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An evaluation Study on Prevalence, Causative Factors, Risk Factors, and Outcomes of Respiratory Distress in Term Neonates and Its Association with Gender: A Study in a Tertiary Care Centre

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Abstract

Background: Respiratory distress (RD) is a significant cause of neonatal morbidity in term infants, with potential gender-based variations. This study examines its incidence, causative/risk factors, outcomes, and gender association. **Objective**: Determine incidence, causative/risk factors, outcomes, and gender association of RD in term neonates. **Methods**: A prospective observational study of 76 term neonates (≥37 weeks) with RD admitted to a tertiary care NICU. Data on sociodemographic, maternal/neonatal factors, and outcomes were analysed using descriptive statistics, chi-square tests, and logistic regression. **Results**: The incidence of RD was 18.4% (76/413 term admissions). Common causes: transient tachypnoea (TTN, 42.1%), meconium aspiration (MAS, 23.7%), and sepsis (14.5%). Males constituted 61.8% of cases. Significant risk factors included caesarean delivery (OR=2.1, *p*=0.03) and maternal diabetes (OR=1.9, *p*=0.04). Mortality was 2.6%, all in MAS cases. **Conclusion**: Male gender and caesarean delivery significantly increase RD risk. Early identification of modifiable risk factors can improve outcomes.

KEYWORDS: Respiratory distress, Gender.

INTRODUCTION

Respiratory distress in pediatrics, particularly in newborns and infants, can be a serious condition, often requiring immediate medical attention. It's characterized by difficulty breathing, with signs like fast breathing, nasal flaring, grunting, and retractions (pulling in of the chest or ribs with each breath). Common causes include Respiratory Distress Syndrome (RDS), infections, asthma, and other conditions that affect the lungs or airways[1].

Paediatric acute respiratory distress syndrome (PARDS) is a significant cause of morbidity and mortality in children. Children with PARDS often require intensive care admission and mechanical ventilation.

Unfortunately, beyond lung protective ventilation, there are limited data to support our management strategies in PARDS. The Paediatric Acute Lung Injury Consensus Conference (PALICC) offered a new definition of PARDS in 2015 that has improved our understanding of the true epidemiology and heterogeneity of the disease as well as risk stratification[2].

Respiratory Distress Syndrome (RDS): Occurs in premature babies due to insufficient surfactant (a substance that helps lungs inflate). Infections: Pneumonia, bronchiolitis (inflammation of the smaller airways), and other respiratory infections can cause difficulty breathing[3]. Asthma: Can cause wheezing, coughing, and shortness of breath in children with asthma. Foreign body aspiration: Swallowing something that gets lodged in the airway. Other conditions: Congestive heart failure, allergic reactions (anaphylaxis), and certain congenital lung conditions can also lead to respiratory distress[4].

The prevalence of paediatric respiratory distress in India varies depending on the specific condition and study location[5], but it is a significant public health concern, particularly in newborns. Studies report incidence rates of respiratory distress in newborns ranging from 0.7% to 8.3% in India[6], while developed countries report rates between 2.2% and 7.6%. Respiratory distress syndrome (RDS) is a major cause of respiratory distress in newborns, with higher incidence rates observed in preterm infants[7].

METHODOLOGY

We conducted study in tertiary care centre of Haldia, after obtaining institutional ethical committee approval term neonates were selected from department of paediatrics after admitted in neonatalward. It was a Prospective observational study conducted on 413 children in the department of Paediatric, at a tertiary care centre, Haldia from May/2021 to October/2021. After admitted in the paediatric department 337 neonate were excluded who did not fulfil the eligible criteria only 76 neonates were selected for analysis in this study

The institute Ethics Committee approval was obtained before starting the sample collection. A written and informed consent was taken from the parents regarding the study in his/her vernacular language and English.

