

Original Research Article

A Hospital Based Prospective Study to Find Out the Etiology of Respiratory Distress in Early Term Neonates Admitted in Neonatal Intensive Care Unit (NICU) at NICE Hospital**Khurshida Khan¹, N. Bharathi², Sudha Boda³, Nasreen Banu⁴, Dheeraj Diwakar^{5*}**¹*Assistant Professor, Department of Pediatric Medicine, Government PDU Medical College, Churu, Rajasthan, India*²*Department of Neonatology, Nice Hospital For Women, Newborn & Children, Hyderabad, India*³*Consultant Neonatology, Department of Neonatology, Nice Hospital For Women, Newborn & Children, Hyderabad, India*⁴*Consultant Neonatology, Ankura Hospital, Hyderabad, India*⁵*Consultant Neonatologist, Radiant Children Hospital, Udaipur, Rajasthan, India*

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Abstract

Background: The aim of this study to find out the etiology of respiratory distress in early term neonates admitted in Neonatal Intensive Care Unit (NICU). **Material & Methods:** A hospital based prospective study done on all early term neonates 37-38+6 weeks with Respiratory distress within first 28 days of life at Tertiary Care Neonatal unit, NICE Hospital for Women, Newborns & Children, Hyderabad during one year period. The babies left against medical advice were excluded from the study. We defined respiratory morbidity as any form of respiratory distress that necessitated admission of the neonate to the NICU irrespective of the need for any diagnostic tests or therapeutic intervention. We further identified cases that required surfactant use, mechanical ventilation (non invasive /invasive), high-frequency ventilation and inhaled nitric oxide. The duration of ventilation, both invasive and noninvasive, maximum FiO₂ requirement and total duration of hospitalization and the outcomes, discharge or death were studied for all the neonates included in the study. Patients who left against medical advice were excluded from the outcome analysis. **Results:** Our study showed that out of 812 babies admitted during the study period, 100 (12%) neonates were early term (37 – 38^{6/7}) having respiratory distress. The most common cause of respiratory distress in early term neonates was transient tachypnea of newborn 42%, followed by meconium aspiration syndrome 24% and respiratory distress syndrome 16%. Out of 41 unindicated cesarean section, 11 (26.8%) were done in the early gestational age group and 30 (73.2%) in the late gestational age group. Previous LSCS was the indication in 32 deliveries, out of which 18 (56%) were done in 37-37^{6/7} group and 14 (43.8%) were done in 38-38^{6/7} group. In 37 to 37+6/7 group most of the patients were discharged within 3 days and no one stay beyond one week. In 2nd group most of the patients were discharged within first 7 days. So we found that in later gestational age group if baby had respiratory distress it required prolong hospital stay as compared with early gestational age group. **Conclusion:** We concluded that major causes of respiratory distress in early term neonates were transient tachypnea of newborn, meconium aspiration syndrome and respiratory distress syndrome. No antenatal steroid coverage and elective cesarean section at early gestation were found to be most significant risk factors.

Keywords: Respiratory Distress, Neonates, NICU, Risk Factors.

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Introduction

Neonatal morbidity due to physiologic immaturity has been studied primarily in preterm infants less than 37 weeks gestation [1-4]. However, more recent evidence indicates that neonatal morbidity decreases with delivery at later gestational ages and that infants delivered at 37 and 38 weeks gestation, are at increased risk for morbidity compared to infants delivered at 39 weeks [5-8]. Specifically, rates of respiratory distress syndrome, transient tachypnea of the newborn, pneumonia, hypothermia, and feeding difficulties are increased in infants born at 37 to 38 weeks compared to infants born after 38 weeks [8-10].

However, there has been a paucity of data regarding whether increased morbidity in early term neonates is a consequence of

physiologic immaturity at earlier gestation or due to the underlying precursor leading to early term delivery.

