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Original Research Article

Clinico-Etiologic and Demographic Profile of Neonatal Respiratory Distress: An Observational Study

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Abstract

Aim: The aim of the present study was to assess the demographic and etiological profile of neonatal respiratory distress in a tertiary care-centre in Bihar**.**

Material & Methods: A prospective observational study conducted in the Department of Pediatrics in between the duration of 2 years. During the study period, 500 neonates were included in the study.

Results: Neonatal respiratory distress was more common in male babies but difference was not statistically significant. Neonatal respiratory distress was more common in preterm babies than term babies and relative risk was statistically significant. Neonatal respiratory distress was more common in LSCS born babies than NVD born babies and relative risk was statistically significant. P value less than 0.01 was statistically significant. History of PROM, MSAF, GDM and maternal pyrexia were risk factors for the neonatal respiratory distress. Tachypnea, central cyanosis, chest retractions, grunting and abnormal heart rate were major signs of neonatal respiratory distress. On admission to NICU the majority of neonates had SpO2 at room air between 70-75 and therefore depicts the importance of early appropriate optimal ventilation measures. The most common causes of the neonatal respiratory distress were TTN, RDS, MAS and the sepsis.

Conclusion: Early diagnosis of specific cause for respiratory distress is very important as different etiologies have different specific treatment and require altogether different ventilatory strategies. The TTN was the most common cause of distress in term newborns, followed by perinatal asphyxia, meconium aspiration, neonatal sepsis, and congenital heart diseases (CHD). Therefore, timely diagnosis and management of these conditions is very imperative to discharge an intact neonate from the NICU.

Keywords: TTN, RDS, MAS, Neonate, Respiratory distress.

Introduction

Respiratory distress is one of the most common reasons for admission in Neonatal Intensive Care Unit (NICU).[1] The most common cause behind the infant's admission in neonatal intensive care unit is the respiratory distress. [1] it has been reported that admission of the neonates in NICU having a less than 34 week of gestational age is much higher compare to late preterm and term neonates with a substantial respiratory morbidity. [2] The most common presenting problem encountered within the first 48-72 hours of life with a prevalence of 4.24% in neonates. [3] The incidence of respiratory distress in newborn babies to be ranging from 3.9 to 8% in admitted patients in Neonatal Intensive Care Unit (NICU). [4,5]

Respiratory distress can be the clinical manifestation of a variety of neonatal conditions. The clinical assessment alone may make it challenging to identify specific underlying etiology of respiratory distress. The most common causes of respiratory distress include Transient Tachypnea of the Newborn (TTN), Hyaline Membrane Disease (HMD), Birth asphyxia, Pneumonia and Meconium Aspiration Syndrome (MAS), pulmonary hypertension of the newborn (PPHN), and delayed transition are the most prevalent causes of respiratory distress. [6,7] The important diagnostic

criteria for the diagnosis of respiratory distress are the acidosis and chest X-ray findings. [8]

Early-onset neonatal sepsis and pneumonia usually occurs within the first three days of life and is caused by the placental transmission of bacteria or aspiration of infected amniotic fluid, to a mother with risk factors for early neonatal sepsis like UTI, premature rupture of membranes more than 18 hours, more than 3 per vaginal examinations, chorioamnionitis. Whereas late-onset sepsis and pneumonia occurs after hospital discharge or community acquired and can be caused by a variety of organisms, including viral and bacterial pathogens. Clinical spectrum of newborn pneumonia is indistinguishable from other neonatal illnesses such as TTN, RDS/MAS, making differentiation difficult. [9]

Hence the objective was to study the demographic and etiological profile of neonates admitted with respiratory distress to the tertiary care neonatal intensive care unit.

Material & Methods

A prospective observational study conducted in the Department of Pediatrics, NMCH, Patna, Bihar , India in between the duration of 2 years. During the study period, 500 neonates were included in the study.

Inclusion Criteria

- All the neonates admitted to NICU with clinically identified respiratory distress were included in study.

Exclusion Criteria

- Babies with major congenital malformations like anencephaly, meningocele, meningomyelocele, encephalocele, major congenital malformation, dysmorphism, birth weight <700 gm. Parents not willing to be enrolled in the study were excluded.

Procedure

All the neonates admitted with respiratory distress. The participants were recruited regardless of the gender, gestational age, mode of delivery, and birth order. Respiratory distress was determined according to the WHO definition depending on clinical examinations. Causes of respiratory distress was diagnosed after detailed history, clinical examination, and other required investigations according to the clinical scenario. After patient is admitted, patient was managed according to standard protocol, and he/she needed oxygen via nasal prongs, continuous positive airway pressure (CPAP), high flow nasal cannula and mechanical ventilation.

Statistical Analysis

The recorded data were compiled and entered in a spreadsheet (Microsoft excel) and then exported to data editor of SPSS version 25 (SPSS Inc., Chicago, Illinois, USA). Statistical software SPSS and Microsoft excel were used to carry out the statistical analysis of data. Descriptive statistics of data including percentages and means were reported.

Results

Table 1: Gender distribution, gestational age and mode of delivery of neonatal respiratory distress

Gender	N	Percentage (%)	P value
Female	225	45	0.025
Male	275	55	
Gestation age			
Preterm	350	70	0.00001
Term	150	30	
Mode of delivery			
NVD	160	32	0.00001
LSCS	340	68	

Neonatal respiratory distress was more common in male babies but difference was not statistically significant. Neonatal respiratory distress was more common in preterm babies than term babies and relative risk was statistically significant. Neonatal respiratory distress was more common in LSCS born babies than NVD born babies and relative risk was statistically significant. P value less than 0.01 was statistically significant.

