

Original Research Article

Study of respiratory distress in newborn

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ABSTRACT

Background: Respiratory distress is one of the most common reasons an infant is admitted to the neonatal intensive care unit. Fifteen percent of term infants and 29% of late preterm infants admitted to the neonatal intensive care unit develop significant respiratory morbidity; this is even higher for infants born before 34 weeks gestation. Certain risk factors increase the likelihood of neonatal respiratory disease. These factors include prematurity, meconium-stained amniotic fluid (MSAF), caesarean section delivery, gestational diabetes, maternal chorioamnionitis, or prenatal ultrasonographic findings, such as oligohydramnios or structural lung abnormalities. Aim of the study was to study the, etiology and outcome of respiratory distress in newborns.

Methods: The present study was conducted at the Department of Pediatrics, Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India. Sample size was decided on the basis of prevalence of neonatal respiratory distress in our area. It was conducted for a period of two years from 1st August 2014 to 31st July 2016.

Results: maximum admissions on day 1 of life i.e. 309 (77.25%) followed by on day 2 i.e. 90 (22.50%) 231 (57.75%) were males and 169 (42.25%) were females. Male to female ratio was 1.36:1 Out of 400 children 11 were less than 1000 gms, followed by 77 (19.25%) had birth weight between 1000 g - 1499 g, 193 (48.25%) neonates had weight between 1500 g - 2499 gms and 118 (29.5%) neonates had weight between 2500 - 3499 gms and remaining 1 neonate had birth weight > 3500 grams. Out of 400 Neonates with respiratory distress, 281 (70.25%) had low birth weight and remaining 119 (29.75%) neonates had normal birth weight.

Conclusions: Respiratory distress was the major cause of admission in our NICU. Caesarean section was the most common predisposing factor associated with the development of respiratory distress in neonates. Antenatal risk factors increase the incidence of RD. The most common causes of respiratory distress were TTN, RDS, MAS, and perinatal asphyxia. The common cause of death was HMD. The outcome of neonatal respiratory distress was found as: a survival rate of 78.5%, mortality rate of 21.5%.

Keywords: Respiratory distress, Respiratory distress syndrome, Transient tachypnea of newborn

INTRODUCTION

Respiratory distress is one of the most common reasons an infant is admitted to the neonatal intensive care unit.¹ Fifteen percent of term infants and 29% of late preterm infants admitted to the neonatal intensive care unit develop significant respiratory morbidity; this is even

higher for infants born before 34 weeks gestation.² Certain risk factors increase the likelihood of neonatal respiratory disease. These factors include prematurity, meconium-stained amniotic fluid (MSAF), caesarian section delivery, gestational diabetes, maternal chorioamnionitis or prenatal ultrasonographic findings, such as oligohydromnios or structural lung abnormalities.

However, predicting which infants will become symptomatic is not always possible before birth. Regardless of the cause, if not recognized and managed quickly, respiratory distress can escalate to respiratory failure and cardiopulmonary arrest. Therefore, it is imperative that any health care practitioner caring for newborn infants can readily recognize the signs and symptoms of respiratory distress, differentiate various causes, and initiate management strategies to prevent significant complications or death.

Respiratory distress in the newborn is recognized as one or more signs of increased work of breathing, such as tachypnea, nasal flaring, chest retractions, or grunting.¹ Normally, the newborn's respiratory rate is 40 to 60 breaths per minute. Tachypnea is defined as a respiratory rate greater than 60 breaths per minute.³ Tachypnea is a compensatory mechanism for hypercarbia, hypoxemia or acidosis (both metabolic and respiratory), making it a common but non specific finding in a large variety of respiratory, cardiovascular, metabolic, or systemic diseases. Pulmonary disease may incite tachypnea, especially in neonates.

This study was conducted at AVBRH, Wardha, Maharashtra, India to study morbidity and mortality of respiratory distress in neonates admitted in NICU. Detection by symptoms, clinical signs and investigations to diagnose the neonates with respiratory distress, according to etiology is necessary to start treatment promptly. The neonatal mortality of respiratory distress can be decreased by proper monitoring of neonates in NICU. Early recognition and appropriate therapy of neonatal respiratory disease has impressive results.

