

Spectrum of Respiratory Distress in Newborn: A Study From a Tertiary Care Military Hospital

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Abstract:

Introduction: Respiratory distress (RD) is a common problem in neonatal period. It is an important cause of neonatal mortality. There are many causes of respiratory distress, among them, transient tachypnea of newborn (TTN), respiratory distress syndrome (RDS) and perinatal asphyxia are commonest causes. Timely and appropriate therapy is essential to prevent ongoing injury and improve outcome. The aim of this study was to determine the prevalence and to identify the causes of respiratory distress in neonatal intensive care unit (NICU) in Combined Military hospital (CMH) Sylhet and to observe the hospital outcome of these babies.

Material and Methods: A descriptive type of cross-sectional study was conducted in CMH Sylhet over a period of one year from April 2018 to March 2019. All live newborns delivered at CMH Sylhet during the study period were included and observed for development of respiratory distress.

Results: All newborns (n=287), delivered at this hospital over the period of 12 months, were observed for respiratory distress. The overall prevalence of respiratory distress was 19.2 %. Prevalence was 10.8 % in full term, 7.3 % in preterm and 1.1% in post term. There was male

predominance (54.5%) and two third (71.1%) were born by cesarean section. Transient tachypnea of newborn was found to be the commonest 47.3% cause of respiratory distress followed by respiratory distress syndrome 29.1%, perinatal asphyxia (10.9%), congenital pneumonia 3.6%, congenital heart disease 3.6%, septicaemia 3.6% and meconium aspiration syndrome (MAS) 1.9%. All babies required high flow oxygen initially, subsequently Bubble CPAP and mechanical ventilation was required in 8 (14.5%) and 1(1.8%) cases respectively. Mortality was 1.8% in neonates with respiratory distress syndrome with pneumothorax with septicaemia requiring mechanical ventilation.

Conclusion: In this series, RDS in newborn majority of cases were due to TTN followed by respiratory distress syndrome and perinatal asphyxia. Mortality was mainly related to pneumothorax with septicaemia, RDS was more common in births related to caesarian section.

Keywords: Meconium Aspiration Syndrome (MAS), Respiratory distress (RD), Respiratory distress syndrome (RDS), Transient Tachypnea of the Newborn (TTN)

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Introduction:

Respiratory disorders are the most frequent cause of admission for neonatal intensive care in both term and preterm infants.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 It occurs in 0.96 to 12% of live births and is responsible for about 20% of neonatal mortality.³ The severity of respiratory distress can be assessed by Downe's scoring system which includes parameters such as respiratory rate, cyanosis, retractions, grunting and air entry in both the lungs.⁴

The causes of respiratory distress in neonates include transient tachypnea of newborn (TTN), respiratory distress syndrome (RDS), meconium aspiration syndrome (MAS), congenital pneumonia, congenital heart disease (CHD), perinatal asphyxia (PNA), and congenital anomalies as tracheo-oesophageal fistula, and congenital diaphragmatic hernia.⁵

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Timely and appropriate therapy is essential to prevent ongoing injury and improve outcome.¹ There has been a tremendous advance in the management of respiratory distress such as ventilator therapy with different modes such as Continuous Positive Airway Pressure (CPAP), conventional mechanical ventilation; ultra high frequency jet ventilation, liquid ventilation, surfactant replacement therapy, sophisticated monitoring and extracorporeal membrane oxygenation all have improved the outcome among the babies with respiratory distress.⁶

In spite of the varying recent advance in clinching diagnosis and management there have been very less clinical studies on the neonatal respiratory distress in our country. Therefore, there is a need to know the causes of respiratory distress and outcome of the babies with respiratory distress.

The aim of the study was to identify the prevalence and causes of respiratory distress among the admitted newborns in neonatal intensive care unit (NICU) in CMH Sylhet and to observe the hospital outcome of these babies.

Material and Methods:

This descriptive type of cross-sectional study was carried out at NICU, CMH Sylhet during April 2018 to March 2019. Any newborn showing one or more of the following signs (for >2 hours) was considered to have respiratory distress which includes parameters such as tachypnea or respiratory rate of more than 60/minute, retraction or increased chest in-drawing on respirations (subcostal, intercostal, sternal, and suprasternal) and noisy respiration in the form of grunt, stridor or wheeze were included in this study and babies with multiple congenital malformations were excluded. The ethical approval of the study was obtained from ethical review committee of the area headquarter, Sylhet cantonment, Sylhet. Diagnosis was done within 24 hours of admission according to their clinical presentation and relevant investigations.

