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Respiratory Distress in Neonates in A Tertiary Care Medical College Hospital: A Cross-Sectional Study

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Abstract

Introduction: Neonatal Respiratory Distress (NRD) is the most frequent reason for admissions to NICUs. Studies on this topic are limited in our setup and mostly focused on finding the incidence of NRD. The aim of this study was to find the incidence and the most common causes of neonatal respiratory distress in our setting to better prepare treatment protocols and improve overall outcomes.

Methodology: A cross-sectional study was conducted in a tertiary care medical college hospital from February 2022 to October 2022. Data of all neonates admitted with respiratory distress during this term was collected and analyzed.

Results: A total of 550 neonates were admitted to the NICU out of which 207(37.6%) developed respiratory distress. The most common cause of NRD was Respiratory Distress Syndrome 129 cases (62.3%) followed by Pneumonia 25 cases (12.1%), Birth Asphyxia 21 cases (10.1%) and Sepsis 17 cases (8.21%). The highest mortality was observed in cases with RDS (8.35%).

Conclusion: The study highlights the importance of NRD which has a high incidence rate in NICUs and a mortality rate of 7.2%. The most common causes are also preventable and treatable, and suggestions have been made to help reduce incidence and mortality and improve outcomes.

Keywords: Common Causes; Neonates; Respiratory Distress.

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INTRODUCTION

While the first cry of a newborn is an important indicator of neonatal well-being and adaptation to extra-uterine life, respiratory distress is one of the common reasons for admissions to the Neonatal Intensive Care Unit (NICU) within a few hours after birth.[1] The incidence of neonatal respiratory distress (NRD) in developing countries like India ranges from 0.7% to 8.3%.[2] Respiratory distress is recognized by signs of increased work

of breathing like: tachypnea, chest retractions, nasal flaring, wheezing, grunting, stridor, cyanosis etc.[3] A number of maternal, foetal and obstetric factors are implicated in the development of respiratory distress. The most common causes according to most literature include: respiratory distress syndrome or hyaline membrane disease (RDS or HMD), transient tachypnea of the newborn (TTN), meconium aspiration syndrome (MAS), birth asphyxia, pneumonia, pneumothorax, and congenital malformations etc.[4,5] Risk factors for NRD include: low birth weight, prematurity, caesarean section, gestational diabetes to name a few.[6,7] Regardless of the cause of respiratory distress, it is responsible for a significant amount of preventable morbidity and mortality in neonates if not detected and treated early.[8] Studies on neonates admitted with respiratory distress in NICUs in Maharashtra are limited. This study was conducted in a tertiary care medical college hospital in western Maharashtra, to evaluate the common neonatal causes of respiratory distress in our setting to help improve further outcomes and reach closer to achieving our millennium development goal of reducing neonatal deaths in high mortality countries.

METHODOLOGY

This was a retrospective, descriptive, cross-sectional study carried out from February 2022 to October 2022 at a tertiary care medical college hospital.

The study included all neonates admitted to the NICU with signs of respiratory distress during the study period.

Informed consent was obtained from parents of all babies enrolled in the study.

The study excluded neonates whose parents/ guardians refused to participate in the study or if any information required for data collection could not be obtained.

Simple convenience non-probability sampling technique was used for data collection.

The cases were diagnosed clinically by the presence of at least 2 of the following criteria: respiratory rate (RR) of 60 breath/ min or more, subcostal indrawing, xiphoid retraction, suprasternal indrawing, flaring of alae nasi, expiratory grunt and cyanosis at room air.

They were also assessed by scoring systems using Silvermen Anderson Scoring system for preterm babies and Downe's Scoring system for term babies.

Data was collected for each patient using hospital records. Neonatal demographic and clinical data was collected under the following headings in a pre-structured proforma: name, age at admission, sex, body weight, singleton or multiple births, date of admission and date of discharge or death. All were weighed using an electronic scale and classified to small for gestational age (SGA) ≤ 2.5 kg, large for gestational age (LGA) ≥ 4 kg and normal weight group (NGA)(2.5-4 kg). The relative investigations were done and treatment as per unit protocol was followed. All neonates were examined daily till discharge from hospital or death.

The prevalence of respiratory distress varies with gestational age: 30.0% among preterm, 20.0% among post terms to 4.0% in term babies. Assuming prevalence of respiratory distress as 16% and 95% confidence interval with 5% margin of error, sample size was calculated using formula N= z2 pq/d2 where, p= prevalence of respiratory distress in newborns. q = 1-p, N= sample size, z=1.96, d= maximum tolerable error. Estimated sample size was 207.

All the data was tabulated in Microsoft Excel and Statistical analysis was done using SPSS program (version 20). Categorical data are expressed as frequency and percentage. Continuous data (if any) are expressed with mean and standard deviation. Chi-square test was used to compare two categorical data. A P-value of <0.05 was considered statistically significant.

Ethical clearance was obtained from the institutional ethics committee before starting the study.

