totally included infants required NICU admission most of them were in the age category 34 weeks (P=0.001) (Table 5).

In terms of the respiratory morbidities, the most common types were TTN (19.6%), RDS (9.9%), PPHN (5%), and apnea (4.3%). Most of these morbidities were reported in the 34 weeks age category (P =0.001). The mechanical ventilation was required only in 9.9% of the totally included infantas all of them were 34 weeks gestational age (P =0.001). Twenty-seven percentage (27%) of the infants required CPAP, 53.7% from the age category 34 weeks, 21% were from the age category 35 weeks, and 8.3% were from the age category 36 weeks (Table 6).

According to the neurological morbidities, Seizures represent 1.6%, HIE represent 2.2%, and IVH grade represent 4.3% with a statistically significant association between the age group and the incidence of neurological morbidities in which most of them were reported in the age group 34 weeks (P =0.001 for all) (Table 7).

As regards the infection, Sepsis was reported in 36 infants (33.3%) in the age group 34 weeks, 4 infants (3.8%) in the age group 35 weeks, and in 4 cases (3.7%) in the age category of 36 weeks (P= 0.001). Pneumonia was reported in 3.7% of the infants, all of them were from the age group 34 weeks. NEC was reported in 3.7% of the infants all of them were from the age group 34 weeks (Table 8).

Blood transfusion was reported in 8.1% of the infants. Hypoglycemia was reported in 5.3% of the infants. Thirty-two cases (9.9%) needed rehospitalization, 21 infants were from the age group 34 weeks and 11 infants were from the age category 35 weeks (p =0.001). The mortality rate in our study was 5.3%, all of them were from the age group 34 weeks (P =0.001) (Table 9). Logistic regression analysis revealed that, gestational age, Gender, and maternal DM were the only predictors for the respiratory morbidity (P =0.001 for all) (Table 10).

Logistic regression analysis revealed that, gestational age, Oligo/poly hydramnios, maternal UTI, Preeclampsia, and maternal DM were the only predictors for the infection (P =0.001, 0.002, 0.001, 0.05, 0.05 respectively) (Table 11).

A statistically significant association was found between the mortality rate and Respiratory morbidity, Neurological morbidity, Infections, Blood transfusion, Hypoglycemia (P =0.001 for all) (Table 12).

Table 1: Demographic data of the studied patients.

Variables		Mean ± SD or N (%)
Gestational age (weeks)	**Mean ± SD** **Range**	35 ± 0.8 34 - 36
Sex	**Males** **Females**	166 (51.6%) 156 (48.4%)

Table 2: Baseline clinical data of the studied patients

Variables		Mean ± SD or N (%)
Birth weight (kg)	Mean ± SD Range	2.4 ± 0.5 1.2 – 3.4
Head circumference (cm)	Mean ± SD Range	32.5 ± 1.4 42 – 50
Length (cm)	Mean ± SD Range	45.2 ± 2.4 42 - 50
Birth weight – Gestational age	Small for gestational age Average for gestational age Large for gestational age	35 (10.9%) 261 (81.1%) 26 (8.1%)

Table 3: Maternal demographic data associated with preterm.

Variables		Mean ± SD or N (%)
Maternal age (years)	Mean ± SD Range	27.8 ± 6.3 19 - 40
Residency	Urban Rural	192 (59.6%) 130 (40.4%)
Intensive Physical Work	Yes No	91 (28.3%) 231 (71.7%)
Smoking	Yes No	22 (6.8%) 300 (93.2%)
Parity	Multiparity Nulliparity	255 (69.9%) 97 (30.1%)

Table 4: Maternal obstetric data associated with preterm.

Variables		Mean ± SD or N (%)
Indication for delivery	Maternal diseases Obstetric complications Isolated spontaneous	59 (18.3%) 144 (44.7%) 119 (37%)
Antenatal care	Proper Not	279 (86.6%) 43 (13.4%)
Pregnancy morbidities	Oligo/poly hydramnios Uterine bleeding Fatal distress Premature rupture of membrane Hypertension Diabetes mellitus Urinary tract infection Preeclampsia Anaemia < 10	35 (10.9%) 97 (30.1%) 12 (3.7%) 39 (12.1%) 40 (12.4%) 61 (18.9%) 101 (31.4%) 22 (6.8%) 144 (44.7%)
Type of delivery	Caesarean section Normal vaginal delivery	266 (82.6%) 56 (17.4%)
Pregnancy outcome	Single Twins	311 (96.6%) 11 (3.4%)

Table 5: Preterm outcomes.

