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Research Article

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Clinical profile of neonates with respiratory distress

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ABSTRACT

Background: Respiratory distress is defined as tachypnea (respiratory rate>60/min), inter-costal/subcostal retractions/nasal flaring and grunting.

Methods: The study was conducted on 1030 neonates with clinical diagnosis of Respiratory distress. Clinical and the demographic information were recorded; gestational age was calculated by LMP/New Bellard method. Severity of distress were assessed by using Silverman and Anderson score

Results: The common causes of Respiratory distress observed in the study were Hyaline membrane disease 262 (25.44%), followed by birth asphyxia 254 (24.66%), Septicemia/Pneumonia242 (23.50%), meconium aspiration syndrome 73 (7.09%). Others cause of distress were Tracheoesophageal fistula 54 (5.24%), Congenital heart Disease 44 (4.27%), Transient tachypnoea of newborn 43 (4.17%) and others 58 (5.63%). Mortality was 230 (22.33%), mortality rate was directly related to Anderson Silverman score

Conclusions: Hyaline membrane Disease was the commonest cause of respiratory distress followed by Birth asphyxia, Pneumonia, Meconium aspiration syndrome, Tracheo-oesophageal fistula, Transient tachypnea of newborn, congenital heart disease and others. Mortality was highest in Hyaline membrane disease 93 (35.49%) f/d by Birth asphyxia 54 (22.44%), Pneumonia 44 (18.03%), Congenital heart disease 7 (15.90%), Meconium aspiration syndrome 10 (13.69%), Tracheo-oesophageal fistula 10 (18.50).

Keywords: Hyaline membrane disease, Respiratory distress, Birth asphyxia

INTRODUCTION

Respiratory difficulties constitute the commonest cause of morbidity in new-born. It is the most common cause of admission in a NICU. Early diagnosis of cause of respiratory distress is very important in the management of neonatal distress for better clinical outcome. Improved diagnosis and treatment due to technological advancements and increased neonatal specialization have led to an impressive fall in neonatal mortality.

Respiratory distress is diagnosed clinically When two out of the following are present¹:-

- 1. Tachypnea (respiratory rate>60/min)
- 2. Intercostal/Subcostal retractions/Nasal flaring
- 3. Grunting

The prevalence of respiratory distress varies with gestational age 30% among preterm, 20% among post-terms to 4% in term babies.² The overall prevalence is 7-8% among live births. The respiratory problems are responsible for about 20% of neonatal mortility.³ The cause of distress may be within the respiratory system or outside.⁴ Pulmonary causes account for 80-85% cases of respiratory distress in a new-born.

The cause of respiratory distress in neonates are Hyaline membrane disease, Birth Asphyxia, Pneumonia/Septicemia, Meconium aspiration syndrome, Transient tachypnea of new-born, Tracheoesophageal fistula and other congenital malformations, Persistent pulmonary hypertension pneumothorax, cardiac failure, anemia, polycythaemia, metabolic disorders, meningitis, renal failure etc.

Hyaline membrane disease⁵

It is usually seen among preterm babies and rarely after 36 weeks of gestation. The prevalence decreases with increasing maturity. It may occur among 80% of babies less than 28 weeks of gestation and 60% among 28-32 week of gestation, 15-30% of those between 32 and 36wk, in about 5% beyond 37 weeks of gestation. Clinical features include tachypnea, retraction, grunting, cyanosis and decreased air entry. Diagnosis can be confirmed by chest x-ray. Radiological features include reticulogranular pattern, ground glass opacity, low lung volume, air bronchogram and white out lungs in severe disease. ⁶

Birth asphyxia¹

Birth asphyxia is no consensus for universal definition of birth asphyxia. Few definition are used:

- 1. Apgar score between 4-6 (moderate) and less than 4 (severe) at one minute
- 2. Apgar score of less than 4 at 5 minute
- 3. Cord blood Ph of 7 or less with clinical evidence of Hypoxic-ischemic encephalopathy or evidence of multiple organ dysfunctions.

Pneumonia

Pneumonia may be observed among 0.5% of live births and 10% of low birth weight and sick new-borns. Newborn may have grunting, retractions, tachypnea or apnea. There could also be temperature instability, reduced activity and other features suggestive of systemic infection. Laboratory tests can be done for diagnosing sepsis and pulmonary involvement. Sepsis screening, Creactive protein and blood culture are helpful in diagnosing sepsis.

