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Original Research Article

The epidemiology of neonatal respiratory distress in a tertiary care neonatal Centre Kashmir India

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ABSTRACT

Background: 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. Objectives were to study the demographic and etiological profile of neonatal respiratory distress.
Method: Hospital based prospective observational study conducted in department of pediatrics, associated hospital of GMC Srinagar.
Results: Respiratory distress was more common in males 56.30%, frequency of prematurity was 68% and most common mode of delivery lower section caesarian section (LSCS) 69.10%. Different maternal risk factors associated with adverse outcome premature rupture of membranes (PROM) (37.7%), meconium-stained amniotic fluid (MSAF) (34.60%), maternal hypertension (31.50%), gestational diabetes mellitus (GDM) (26.9%). Common causes for respiratory distress in neonate were transient tachypnea of newborn (TTN) (22.0%), respiratory distress syndrome (RDS) (20%), meconium aspiration syndrome (MAS) (16.90%), sepsis (14%) and perinatal asphyxia (12%).
Conclusions: 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

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.[1] Regardless of the underlying etiology, respiratory distress is characterized by a clinical picture based on observable signs and symptoms.[2] 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.[3,4] 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.[5] Further extrapulmonary etiologies are

less common, such as congenital- heart abnormalities, airway malformations, inborn error of metabolic pathways, neurologic, and hematologic causes. TTN is most prevalent cause of newborn respiratory distress.[5]

RDS usually manifests shortly after birth and worsens in the first few hours of life. RDS arises due to deficiency or dysfunction of surfactant, and that results in increased alveolar surface tension and alveolar collapse at the end of expiration. This neonatal condition can progress quickly and result in hypoxia, increased work of breathing, intrapulmonary shunting, ventilation perfusion mismatch and eventually respiratory failure.[6]

MAS occurs in babies who had aspirated the meconium during the process of birth. Respiratory distress of MAS becomes evident within few hours after birth in term or post-term infants born through meconium-stained amniotic fluid (MSAF).[6]

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.[6]

Objectives

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

METHODS

Study setting

The study was prospective observational study conducted in the department of pediatrics, an associated hospital of GMC Srinagar.

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.

Study duration

Study conducted from December 2020-November 2022.

Interventions

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

During the study period, 650 neonates were included in the study. We found that respiratory distress was more common in preterm male babies born through LSCS with underlying one or more risk factors. The study results are depicted in below mentioned tables:

Table 1: Gender distribution of neonatal respiratory distress.

Gender	N	Percentage (%)	P value
Female	284	43.70	0.022678
Male	366	56.30	

Depicts that neonatal respiratory distress is more common in male babies, but difference is not statistically significant.

Table 2: Neonatal respiratory distress and gestation age.

Gestation age	N	Percentage (%)	P value
Preterm	442	68	0.00001, significant
Term	208	32	

Depicts that neonatal respiratory distress is more common in preterm babies than term babies and relative risk is statistically significant.

Table 3: Neonatal respiratory distress and mode of delivery.

Mode of delivery	N	Percentage (%)	P value
NVD*	201	30.90	0.00001, significant
LSCS	449	69.10	

Depicts that neonatal respiratory distress is more common in LSCS born babies than NVD born babies and relative risk is statistically significant. P value less than 0.01 is statistically significant. *NVD: Normal vaginal delivery

Table 4: Different risk factors associated with neonatal respiratory distress.

Maternal history	N	Percentage (%)
PROM	245	37.70
MSAF	225	34.60
Maternal hypertension	105	16.15
Hypothyroid	90	13.84
Maternal pyrexia	180	27.70
GDM	175	26.90
COVID-19	80	12.30
Previous abortions	70	10.80

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

Table 5: Clinical spectrum of the neonates.

Signs and symptoms	N	Percentage (%)
Tachypnea	486	74.70
Cyanosis	365	56.10
Nose flaring	305	46.90
Abnormal heart rate	285	43.80
Chest retraction	275	42.30
Grunting	225	34.60
Sweating	230	35.30
Changes in alertness	208	32.00
Others	95	14.60

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

Table 6: SpO_2 at room air on presentation.

SpO_2 (%)	N	Percentage (%)
70-75	185	28.50
76-80	150	23.10
81-85	125	19.20
86-90	100	15.40
> 90	90	13.80

On admission to NICU the majority of neonates had SpO_2 at room air between 70-75 and therefore depicts the importance of early appropriate optimal ventilation measures.

Table 7 depicts that the most common causes of the neonatal respiratory distress are TTN, RDS, MAS and the sepsis.

Table 7: Different etiologies of neonatal respiratory distress.

Diagnosis	N	Percentage (%)
TTN	143	22.00
RDS	130	20.00
MAS	110	16.90
Early neonatal sepsis	91	14.00
Perinatal asphyxia	78	12.00
CHD	58	8.90
Others	40	6.20

DISCUSSION

We studied 650 neonates who were admitted with respiratory distress to neonatal section of the hospital. The respiratory distress was more common in males (56.30%) than the females. This finding was consistent with the study done by Nahar et al which determined similar high frequency of respiratory distress in males.[7] In this study, we observed that (68%) of newborns were preterm babies, and (32%) were full term babies. 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.[8]

The most important observation in our study was that most of the neonates were born through LSCS (69.10%) and only (30.90%) were born by normal vaginal delivery. 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.[9] The LSCS has literally replaced the natural mode of delivery and at least one million mothers a year have been estimated to be affected by this LSCS worldwide. [10]

Some of the adverse maternal risk factors associated with poor neonatal outcome were PROM (37.70%), MSAF (34.60%), hypertension (16.15%), hypothyroid (13.84%), maternal pyrexia (27.70%), GDM (26.90%), COVID-19 (12.30%) and previous abortions (10.7%) respectively.

In this study we observed that neonates with respiratory distress, the abnormal respiratory rate more than 60 per minute was observed in (74.70%) babies, and dusky skin color (56.10%), nasal flaring (46.90%), abnormal heart rate (43.80%), chest retraction (42.30%), grunting (34.60%), sweating (35.30%), change in alertness (32%) respectively.

The most common cause of neonatal respiratory distress was TTN observed in 22% cases. 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%).[11]

Further RDS is one of the common causes of neonatal respiratory distress in preterm and late preterm babies and

incidence of preterm deliveries has exponentially increased in the last decade due to increased frequency of LSCS as a mode of delivery. 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.[12]

The MSAF is present in 10-15% of deliveries, nonetheless most infants born to mothers with MSAF, are asymptomatic, and vigorous. Our study depicted that MSAF was risk factor of respiratory distress in 34.60% babies, but only 16.90% had MAS. 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.[13]

Limitations

The neonates who were out born might have confounded the many of the study findings. Some of the neonates did have more than one neonatal condition.

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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