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A STUDY OF ETIOLOGICAL PROFILE AND OUTCOME OF RESPIRATORY DISTRESS IN NEONATES FROM TERTIARY CARE CENTRE

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Abstract:

Objective: To study different underlying causes of respiratory distress and factors associated with the neonatal outcomes.

Materials and Methods: Hospital based cross-sectional observational study was conducted in the department of Pediatric Medicine, J.KLon Hospital, SMS Medical College, Jaipur, India.Total 184 neonates with respiratory distress were enrolled in the studyafter applying inclusion and exclusion criteria.

Results:A total of 184 neonates with respiratory distress were enrolled in the study, out of which, 97 neonates (52.72%) were preterm, 84 neonates (45.62%) were term and 3 neonates (1.63%) were post term.Out of 184 neonates,129 were male and remaining 55 were female with male: female ratio of 2.3:1.Respiratory distress syndrome (RDS) was the most commoncause of respiratory distress(33.70%), followed by perinatal asphyxia (22.3%), Meconium Aspiration Syndrome (MAS) (15.8%), congenital pneumonia (13%), sepsis (6.5%),congenital heart disease (4.9%), transient tachypnea of newborn (TTNB) (1.6%) and othernon-respiratory causes (2.2%) like congenital malformations, jaundice and metabolic

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disorders.120 neonates (65%) were discharged, 53 (29%) were died, and only 5 (2.7%) neonates with congenital heart defects and other congenital malformations were referred to higher centre for surgical management.

Conclusion: Respiratory distress syndrome (RDS) was found to be the most common cause of respiratory distress and NICU admission in new-borns in the present study. Meconium aspiration syndrome (MAS) was the most common cause of respiratory distress in term babies, whereas respiratory distress syndrome (RDS) was most common in preterm babies. Clinical assessment of respiratory distress by Anderson Silverman score in preterm and Downes score in term babies may be helpful in assessing clinical outcome. Foetal risk factors were low birth weight and late preterm period of gestation. Proper antenatal care and early diagnosis of the antenatal complication and avoiding preterm deliveries will aid in the better outcome of the new-borns. Early detection and appropriate management of the condition is essential to ensure better outcome in all infants presenting with respiratory distress.

Keywords: New Born, RDS, MAS,TTNB

Introduction

Every year, an estimated 2.9 million babies die in the neonatal period, accounting for more than half of the under-five child deaths in most regions of the world, and 44% globally (1). Respiratory disorders are the leading cause of early neonatal mortality (0–7 days of age) (2), as well as the leading cause of morbidity in new-borns (3), and are the most frequent cause of NICU admission for both term and preterm infant (4).

Clinical presentation of respiratory distress in neonate includes one or more of the following features- respiratory rate of ≥60/ min, apnoea, retractions (sub costal, intercostal, xiphoid, suprasternal), grunting, nasal flaring, cyanosis (5). The neonate may also have lethargy, poor feeding, hypothermia, and hypoglycaemia (6). The most common causes of respiratory distress in neonates are transient tachypnea of the neonate (TTNB), respiratory distress syndrome (RDS), meconium aspiration syndrome (MAS), pneumonia, sepsis, pneumothorax, and delayed transition. Rare causes include choanl atresia,diaphragmatic hernia, tracheoesophageal fistula, congenital heart disease and neurologic, metabolic, and hematologic disorders (6). Certain risk factors which increase the likelihood of neonatal respiratory diseaseincludes prematurity, meconium-stained amniotic fluid (MSAF), caesarean section delivery, gestational diabetes, maternal chorioamnionitis, or oligohydramnios or structural lung abnormalities (7-13).

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Therefore, it is important that any health care practitioner caring for neonate infants should readily recognize the signs and symptoms of respiratory distress, differentiate various causes, and initiate management strategies to prevent significant complications or death (14).

The two important clinical scores to assess the severity of respiratory distress in neonates are Downe's score in term babies and SilvermanAndersen score in preterm babies (15).

Continued efforts for prevention of premature birth, early recognition of foetal distress, identification of maternal risk factors and diagnosis of diseases in-utero will further improve neonatal outcome. Early recognition and appropriate therapy of neonatal respiratory disease has impressive results. Though treatment is disease specific, common modalities of treatmentinclude resuscitation, oxygenation, surfactant replacement, ventilation. Introduction of Continuous Positive Airway Pressure(CPAP) and Ventilators have revolutionized the outcome of respiratory failure in neonates (15).The purpose of this study was to gain knowledge about the demographical (including maternal and neonatal factors) &etiological factors and factors associated with outcome of respiratory distress in newborns from a tertiary care referral centre, India.

