Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v30i18.3342

A PROSPECTIVE STUDY ON THE CLINICAL CHARACTERISTICS OF RESPIRATORY DISTRESS IN NEONATES AT MARDAN MEDICAL COMPLEX

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Abstract

Background and Aim: Respiratory distress frequently leads to admissions in the Neonatal Intensive Care Unit. There is paucity of data regarding the clinical profile of neonates suffering from respiratory distress. Therefore, the present study aimed to investigate the clinical characteristics of respiratory distress among neonates.

Patients and Methods: This prospective study investigated 186 neonates diagnosed of respiratory distress presented to the Neonatal Intensive Care Unit (NICU), Mardan Medical Complex, Mardan from January 2022 to December 2022. Patient's details such as socioeconomic status, demographic details, comprehensive perinatal history, and clinical examination were recorded. Additionally, Mode of delivery, steroid coverage, and risk factors for sepsis were also recorded.

Results: Of the total 186, the incidence of premature neonates was 50.5% (n=94). About 82.9% (n=156) neonates were born through lower segment Caesarean section (LSCS). The key risk factors identified were Cesarean section delivery and maternal infection, accounting for 38.7% (n=72) of cases. Transient tachypnea, congenital pneumonia, and Late-onset sepsis was the most prevalent causes of respiratory distress found in 45.2% (n=84), 23.1% (n=43), and 10.8% (n=20) respectively. Respiratory support, including both invasive and non-invasive ventilation, was needed for 30.1% (n=56) of these infants. The mortality rate of infants was 1.1% (n=2) due to severe Respiratory Distress Syndrome (RDS) and delayed hospital referral.

Conclusion: The primary risk factors for respiratory distress include Cesarean section delivery and maternal infection. Significant maternal risk factors included primiparity, gestational diabetes, pre-eclampsia, multiple gestation, and not receiving antenatal steroids in cases of preterm labor. Timely referral and prompt respiratory support significantly contribute to improved outcomes.

Keywords: Respiratory distress, Clinical profile, Neonates

INTRODUCTION

Respiratory distress is a prevalent condition observed within the initial 48-72 hours of life, posing a significant health concern, particularly for premature infants. It stands as a leading cause of morbidity among newborns. Clinical signs of respiratory distress in newborns encompass cyanosis, inspiratory stridor, nasal flaring, grunting, feeding difficulties, rapid breathing, and visible retractions in the intercostal, subcostal, or supracostal areas. This condition affects approximately 7% of neonates, emphasizing the importance of preparedness for physicians delivering neonatal care [1-3]. Various factors like prematurity, meconium-stained amniotic fluid (MSAF), cesarean section, gestational diabetes, maternal chorioamnionitis, oligohydramnios, or structural lung abnormalities contribute to neonatal respiratory distress. In developed countries, the mortality rate for infants with hyaline membrane disease ranges from 20.0% to 40.0%, while in India, it is between 50.0% and 75.0%. Meconium aspiration-related respiratory distress leads to mortality rates ranging from 14.3% to 37.0% [4-6].

Considerable advancements have been achieved in the management of respiratory distress over the years [7]. Various advanced techniques, including ventilator therapy with modes such as CPAP (Continuous Positive Airway Pressure), conventional mechanical ventilation, ultra-high-frequency jet ventilation, liquid ventilation, and surfactant replacement therapy, along with sophisticated monitoring and extracorporeal membrane oxygenation, have greatly enhanced the outcomes for infants suffering from respiratory distress [8, 9]. Significant progress has been made in the treatment of neonatal respiratory distress syndrome; however, there is a lack of comprehensive clinical studies conducted in our country. Therefore, this study was initiated to explore and understand the clinical characteristics of infants experiencing respiratory distress. The objectives of the current study are to understand the clinical characteristics and causes of respiratory distress in neonates.

METHODOLOGY

This prospective study investigated 186 neonates diagnosed of respiratory distress presented to the Neonatal Intensive Care Unit (NICU), Mardan Medical Complex, Mardan from January 2022 to December 2022. Patient's details such as socioeconomic status, demographic details, comprehensive perinatal history, and clinical examination were recorded. Additionally, Mode of delivery, steroid coverage, and risk factors for sepsis were also recorded. Maternal and neonatal information was gathered using pre-designed and pre-tested forms. Based on their diagnosis, various tests such as blood culture and other related tests were performed. The outcomes, complications, and diagnosis were accurately measured. The outcome measure distinguished between in-hospital death and survival, defined as the baby being discharged alive from the hospital.