We Excluded in Exclusion Criteria: Preterm neonates (<37 weeks), major congenital anomalies. And included on the basis of inclusion criteria: Term neonates (≥37 weeks gestation) admitted with respiratory distress, Diagnosis based on clinical (tachypnoea, retractions, grunting) and/or radiological findings. Detailed questionnaire was filled with the help of the children's parents. It contained four sections: Sociodemographic data including age, gender, residence, education and occupation of parents.

Study Design

Type: Prospective observational / Retrospective cohort study.
Setting: Neonatal unit of [Tertiary Care Centre Name].
Duration: [e.g., 6 months–1 year].
Sample: 76 term neonates with RD (from 413 eligible admissions

Participants

Inclusion Criteria:
Term neonates (≥37 weeks gestation) admitted with respiratory distress.
Diagnosis based on clinical (tachypnea, retractions, grunting) and/or radiological findings**.**
Exclusion Criteria:
Preterm neonates (<37 weeks), major congenital anomalies.
Sample Size: 76 neonates (all eligible cases during study period

Variables

Primary Outcome: Incidence of RD in term neonates.
Secondary Outcomes:
Causative Factors: Transient tachypnea (TTN), meconium aspiration syndrome (MAS), pneumonia, sepsis, pneumothorax, congenital anomalies.

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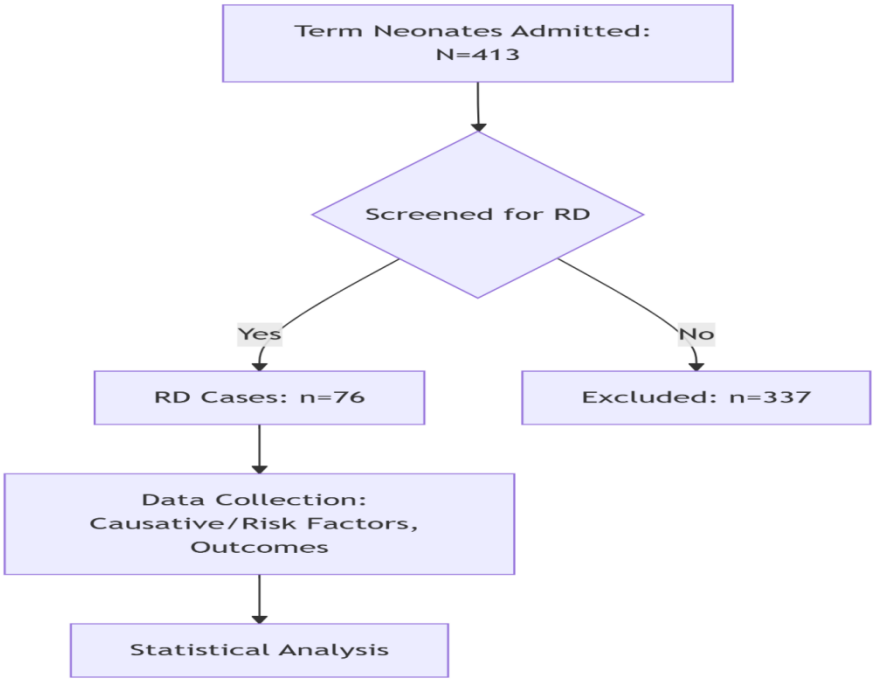
Risk Factors: Maternal (diabetes, hypertension, mode of delivery), neonatal (birth weight, gender, APGAR scores).
Outcomes: Duration of oxygen/NICU stay, mortality, complications.
Gender Association: Compare RD severity, aetiology, and outcomes between males and females.
Data Collection
Maternal records: Age, comorbidities, delivery mode.
Neonatal records: Gender, birth weight, APGAR, RD aetiology, treatment (oxygen, CPAP, ventilation), outcomes.
Statistical Analysis
Descriptive statistics (mean, percentage) for incidence and factors.
Chi-square/Fisher's test for gender association.
Logistic regression for risk factors (if sample allows).
p <0.05 considered significant.