An increased rate of cerebral palsy, a more severe complication, has also been observed in infants born at 37 weeks compared to 38 weeks gestation [11]. Long term childhood morbidities including increased risk of problems with school performance and behavior, increased hospital admission up to 5 years of age, and increased rates of asthma and wheezing have also been observed in children born at 37 to 38 weeks compared to those born after 38 weeks gestation [12].

The small but measurable increased risk of neonatal morbidity for infants born at 37 and 38 compared to 39 weeks gestation led Fleischman et al [13] to suggest adoption of an “early term” delivery category. Subsequently, the American College of Obstetrics and Gynecology (ACOG) recommended designating 37 to 38 completed weeks gestation as “early term” and 39 to 40 weeks gestation as “full term” [14].

The American College of Obstetricians and Gynecologists has recommended that elective deliveries not be performed before 39 weeks of gestation, to minimize prematurity-related neonatal

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complications. Because a worrisome number of elective deliveries were occurring before 39 weeks of gestation in our system, leading to increased morbidity in these group of newborn. The aim of this study to find out the etiology of respiratory distress in early term neonates admitted in Neonatal Intensive Care Unit (NICU).

Materials and Methods

A hospital based prospective study done on all early term neonates 37-38+6 weeks with Respiratory distress within first 28 days of life at Tertiary Care Neonatal unit, NICE Hospital for Women, Newborns & Children, Hyderabad during one year period. The babies left against medical advice were excluded from the study.

Methodology

We enrolled all early term neonates 37-38+6 admitted in Neonatal Unit of Nice Hospital with respiratory distress within first 28 days of life between Jan 2017 to December 2017 (12 months). The study was cleared by the institution ethics committee and the institution scientific research committee. Written parental consent was obtained before enrolling.

We defined respiratory morbidity as any form of respiratory distress that necessitated admission of the neonate to the NICU irrespective

Score	Respiratory rate	Cyanosis	Air entry	Grunting	Retractions
0	<60/min	Nil	Normal	None	Nil
1	60-80 min	In room air	Decreased	Audible with stethoscope	Mild
2	>80/min	In >40%	Barely audible/ absent	Audible with naked ear	Moderate

Mild distress 0-3; Moderate distress 4-6; Severe or impending respiratory failure >7

The clinical and the demographic information was recorded based on a pre-structured proforma. Weight of the neonates was recorded by an electronic weighing machine. Gestational age assessment was done by 1st trimester scan or New Ballard Scoring system or LMP in that order of preference.

All newborns with respiratory distress underwent a Chest X Ray. Other relevant investigations which are necessary to establish the diagnosis and help in management of these neonates were done. Diagnosis was made on basis of these clinical and laboratory parameters. The newborns were managed as per standard protocols. The duration of ventilation, both invasive and noninvasive, maximum FiO₂ requirement and total duration of hospitalization and the outcomes, discharge or death were studied for all the neonates included in the study. Patients who left against medical advice were excluded from the outcome analysis.

Results

Our study showed that out of 122 babies admitted during the study period, 100 (12% neonates were early term) 37 – 38^{6/7} (having respiratory distress. Out of 100 newborns, 65 babies were male and 35 were female. 84 (84% neonates with respiratory distress presented within 24 hours of birth and mostly 43 babies have birth weight between 2501-3000 grams (table 1).

The most common cause of respiratory distress in early term neonates was transient tachypnea of new born 42%, followed by meconium aspiration syndrome 24% and respiratory distress syndrome 16% (table 2).

of the need for any diagnostic tests or therapeutic intervention. Respiratory support included the entire spectrum ranging from nasal cannula and oxygen hood to mechanical ventilation. We further identified cases that required surfactant use, mechanical ventilation (non invasive /invasive), high-frequency ventilation and inhaled nitric oxide.

As a tertiary care hospital, our neonatal unit of is one of the main referral units in Hyderabad in private sector.