RESULTS

Out of 550 NICU admissions during the study period, 37.6% (207) neonates were admitted for respiratory distress. Our study comprised of 58.9% (122) males and 41.1% (85) females. The male: female ratio was 1.4:1. 61.4% (127) neonates were full term while 38.6% (80) were preterm. 72.9% (151) babies were in the normal birth weight group (2.5-4kg) and 27.1% (56) were small for gestational age (SGA) (<=2.5kg). There were no post-term admissions or large for gestational age (LGA) (>=4kg) babies in our study. 94.2% (195) were singleton births whereas there were 12(5.80%) twin births.

88.36% (183) of the cases were of respiratory origin, whereas the other 11.64% (24) had a non-respiratory origin.

The commonest cause of neonatal respiratory distress was Respiratory Distress Syndrome (RDS): 62.3% (129), followed by Pneumonia: 12.1% (25), Birth Asphyxia: 10.1% (21) and Sepsis 8.21% (17). Bronchiolitis comprised 3.86% (8) of the cases and Congenital Heart Diseases (CHD): 3.38% (7).

44.9% (58) of the RDS cases were born preterm and 30.2% (39) were SGA, while 6.2% (8) out of them were twins. 36% (9) of the cases of Pneumonia were preterm births, with 28% SGA babies. 71.4% (15) of Birth Asphyxia 70.6% (12) of Sepsis cases were full term births with 76.2% (16) and 82.3% (14) of them being of normal birth weight respectively. No case of Bronchiolitis were preterm, SGA or twins. 28.6% (2) of CHD cases were preterm, while 28.6% (2) of them were SGA and 1 (14.3%) was a twin birth. All cases showed a male preponderance.

92.8% (192) were treated and subsequently discharged while 7.2% (15) died. Maximum mortality was seen in cases with Respiratory Distress Syndrome (RDS) 8.35%.11

Table 1: Features associated with common causes of Neonatal Respiratory Distress

Diagnosis	Sex		Term		Weight		Singleton/Twin		Total
	Male	Female	Full Term	Preterm	NGA	SGA	Singleton	Twin	
RDS	76 (58.9%)	53 (41.1%)	71 (55.1%)	58 (44.9%)	90 (69.8%)	39 (30.2%)	121 (93.8%)	8 (6.2%)	129 (62.3%)
Pneumonia	15 (60%)	10 (40%)	16 (64%)	9 (36%)	18 (72%)	7 (28%)	24 (96%)	1 (4%)	25 (12.1%)
Birth Asphyxia	12 (57.1%)	9 (42.9%)	15 (71.4%)	6 (28.6%)	16 (76.2%)	5 (23.8%)	20 (95.2%)	1 (4.8%)	21 (10.1%)
Sepsis	10 (58.8%)	7 (41.2%)	12 (70.6%)	5 (29.4%)	14 (82.3%)	3 (17.7%)	16 (94.1%)	1 (5.9%)	17 (8.21%)
Bronchiolitis	5 (62.5%)	3 (37.5%)	8 (100%)	0 (0%)	8 (100%)	0 (0%)	8 (100%)	0 (0%)	8 (3.86%)
CHD	4 (57.1%)	3 (42.9%)	5 (71.4%)	2 (28.6%)	5 (71.4%)	2 (28.6%)	6 (85.7%)	1 (14.3%)	7 (3.38%)
Total	122 (58.9%)	85 (41.1%)	127 (61.4%)	80 (38.6%)	151 (72.9%)	56 (27.1%)	195 (94.2%)	12(5.8%)	207 (100%)

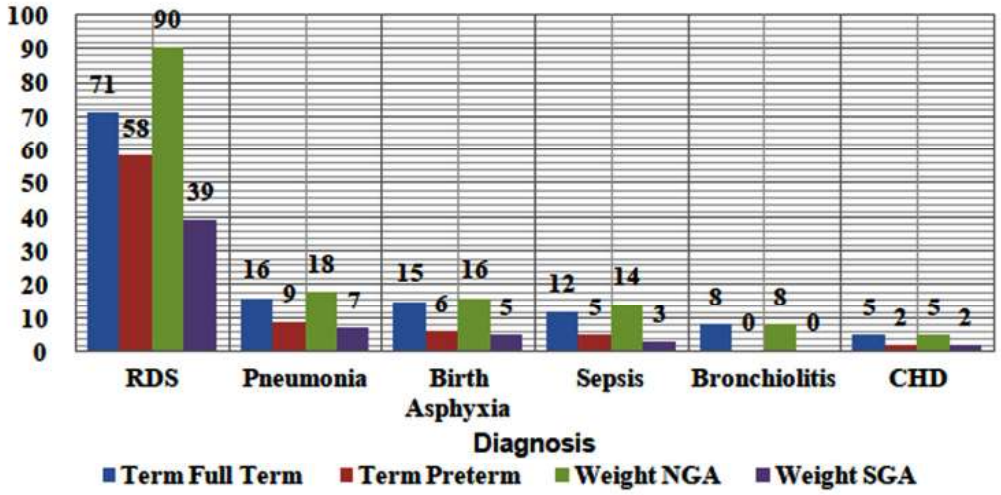

Chart 1: Features associated with the common causes of Neonatal Respiratory Distress

