

Study on incidence and etiology of respiratory distress in newborns in a tertiary care hospital¹Dr. Ajeet Kumar Saini, Senior Resident, Dept. of Pediatrics, GMC, Budaun.²Dr. Kuwar Vishal, Assistant Professor, Dept. of Pediatrics, Prasad Institute of Medical Sciences, Lucknow, UP³Dr. Gunjan Jain, Assistant Professor, Dept. of Pediatrics, Prasad Institute of Medical Sciences, Lucknow, UP⁴Dr. Sharad Kumar Singh, Associate Professor, Dept. of Pediatrics, Prasad Institute of Medical Sciences, Lucknow, UP⁵Dr. Ritu Chawla, Professor, Dept. of Pediatrics, Deen Dayal Upadhyay, New Delhi**Corresponding Author:** Dr. Gunjan Jain, Assistant Professor, Dept. of Pediatrics, Prasad Institute of Medical Sciences, Lucknow, UP**How to citation this article:** Dr. Ajeet Kumar Saini, Dr. Kuwar Vishal, Dr. Gunjan Jain, Dr. Sharad Kumar Singh, Dr. Ritu Chawla, “Study on incidence and etiology of respiratory distress in newborns in a tertiary care hospital”, IJMACR- January - 2023, Volume – 6, Issue - 1, P. No. 401 – 407.**Open Access Article:** ©2023, Dr. Gunjan Jain, et al. This is an open access journal and article distributed under the terms of the creative commons attribution license (<http://creativecommons.org/licenses/by/4.0>). Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract****Aim of the study:** to find out the incidence, aetiology and outcome of respiratory distress in neonates admitted in neonatal intensive care unit (NICU) of a tertiary care hospital.**Materials and methods:** A prospective observational study to assess the newborn of less than 28 days of age admitted with respiratory distress (RD) in NICU according to National neonatal perinatal database (NNPD) criteria during a period of 1 year. The incidence was calculated as the number of newborns with respiratory distress per population at risk. The various parameters like obstetric history and clinical profile of newborn were studied.**Results and Discussion:** Out of 1032 neonates admitted in NICU, 380 neonates fulfilled the criteria. The RD was

more in pre term neonates 219 (57.6 %) than term 146 (38.4 %) and post term neonates 15 (3.9%). One hundred thirty-eight (36.3%) patients had birth weight in the range of 1500-2490 grams, followed by 128 (33.7%) with birth weight of >2500 gram. The most common aetiology of RD was RDS in 129 (33.9%), followed by sepsis, perinatal asphyxia, meconium aspiration and others. A mortality rate was maximum in RDS followed by in perinatal asphyxia, meconium aspiration syndrome, and neonatal sepsis. There was positive correlation between aetiology and outcome of neonatal respiratory distress (p value <0.001).

Conclusion: Respiratory distress is one of the most common causes of neonatal morbidity and mortality. Early detection and appropriate management is the key

to ensure the best outcome in neonates with respiratory distress.

Keywords: Respiratory distress syndrome (RDS); respiratory distress; NICU; neonatal distress.

Introduction

Respiratory distress in the newborn is one of the commonest causes of admission to the neonatal intensive care unit (NICU) as it occurs in 7% of early neonates.¹ NNPD data (2002-03) showed that about 5.8% newborn had respiratory morbidities.² Respiratory distress in newborn is contributing about 30-40% of NICU admissions.³ According to the 2011 census of India, the neonatal mortality rate was 31%.⁴ As per WHO-CHERG 2012 report major causes of neonatal deaths are prematurity (18%), infections (16%) such as pneumonia and septicemia, perinatal asphyxia (10%) and congenital causes (5%).⁵

Respiratory distress is characterized by tachypnea, retractions, cyanosis, increased oxygen requirement, grunt and dependency on oxygen. Acute respiratory distress can be assessed by Silverman Anderson score (chest movement, intercostal retraction, xiphoid retraction, nasal flaring, grunt) and Downe score (cyanosis, retraction, grunt, air entry, respiratory rate).⁶ Downe Score is more comprehensive and can be applied to any gestational age.³