Variables		Age				P value
		Total (n=322)	**34 weeks (n= 108)**	**35 weeks (n= 105)**	**36 weeks (n= 109)**	
Multiple Congenital abnormalities	No Major	312 (96.9%) 10 (3.1%)	98 (90.7%) 10 (9.3%)	105 (100%) 0 (0%)	109 (100%) 0 (0%)	0.001*
Apgar score 1 min	Mean ± SD Range	7.3 ± 1.2 4 – 9	6.8 ± 1.5 4 – 9	7.6 ± 0.7 6 – 9	7.6 ± 1 4 – 9	0.001*[b]
Apgar score 5 min.	Mean ± SD Range	8.6 ± 0.6 6 – 10	8.5 ± 0.8 7 – 9	8.8 ± 0.5 8 - 10	8.7 ± 0.5 6 – 9	0.04*[b]
NICU admission	Yes No	113 (35.1%) 209 (64.9%)	66 (61.1%) 42 (38.9%)	28 (26.7%) 77 (73.3%)	19 (17.4%) 90 (82.6%)	0.001*
Admission with jaundice	Yes No	54 (16.8%) 268 (83.2%)	26 (24.1%) 82 (75.9%)	16 (15.2%) 89 (84.8%)	12 (11%) 97 (89%)	0.03*
Jaundice needed extensive intervention	Yes No	18 (5.6%) 304 (94.4%)	15 (13.9%) 93 (86.1%)	3 (2.9%) 102 (97.1%)	0 (0%) 109 (100%)	0.001*

Table 6: Respiratory morbidity of the preterm.

Variables	Age				P value
	Total (n=322)	34 weeks (n= 108)	35 weeks (n= 105)	36 weeks (n= 109)	
Transient tachypnoea of newborn	63 (19.6%)	32 (29.6%)	22 (21%)	9 (8.3%)	0.001*
persistent pulmonary hypertension of the newborn	16 (5%)	16 (14.8%)	0 (0%)	0 (0%)	0.001*
Apnoea	14 (4.3%)	14 (13%)	0 (0%)	0 (0%)	0.001*
Respiratory distress syndrome	32 (9.9%)	32 (29.6%)	0 (0%)	0 (0%)	0.001*
Mechanical ventilation	32 (9.9%)	32 (29.6%)	0 (0%)	0 (0%)	0.001*
Continuous positive airway pressure	87 (27%)	58 (53.7%)	22 (21%)	7 (6.4%)	0.001*

Table 7: Neurological morbidity of the preterm.

Variables		Age				P value
		Total (n=322)	34 weeks (n= 108)	35 weeks (n= 105)	36 weeks (n= 109)	
Seizures		5 (1.6%)	5 (4.6%)	0 (0%)	0 (0%)	0.007*
Hypoxic ischemic encephalopathy		7 (2.2%)	7 (6.5%)	0 (0%)	0 (0%)	0.001*
Hypoxic ischemic encephalopathy grade	0 1 2 3	315 (97.8%) 2 (0.6%) 5 (1.6%) 0 (0%)	101 (93.5%) 2 (1.9%) 5 (4.6%) 0 (0%)	105 (100%) 0 (0%) 0 (0%) 0 (0%)	109 (100%) 0 (0%) 0 (0%) 0 (0%)	0.007*
Intraventricular haemorrhage		14 (4.3%)	14 (13%)	0 (0%)	0 (0%)	0.001*
Intraventricular haemorrhage grade	0 1 2 3	308 (95.7%) 2 (0.6%) 7 (2.2%) 5 (1.6%)	94 (87%) 2 (1.9%) 7 (6.5%) 5 (4.6%)	105 (100%) 0 (0%) 0 (0%) 0 (0%)	109 (100%) 0 (0%) 0 (0%) 0 (0%)	0.001*

Table 8: Infections of the preterm.