Table 2: Outcome of various causes of Neonatal Respiratory Distress

Diagnosis	Outcome		Total
	Discharged	Death	
RDS	118 (91.5%)	11 (8.35%)	129 (62.3%)
Pneumonia	23 (92%)	2 (8%)	25 (12.1%)
Birth Asphyxia	20 (95.2%)	1 (4.8%)	21 (10.1%)
Sepsis	16 (94.1%)	1 (5.9%)	17 (8.21%)
Bronchiolitis	8 (100%)	0 (0%)	8 (3.86%)
CHD	7 (100%)	0 (0%)	7 (3.38%)
Total	192 (92.8%)	15 (7.2%)	207 (100%)

DISCUSSION

While respiratory distress remains one of the most common cause of admissions to the NICU according to most studies[9,10], it has not been extensively studied in context of India despite its prevalence and mortality.[11] Very limited studies have tried to find out the common causes of neonatal respiratory distress in settings similar to ours. Respiratory distress is often associated with neonatal mortality which is an important chunk of under-five mortality. While infant mortality rates have decreased, neonatal death rates have remained almost the same.[2] Knowledge of the causes of respiratory distress is important for preparing protocols for treating neonates presenting with respiratory distress, especially in low resource settings, and for arranging basic treatment facilities to help improve outcomes.

Our study found the incidence of neonatal respiratory distress among hospital admissions to be 37.6%, which is similar to admissions rates of NRD reported in other studies.[12,13] The most common cause of neonatal respiratory distress in our study was Respiratory Distress Syndrome (62.3%), followed by Pneumonia (12.1%), Birth Asphyxia(10.1%) and Sepsis(8.21%).

Respiratory distress syndrome was the most common cause of respiratory distress in our study, following the trends seen in other studies[14,15] and 44.9% cases were preterm and 30.2% were SGA. It further verifies findings of other studies which state that frequency of RDS is increased with low birth weight and prematurity.[16,17] Further highest mortality was found amongst RDS cases with 8.35%. While mortality due to RDS has reduced due to surfactant therapy[18], we did not have facilities for the same at our institute. However, we can aim to provide good antenatal and obstetric care to help reduce preterm births and get better results.

Pneumonia was the second common cause of respiratory distress with 12.1%, as also shown by Dutta et al with 24.3% incidence[19], however, a paper by Mathur et al. reported pneumonia to be the most common cause with 68.7% incidence.[20]

Birth asphyxia was seen in 10.7% of neonates in a study done by Prakash et al[21], very similar to our incidence rate (10.1%). Sepsis constituted 8.21% cases in our study, while much higher incidence has been noted in other studies.[9,11]

Bronchiolitis was seen in 3.86% cases, which has not been previously reported in other studies. Congenital heart disease was seen in 3.38% of our cases, while almost double incidence has been reported in other studies.[11,22]

This study showed a male preponderance for respiratory distress in line with findings of other studies[23,24,25] However, no plausible explanation could be found for the same. Our study did not have any neonate who was post-term or large for gestational age (>4kg).

The results show that neonatal respiratory distress associated with RDS, Pneumonia, Birth Asphyxia and Sepsis is quite common, and as these causes are either preventable or treatable, the overall burden of NRD and associated mortality can be greatly reduced. More emphasis should be laid to deal with the cause that is the most prevalent and also one that causes maximum mortality, as tackling them on a priority basis will vastly help improve our overall outcomes.

CONCLUSION

Respiratory distress was the most common cause of admission in our NICU and consisted of 37.6% of total admissions, during the study period. The most frequently encountered cause was Respiratory Distress Syndrome (62.3%), followed by Pneumonia (12.1%), Birth Asphyxia (10.1%) and Sepsis (8.21%). In our setup, the outcomes were fairly good with a 92.8% cure rate and 7.2% mortality rate.

RECOMMENDATIONS

Efforts need to be made to further lower the mortality rate by providing good antenatal care to decrease the incidence of premature labor, or administration of steroids to the mother in anticipated premature deliveries and use of surfactant immediately after delivery for all prematurely born infants. Also, NICU personnel need to be trained to identify early signs of respiratory distress and provide neonatal resuscitation and initiate treatment soon after. This will help in decreasing the incidence and mortality associated with neonatal respiratory distress.

LIMITATIONS

Our study was conducted for a short time period, had a limited sample size and was a hospital based study. Further, we have not included maternal antenatal and obstetric history in our study. So, more extensive studies need to be conducted on a larger scale to substantiate our findings. However,

this study provides a good idea about the common causes of respiratory distress in neonates in a tertiary care setup of western Maharashtra.

Conflict of interest: None.

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