Materials and Methods

It was a hospital basedobservationalstudy and was conducted in a tertiary level paediatric hospital attached to a govt medical college of northwest India. Prior permission from the institutional ethical committee was obtained. Neonates admitted in the NICU with respiratory distress were prospectively enrolled in the study after obtaining appropriate informed written consent from their parents.

Inclusion Criteria

All neonates with respiratory distress (assessed by either Downe's orSilverman Andersen scoring system) who admitted to neonatal intensive care unit were included.

Exclusion Criteria

Neonates admitted in the NICU, not fulfilling the criteria for respiratory distress with either Downe's or Silverman-Anderson scoring system, parents refusing for consent, age >28 days.

Methodology

Detailed antenatal, natal&postnatal history was taken. Complete clinical examination including a thorough search for any congenital malformation was done.Neonates was

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assessed for severity of respiratory distress by respiratory severity score i.e., Silverman Andersen score in case of preterm infant and Downe's score in case of term baby (15).Their mothers were inquired for maternal age,parity,pregnancy induced hypertension(PIH),gestational diabetes mellitus (GDM), thyroid status, amniotic fluid volume, ante partum haemorrhage(APH), maternal membrane ruptured for>24 hours, urinary tract infection, antenatal steroid administration,any other illness and history of drug intake during pregnancy.

Statistical Analysis

All data were compiled in the form of master chart using MS excel sheet, categorical data was presented as numbers (percent) and were compared among groups using Chi square test.The quantitative data was presented as mean and standard deviation and were compared by student's t-test and continuous non parametric data were compared by Pearson correlation coefficient test.The level of significance was kept 5% for all statistical analysis. A p value less than 0.05 was considered statistically significant. All data were analysed using SPSS, version 23 for Windows statistical software package (SPSS inc., Chicago, IL, USA).

Results

A total of 184 neonateswith respiratory distress were enrolled in the study, out of which97 neonates (52.72%) were preterm, 84 neonates (45.62%) were term and 3 neonates (1.63%) were post term.41.85% neonates in the study were normal birth weight, 36% were low birth weight, 13% were very low birth weight, 3.26% were extremely low birth weight and 0.5% were high birth weight.Normal vaginal delivery was the most common mode of delivery in the study with 143 neonates (77.71%).Out of 184 neonates,129 were male and remaining 55 were female with male: female ratio of 2.3:1.

Table 1: DISTRIBUTION OF STUDY POPULATION ACCORDING TO ETIOLOGY OF RESPIRATORY DISTRESS (N=184)

ETIOLOGY	No.of patients
Respiratory distress syndrome – Hyaline membrane disease (RDS-HMD)	62
Perinatal Asphyxia	41
Meconium aspiration syndrome (MAS)	29
Congenital Pneumonia	24
Sepsis	12

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Congenital heart disease (CHD)	09
Transient tachypnea of newborn (TTNB)	03
Others (Prematurity, Rh incompatibility, Neonatal Jaundice,Noonan syndrome, Intra-cranial hemorrhage)	04

As shown in Table 1, respiratory distress syndrome (RDS)was the most common cause of respiratory distress (33.70%), followed by perinatal asphyxia (22.3%), meconium aspiration syndrome (MAS) (15.8%), congenital pneumonia (13%), sepsis (6.5%),congenital heart disease (4.9%), transient tachypnea of newborn (TTNB) (1.6%) and other non-respiratory causes (2.2%) like congenital malformations, jaundice and metabolic disorders.

Table 2: OUTCOME OF STUDY POPULATION (N=184)

OUTCOME	No.of patients
Discharge	120 (65%)
Death	53 (29%)
Leave against medical advice (LAMA)	6 (3%)
Referred to higher centre	5 (3%)

The final outcome of admitted neonates (n=184) are shown in Table 2. 120 neonates (65%) were discharged, 53 (29%) were died, and only 5 (2.7%) neonateswith congenital heart defects and other congenital malformationswere referred to higher centre for surgical management.

Discussion

Respiratory distress occurs among 4-7% of all neonates and is the reason for 30-40%of admissions in the NICU (16,17). Neonates with respiratory distress are 2 to 4 times more likely to die than those without respiratory distress (17). It is more common among preterm (30%) and post term (21%) than among term neonates (4.2%) (16).

In present study, out of 184 cases of respiratory distress,118 (64.13%) cases developed respiratory distress due to respiratory causes, while 66 (35.87%) cases were having

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respiratory distress because of non-respiratory causes.Among all, most common cause of respiratory distress was RDS (33.70%).