Informed consent was taken from each patient before enrollment. Data were collected by checkup sheet and appropriate questionnaire who were admitted in NICU.

After the initial assessment and cardio respiratory management, a history was obtained. Maternal and obstetrical histories were taken which provided invaluable information. Intra-partum details with special reference to the fetal well-being, duration of rupture of membranes, quantity and quality of liquor, drugs especially analgesics and sedatives given to the mother were recorded. Apgar score, resuscitation details, sex, and gestational age was assessed by modified Ballard score and clinical examination, birth weight and findings suggestive of respiratory distress were also noted. Data regarding use of mechanical ventilation, Bubble CPAP or required only oxygen were recorded. Statistical analysis was performed using the commercial statistical software Epi info version 3.5.

RESULTS:

The total number of live births during the study period was 287. Total number of caesarean section deliveries were 204 (71.1%) and spontaneous vaginal deliveries were 83 (28.9%). Out of all these cases 55 (19.2%) newborns developed respiratory distress. Among respiratory distress male and female ratio was equal. Full term newborns were 31 (56.4%), premature newborns were 21 (38.2%), and post term was 3 (5.4%). The overall prevalence of respiratory distress was 19.2%. Prevalence of respiratory distress among term, preterm and post term was 56.4%, 38.2% and 5.4% respectively. Mean gestational age was 35.6 ± 3.1 wks (range - 31 to 41 weeks). Mean weight was 2447 ± 826 gm (range - 1400 to 4100 gm). Thirty three (60%) babies had normal birth weight, 20 (36.4%) were low birth weight, 1(1.8%) were very low birth weight and 1(1.8%) were macrosomic (weight >4000gm) babies. The major causes of RD are shown in (Table I).

Table I: Causes of respiratory distress of studied newborn (n=55)

Disease	Number	Percentage
Transient tachypnea of newborn (TTN)	26	47.3%
Respiratory distress syndrome (RDS)	16	29.1%
Perinatal asphyxia (PNA)	6	10.9%
Congenital pneumonia	2	3.6%
Congenital heart disease (CHD)	2	3.6%
Septicaemia	2	3.6%
Meconium aspiration syndrome (MAS)	1	1.8%

TTN was found to be the commonest cause of respiratory distress (47.3%) and it was found to be the commonest cause of respiratory distress among both term and preterm babies. RDS was the second commonest cause of respiratory distress (29.1%) and it was found in preterm babies. PNA was the third

commonest cause of respiratory distress (10.9%) and it was found in term and post term newborns. Congenital pneumonia, CHD, septicaemia, and MAS were found in 3.6%, 3.6%, 3.6%, and 1.8% of cases respectively. Causes of respiratory distress with obstetrics and gestational history are shown in Table II.

Table II: Causes of respiratory distress with obstetrics and gestational history

Criteria	TTN	RDS	PNA	Congenital pneumonia	CHD	Septicaemia	MAS
M:F	1.4:1	1.3:1	2:1	1:1	1:1	1:1	1:1
Term (%)	88.5%	6.3%	66.7%	50%	50%	0%	100%
Preterm (%)	11.5%	93.7%	33.3%	50%	50%	100%	0%
Mean GA (weeks) ± SD	37.1 (±1.1)	32.5 (±0.8)	37.3 (±1.2)	37.1 (±1.0)	36.2 (±1.1)	34.5 (±1.1)	41 (±1.2)
Mean weight (grams) ± SD	2900 (±880)	1500 (±770)	2700 (±565)	2740 (±630)	2500 (±820)	1850 (±785)	3100 (±740)
C/S	69.2%	87.5%	83.3%	100%	100%	50%	100%
NVD	30.8%	12.5%	16.7%	0%	0%	50%	0%

Table III: Treatment of patients of respiratory distress

High flow oxygen through head box	55 (100%)
Bubble CPAP	8 (14.5%)
Mechanical ventilation	1(1.8%)

All babies required high flow oxygen initially by head box 55 (100%), subsequently Bubble CPAP and mechanical ventilation was required in 8 (14.5%) and 1(1.8%) cases respectively.

Mortality was 1.8% in neonates with respiratory distress syndrome with pneumothorax with septicemia requiring mechanical ventilation.

Discussion:

Respiratory distress, the most common cause for which baby needed intensive care support and death rate was 2-4 times more in this group of patients than those required admission without respiratory distress⁷. The overall prevalence of respiratory distress in this study was 19.2%. Results from our study are comparable with results from developed countries with reported prevalence rates of 4.24% in Pakistan⁸, 18.5% in France⁹, 23% in Ivory Coast¹⁰ and 14.5% Burkina Faso¹¹.