RESULTS

Of the total 186, the incidence of premature neonates was 50.5% (n=94). About 82.9% (n=156) neonates were born through lower segment Caesarean section (LSCS). The key risk factors identified were Cesarean section delivery and maternal infection, accounting for 38.7% (n=72) of cases. Transient tachypnea, congenital pneumonia, and Late-onset sepsis was the most prevalent causes of respiratory distress found in 45.2% (n=84), 23.1% (n=43), and 10.8% (n=20) respectively. Respiratory support, including both invasive and non-invasive ventilation, was needed for 30.1% (n=56) of these infants. The mortality rate of infants was 1.1% (n=2) due to severe Respiratory Distress Syndrome (RDS) and delayed hospital referral. There were 74 (39.9%) male and 112 (60.1%) female. The incidence of appropriate to gestational age (AGA), small for gestational age (SGA), and large for gestational age (LGA) was 81.7% (n=152), 16.1% (n=30), and 2.2% (n=4) respectively. Demographic details and baseline characteristics of neonates are shown in Table-I. Distribution of neonates based on their gestational age is shown in Table-II. APGAR score distribution among neonates shown in Figure-1. Figure-2 demonstrate the association of various maternal factors with complications. Different diagnosis (signs and symptoms) of respiratory distress among neonates depicted in Figure-3. Respiratory support required for neonates shown in Table-III.

Table-I Demographic details and baseline characteristics (N=186)

Variables	N (%)
Gender	
Male	74 (39.9%)
Female	112 (60.1%)
Birth Weight (Kg)	
<1.5	12 (6.5%)
1.5-2.5	82 (44.1%)
2.6-4.0	92 (49.4%)
Mode of delivery	
LSCS	156 (82.9%)
Normal vaginal delivery (NVD)	30 (17.1%)
Steroid coverage	
Yes	128 (68.8%)
No	58 (21.2%)
Gestational age status	
AGA	152 (81.7%)
SGA	30 (16.1%)
LGA	4 (2.2%)

Table-II Categorization of neonates based on Gestational age (N=186)

Gestational age (weeks)	N (%)
<34	36 (19.4%)
35-36	58 (31.2%)
37-38	78 (41.9%)
≥39	14 (7.5%)
Total	186 (100%)