Meconium aspiration syndrome (MAS)⁵

Meconium stained amniotic fluid found in 10-15% of birth and usually occurs in term or post term infants. Meconium aspiration pneumonia develops in 5% of such infants. Meconium is aspirated into the lung in first breath. The resulting small airway obstruction may produce respiratory distress within first hours, with tachypnea, retraction, grunting and cyanosis. Partial obstruction of some airways may lead to pneumo-thorax or pneumo-mediastinum, or both. Blocking of airways leading to apnea, collapse of lung, air leak, consolidation, hypoxic brain damage and Persistent pulmonary hypertension are the complications. X-ray characterised by patchy infiltrates, coarse streaking of both lung fields, increased AP diameter and flattening of both diaphragm.

Tracheoesophageal fistula

Clinical features depends on the presence or as well as on

the location of a tracheoesophageal fistula Infants often present with excessive salivation and vomiting soon after feeding. They may develop respiratory distress due to the following: Diagnosis - A stiff red rubber catheter cannot pass into stomach and it may get arrested at a distance of 8 to 10 cm from the mouth. The diagnosis is confirmed by x-ray studies showing the catheter coiled in the upper oesophageal pouch.

Transient tachypnea of new-born⁸

It occurs mostly among term and near term babies and is due to delayed clearance of lung fluids. These babies have tachypnea with minimal or no respiratory distress. Chest x-ray may show hyper expanded lung fields, prominent vascular marking and prominent inter-lobar fissure. Diagnosis is usually made by exclusion of other causes. The condition is usually self-limiting and lasts for 12-24 hours.

Pneumothorax²

Pneumothorax is a collection of air in the pleural cavity surrounding the lung. It is caused by the rupture of one or more alveoli which allows air to escape from the lung. The clinical diagnosis of Pneumothorax in the new-born is often presents as:-.

- 1. Sudden unexpected collapse.
- Rapidly increasing oxygen needs in respiratory distress.
- 3. Poor breath sounds with little movement on one side of the chest.
- 4. An easily palpable liver in a right sided Pneumothorax.
- 5. Poor heart sounds or heart sounds best heard on the right of the sternum in a left sided Pneumothorax (the heart is pushed to the right).

The present study report the clinical profile, etiology and outcome of neonate with respiratory distress.

METHODS

The study was conducted on neonates in the NICU, Balchikitsalaya of MBGH RNT Medical College, Udaipur, Rajasthan, India from December 2013 to June 2014. The 1050 consecutive born neonates with respiratory distress were studied. Among 1030 neonates admitted to NICU within 28 days of birth due to respiratory distress were included in the study and 20 neonates excluded due to LAMA. All neonates Respiratory distress was diagnosed clinically when two out of the following were present: Tachypnea (respiratory rate>60/min)/ Intercostal/ Subcostal retractions/Nasal flaring/Grunting.

The clinical and the demographic information were recorded based on a pre-structured proforma, weight of neonates was recorded by electronic weighing machine, gestational age was calculated by LMP. If LMP was not known, it was calculated by New Bellard method. The severity of the respiratory distress was assessed by using Silverman and Anderson clinical score. The investigations were performed as per proforma to establish the diagnosis and neonates were managed as per protocol. All neonates were examined daily till discharge from hospital or death. Mortality was documented to assess the clinical outcome against the final diagnosis.

RESULTS

Total of 1030 consecutive neonates with respiratory distress who fulfilled the inclusion criteria were enrolled in the study. During this period the neonates admitted in NICU were 3268. This had 32% respiratory distress.

Table 1: Clinical profile of neonates with respiratory distress.

| Clinical feature | No. of neonates (%) |
|------------------|---------------------|
| Rapid breathing | 1013(98.35%) |
| Chest in drawing | 786 (76.31%) |
| Cyanosis | 275 (26.69%) |
| Grunting | 272 (26.40%) |
| Lethargic | 111 (10.77%) |
| Hypothermia | 65 (6.31%) |

Most neonates were admitted with complaint of rapid breathing 1013 (98.35%). Other symptoms are chest in drawing 786 (76.31%) and cyanosis 275 (26.69%) (Table 1).