Respiratory distress was defined according to the National Neonatal Perinatal Database (NNPD) (as presence of any two of the following features:

1. Respiratory rate >60/minute
2. Subcostal / intercostal recessions
3. Expiratory grunt / groaning

The severity of respiratory distress was assessed using Downe's score. This scoring system is based on five parameters – respiratory rate, requirement of oxygen (cyanosis), air entry, grunting and chest retraction. A score of 0 to 2 is assigned for each parameter as shown below.

Out of 100 mothers, PIH was present in 7 mothers, GDM was present in 4 mothers, PROM was present in 2 mothers, meconium stained liquor was present in 26 mothers and maternal infection was present in 3 mothers (table 3).

We found that in both groups most common indication of Emergency LSCS was previous LSCS and most of the cesarean sections were done without any known indication. Out of 41 unindicated cesarean section, 11 (26.8%) were done in the early gestational age group and 30 (73.2%) in the late gestational age group. Previous LSCS was the indication in 32 deliveries, out of which 18 (56%) were done in 37-37^{6/7} group and 14 (43.8%) were done in 38-38^{6/7} group (table 4).

We observed that most of the early term babies were requiring very short duration of respiratory support. Out of 100 babies 56 required less than one day duration of respiratory support, 42 babies required 2-5 days of respiratory support and only 2 babies required prolonged respiratory support, both of them belong to later gestational group (figure 1).

In 37 to 37+6/7 group most of the patients were discharged within 3 days and no one stay beyond one week. In 2nd group most of the patients were discharged within first 7 days. So we found that in later gestational age group if baby had respiratory distress it required prolong hospital stay as compared with early gestational age group (table 5).

Out of 100 neonates, 97 with respiratory distress was alive and discharged and 3 patients could not be survived. Out of three deaths, 1 patient was in 37 to 37+6/7 groups and two were in 38 to 38+6/7 groups (table 6).

Table 1: Distribution of patients according to various parameters

Parameters	Number (N=100)	Percentage
Gender		
Male	65	65.0
Female	35	35.0
Age In Days		
< 1 day	84	84%
1-3 Days	9	9%
4-7 Days	2	2%

>7 Days	5	5%
Birth Weight		
<2000 Gms	6	6%
2001-2500 Gms	29	29%
2501-3000 Gms	43	43%
>3000 Gms	22	22%

Table2: Cause of respiratory distress according to gestational age

Cause of RD	37 TO 37+6/7		38 TO 38+6/7	
	NO	%	NO	%
MAS	7	16	17	29.3
Pneumonia	2	4.8	5	8.6
PPHN	0	0.0	4	6.9
RDS	7	16.7	9	15.5
TTNB	26	62.5	23	39.6
Total	42	100	58	100

Table 3:Prevalence of risk factors in study population

RISK FACTORS	YES	%
PIH	7	7.0
GDM	4	4.0
PROM	2	2.0
MSL	26	26.0
DRUG INTAKE	0	0
ANAEMIA	0	0
MATERNAL INFECTIONS	3	3

Table 4: Distribution between gestational age with indication of EM-LSCS

INDICATION OF EM LSCS	37 TO 37+6/7		38 TO 38+6/7	
	NO	%	NO	%
Oligo Hydroamnios	3	7.14	4	6.8
Breech	0	0.0	1	1.7
Fetal Distress	3	7.14	2	3.4
MSL	5	11.9	5	8.6
Not Identified	11	26.1	30	51.7
Oligo Hydroamnios	0	0.0	1	1.7
Pre LSCS	18	42.8	14	24.1
Scar Tenderness	0	0.0	1	1.7
Severe PIH	2	4.7	0	0.0
Total	42	100	58	100