Variables	Age				P value
	Total (n=322)	34 weeks (n= 108)	35 weeks (n= 105)	36 weeks (n= 109)	
Sepsis	44 (13.7%)	36 (33.3%)	4 (3.8%)	4 (3.7%)	0.001*
Pneumonia	14 (4.3%)	14 (13%)	0 (0%)	0 (0%)	0.001*
Necrotizing enterocolitis	12 (3.7%)	12 (11.1%)	0 (0%)	0 (0%)	0.001*

Table 9: Other morbidity and mortality of the preterm

Variables	Age				P value
	Total (n=322)	34 weeks (n= 108)	35 weeks (n= 105)	36 weeks (n= 109)	
Blood transfusion	26 (8.1%)	26 (24.1%)	0 (0%)	0 (0%)	0.001*
Hypoglycemia	17 (5.3%)	17 (15.7%)	0 (0%)	0 (0%)	0.001*
Rehospitalization	32 (9.9%)	21 (19.4%)	11 (10.5%)	0 (0%)	0.001*
Live	305 (94.7%)	91 (84.3%)	105 (100%)	109 (100%)	0.001*
Died	17 (5.3%)	17 (15.7%)	0 (0%)	0 (0%)	

Table 10: Factors predicting Respiratory morbidity for late preterm infants

Variables	Respiratory morbidity			
	B	Exp (B) / OR	95% CI	P value
Gestational age	-1.8	0.16	95% [0.07-0.3]	0.001*
Birth weight	-0.7	0.4	95% [0.1-1.2]	0.2
Female gender	-1.7	0.17	95% [0.06-0.5]	0.001*
Rural Residency	0.7	2	95% [0.8-4.9]	0.1
Multiparity	0.47	1.6	95% [0.5-4.9]	0.4
Oligo/poly hydramnios	-0.02	1.1	95% [0.3-3.3]	0.9
Uterine bleeding	0.1	1.1	95% [0.4-2.9]	0.7
Premature rupture of membrane	0.94	2.5	95% [0.7-9.2]	0.1
Diabetes mellitus	-1.5	0.2	95% [0.06-0.6]	0.009*
Urinary tract infection	-0.01	0.9	95% [0.3-2.9]	0.2
Caesarean section	-0.7	0.4	95% [0.1-1.8]	

Table 11: Factors predicting Infections for late preterm infants

Variables	Infections			
	B	Exp (B) / OR	95% CI	P value
Gestational age	-0.3	0.04	95% [0.01-0.4]	0.001*
Birth weight	0.18	1.2	95% [0.2-6.8]	0.8
Female gender	-0.6	0.5	95% [0.1-1.6]	0.2
Rural Residency	0.6	1.9	95% [0.5-5.7]	0.2
Multiparity	-0.2	0.7	95% [0.2-2.7]	0.6
Oligo/poly hydramnios	3.8	46.9	95% [3.9-564.7]	0.002*
Uterine bleeding	0.7	2	95% [0.7-5.9]	0.16
Premature rupture of membrane	-0.7	0.4	95% [0.1-2.1]	0.33
Diabetes mellitus	-1.4	0.2	95% [0.05-0.9]	0.05*
Urinary tract infection	-2.2	0.1	95% [0.02-0.4]	0.001*
Preeclampsia	2.5	12.7	95% [0.9-164]	0.05*
Caesarean section	2.1	8.9	95% [0.9-81.9]	0.05*
Antenatal care	-2.6	0.07	95% [0.01-0.3]	0.001*

Table 12: Factors predicting mortality for late preterm infants

Variables	Mortality		P value
	Died (n=17)	Live (n=305)	
Respiratory morbidity	10 (58.8%)	68 (22.3%)	0.001*
Neurological morbidity	17 (100%)	4 (1.3%)	0.001*
Infections	17 (100%)	32 (10.5%)	0.001*
Blood transfusion	17 (100%)	9 (3%)	0.001*
Hypoglycemia	17 (100%)	0 (0%)	0.001*