The prevalence of respiratory distress is influenced by the geographical and ethnic factors, availability of neonatal intensive care unit and health care facilities. Results from our study are comparable with results from developed countries because the facilities

available in our NICU were equal to those available in developed countries.

In the present study, the most common causes of respiratory distress found were TTN (47.3%), RDS (29.1%), PNA (10.9%), septicemia (3.6%), congenital pneumonia (3.6%) and congenital heart disease (3.6%). Santosh S¹² et al also reported near similar finding.

TTN was the commonest (47.3%) cause of respiratory distress in this study. In many study, TTN was found to be the commonest cause which was consistent with this study^{13, 14}. Among the neonates with TTN 88.5% were term and their mean Gestational age was 37.1 weeks, and their mean weight was 2900 gm. Two third (69.2%) were delivered by C/S. Different studies showed cesarean section, term babies and male predominance to be associated with TTN^{15,16}. In this study similar result was found but more than half of the TTN cases were term baby but their birth weight was normal. Assisted ventilation in the form of bubble CPAP (bCPAP) was required in 14.5% cases without any mortality. Zaazou MH et al. found 37.9% neonates had

respiratory distress due to TTN among them 11.5% cases required nasal CPAP with no mortality¹⁵. Many other studies also reported cases with TTN requiring assisted ventilation without any mortality^{14,17}.

RDS is an important cause of respiratory distress in our set up and also was the second common cause in our study. It constituted 29.1% of cases. Majority (93.7%) were preterm with mean gestational age 32.5 weeks and mean weight of 1500 gram. One study showed that RDS was the second commonest cause of respiratory distress which constituted 31%, like our finding¹⁵. In many other studies showed low percentage (2-7%) of RDS^{14, 18, 19}. Assisted ventilation was required for the management of RDS, in the form of bCPAP and mechanical ventilation in 14.5% and 1.8% cases respectively. Mortality was 1.8% among the ventilated baby who required mechanical ventilation associated with pneumothorax with septicemia while no death observed who required bCPAP. One study showed that 83.2% cases of RDS required ventilator support and mortality rate was 76.0% who put on IMV mode¹⁴.

Perinatal asphyxia still remains one of the major cause of neonatal respiratory distress^{20, 21}. Perinatal asphyxia was the third common (10.6%) cause of respiratory distress in this study. Their mean gestational age 37.3 weeks and mean weight 2600 grams. Nessa L et al found 52% newborn had respiratory distress who had perinatal asphyxia¹⁸ which is much higher than our study but on the contrary, many other study showed low incidence of perinatal asphyxia^{14, 15}.

In this study, among all cases with respiratory distress, mechanical ventilation was required in 1.8% cases and bCPAP required in 14.5% cases. There was no death who required bCPAP but mortality rate was 1.8% among the babies who required mechanical ventilation. One study reported that mortality was high (80%) in perinatal asphyxia who required mechanical ventilation¹⁵. Lawn et al. reported that mortality rate in cases of perinatal asphyxia is as high as 25-50%²².

Neonatal sepsis is an important and common cause of neonatal morbidity and mortality^{23, 24, 25}. We found septicemia as the fourth (3.6%) cause of respiratory distress in this study. Majority (100%) of them were preterm, mean gestational age was 34.5 weeks and mean weight was 1850 grams. Mechanical ventilation and bCPAP were required in 1.8% and

14.5% cases respectively among these babies. Among these babies, 1 (1.8%) died who required mechanical ventilation but no death was observed who required bCPAP. One study reported that case fatality rate is 33.3% in the cases with neonatal sepsis¹⁸.

Congenital pneumonia was found in 3.6% cases. 50% were preterm mean gestational age was 37.1 weeks. Dutta A et al found pneumonia as the second common cause of respiratory distress in his study¹⁴, where in most cases it was part of septicemia and 34.28% was primary pneumonia. In another study, pneumonia was found to be a cause of respiratory distress in 8% cases¹⁸, which is near to our finding. Mechanical ventilation and bCPAP were required in 1.8% and 14.5% cases respectively among these babies. No death was observed in cases required bCPAP or mechanical ventilation.

Conclusion:

Respiratory distress is the commonest problem encountered in neonatal ICU. Most common causes of respiratory distress are TTN, RDS, perinatal asphyxia and septicemia. Better obstetrical care and awareness of the risk factors of birth asphyxia among mothers and fetus, along with adequate follow-up of pregnancy and labor for early detection of risk factors and timely intervention may improve the outcome of neonatal respiratory distress.

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