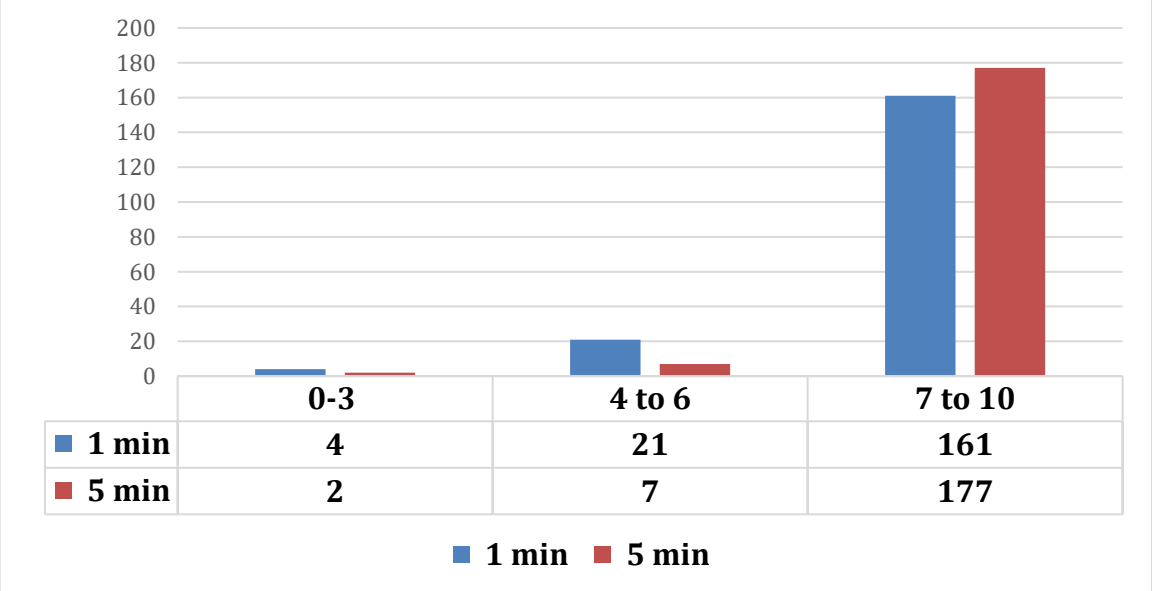

Figure-1 APGAR score distribution

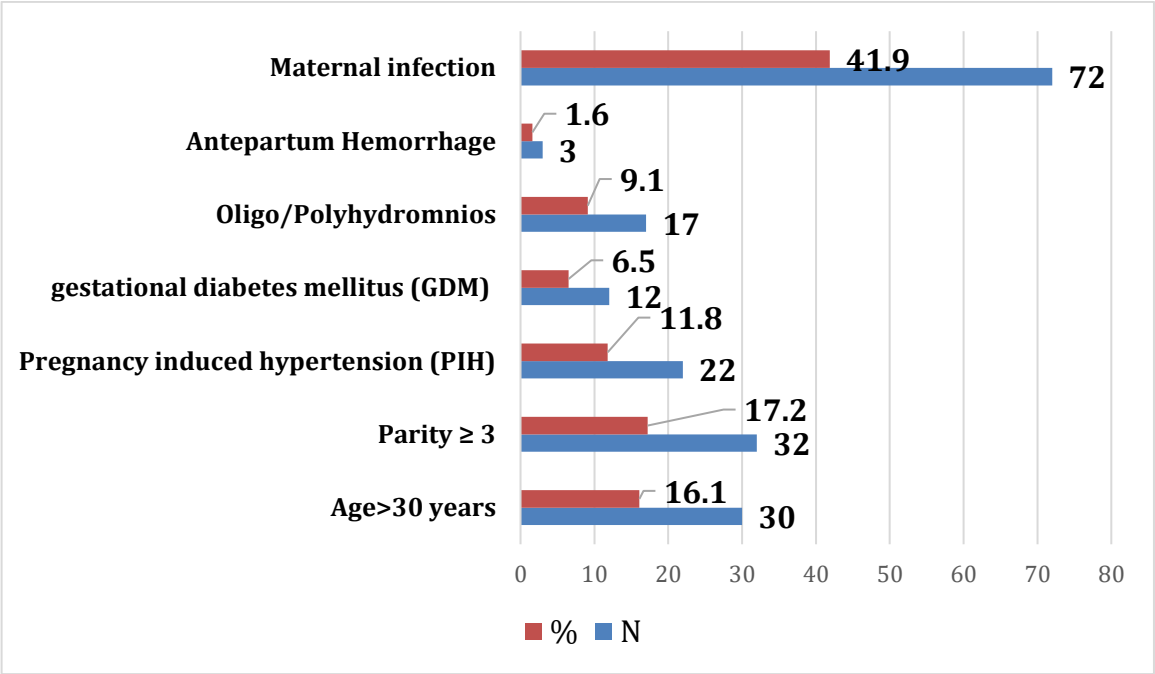

Figure-2 association of various maternal factors with complications

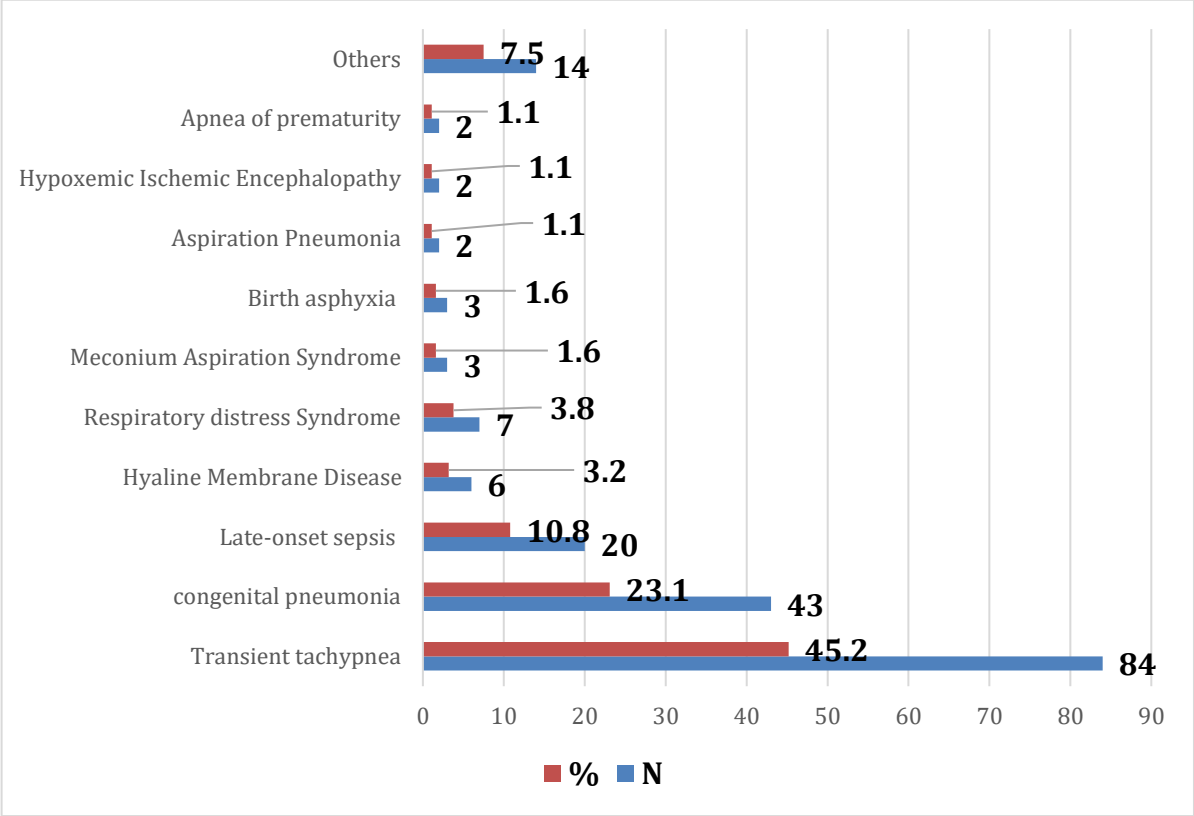

Figure-3 Different diagnosis of respiratory distress among neonates (N=186)

Table-III Respiratory support required for neonates

Respiratory support	**N (%)**
Oxygen	128 (68.8%)
Synchronized intermittent mandatory ventilation (SIMV)	31 (16.7%)
Bubble continuous positive airway pressure (bCPAP)	16 (8.6%)
Nasal intermittent positive pressure ventilation (NIPPV)	11 (5.9%)

DISCUSSION

Respiratory distress is a prevalent reason for Neonatal Intensive Care Unit (NICU) admissions within the first three to four days, affecting 0.90% to 11.9% neonates and contribute to higher mortality rate of 20%. There were 60.1% female, which is more prominent than male. In contrast, Adebami et al. [10] reported that male neonates were more common than female. Meconium aspiration syndrome, transient neonatal tachypnea, pneumonia, hyaline membrane disease, and other varied causes are responsible factors for the respiratory distress among neonates. Despite the high prevalence, morbidity, and mortality associated with respiratory distress in neonates, there has been limited research conducted on this issue. Previous studies have reported incidences ranging from 3.9% to 8.0% [11, 12].

In line with the findings of Abinaya et al., [13] our study also observed that the most common mode of delivery was Lower Segment Caesarean Section (LSCS), accounting for 82.9% of cases. The higher incidence of cesarean section in out setting is due to the nature of tertiary care hospital, where high-risk pregnancies are the main contributor to LSCS. This trend can be attributed to the hospital's role in managing complicated pregnancies. Additionally, the high incidence of antenatal steroid coverage in our study can be explained by the fact that elective cesarean section and preterm delivery both require antenatal steroids. The prevalence of cesarean sections, driven by factors like non-proven cephalopelvic disproportion, has led to challenges in estimating the reliable prevalence of obstructive labor. According to a study by Edward et al., at least one million mothers worldwide are estimated to be affected by this issue, highlighting the significant impact of LSCS on maternal health [14, 15].