Aim of the study was to study the etiology and outcome of respiratory distress in newborns, to study proportion of babies admitted with respiratory distress in out born and inborn section of NICU at AVBRH, to classify above babies based on etiology and study there outcome. Secondary objectives of the study were to correlate etiology with outcome, to correlate socioeconomic status with etiology and outcome.

METHODS

The present study was conducted at the Department of Pediatrics, Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India. This hospital has a well-equipped Pediatric department with 120 beds in 4 wards, with 10 bedded each, PICU and NICU.

NICU has separate inborn and outborn sections, where neonates were admitted. Sample size was decided on the basis of prevalence of neonatal respiratory distress in our area. It was conducted for a period of two years from 1st August 2014 to 31st July 2016.

Inclusion criteria

All the newborns less than equal to 28 days admitted in the NICU (inborn/outborn) with clinically identified respiratory distress.

Exclusion criteria

Parents not willing to enrolled in the study.

In this study newborns who were admitted to the neonatal intensive care unit (NICU) with clinically identified respiratory distress were included in the study. 400 newborns were recruited for this study as per the criteria.

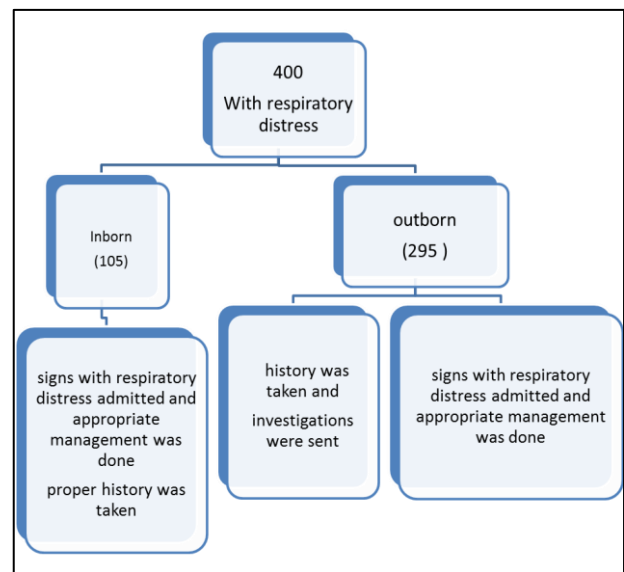


Figure 1: Methodology.

RESULTS

Maximum admissions on day 1 of life i.e. 309 (77.25%) followed by on day 2 i.e. 90 (22.50%). Males were affected more than females M:F ratio was 1.36:1 many of them were delivered by LSCS. 122 (43.72%) inborn and 38 (36.19%) outborn neonates had diagnosis of TTN who presented with respiratory distress in NICU whereas 74 (25.1%) inborn 33 (31.4%) and outborn neonates had RDS. There was no statistically significant difference was found between the place of delivery and diagnosis in neonates (P = 0.261) Table 1.

The most common cause of neonatal respiratory distress was TTN 160 (40%) followed by 107 (26.75%) respiratory distress syndrome. Third cause was birth asphyxia 49 (12.25%). Out of 400 neonates admitted in NICU with respiratory distress, 314(78.5%) neonates were discharged and 86 (21.5%) were deaths. The outborn death rate (21.9%) was marginally more as compared to inborn (21.35%) neonates with respiratory distress.

Table 1: Correlation of diagnosis in neonates with place of delivery.