The causes of respiratory distress in newborns may be broadly classified as respiratory, cardiac, central nervous system and metabolic disorders. Intranatal /natal aspiration, transient tachypnea of newborn, hyaline membrane disease, birth asphyxia diaphragmatic hernia and trauma are usual causes of respiratory distress at birth. Congenital pneumonia, atresia, thoracic dystrophy presents with respiratory distress few days after birth and respiratory distress due to muscular paralysis,

bronchopulmonary dysplasia, pulmonary hemorrhage, emphysema develops within days to a few weeks.⁷

According to NNPD, respiratory distress is associated with high morbidity and mortality if not addressed appropriately. So, early diagnosis of respiratory distress is utmost important for its management, prevention of complications and better clinical outcome.

We conducted a study to assess the etiology and outcome of respiratory distress in newborn admitted in NICU of DeenDayalUpadhyay Hospital where around 10,000 deliveries are conducted every year. This study will help us in early identification of the causes of respiratory distress with evaluating antenatal and natal history, maternal risk factors like chorioamnionitis, clinical examination and other associated factors, so that we can timely intervene and use appropriate life saving measures like nasal CPAP, surfactant, ventilation etc. Thus, these measures will reduce complications and associated mortality and morbidity, and improve the outcome of newborns with respiratory distress. The objective of the study is to find out the incidence, aetiology and outcome of respiratory distress in neonates admitted in neonatal intensive care unit (NICU) of a tertiary care hospital.

Materials & methods

This was a prospective observational study conducted at the Neonatology unit of a tertiary care Institution. The Study was conducted over 12 months of the period starting from June 2017 to May 2018. The study population comprised of newborn less than 28 days of age with the diagnosis of respiratory distress. Informed consent was obtained from the parents of child before the inclusion in the study. The study was conducted as per the guidelines of Declaration of Helinski. Ethical committee clearance was obtained prior to the study.

According to NNPD 2002-03, respiratory distress was defined as, New born having at least 2 of following criteria, Respiratory Rate > 60/minutes, Subcostal/intercostal recessions and Expiratory grunt/groaning². The neonates whose parents did not give consent, and those with any obvious congenital malformation requiring urgent surgery, and out born newborn were excluded from the study. All newborns admitted to the NICU with respiratory distress were enrolled after fulfilling the inclusion and exclusion criterion and studied in details with regards to obstetric history like period of gestation, gravidity of mother, status of mother (booked/unbooked case), maternal chronic diseases (anemia, diabetes mellitus, hypothyroidism, tuberculosis etc.), antenatal history (maternal fever, leaking per vaginum, chorioamnionitis, polyhydramnios, oligohydramnios, pregnancy induced hypertension, eclampsia etc.), natal history (meconium stained amniotic fluid, prolonged labour etc.), post-natal history like (mode of delivery, sex of baby, birth weight and maturity of baby, assessment of APGAR score, onset and duration of respiratory distress) and all necessary investigation (sepsis screen, blood culture and chest X ray etc.) had done to define the probable etiologies of respiratory distress. The outcome of interest in my study were the numbers of babies improved with respiratory distress, referred/LAMA or died after

receiving treatment in the NICU and outcome was assessed on the basis of the Downe score. Incidence was calculated as the number of new newborns with respiratory distress per population at risk admitted in NICU from June 2017 to May 2018 (1 year) duration.

Scoring is essential as it provides an objective way of assessing the severity of respiratory distress and also monitoring the score at regular intervals helps in deciding the course of illness either improving or deteriorating. For this, we used Downe's score for assessment of respiratory distress in newborn in our study.

Downe score of 4 or more denotes clinical RD and score 6 or more is an indication of respiratory failure. Scoring was done at one hour interval to determine progress and deciding the outcome of respiratory distress.³ Statistical analysis was performed using the statistics software SPSS 20 for windows. Qualitative data was expressed in form of frequency and percentage. Correlation was established between probable etiologies and outcome by using Chi square test.

