Section: Pediatrics

Original Research Article

# EPIDEMIOLOGY OF RESPIRATORY DISTRESS IN NEWBORN ADMITTED WITH RESPIRATORY DISTRESS IN NICU OF A TEACHING HOSPITAL IN EASTERN INDIA

**Niloy Kumar Das[1], Subhendu Saha[2], Alakesh Halder[3], Suman Mandal[4], Ali Hossain Mondal[5]**

[1]Associate Professor, Department of Pediatrics, ESI-PGIMSR, Rajajinagar, Karnataka, India. [Ex Associate Professor, Department of Pediatrics, ESI PGIMSR, Joka, Kolkata, West Bengal, India.
[2]Assistant Professor, Department of Pediatrics, College of Medicine & Sagore Dutta Hospital, Kolkata, West Bengal, India.
[3]Associate Professor, Department of Forensic Medicine & Toxicology, Jagannath Gupta Institute of Medical Sciences and Hospital, Budge Budge, Kolkata, West Bengal, India.
[4]Assistant Professor, Department of Pediatrics, ESI PGIMSR, Joka, Kolkata, West Bengal, India.
[5]PGT, Department of Pediatrics, ESI-PGIMSR, Joka, Kolkata, West Bengal, India.

*Received* : 27/10/2023
*Received in revised form* : 11/11/2023
*Accepted* : 05/12/2023

*Keywords:*
*Respiratory distress (RD), TTN, RDS, MAS, MSL, Preterm, LUCS.*

Corresponding Author:
**Dr. Suman Mandal,**
Email: sumanmondal2100@gmail.com

DOI: 10.47009/jamp.2023.5.6.147

Source of Support: Nil,
Conflict of Interest: None declared

*Int J Acad Med Pharm*
2023; 5 (6); 712-715

## Abstract

**Background:** Respiratory distress (RD) is a prevalent concern among neonates admitted to Neonatal Intensive Care Units (NICUs). This cross-sectional study, conducted at a teaching hospital in eastern India from July 2021 to June 2022, aimed to investigate the epidemiological profile of neonates with RD in the NICU. **Materials and Methods:** A total of 86 neonates aged less than 28 days were included in this cross-sectional study. RD was diagnosed based on specific criteria, and detailed clinical assessments were conducted to confirm the etiology. Data, including demographics, risk factors, and therapeutic modalities, were collected and analyzed using SPSS version 25. **Results:** Among the 86 neonates, 48 (55.81%) were admitted for RD. The study revealed a higher prevalence of RD in males (62.5%) compared to females. Caesarean section (CS) was more commonly associated with RD than normal vaginal delivery (NVD). Prematurity emerged as the primary risk factor (41.6%), followed by other factors such as prolonged rupture of membranes, meconium-stained liquor, and pregnancy-induced hypertension. Pneumonia was identified as the leading cause of RD (29.17%), followed by respiratory distress syndrome (RDS), Transient Tachypnea in Newborns (TTN), and Meconium Aspiration Syndrome (MAS). Management modalities included head box oxygen (100%), Continuous Positive Airway Pressure (CPAP) (37.5%), and mechanical ventilation (8.33). **Conclusion:** This study contributes to understanding the landscape of neonatal RD in the NICU setting, emphasizing the need for targeted interventions and improved clinical management.

## INTRODUCTION

Respiratory distress (RD) is common in NICU admitted babies. RD has been observed in 6.7 -12% of newborn.[1,2] Again respiratory pathology is the commonest autopsy finding among early neonatal death.[3] Causes of respiratory distress in newborn are varied like-transient tachypnea in newborn (TTN), Meconium aspiration syndrome (MAS), respiratory distress syndrome (RDS), Pneumonia, non-pulmonary cause like heart failure, acidosis. In spite of tremendous improvement of therapy like surfactant, invasive and non-invasive ventilation, sophisticated monitor still RD responsible for 40-50% of all perinatal death.[4]

There is lacuna of literature on spectrum of RD in newborn in eastern region of India. The aim of this study is to know the epidemiological profile of newborn admitted with RD in NICU in this region and plan preventive and therapeutic management protocol for this set up.

## MATERIALS AND METHODS

This was a cross sectional study, carried out at Neonatal Intensive Care Unit (NICU) of a teaching hospital of eastern India, carried out from July 2021-June 2022 after obtaining ethical clearance of the institute. All the newborns age less than 28 days admitted to NICU for RD were included in the study. Newborn with weight less than 700gm and whose


ISSN (O): 2687-5365; ISSN (P): 2753-6556

parents did not give the consent were excluded from the study.

RD was diagnosed by presence of at least 2 of the following on two consecutive examinations at least 1 hour apart:

- Respiratory rate of >60/min or more
- Chest retraction (subcostal indrawing, xiphoid retraction, suprasternal indrawing)
- Expiratory grunt/groaning.5

Detailed history and examination findings were put in a data collection form. Cause of respiratory distress was confirmed with proper history, examination findings, disease course and relevant examination like –complete blood count, blood culture, C reactive protein, x-ray, echocardiography, acid blood gas analysis, sonography of chest and head etc.