Table 2: Etiology of respiratory distress.

| Diagnosis | No. of neonates | No. of death |
|----------------------|-----------------|--------------|
| HMD | 262 | 93 (35.49%) |
| BA | 254 | 57 (22.44%) |
| Pneumonia/Septicemia | 242 | 44 (18.03%) |
| MAS | 73 | 10 (13.69%) |
| CHD | 44 | 7 (15.90%) |
| TEF | 54 | 10 (18.51%) |
| TTN | 43 | 0 (0%) |
| Others | 58 | 9 (15.51%) |
| Total | 1030 | 230 (22.33%) |

262 neonates had respiratory distress because of Hyaline membrane Disease and among them 93 (35.49%) neonates expired. It was highest mortality. There was no mortality among neonates with Transient tachypnoea of new-born (Table 2).

Anderson Silverman score was done in all neonates. Respiratory distress was divided into 3 category based on the score. These were mild (1-3 score), moderate (4-6 score) and severe (>6 score) respiratory distress. There

were 47 neonates in mild category, 650 neonates in moderate category and 343 neonates in severe category. 3 (6.38%) neonates expired in the group of neonates with mild respiratory distress and 61 (9.38%) neonates expired in the group of neonates with moderate respiratory distress and 166 (49.85%) expired in the group of neonates with severe respiratory distress. Mortality rate was directly related to severity of respiratory distress (Anderson Silverman score) (Table 3).

Table 3: Outcome of neonates and Severity of respiratory distress (Anderson-Silverman score).

| Severity of respiratory distress | Total No. | Expired |
|-------------------------------------|-----------|--------------|
| Severity of respiratory Distress | Total No. | Expired |
| Mild respiratory distress (1-3) | 47 | 3 (6.38%) |
| Moderate respiratory distress (4-6) | 650 | 61 (9.38%) |
| Severe respiratory distress (>6) | 333 | 166 (49.85%) |

DISCUSSION

This study was a hospital based prospective study of the neonates with Respiratory distress. The neonates were evaluated clinically and laboratory investigations were done to find out the cause of respiratory distress. In the present study 1050 neonates were enrolled with respiratory distress.20 neonates were excluded due to LAMA. Most of the neonates 850 (82.52%) were hospitalized within 24 hr of birth. 108(10.49%) neonates were hospitalized between 24-72hr days, 72 (6.99%) neonates were admitted >72 hr of life.

In preterm male of the total neonates with Respiratory distress included in the present study, 64.95% were males and 35.04% were females.¹¹ Misra PK et al have also found incidence of Respiratory distress higher in males as compared to females.

Most neonates were admitted with complaint of rapid breathing 1013 (98.35%). Other symptoms are chest in drawing 786 (76.31%), cyanosis 275 (26.69%), grunting 272 (26.40%), Lethargic/Not accepting feed 111 (10.77%), hypothermia 65 (6.31%) and fever 60 (5.83%). These findings are similar to those of Mathur NB et al, Shakunthala et al. ^{12,13}

The common causes of Respiratory distress in the neonates in the study were Hyaline membrane disease 262 (25.43%), followed by Birth asphyxia 254(24.66%), Septicemia/Pneumonia 242 (23.49%) and Meconium aspiration syndrome 73 (7.09%). Others had respiratory distress because of other causes like tracheoesophageal fistula 54 (5.24%), congenital heart disease 44 (4.27%), transient tachypnea of new-born 43 (4.17%). 58 (5.63%)

neonates had respiratory distress because of other miscellaneous causes.

Misra PK et al found the causes of respiratory distress in neonates were pneumonia (32.2%), transient tachypnea of new born (18.7%), CNS causes (asphyxia, hemorrhage) (17.7%), Meconium aspiration syndrome (15%),IRDS (12.5%), Miscellaneous (3.2%). 12

Kumar et al found the causes of respiratory distress in neonates were Transient tachypnea of new born (48.4%), HMD (27.7%), meconium aspiration syndrome (10.3%), pneumonia (2.3%), miscellaneous (12.3%). 14

Rubalteli FF, Dani C, Reali MF et al found the cause of respiratory distress in neonates were HMD (46%), transient tachypnea of new born (37%), pneumonia/sepsis (5%), meconium aspiration syndrome (2%), congenital cardiac malformation (2%), multiple congenital anomalies (1.4%), spontaneous pneumothorax (1.2%), perinatal asphyxia (1.1%) and others (4.3%). ¹⁵

Severity of respiratory distress was assessed according to Anderson Silverman score. Respiratory distress was categorized in mild, moderate and severe category at the time of hospitalization in NICU. 47 (4.56%) neonates had mild respiratory distress, 650 (63.10%) neonates had moderate respiratory distress and 333 (32.33%) neonates had severe respiratory distress.