Similar to our study, Nagendra K et al.,(18) in 1999 found that the mostcommon cause of respiratory distress was RDS (18.8%), followed by transient tachypnea of newborn (14.5%) and meconium aspiration syndrome (12.5%).

Harshini B.P. et al.,(19) in 2020 also found the commonest cause of neonatal respiratory distresswas respiratory distress syndrome(34%), followed by transient tachypnea of the newborn (30%), and meconium aspiration syndrome (22.66%). In this study, the greatest numbers of deliveries were LSCS, hence incidence of TTNB was also high.

Chandini P.et al.,(20) in 2020 also found similar results thatthe commonest cause of respiratory distress was RDS (40%) followed by TTNB (19%) and MAS (10%).

The higher incidence of RDS (89%) in our study may be due to inclusion of relatively more premature babies.

In contrary to our study, Cunnigum MD et al., (21) in 2013 found that among 76 neonates with respiratory distress,46% babies hadTTNB, 31.5% babies had RDS, 25% had BA,25% babies had pneumonia and sepsis, 7.8%babies had MAS.

Brahmaiah P et al., (15) in 2017 studied 200 neonates with respiratory distress and found that most common cause of respiratory distress was TTNB (30%) followed by RDS (24%). Contrary to this study, our study showed that RDS was most common cause of respiratory distress because respiratory distress due to TTNB usually is mild disease and get treated mostly at the place of birth at peripheral health centres, hence number of referrals were less. Since our hospital is a tertiary care centre, unresolved and complicated cases such as RDS, MAS, perinatal asphyxia and congenital pneumonia are more frequently referred here.

In our study, 65% patients were successfully discharged but 29% neonates died inspite of level 3 NICU care.

Almost all patients with respiratory distress received antibiotics (180, 97.8 %) and oxygen therapy (183, 99.5%) via either nasal prongs or CPAP. Mechanical ventilation was provided to patientswith moderate to severe respiratory distress (79, 43%); among them, 33 (38.8%) were discharged but 46 (54.1%) patients died. Since CPAP has emerged as the first-line

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management of RDS, this approach along with early selective surfactant appears to provide a better option as illustrated in recent studies.

The longest stay in the NICU in our study was recorded for RDS complicated with BPD (bronchopulmonary dysplasia) & sepsis etc.(26 days on average). Patients with Congenital pneumonia patients spent 18 days on average in NICU. Patients with MAS, Perinatal asphyxia and sepsis spent 12-15 days on average, while patients with TTNB spent 3-5 days on average in the NICU.

Outcome was poor for MAS patients i.e.,(15, 52% died), especially for those who delivered with thick meconium-stained amniotic fluid (9, 37.5%).

Berkus MD et al.,(22) in 1994 studied a cohort of 2200 patients and concluded that moderate or thick meconium increased the risk for adverse outcome by more than threefold (relative risk 3.2, 95% confidence interval 2.0-5.2).

LOUIS et al., (23)in 2014 found that out of 172 neonates, 44 (26%) neonates died. Thisstudy also concluded that meconium aspiration syndrome was associated with significant mortality. Myocardial dysfunction, birth weight, and initial oxygen requirement are independent predictors of mortality.

Our study reported higher mortality among MAS patients, probably because enrolled neonates were out-born, while study by louis et al., had enrolled all inborn neonates as study population. Hence, sick babies were referred to our hospital with complication like shock, PPHN, pneumothorax, need of vasopressor support etc. resulting in higher mortality in comparison to other studies.

During the study period, only 5 (2.7%) patients were referred to a higher centre for further management such as CHD and congenital malformation patients whose surgeries are not possible at our hospital.

Conclusion

Respiratory distress syndrome (RDS) was found to be the most common causes of respiratory distress and NICU admission in new-borns in the present study. Meconium aspiration syndrome (MAS) was the most common cause of respiratory distress in term babies whereas respiratory distress syndrome (RDS) was common in preterm babies. Clinical assessment of

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respiratory distress by Anderson Silverman score in Preterm and Downes score in Term babies may be helpful in assessing clinical outcome.

Foetal risk factors were low birth weight and late preterm period of gestation. Proper antenatal care and early diagnosis of the antenatal complication and avoiding preterm deliveries will aid in the better outcome of the new-borns. Early detection and appropriate management of the condition is essential to ensure better outcome in all infants presenting with respiratory distress.

Limitations

This study was conducted in only one hospital with a limited sample size. The present study was conducted on 184 neonates in a tertiary care hospital. All of them were referred cases from peripheral hospitals. The same study should be done in community-based setting with more samples in multicentre and the meta-analysis of the results will give clear spectrum of respiratory distress in our community.

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