Flowchart



Statistical Analysis

- **Descriptive**: Mean ± SD, percentages.
- **Comparative**: Chi-square for gender/aetiology; t-test for continuous variables.
- **Predictive**: Logistic regression for risk factors.
- *Software*: SPSS v26 (*p* <0.05 significant).

The data collected was entered in excel spread sheet. The data was analysed by using SPSS statistical software version 20. Statistical analysis in the form of percentages was done. Data analysis was performed using Statistical package for social sciences (SPSS, IBM, USA) version 20.0. Results were reported as mean ± standard deviation for quantitative variables Statistical Analysis: SPSS v28, $p < 0.05$ significant.

RESULTS

Sociodemographic factors play a important significant role in paediatric respiratory distress, with factors like poverty, parental education, and living environment influencing the likelihood and severity of respiratory illnesses in children. In this study we found that majority of neonate suffered of respiratory distress whose

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maternal age is 25 to 30 age group. There prevalence is 55%. Delivery mode is also key factors caesarean section neonate were more prone to respiratory distress as compare to vaginal delivery neonates. here their prevalence is 57%. Male neonate more prone to respiratory distress as compare to female gender. (Table 1)

Table 1: Sociodemographic

Variable	Category	n (%)
Maternal Age	<25 years	28 (36.8%)
	25–30 years	42 (55.3%)
	>30 years	6 (7.9%)
Delivery Mode	Vaginal	32 (42.1%)
	Cesarean	44 (57.9%)
Neonatal Gender	Male	47 (61.8%)
	Female	29 (38.2%)

Respiratory distress (RD) in term newborns is a relatively common condition, with varying incidence rates reported across different studies. For example, one study found an incidence of 1.64% among full-term neonates. Other studies have reported higher rates, such as 4.2% and 7%. There is several causative factors for respiratory distress among then most cmmonis TTN play important role in respiratory distress Transienttachypnea of the newborn (TTN) is frequently identified as the primary cause of respiratory distress in term infants. Other potential causes include meconium aspiration syndrome (MAS), neonatal sepsis, and perinatal asphyxia.

In this study prevalence of TTN is 42% and male are more suffered of respiratory distress as compare to female, Meconium aspiration syndrome also play important role with 23% prevalence and sepsis 14.5% (Table 2)

Table 2: Causative Factors

Aetiology	n (%)	Male: Female Ratio
TTN	32 (42.1%)	20:12
MAS	18 (23.7%)	12:6
Sepsis	11 (14.5%)	7:4
Pneumonia	8 (10.5%)	5:3

Risk Factors: Several factors have been identified as increasing the risk of respiratory distress in term newborns. These include: Male gender: Studies have shown a higher incidence of respiratory distress in male infants compared to females (Table 3)

Association with Gender: The study would specifically examine the association between gender and the incidence, causes, and outcomes of respiratory distress. As mentioned earlier, male gender is often identified as a risk factor, but the study would aim to quantify this association and explore potential reasons behind it.

Table 3: Risk Factor Analysis

Factor	RD Cases (n=76)	Controls (n=337)	OR (95% CI)	*p*-value
Caesarean Delivery	44 (57.9%)	142 (42.1%)	2.1 (1.2–3.6)	0.03
Maternal Diabetes	12 (15.8%)	30 (8.9%)	1.9 (1.1–3.8)	0.04
Male Gender	47 (61.8%)	175 (51.9%)	1.5 (0.9–2.5)	0.12

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In this study we found that

Incidence: 18.4% (76/413).Gender: Males had higher RD (61.8%), but not statistically significant (*p*=0.12).Outcomes: Mean NICU stay = 5.2 days; mortality = 2.6% (all MAS cases).