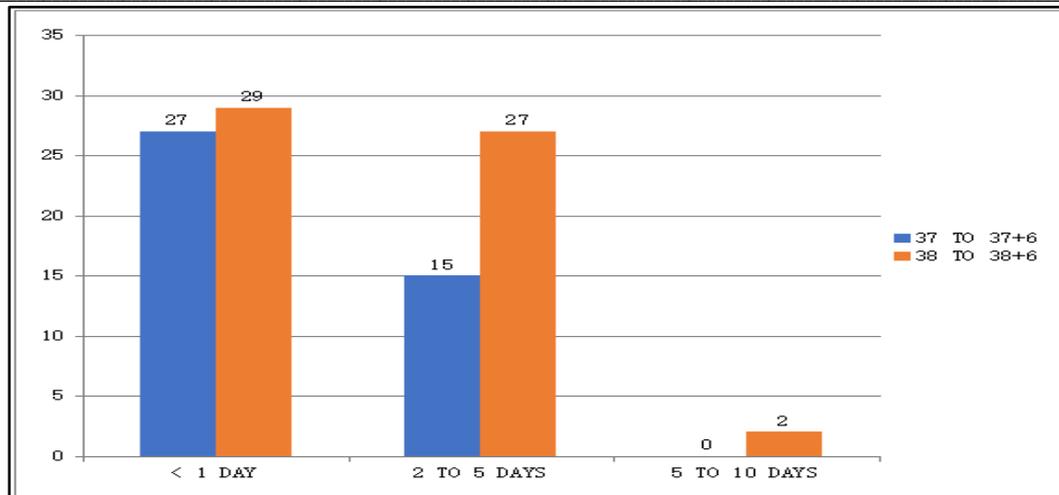


Fig1: Distribution between gestational age with duration of respiratory support
Table5: Association between gestational age with hospital duration

HDD	37-37+6/7		38-38+6/7		TOTAL	
	NO	%	NO	%	NO	%
< 3 DAY	27	64.2	23	39.6	50	50.0
3 TO 6 DAYS	12	28.6	27	46.6	39	39.0
7 TO 10 DAYS	0	0	4	6.9	4	4.0
>10 DAYS	3	7.2	4	6.9	7	7
Total	42	100	58	100	100	100.0

P=0.49

Table6: Association between gestational age with short term out come

OUT COME	37 to 37+6/7		38 to 38+6/7	
	NO	%	NO	%
DEATH	1	2.4	2	3.5
DISCHAREGED	41	97.6	56	96.5
Total	42	100	58	100

Discussion

Neonatal morbidity due to physiologic immaturity has been studied primarily in preterm infants less than 37 weeks gestation. However, more recent evidence indicates that neonatal morbidity decreases with delivery at later gestational ages and that infants delivered at 37 and 38 weeks gestation, are at increased risk for morbidity compared to those delivered at 39 weeks. Specifically, rates of respiratory distress syndrome, transient tachypnea of the newborn, pneumonia, hypothermia, and feeding difficulties are increased in infants born at 37 to 38 weeks compared to infants born after 38 weeks.

However, there has been a paucity of data regarding whether increased morbidity in early term neonates is a consequence of physiologic immaturity at earlier gestation or due to the underlying causes leading to early term delivery.

Total 812 patients were admitted during the study period from January to December 2017)12 months(. Out of those, 100)12%(patients are early term neonates. As tertiary care referral unit we received majority of newborn with respiratory distress.

We studied various risk factors and causes of respiratory morbidity in early term infants. We also compared various risk factors and causes of respiratory distress and short-term outcome in two sub groups-37-37^{6/7} and 38-38^{6/7} group.

We studied the various clinical and demographic parameters in both groups. Most of the neonates 84% of them presented within 24 hours of birth. It reemphasizes the significance of careful assessment of newborn at birth for any evidence of respiratory distress and other

features. Among 100 babies, 65%)65(were male and 35%)35(were female.

The distribution of birth weight in early term neonates was studied, 43% of babies birth weight is in range of 2501 to 3000gms. Downe’s scoring was done in all the newborn, out of 100 babies 27 babies had Downe’s score 4-6)moderate respiratory distress(at the time of admission.

We compared various causes of respiratory distress in both groups. In 37-37^{6/7} group, the most common cause was found to be transient tachypnea of new born 52% followed by meconium aspiration syndrome 16% and respiratory distress syndrome 16%.