After the admission of the baby in NICU management was started as per standard protocol. Oxygen was provided via nasal cannula or head box or cpap or ventilator as per set protocol. Surfactant was administered when indicated.

The data were put in a spreadsheet (Microsoft excel) and then exported to data editor of SPSS version 25 (SPSS Inc., Chicago, Illinois, USA). SPSS and Microsoft excel were used for the statistical analysis of data. Descriptive statistics of data were reported.

## RESULTS

In this study 86 neonates were included in this study. Out of them 48(55.81%) newborns were admitted for respiratory distress.

**Table 1: Gender distribution of neonatal respiratory distress.**

| Gender | N | Percentage |
|---|---|---|
| Female | 18 | 37.5 |
| Male | 30 | 62.5 |

**Table 2: Distribution of mode of delivery in neonatal respiratory distress**

| Gender | N | Percentage |
|---|---|---|
| (CS) Cesarean section | 31 | 64.58 |
| (NVD) Normal vaginal delivery | 17 | 35.41 |

**Table 3: Different risk factors associated with neonatal respiratory distress.**

| Maternal history | N | Percentage |
|---|---|---|
| Premature rupture of membrane > 18 hours (PROM) | 9 | 18.75 |
| Absent diastolic flow | 3 | 6.25 |
| Meconium-stained liquor (MSL) | 5 | 10.42 |
| Gestational Diabetes Mellitus (GDM) | 2 | 4.16 |
| Placenta previa | 2 | 4.16 |
| Pregnancy induced hypertension (PIH) | 4 | 8.33 |
| Preterm | 20 | 41.6 |
| No risk factor found | 3 | 6.25 |
| Multiple risk factor | 5 | 10.42% |

**Table 4: Distribution of birth weight in neonatal respiratory distress**

| Birth weight | N | Percentage |
|---|---|---|
| >2.500gm | 5 | 10.42 |
| 1.500-2.499 gm | 27 | 56.25 |
| 1000gm-1.499gm | 14 | 29.17 |
| <1000gm | 2 | 4.17 |

**Table 5: Different etiology of neonatal respiratory distress**

| Diagnosis | N | Percentage |
|---|---|---|
| RDS | 10 | 20.83 |
| TTN | 6 | 12.5 |
| MAS | 5 | 10.42 |
| Pneumonia/Sepsis | 14 | 29.17 |
| Birth asphyxia | 5 | 10.42 |
| Cardiac etiology | 4 | 8.33 |
| Others(surgical/unknown) | 4 | 8.33 |

**Table 6: Other system affected with neonatal respiratory distress**

| System affected | N | Percentage |
|---|---|---|
| CNS-Seizure | 3 | 6.25 |
| GIT-vomiting, abdominal distention | 7 | 14.48 |
| Heamato-poetic system- bleeding | 2 | 4.17 |
| Nil | 36 | 75 |

**Table 7: Distribution of oxygen delivery device used to treat respiratory distress**

| Therapeutic modalities | N | Percentage |
|---|---|---|
| Head box | 48 | 100 |


ISSN (O): 2687-5365; ISSN (P): 2753-6556

| | | |
|---|---|---|
| CPAP | 18 | 37.5 |
| Mechanical ventilation | 4 | 8.33 |

## DISCUSSION

In this hospital-based cross-sectional study, the prevalence of respiratory distress in NICU admissions was 55.81%. This finding contrasts with a study from a Delhi-based referral hospital, which reported an incidence of 29.28% among all newborn admissions, with a predominantly out-born study population.[6] Our findings exceeded the rates reported in previous studies conducted in the same region.[7] The higher incidence in our study may be attributed to several factors, including an increase in premature deliveries, the referral of out-born babies and inclusion of up to 700grams newborns.

The study confirmed the male predominance in respiratory distress, consistent with other studies.[7-9] Caesarean section deliveries were more prevalent among neonates with RD, supporting the observation that the mode of delivery may influence respiratory outcomes. Kommawar et al in their study had also observed that the LUCS was most common mode of delivery (87.16%) in neonates who were admitted with respiratory distress.[10,11] The LUCS has literally replaced the natural mode of delivery and at least one million mothers a year have been estimated to be affected by this LUCS worldwide.[12]

Prematurity was identified as the most common risk factor associated with respiratory distress, aligning with findings from other studies in Kashmir.

In our study respiratory distress is more common in babies with birth weight <2500 gm. Only 10.42% newborns with RD have birth weight more than 2499 gm.

Regarding risk factor associated with respiratory distress, the most common cause is prematurity (41.6%) followed by prolonged rupture of membrane-PROM (18.75%) MSL (10.42%) and PIH (8.33%) respectively. Gaurav et al. in their study at Kashmir found PROM (37.70%), MSL (34.60%), hypertension (16.15%) as common risk factor.8 They did not include prematurity as risk factor in their study.