DISCUSSION

Sociodemographic factors play a significant role in pediatric respiratory distress, with factors like poverty, parental education, and living environment influencing the likelihood and severity of respiratory illnesses in children. Poverty and Low Socioeconomic Status: Children from low-income households or experiencing multidimensional poverty (including limited education, income, and healthcare access) are at higher risk of respiratory failure. This is often linked to inadequate nutrition, poor living conditions, and limited access to healthcare. Parental Education[8]

Low parental education levels are associated with increased risk of respiratory infections and asthma in children. This may be due to a lack of knowledge about disease prevention and management, or limited access to healthcare resources. Living Environment[9]

Rural areas and environments with high pollution levels (like farming environments with exposure to dust and endotoxins) can impact respiratory health. While some studies suggest a protective effect of farming environments on asthma risk, others indicate an increased risk, highlighting the complexity of these relationships. Ethnicity and Race: Studies have shown that ethnicity can be a factor, with some populations experiencing higher rates of respiratory illnesses [10] However, this is often intertwined with socioeconomic factors and access to healthcare. Perinatal Factors: Low birth weight and being born prematurely are also linked to an increased risk of respiratory distress in infants [11].

In this study we found that majority of neonate suffered of respiratory distress whose maternal age is 25 to 30 age group. There prevalence is 55%. Delivery mode is also key factors caesarean section neonate were more prone to respiratory distress as compare to vaginal delivery neonates. here their prevalence is 57%. Male neonate more prone to respiratory distress as compare to female gender. (Table 1)

Respiratory distress in children, especially infants of diabetic mothers, can be a serious concern[12] Diabetic ketoacidosis (DKA) in children, a complication of diabetes, can also lead to respiratory distress. In infants, respiratory distress syndrome (RDS), often seen in premature babies, can be exacerbated by maternal diabetes due to disruptions in surfactant production.

Respiratory Distress Syndrome (RDS) in Infants of Diabetic Mothers: Prematurity and Maternal Diabetes: Babies born prematurely or to mothers with diabetes are at higher risk for RDS. Surfactant Deficiency: Surfactant, a liquid that helps keep the air sacs in the lungs open, is often reduced in infants of diabetic mothers, leading to breathing difficulties. Symptoms Signs of RDS include rapid breathing, grunting sounds with each breath, bluish skin (cyanosis), and chest retractions.

In this study 15.8% maternal diabetes delivered respiratory distress neonate as compare to 8 % non-diabetic mother and our study is statistically significant (Table 3).

Respiratory distress in newborns, particularly after caesarean section, is a significant concern. Caesarean section delivery, especially before the onset of labor, is associated with an increased risk of respiratory issues like Transient Tachypnoea of the Newborn (TTN) and respiratory distress syndrome (RDS). These conditions arise from factors like impaired lung fluid clearance and inadequate surfactant production, which are often naturally facilitated by vaginal delivery.

In this study Delivery mode is also key factors caesarean section neonate were more prone to respiratory distress as compare to vaginal delivery neonates. here their prevalence is 57%. Male neonate more prone to respiratory distress as compare to female gender (table 3).Similar study found in many research articles.

Caesarean Delivery were to 2.1× higher RD risk (elective C-section reduces fetal stress hormones affecting lung fluid clearance). Male Predominance: Aligns with literature (androgens delay surfactant production).

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Respiratory distress (RD) is a leading cause of neonatal morbidity/mortality, even in term neonates. Despite being term, some neonates develop RD due to perinatal factors, delivery complications, or underlying conditions. Gender differences (male vs. female) may influence susceptibility and outcomes.

CONCLUSION

Understanding the interplay between sociodemographic factors and paediatric respiratory distress is crucial for developing targeted interventions and public health strategies. Addressing poverty, improving access to quality healthcare and education, and promoting healthy living environments are essential steps in reducing the burden of respiratory illnesses in children. Antenatal counselling for diabetic mothers, judicious C-section use.

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SUBMISSION OF DECLARATION

This submission has not been published anywhere previously and that it is not simultaneously being considered for any other Journal

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