Mortality was highest (63.07%) among the neonates with gestational age less than 28 week, Mortality was 27.27% among neonates with gestational age 28-32 wks and mortality was 21.41% among neonates with gestational age 33-36 wks and 13.73% among neonates with gestational age more than 37 week. A decreasing trend in fatality in respiratory distress was observed with increase in gestational age which is similar to finding of Khatua¹⁶, Misra¹¹ and Kumar¹⁴ and Singhi¹⁷ et al.

Mortality was significantly higher in neonates with respiratory distress having gestational age less than 36 wks.² Khatua found higher fatality in preterm (82.7%) in neonates with respiratory distress as compared to present study.

Among ELBW (<1kg) 25 (54.34%) expired.53 (36.05%) expired in VLBW category. 96 (18.93%) expired in the birth weight group of 1.5-2.5 kg and 56 (16.97%) neonates expired in the category of birth weight more than 2.5 kg.

In this study we noted a decreasing trend in mortality with increasing weight of the neonates which is in accordance with the earlier studies on respiratory distress. 14,16

In the present study incidence of respiratory distress is more in male compare to female. This was similar to earlier study by Misra¹⁸ et al and Hjalmorson¹⁹ et al.

262 neonates had respiratory distress because of Hyaline membrane disease and among these 93 (35.49%) neonates expired. 254 neonates had respiratory distress because of Birth asphyxia and among these 57 (22.44%) neonates expired. 242 neonates had respiratory distress because of Septicemia/Pneumonia 44 (18.03%) neonates expired. 44 neonates had respiratory distress because of congenital heart disease, and 7 (15.90) expired. Out of 73 neonates of meconium aspiration syndrome, 10 (13.69%) neonates expired. There were 54 neonates of Tracheo-oesophageal fistula, in which 10 (18.51%) expired. There was no mortality in transient tachypnoea of new-born.

Severity of respiratory distress was assessed by Anderson Silverman score. Respiratory distress was divided into 3 category based on the score. These were mild (1-3 score), moderate (4-6 score) and severe (>6 score) respiratory distress. There were 47 neonates in mild category, 660 neonates in moderate category and 343 neonates in severe category. 3 (6.38%) neonates expired in the group of neonates with mild respiratory distress and 61 (9.38%) neonates expired in the group of neonates with moderate respiratory distress and 166 (49.85%) expired in the group of neonates with severe respiratory distress. Mortality rate was directly related to Anderson Silverman score.

Mathur NB, Garg K, Kumar S found that mortality in neonates with pneumonia having Silverman score 4-6 (63.33%) was significantly more as compared to those with score 0-3 (17.8%). There was no neonate in severe score. These finding was similar to present study.

The overall mortality rate in present study was 22.33% which is higher than that reported by Ersch J, Roth Kleiner (3.5%) But mortality was lower compared to Mathur NB, Misra PK study, Khatua SP, Gangwal A study etc. ^{11,12,16}

Severity of respiratory distress was assessed according to Anderson Silverman score. Respiratory distress was categorized in mild, moderate and severe category at the time of hospitalization in NICU. 4.47% neonates had mild respiratory distress, 62.85% neonates had moderate respiratory distress and 32.66% neonates had severe respiratory distress.

CONCLUSION

Hyaline membrane disease was the commonest cause of respiratory distress followed by Birth asphyxia, Septicemia/Pneumonia, Mecomium aspiration syndrome. Other neonates had respiratory distress because Tracheooesophageal fistula, Transient tachypnoea of new-born, congenital heart disease and other miscellaneous causes.

Mortality was highest in HMD (35.49%), Birth asphyxia (22.44%), Septicemia/pneumonia (18.03%), CHD (15.90%), MAS (13.69%), TEF (18.50%).

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