Newborn transient tachypnea, characterized by the persistence of residual lung fluid after birth, is the leading cause of neonatal respiratory distress. This condition results in transient rapid breathing in newborns. Cesarean birth, asthma, maternal diabetes, and macrosomia were different contributing factors. The leading cause identified was transient tachypnea of the newborn, followed by sepsis, early-onset sepsis resulting in congenital pneumonia, and late-onset sepsis. These results support with the findings of Santosh et al., [16] where transient tachypnea of the newborn was also reported as the primary cause of respiratory distress.

Our study findings indicate that the majority of infants experiencing respiratory distress primarily required minimal respiratory support. Infants with respiratory distress syndrome showed improvement with non-invasive respiratory support methods such as Continuous Positive Airway Pressure (CPAP) and Nasal Intermittent Positive Pressure Ventilation (NIPPV). It is worth noting that preterm babies often require respiratory support due to respiratory insufficiency [17-20]. Nasal CPAP was successfully implemented as the initial therapy for preterm infants, proving to be effective. Non-invasive positive pressure breathing techniques have been instrumental in addressing apnea in preterm infants and reducing their work of breathing [21-23].

Providing early respiratory support to infants experiencing respiratory distress yields positive outcomes, as evidenced by the majority of infants recovering and being discharged. However, during the study period, three infants faced a tragic outcome. Unfortunately, they received inadequate respiratory support before their transfer, which likely contributed to their unfortunate demise [24, 25]. Anticipating and preventing premature deliveries is essential to reduce perinatal morbidity and mortality. Women with a history of spontaneous preterm birth are at significantly higher risk of experiencing preterm delivery in subsequent pregnancies [26, 27].

CONCLUSION

The primary risk factors for respiratory distress include Cesarean section delivery and maternal infection. Significant maternal risk factors included primiparity, gestational diabetes, pre-eclampsia, multiple gestation, and not receiving antenatal steroids in cases of preterm labor. Timely referral and prompt respiratory support significantly contribute to improved outcomes.

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