Results

1032 neonates admitted in NICU with all complaints of which 380 neonates satisfying the criteria of the study were enrolled over a period of one year from June 2017 to May 2018. 36.82% neonates developed respiratory distress in our NICU.

Table 1: Demographic characteristics of neonates admitted with respiratory distress syndrome.

Parameters	Characteristics	Number (%)
Gestation Age	<37 weeks	219 (57.6%)
	>37 weeks	146 (38.41%)
	>42 weeks	15 (3.91%)
Sex of Baby	Male	220 (57.91%)
	Female	160 (42.1%)

Birth Weight	<1000 grams	43 (11.3%)
	1000-1490 grams	71 (18.7%)
	1500-2490 grams	139 (36.3%)
	>2500 grams	128 (33.7%)
Gravida of Mother	G1	191 (50.3)
	G2	145 (38.2)
	G3	33 (8.7)
	>G3	11 (2.9)
Booked Mother	Booked	86 (22.6)
	Unbooked	294 (77.4)
Mode of Delivery	LSCS	181 (47.6)
	Normal	199 (52.4)

Table 2. Distribution of risk factors (maternal, antenatal and postnatal) associated with neonatal respiratory distress in NICU.

Risk Factors	Present	
	Frequency	Percent
Anemia	200	52.6
Diabetes mellitus	16	4.2
Hypothyroidism	9	2.4
Fever and Rash	19	5
Pregnancy induced hypertension	41	10.8
Eclampsia	10	2.6
LPV	61	16.1
Chorioamnionitis	8	2.1
Polyhydroamnios	10	2.6
Oligohydroamnios	32	8.4
Prolonged labor	26	6.8
MSAF	58	15.3

Table 3: Probable etiologies on neonatal respiratory distress.

Probable A etiologies of RD	Frequency	Percent
Respired Distress Syndrome	129	33.9
Sepsis	94	24.7

Perinatal Asphyxia	51	13.4
Meconium aspiration syndrome	48	12.6
Pneumonia	39	10.3
Transient tachypnea of newborn	16	4.2
Pneumothorax	3	0.8

Table 4: Blood investigations and chest x-ray findings of neonatal respiratory distress in NICU.

Investigation		Present	
		Frequency	Percent
Sep. screen		95	25
Blood culture		34	8.9
C X-ray	Hyperinflation	37	9.7
	Ground glass appearance	115	30.3
	Pneumothorax	3	0.8
	Pul. Opacity	101	26.6

Table 5: Correlation of probable a etiologies of respiratory distress and outcome of neonatal respiratory distress.

Probable aetiology of RD * Outcome of patients of RD		Outcome of patients of RD		
		Discharged	Expired	LAMA
Probable etiology of RD	Respiratory Distress Syndrome (RDS)	72 (55.8%)	53 (41.1%)	4 (3.1%)
	Neonatal Sepsis	77 (81.9%)	15 (16.0%)	2 (2.1%)
	Perinatal Asphyxia	34 (66.7%)	17 (33.3%)	0 (0.0%)
	Meconium aspiration syndrome (MAS)	32 (66.7%)	15 (31.2%)	1 (2.1%)
	Pneumonia	34 (87.2%)	5 (12.8%)	0 (0.0%)
	TTNB	16 (100.0%)	0 (0.0%)	0 (0.0%)
	Pneumothorax	3 (100.0%)	0 (0.0%)	0 (0.0%)

Chi square test- 35.205, df-12, p value- <0.001.