The most frequent cause of respiratory distress in this study was pneumonia, followed by RDS, TTN, and MAS, differing from other studies that reported varying proportions due to differences in methodology like exclusion of preterm, onset of respiratory distress after 72 hours of life etc. In a study conducted by Kumar et al. TTN was most common cause of respiratory distress observed it in (42.7%) babies, followed by infection (17%), MAS (10.7%), hyaline membrane disease/RDS (9.3%) and birth asphyxia (3.3%).[1] Mehta A et al. found with sepsis with pneumonia was the leading cause (46.36%) of RD.13 Similar observation with maximum cases of pneumonia as a cause of RD was found by Thomas et al, (44%), Mathur et al (68.7%) and Misra PK et al(32.2%).

Gastrointestinal symptoms were the most common associated system affected followed by CNS, emphasizing the need for comprehensive care in neonates with respiratory distress.

The treatment modalities employed in our study included continuous positive airway pressure (CPAP) in 37.5% of cases, mechanical ventilation in 8.33% of cases, and the use of a head box for oxygen in all cases at some point during treatment. A study by Mehta et al. reported a higher use of CPAP (45.45%) and mechanical ventilation (23.9%), suggesting potential variations in treatment approaches influenced by infrastructure, resources and NICU treatment policies.

## CONCLUSION

This study contributes valuable insights into the epidemiology of neonatal respiratory distress in the eastern region of India. The findings underscore the need for region-specific protocols in NICUs to address the unique challenges posed by premature deliveries and diverse etiologies.

**Limitations**

While this study provides valuable insights into the epidemiological profile and management of neonatal respiratory distress in the NICU setting, several limitations should be acknowledged:

1. Single-Center Study: The research was conducted at a single teaching hospital in the eastern region of India, which may limit the generalizability of the findings to other healthcare settings with potentially different patient populations and practices.
2. Limited Time Frame: The study was conducted over a one-year period, and the data collection may not capture seasonal variations or long-term.
3. Resource Limitations: Variations in the availability of resources, such as CPAP and mechanical ventilators, may influence the treatment modalities employed. The study does not delve into the specific challenges or resource constraints that could affect clinical decision-making.
4. Changing Practices: Neonatal care practices and protocols may evolve over time, and the study does not capture potential changes in management strategies or interventions that may have occurred during the study period.

Addressing these limitations in future research endeavours can contribute to a more comprehensive understanding of neonatal respiratory distress and facilitate the development of targeted interventions and improvements in clinical care.


ISSN (O): 2687-5365; ISSN (P): 2753-6556

## REFERENCES


1. Kumar A, Bhat BV. Epidemiology of respiratory distress of newborns. Indian J Pediatr. 1996 Jan-Feb;63(1):93-8.
2. Thomas S, Verma IC, Singh M, Menon PS. Spectrum of respiratory distress syndrome in the newborn in North India: a prospective study. Indian J Pediatr. 1981 Jan-Feb;48(390):61-5.
3. Tibrewala NS, Bhat S, Pai PM, Soneji JS. Autopsies in newborns: A study of 356 cases. Indian Pediatr 1975; 12: 233-237.
4. Santosh S, Kumar K, Adarsha E. A Clinical Study of Respiratory Distress In Newborn and its Outcome. Indian Journal of Neonatal Medicine and Research. 2013; 1(1): 2-4.
5. NNPD network. National Neonatal Perinatal Database. Delhi, India. Report 2002-03.
6. Mathur N.B, Garg K, Kumar S. Respiratory Distress in Neonates with Special Reference to Pneumonia Indian Pediatrics 2002; 39: 529-537.
7. Dutta A, Sinhamahapatra KT. Spectrum of respiratory distress in newborn: A study from a tertiary care hospital in Kolkata. The Child and newborn, 2011; 15(2): 45- 48
8. Gaurav, Naik SA, Ahmad ST. The epidemiology of neonatal respiratory distress in a tertiary care neonatal Centre Kashmir India. Int J Contemp Pediatr 2023;10:1040-3.
9. Nahar, Begum S. Neonatal Sepsis in A Tertiary Care Hospital: Evaluation of Causative Agents and Antimicrobial Susceptibilities. Bangladesh J Child Health. 2013;37:14-7.
10. Warren JB, Anderson JM. Newborn respiratory disorders. Pediatr Rev. 2010;31(12):487-95.
11. Kommawar A. Study of respiratory distress in newborn. Int J Contemporary Ped. 2017;4:490-94.
12. Ward RM, Benjamin D, Barrett JS, Allegaert K, Portman R, Davis JM, Turner MA. Safety, dosing, and pharmaceutical quality for studies that evaluate medicinal products (including biological products) in neonates. Pediatr Res. 2017;81(5):692-711.
13. Mehta A, Pratap D, Kushwaha K.P, Singh A, Sharma B, Mittal M. A study of causes of respiratory distress in neonates presenting within 72 hours. J PediatrRes.2017;4(01):22-28.




ISSN (O): 2687-5365; ISSN (P): 2753-6556