Diagnosis	Inborn (%)	Outborn (%)	Total
Transient Tachypnea of new born	122 (43.72)	38 (36.19)	160 (40%)
Respiratory distress syndrome	74 (25.1%)	33 (31.4)	107 (26.75%)
Birth asphyxia related respiratory distress	38 (12.9)	11 (10.47)	49 (12.25%)
Meconium aspiration syndrome (MAS)	23 (7.8)	08 (7.6)	31 (7.75%)
Congenital pneumonia	21 (7.11)	05 (4.76)	26 (6.5%)
Congenital heart diseases	14 (4.74)	05 (4.76)	19 (4.75%)
Congenital anomalies	03 (1.01)	03 (2.85)	06 (1.5%)
Persistent Pulmonary Hypertension	00	01 (0.95)	01
Other conditions	00	01 (0.95)	01
Total	295	105	400

When socio economic status of neonates with respiratory distress was considered, out of 400 neonates with respiratory distress, most of the neonates were in upper lower class 198 (49.5%) followed by 124 (31%) were in middle lower class. The upper lower class had suffered more than other classes when etiology of respiratory distress was considered. All diseases but cardiac anomalies were common in upper lower class.

109 (27.5%). neonates had hyperinflation followed by pulmonary opacities in 103 (25.75%), white out lung

fields with air bronchogram in 90 (22.50%). Normal chest x-ray found in 93 (23.25%) neonates (Table 4)

Table 2: Outcome of neonates with respiratory distress admitted in NICU.

Outcome	Inborn	Outborn	Total
Discharge	232	82	314
Death	63	23	86
Total	295	105	400
Mortality %	21.35	21.9	21.5

Table 3. Socioeconomic status and etiology of respiratory distress.

Socio economic status	TTN (%)	MAS (%)	Congpneumonia (%)	Persistent pulmonary hypertension	HMD (%)	CongAnomalies (%)	Cardiac anomalies (%)	Birth asphyxia (%)	Othercauses
Upper class (n = 6)	2 (1.25)	1 (3.22)	0	0	2 (1.86)	0	1 (5.26)	0	0
Middle upper class (n = 38)	16 (10)	3 (9.6)	2 (7.7)	0	8 (7.47)	0	3 (15.8)	5 (10)	1
Middle lower class (n = 124)	43 (26.8)	9 (29.03)	11 (42.3)	0	36 (33.64)	2 (33)	8 (42.1)	15 (30.6)	0
Upper lower class (n = 198)	84 (52.5)	12 (38.7)	12 (46)	1	54 (50.46)	4 (66)	6 (31.6)	25 (51)	0
Lower class	15 (9.3)	6 (19.35)	1 (3.84)	0	7 (6.54)	0	1 (5.26)	4 (8.2)	0
Total	160	31	26	01	107	6	19	49	1

χ^2 value =90.10; p=0.0001; Significant; df=32

Table 4: X-ray findings in neonates admitted with respiratory distress in NICU.

X-ray finding	Frequency	Percentage
Hyperinflation	109	27.25
Pulmonary opacities	103	25.75
Normal	93	23.25
Ground glass opacities with air bronchogram	90	22.50
Consolidation	4	1.00
Collapse	1	0.25

Table 5: Causes of deaths in neonates with respiratory distress.

Causes of death	No of deaths
Transient tachypnea of new born	1 (1.16)
Meconium aspiration syndrome	7 (8.13%)
Congenital pneumonia	2 (2.32%)
Respiratory distress syndrome	53 (61.62%)
Congenital anomalies/ Trachea-esophageal fistula/diaphragmatic hernia	6 (6.97%)
Congenital heart disease	2 (2.32%)
Birth asphyxia	15 (17.4%)
Total	86

In the above table, RDS was the most common cause of deaths in neonates with respiratory distress admitted in our NICU followed by birth asphyxia.

DISCUSSION

Respiratory distress is one of the commonest disorder encountered within the first 48-72 hours of life. It occurs in 0.96 to 12% of live births and is responsible for about 20% of neonatal mortality. Respiratory pathology is the commonest (32-54%) autopsy finding among early neonatal deaths. The spectrum of respiratory distress in neonates includes transient tachypnea of the newborn, hyaline membrane disease, meconium aspiration syndrome, pneumonia and other miscellaneous causes. In developing countries there is a paucity of studies on causes of respiratory distress in neonates and all respiratory distress in neonates are treated as pneumonia at the first referral unit. The clinical features of pneumonia in neonatal period are often non-specific.