Discussion

The present study was conducted to find the incidence, outcome, probable etiologies of respiratory distress by studying maternal obstetric history, risk factors (maternal and neonatal), all necessary investigations and correlate these etiologies with outcome. Out of 1032 neonates admitted in NICU, 380 neonates had

respiratory distress. Out of 1032 neonates admitted in NICU, 380 neonates fulfilled the criteria. The frequency of respiratory distress was more in pre term neonates 219 (57.6 %) than term 146 (38.4 %) and post term neonates 15 (3.9%). There was a male preponderance with respect to the sex of baby. One hundred thirty-eight (36.3%) patients had birth weight in the range of 1500-

2490 grams, followed by 128 (33.7%) with birth weight of >2500 gram. Other parameters like gravida status of mother, mode of delivery, booked or un booked mother are shown in Table 1. The risk factors associated with respiratory distress were most commonly anemia in 200(52.6%), leaking per vaginum in 61(16.1%), meconium-stained amniotic fluid in 58(15.3%). The rest of the risk factors are shown in Table 2. The aetiology of respiratory distress were respiratory distress syndrome in 129 (33.9%), followed by sepsis in 94 (24.7%), perinatal asphyxia in 51(13.4%), meconium aspiration syndrome in 48(12.6%), pneumonia in 39(10.3%), TTNB in 16(4.2%) and pneumothorax in 3(0.8%) neonates admitted in NICU with respiratory distress (Table 3). The sepsis screen was positive in 95 (25%), blood culture was positive in 34(8.9%) and chest X ray findings were ground glass lung fields 115 (30.3%) with air bronchogram in 115(30.3%) followed by pulmonary opacities in 103 (25.75%), hyperinflation in 37(9.7%) and pneumothorax in 3(0.8%) neonates (Table 4). Two hundred thirty three (61.3%) neonates developed respiratory distress within < 6 hrs of life, 67 (17.6 %) neonates between 6 hrs to 12 hrs of life, 44 (11.6 %) neonates between 12 hrs to 24 hrs of life, 29 (7.6 %) neonates between 24 hrs to 48 hrs, 4 (1.1%) between day 2 to day 3 of life and only 3(0.8%) neonates after 3 days of life. The duration of respiratory distress was for <24 hr in 37(9.7%) neonates, 24 hr to 48 hr in 138(36.3%) neonates, 48 to 72 hr in 149(39.2%) neonates, >3 day to 7 day in 56 (14.7%) neonates out of 380 neonates. The APGAR score at the 1st min was <4 in 8.8% (33/380), 4-6 in 72.8% (277/380) and >7 in 18.4% (70/380) of neonates had respiratory distress. The APGAR score at the 5th min was <4 in 0.8% (3/380), 4-6 in 4.6% (53/380) and >7 in 85.3% (324/380) of neonates had respiratory

distress. 380 neonates admitted in NICU with respiratory distress, 268(70.5%) neonates were discharged and 105 (27.6%) were expired and 7(1.8%) of them went LAMA. Due to RDS 55.8 % babies were discharged, 41.1 % babies were expired and 3.1% babies went LAMA. Other disease specific treatment outcome has been shown in Table 5. It was observed that, mortality were maximum in RDS followed by in Perinatal asphyxia, MAS and neonatal sepsis. There was positive correlation between aetiology and outcome of neonatal respiratory distress (df-12, p value <0.001). The findings of our study were similar to the studies conducted by other authors.⁸⁻¹⁵

Conclusion

In the present study, we found that the RD was more in pre-term neonates 219 (57.6 %) than term 146 (38.4 %) and post term neonates 15 (3.9%). One hundred thirty-eight (36.3%) patients had birth weight in the range of 1500-2490 grams, followed by 128 (33.7%) with birth weight of >2500 gram. The most common aetiology of RD was RDS in 129 (33.9%), followed by sepsis, perinatal asphyxia, meconium aspiration and others. A mortality rate was maximum in RDS followed by in perinatal asphyxia, meconium aspiration syndrome, and neonatal sepsis. There was positive correlation between aetiology and outcome of neonatal respiratory distress (p value <0.001). Respiratory distress is one of the most common cause of neonatal morbidity and mortality. Early detection and appropriate management is the key to ensure the best outcome in neonates with respiratory distress.

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