In 38-38^{6/7} group, the most common cause was found to be transient tachypnea of new born 34% followed by meconium aspiration syndrome 29% and respiratory distress syndrome 12%. So the risk of MAS increased with advanced gestational age.

This finding is comparable with study done by Numan Nafie Hameed, Muhi K. Al-Janabi and et al[15]. They also found that Transient tachypnea of newborns)TTN(is the most common cause of neonatal respiratory distress)>40%(, followed by respiratory distress syndrome)RDS(, and meconium aspiration syndrome)MAS(. They also found that the elective caesarean delivery was a significant risk factor for respiratory distress in full term newborns.

We found that in both the groups elective and emergency cesarean sections were more as compared to normal delivery. So it is suggestive that increase in cesarean sections are associated with increase in respiratory morbidity in early term newborns.

This result is consistent with Zanardo V, Simbi AK, Franzoi M and et al[16] study. In their study Neonatal respiratory morbidity risk (odds ratio, OR), including RDS and TTN, was significantly higher in the infant group delivered by elective caesarean delivery compared with vaginal delivery (OR 2.6; 95%CI: 1.35-5.9; $p < 0.01$). RDS risk is greatly increased in weeks 37⁺⁰ to 38⁺⁶ (OR 12.9; 95%CI: 3.57-35.53; $p < 0.01$). After 39⁺⁰ wks, there was no significant difference in RDS risk. They concluded that infants born by elective caesarean delivery at term are at increased risk for developing respiratory disorders compared with those born by vaginal delivery. A significant reduction in neonatal RDS would be obtained if elective caesarean delivery were performed after 39⁺⁰ gestational weeks of pregnancy.

In emergency LSCS various indications of cesarean section were studied. We found that in both groups most common indication was previous LSCS and most of the cesarean sections were done without any known indication. Out of 41 unindicated cesarean sections, 11)26.8% (were done in early gestational group and 30)73.2% (in late gestational group.

Previous LSCS was the indication in 32 deliveries, out of which 18)56% (were done in 37-37⁺⁷ group and 14)43.8% (were done in 38-38⁺⁷ group. So it is concluded that increase in cesarean sections especially at early gestational age 37-37⁺⁷ is associated with increased respiratory morbidity as compare to 38-38⁺⁷ group.

Anne Kirke by Hansen and et al[17] also found in their study that compared with newborn delivered vaginally or by emergency sections, those delivered by elective cesarean section around term have an increased risk of overall and serious respiratory morbidity. The relative risk increased with decreasing gestational age.

We observed that most of the early term babies were requiring very short duration of respiratory support. Out of 100 babies, 56 required less than 1 day of respiratory support and only 2 babies required prolonged respiratory support for more than 10 days, both of them belong to later gestational group.

Major modality of respiratory support was found to be HHHFNC which was used in 53% of patients followed by hood box/ nasal prongs used in 22% patients.

Out of 100 patients 15% required invasive ventilation and out of these 15 babies, 6 newborns also required high frequency ventilation.

The duration of hospital stay in patients with respiratory distress were also compared in both groups. In 37 to 37+6/7 group, most of the patients were discharged within 3 days and no one stayed beyond one week. In second group most of the patients were discharged within first 7 days. So we found that in later gestational age group if baby had respiratory distress it required prolonged hospital stay as compared to early gestational age group. We found that out of 100 babies, 97 with respiratory distress were alive and discharged and 3 patients died. Out of three deaths 1 patient was in 37 to 37+6/7 group and two were in 38 to 38+6/7 group.

Conclusion

We concluded that major causes of respiratory distress in early term neonates were transient tachypnea of newborn, meconium aspiration syndrome and respiratory distress syndrome. No antenatal steroid coverage and elective cesarean section at early gestation were found to be most significant risk factors.

Conflict of Interest: Nil

Source of support: Nil

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