The present study was conceptualized to highlight the causes, maternal risk factors, neonatal risk factors and outcome of respiratory distress. A total of 400 neonates with respiratory distress included of which 86 died with the mortality of 21.5% in the study. The most common cause of respiratory distress syndrome was transient tachypnea of newborn followed by respiratory distress syndrome. The respiratory distress syndrome proved to be number one cause of mortality in this study. The most common cause of neonatal respiratory distress was TTN

160 (40%) followed by 107 (26.75%) respiratory distress syndrome. Third cause was birth asphyxia 49 (12.25%).

In the study by Rakholia et al, in both inborn and outborn neonates the most common cause of respiratory distress was respiratory distress syndrome. The second common cause in inborn neonates was birth asphyxia (17%) and in outborn neonates had sepsis.⁴

It can be noted that the birth asphyxia in present study as the cause of neonatal respiratory distress was less common i.e., third in the order after respiratory distress syndrome. Santosh S et al mentioned that, 35 (46%) babies had TTNB, 24 (31.5%) babies had RDS, 19 (25%) had BA, 19(25%) babies had pneumonia and sepsis, 6 (7.8%) babies had MAS, 2 (2.6%) babies had pneumothorax, 1 (1.3%) neonates had CHD, 1 (1.3%) neonates had laryngomalacia as a cause for respiratory distress.

According to Tudehope et al TTN is the commonest cause of RD accounting for 41%, he also showed TTNB was more common following caesarean section before labor the reason given that is in absence of labour anticipatory lung fluid clearance will not have occurred.⁶ In the study done by Kumar A transient tachypnea of newborn (TTN) was found to be the commonest (42.7%) cause of RD followed by infection (17.0%), meconium aspiration syndrome (10.7%), hyaline membrane disease (9.3%) and birth asphyxia (3.3%).⁷

Lucy K et al had demonstrated estimated time trends in the deprivation gap in neonatal mortality by cause of death. Neonatal mortality rates were more than twice as high in the most deprived areas of England than in the least deprived areas, and the relative gap widened over time.⁸ They concluded that neonatal deaths would be 39% lower if all areas had the same neonatal mortality rates as the least deprived areas. This widening relative deprivation gap in all causes of neonatal mortality is particularly associated with an increase in the proportion of deaths associated with immaturity at less than 24 weeks gestation, for which the deprivation gap in mortality is widest.

Lucy K et al also pointed out that the all cause morbidity and mortality due to prematurity, sepsis, congenital anomalies, accidental deaths were more in the low socioeconomic status.

In the present study, similar findings were observed as low socioeconomic status (upper lower class and middle lower class) had more burden of neonatal morbidity.

In the present study, 109 (27.5%) neonates had hyperinflation followed by pulmonary opacities in 103 (25.75%), white out lung fields with air bronchogram in 90 (22.50%). Normal chest x-rays were found in 93 (23.25%) neonates.

A 65.4% of cases in Zaazou MH et al study had characteristic radiological findings of linear streaking at hilum.⁹ This coincides with the findings of Eaton J et al who reported that chest radiography is the diagnostic standard of TNN with prominent peri-hilar streaking that correlates with engorgement of lymphatic system with retained lung fluids.¹⁰ Prasad V et al and Singh N had the mortality rate of 18.69 % which is similar but slightly lower as compared to study in Pakistan by Das PJ et al.^{11,12} Steven et al reported that mortality rate of respiratory distress syndrome decreased by approximately 50% over the last decade with the advent of surfactant therapy.¹³

CONCLUSION

Males were affected more than females M:F ratio was 1.36:1 many of them were delivered by LSCS. The most common causes of respiratory distress were TTN, RDS, MAS, and perinatal asphyxia. In most of the cases X-ray findings correlated with the clinical picture. The survival rate was 79% among RD cases admitted to NICU. The common cause of death was HMD. Mortality is significantly higher than developed and even much higher than other developing countries and rest of India because of low socioeconomic status. Early detection and appropriate management is essential to ensure better outcome in all infants presenting with respiratory distress. The outcome of neonatal respiratory distress was found as: a survival rate of 78.5%, mortality rate of 21.5%.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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