Table 2: Different risk factors associated with neonatal respiratory distress

Maternal history	N	Percentage (%)
PROM	190	38
MSAF	175	35
Maternal hypertension	80	16
Hypothyroid	70	14
Maternal pyrexia	135	27
GDM	130	26
COVID-19	60	12
Previous abortions	50	10

History of PROM, MSAF, GDM and maternal pyrexia were risk factors for the neonatal respiratory distress.

Table 3: Clinical spectrum of the neonates

Signs and symptoms	N	Percentage (%)
Tachypnea	375	75
Cyanosis	275	55
Nose flaring	225	45
Abnormal heartrate	220	42
Chest retraction	215	41
Grunting	170	34
Sweating	175	35
Changes in alertness	160	32
Others	70	14

Tachypnea, central cyanosis, chest retractions, grunting and abnormal heart rate were major signs of neonatal respiratory distress.

Table 4: SpO_2 at room air on presentation

SpO2 (%)	N	Percentage (%)
70-75	140	28
76-80	120	24
81-85	100	20
86-90	75	15
> 90	65	13

On admission to NICU the majority of neonates had SpO2 at room air between 70-75 and therefore depicts the importance of early appropriate optimal ventilation measures.

Table 5: Different etiologies of neonatal respiratory distress

Diagnosis	N	Percentage (%)
TTN	110	22
RDS	100	20
MAS	80	16
Early neonatalsepsis	70	14
Perinatal asphyxia	60	12
CHD	45	9
Others	35	7

The most common causes of the neonatal respiratory distress were TTN, RDS, MAS and the sepsis.

Discussion

According to the American academy of pediatrics, nearly 10% of newborns require some form of assistance to start breathing at birth, with up to 1% requiring intensive resuscitation. Respiratory distress in neonate is symptom complex that results from diverse underlying neonatal conditions, originating from pulmonary/ extrapulmonary disorders. [10] Regardless of the underlying etiology, respiratory distress is characterized by a clinical picture based on observable signs and symptoms. [11] Majority of neonates develop tachypnea, nasal flaring, grunting, retractions, (subcostal, intercostal, supra-costal, jugular), and cyanosis as clinical signs and are clinical markers of respiratory distress in a sick neonate. [12,13] Other less frequent symptoms may be apnea, bradypnea, irregular (see saw) breathing, inspiratory stridor, and hypoxia. Respiratory distress can be the clinical manifestation of a variety of neonatal conditions. The clinical assessment alone may make it challenging to identify specific underlying etiology of respiratory distress. TTN, RDS, MAS, pneumonia, sepsis, pneumothorax, primary pulmonary hypertension of the newborn (PPHN), and delayed transition are the most prevalent causes of respiratory distress. [14]

Neonatal respiratory distress was more common in male babies but difference was not statistically significant. This finding was consistent with the study done by Nahar et al which determined similar high frequency of respiratory distress in males. [15] Neonatal respiratory distress was more common in preterm babies than term babies and relative risk was statistically significant. Similar results were observed by Santosh et al who found that around 39% term and 61% of preterm babies had respiratory distress at presentation to the hospital. [16] Neonatal respiratory distress was more common in LSCS born babies than NVD born babies and relative risk was statistically significant. P value less than 0.01 was statistically significant. Kommawar et al in their study had also observed that the LSCS was most common mode of delivery (87.16) in neonates who were admitted with respiratory distress. [17] History of PROM, MSAF, GDM and maternal pyrexia were risk factors for the neonatal respiratory distress. Tachypnea, central cyanosis, chest retractions, grunting and

abnormal heart rate were major signs of neonatal respiratory distress. In a study conducted by Kumar et al. The TTN was most common cause of respiratory distress observed it in (42.7%) babies, followed by infection (17%), MAS (10.7%), hyaline membrane disease (9.3%) and birth asphyxia (3.3%). [18]

On admission to NICU the majority of neonates had SpO2 at room air between 70-75 and therefore depicts the importance of early appropriate optimal ventilation measures. Islam et al in their study have observed RDS was commonest cause of respiratory distress in preterm babies (94.4%), of which 61.6% were seen below 34 weeks. [19] The most common causes of the neonatal respiratory distress were TTN, RDS, MAS and the sepsis. Pramanik et al in their study have observed the incidence of MAS only 1%, the finding which is discordant from our study. The high frequency of MAS in our study can be explained due to overburdened and overstretched public health sector and lack of structured private health sector. [20]

Conclusion

Respiratory distress is most common cause of neonatal admission to NICU and has different etiologies with similar clinical presentation. Early diagnosis of specific cause for respiratory distress is very important as different etiologies have different specific treatment and require altogether different ventilatory strategies. The TTN was the most common cause of distress in term newborns, followed by perinatal asphyxia, meconium aspiration, neonatal sepsis, and congenital heart diseases. Therefore, timely diagnosis and management of these conditions is very imperative to discharge an intact neonate from the NICU. Further to decrease the incidence of respiratory distress and its associated morbidity and mortality in neonates, reduction in frequency of LSCS, protocol-based use of antenatal steroids, early use of CPAP, timely use of surfactant with proper ventilation is must to decrease the incidence of respiratory distress and associated mortality in neonates.

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