DISCUSSION

322 LPI who were delivered at our university hospital were included in our study; this high incidence may be the result of lesser quality prenatal care. The lack of antenatal ultrasound equipment to detect fetal prenatal conditions and the ability to treat these diagnoses, the inability to identify mothers at risk of preterm birth early enough to provide timely care, the lack of multiple micronutrient supplementation, the poor referral systems, the poor health infrastructures, the lack of health supplies, and structural factors in the health system are the causes of this. The delivery and experience of high-quality maternity care at medical facilities are hampered by these technical, interpersonal, resource, and infrastructure issues.

The incidence was reported in multiple studies, in Mansoura University Hospital, Egypt, a study was done by reported an incidence of 24.3% [10]. In South–West Ethiopia the incidence was 25.9% [11]

Predictors of LPIs

The sociodemographic factors are considered an important risk factor for LPIs incidence. The mean age of the mothers was 27.8 ± 6.3 years. Most of them [59.6%] were from urban areas. Maternal factors are also considered an important risk factor in which, 13.4% of the mothers didn't have proper ANC, 10.9% had Oligo or poly hydramnios, 30.1% had uterine bleeding, 12.1% had PROM, 12.4% were hypertensive, 18.9% were diabetics, 31.4% had UTI, 6.8% had preeclampsia, and 44.7% were anemic [Hb<10 gm], which is in agreement with Vanin ***et al***., [3] who discovered that 91.3% of pregnant women had a urinary tract infection and 7.5% had a bacterial infection at delivery.

Another important risk factor for the LPIs is the mother employment in which 28.3% are working intensive physical work. in a study by **Etil *et al***., [12], found that mothers who were unemployed being 0.657 times less likely to give birth to premature children than those who had jobs.

Long work hours and temporary contracts were also linked to higher risks of preterm delivery at Mansoura University Hospital in Egypt [AOR = 2.36, CI: 1.18–7.78] and [AOR = 1.98, CI: 1.72–8.74] respectively [10]. Additionally, the type of work a pregnant woman does may have a different effect depending on whether it is manual or labor-intensive. In a similar vein, a high workload may cause stress for an expectant mother, which may result in pregnancy complications and an early birth.

In our study most of the neonates were delivered by CS [82.6%], **Tsai *et al***. [14], as well as **Mekic *et al***. [13], reported a higher CS rate. However, **Champion *et al***. [15] and **Aliaga *et al***. [16] discovered that the majority of late preterm infants [59.6%] were delivered vaginally, particularly when labor was induced.

Poor birth outcomes were also linked to parity [**Schimmel *et al***., 17]. Multipara mothers made up 69.9% of the mothers in our study. In line with a recent study involving 837,226 singleton births in the Netherlands, late-preterm birth was significantly and independently linked to a higher risk of unfavorable neonatal outcomes for nulliparous mothers. According to the aforementioned study, nulliparous mothers had a significantly higher risk of PTB than mothers who had given birth at least once [RR: 1.95, 95% CI: 1.89–2.00 for PTB]. [18].

Identifying the risk factors for hospitalization and morbidity is crucial for creating treatment and prevention plans. For late-preterm infants who may be at a higher risk, careful observation and follow-up are necessary.

The clinical diagnosis of respiratory distress syndrome [RDS] is made based on the presence of tachypnea, retractions, grunting, increased work of breathing, and other typical X-ray findings. One of the most prevalent respiratory conditions affecting LPIs is still RDS. Lung epithelium immaturity, the epithelial Na+ channel [ENaC] transition immaturity, and decreased surfactant production all contribute to the increased risk of TTN in LPI. All newborns are susceptible to NP, but premature newborns—especially those in need of mechanical ventilation—are at an even greater risk. High pulmonary vascular resistance and postpartum hypoxemia are hallmarks of persistent pulmonary hypertension of the newborn [PPHN] [12].

In our study most of the respiratory morbidities were in the newborns of gestational age 34 weeks in which TTN represent 19.6%, PPHN represent 5%, Apnea represent 4.3%, and RDS represent 9.9%. newborns who need a mechanical ventilation represent 9.9% and who need CPAP represent 27%.

Numerous studies show that late-preterm infants have high rates of TTN [19,20]. A higher rate of respiratory distress may result from lung immaturity-related factors like underdeveloped surfactant and impaired fetal alveolar fluid resorption, even though spontaneous preterm labor promotes fetal lung maturation and enhances pulmonary fluid clearance. The cessation of maternal antibody transmission and immature immune cells makes late-preterm newborns comparatively more vulnerable to lower respiratory tract infections [21].

Additionally, late-preterm newborns need more respiratory support than full-term newborns due to physiological and metabolic immaturity. Reducing the incidence of late-preterm births and using antenatal steroids and other appropriate prenatal care can help avoid respiratory issues and save money. The need for respiratory support in these infants can be further reduced by treating infections early and effectively. Four to twelve percent of late preterm infants have apnea of prematurity. According to **Engle *et al***., it is linked to premature breathing control and potential neurodevelopmental deficits [9].

According to a study by **Pisani *et al***. [22] infants born at 34 weeks GA had a > 10-fold higher rate of respiratory morbidity than those born at term, and there was a strong age-related trend in respiratory morbidity regardless of delivery mode.

Up to one-third of newborn deaths globally are caused by sepsis each year. According to the World Health Organization, neonatal sepsis is a serious worldwide health issue, with low- and middle-income nations bearing the brunt of the burden [23]. 13.7% of the patients in our study had sepsis, and the literature reports infection frequency percentages ranging from 4.9% to 20.6% [24].

Both short-term and long-term neurological morbidity are more likely to occur in LPIs. Preterm newborns are more likely to experience neonatal convulsions and seizures that are solely detected by electrography [22]. Preterm infants are primarily caused by hypoxic-ischemic encephalopathy and intracranial hemorrhage [25].

In our study, convulsions occurred in 1.6% of the patients all of them were from the 34 weeks age group. IVH represent 4.3% of the total

patients, and in 14 of the patients with an age of 34 weeks the percentage rises to 10.9% at 34 weeks GA when we only look at the data on LPIs admitted to the NICU. McIntire ***et al***. reported rates of IVH grade 1 and 2 in LPIs of 0.5% at 34 weeks GA, 0.2% at 35 weeks GA, and 0.06% at 36 weeks GA. According to **Teune *et al***. [26], who examined 22 studies, intracranial hemorrhage was more common in LPIs. LPIs had a very low rate of IVH grade 3 or 4, but it was still higher than the rate for term neonates [0.01% vs. 0.004%].

The nadir hematocrit is inversely proportional to GA and is lower in LPIs than in term neonates. Some LPIs tolerate normocytic, normochromic anemia well, while others need blood [27]. Given the morbidities of preterm infants needing NICU admission, it was not surprising that 8.1% of LPIs in our study had anemia requiring blood transfusions. As gestational age increased from 34 to 36 weeks, the rate of anemia declined.

As regards the mortality rate, it was 5.3% all of them were from the age group 34 weeks. All of them had a neurological morbidity, infection, hypoglycemic and need blood transfusion. Only 10 cases had a respiratory morbidity. Some studies showed higher mortality rates in late-preterm infants [0.3-1.3%] than in term infants [0.0-0.08%] [**Tsai *et al***., 2012], in agreement with our finding [1.4% vs. 0.0%].

According to a prior study, the rehospitalization rate for late-preterm infants is two to three times higher than that of term infants. This was supported by the fact that 32 cases [9.9%] required rehospitalization. [28].

One of the main limitations of the present study is the absence of control group as the presence of a control group will allow for the identification of factors associated with early delivery, not just a description of the characteristics of late preterm infants. Another limitation is that more than 90% of the population studied had low income, which did not allow social comparisons, as other studies have done.

The strength of the study is that all infants were delivered and cared for at the same academic institution and it provides insight into the maternal risk factors

CONCLUSION

Identifying the predictors of adverse short-term outcomes in late preterm infants is of crucial importance for informing and evaluating clinical practices and guidelines aimed at reducing infant morbidity and mortality

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