

ORIGINAL RESEARCH

## Study of clinical profile of neonates admitted in NICU with respiratory distress in a tertiary care hospital

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### ABSTRACT

**Background:** Respiratory distress (RD) is a challenging problem and is one of the most common causes of admission in neonatal intensive care unit (NICU). The common causes of RD in neonates includes transient tachypnea of the newborn (TTN), hyaline membrane disease (HMD), birth asphyxia, pneumonia, meconium aspiration syndrome (MAS), and other miscellaneous causes. Present study was aimed to clinical profile of neonates admitted in NICU with respiratory distress in a tertiary care hospital.

**Material and Methods:** This study was prospective, observational study, conducted in neonates admitted to NICU with respiratory distress.

**Results:** In present study, majority neonates were male (56.38 %), had birth weight 1.5 – 2.5 kg (46.28 %), were term gestational age (41.49 %) & delivered vaginally (52.13 %). Symptoms and signs of respiratory distress noted were tachypnea (86.17 %), flaring of alae nasi (84.04 %), chest in drawing (82.45 %), grunting (47.34 %) & cyanosis (42.55 %). Premature rupture of membranes (13.83 %), meconium-stained amniotic fluid (11.17 %), hypertension (9.04 %), maternal pyrexia (5.85 %), foul smelling liquor (2.66 %) & diabetes mellitus (2.13 %) were maternal risk factors observed among neonates with respiratory distress. Among neonates admitted with respiratory distress common diagnosis were transient tachypnea of newborn (34.57 %), sepsis (20.74 %), respiratory distress syndrome (11.17 %), meconium aspiration syndrome (9.04 %), hyaline membrane disease (8.51 %) & birth asphyxia (5.85 %). Majority neonates were discharged uneventfully (86.71 %) & mortality was observed among 16 neonates (8.51 %).

**Conclusion:** Common diagnosis observed in neonates with respiratory distress were transient tachypnea of newborn, sepsis, respiratory distress syndrome, meconium aspiration syndrome, hyaline membrane disease & birth asphyxia.

**Keywords:** respiratory distress, NICU, transient tachypnea of newborn, meconium aspiration syndrome, hyaline membrane disease

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### INTRODUCTION

Respiratory distress (RD) is a challenging problem and is one of the most common causes of admission in neonatal intensive care unit (NICU). 15% of term infants and 29% of late preterm infants admitted to the neonatal intensive care unit experience significant respiratory morbidity.<sup>1</sup> Signs and symptoms of respiratory distress include cyanosis, grunting, nasal

flaring, retractions, tachypnea, decreased breath sounds with or without rales and/or rhonchi, and pallor.<sup>2</sup>

The common causes of RD in neonates includes transient tachypnea of the newborn (TTN), hyaline membrane disease (HMD), birth asphyxia, pneumonia, meconium aspiration syndrome (MAS), and other miscellaneous causes.<sup>1,3</sup> Non-respiratory causes of respiratory distress include metabolic disorders such as hypothermia or hyperthermia, hypoglycemia, polycythemia, cardiac disorders, birth asphyxia, metabolic acidosis, and various inborn errors of metabolism.<sup>4</sup>

In the last decades, the primary goals have been directed toward decreasing the rate of respiratory distress, as well as morbidity and mortality caused by respiratory distress, by introducing different interventions, such as sophisticated models of mechanical ventilators, nasal continuous positive airway pressure (CPAP), use of the antenatal steroids, and surfactant.<sup>5</sup> Present study was aimed to clinical profile of neonates admitted in NICU with respiratory distress in a tertiary care hospital.

## MATERIAL AND METHODS

This study was prospective, observational study, conducted in neonatal intensive care unit (NICU) under Department of Pediatrics, Dr. Ulhas Patil Medical College and Hospital, Jalgaon,, India. Study duration was of 1 year (January 2021 to December 2021). Study approval was obtained from institutional ethical committee.

### Inclusion criteria

- Neonates admitted to NICU with respiratory distress, parents willing to participate in present study

### Exclusion criteria

- Neonates less than 28 weeks gestational age\
- Neonates less than 1 kg birth weight
- Neonates left the hospital against medical advice before recovery
- Parents not willing to participate

Study was explained to parents in local language & written consent was taken for participation & study. General information, socioeconomic status, detailed history, including antenatal, intrapartum, and postnatal, including risk factors for sepsis, steroid coverage, antenatal scans, singleton or multiple gestations, and mode of delivery was recorded. At admission, a detailed physical examination including vitals, SPO<sub>2</sub>, Blood sugar, general physical examination, gestational assessment using New Ballard's score, and clinical examination findings of these neonates was documented in a predesigned proforma.

Laboratory evaluation (Total leucocyte count, Absolute leucocyte count, I/T ratio, CRP, if require blood culture), radiological evaluation (Chest X-ray) and other related investigations were done based on the diagnosis. The diagnosis, complications during NICU stay, and the outcome was duly recorded.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

## RESULTS

In present study, majority neonates were male (56.38 %), had birth weight 1.5 – 2.5 kg (46.28 %), were term gestational age (41.49 %) & delivered vaginally (52.13 %).

**Table 1: General characteristics**

| Characteristics | No. of patients | Percentage |
|-----------------|-----------------|------------|
| Gender          |                 |            |
| Males           | 106             | 56.38%     |
| Female          | 82              | 43.62%     |

|                         |    |        |
|-------------------------|----|--------|
| Birth weight (kgs)      |    |        |
| 1000 – 1500 gms         | 35 | 18.62% |
| 1501- 2500 gms          | 87 | 46.28% |
| 2501-3500 gms           | 58 | 30.85% |
| > 3500 gms              | 8  | 4.26%  |
| Gestational age         |    |        |
| Term ( $\geq 37$ weeks) | 78 | 41.49% |
| 34- 37 weeks            | 71 | 37.77% |
| 28 - 34 weeks           | 39 | 20.74% |
| Mode of delivery        |    |        |
| Vaginal                 | 98 | 52.13% |
| Caesarean               | 86 | 45.74% |
| Instrumental            | 4  | 2.13%  |

Symptoms and signs of respiratory distress noted were tachypnea (86.17 %), flaring of alae nasi (84.04 %), chest in drawing (82.45 %), grunting (47.34 %) & cyanosis (42.55 %).

**Table 2: Symptoms and signs of respiratory distress**

| Signs and symptoms   | No. of patients | Percentage |
|----------------------|-----------------|------------|
| Tachypnea            | 162             | 86.17%     |
| Flaring of alae nasi | 158             | 84.04%     |
| Chest in drawing     | 155             | 82.45%     |
| Grunting             | 89              | 47.34%     |
| Cyanosis             | 80              | 42.55%     |

Premature rupture of membranes (13.83 %), meconium-stained amniotic fluid (11.17 %), hypertension (9.04 %), maternal pyrexia (5.85 %), foul smelling liquor (2.66 %) & diabetes mellitus (2.13 %) were maternal risk factors observed among neonates with respiratory distress.

**Table 3: Maternal risk factors**

| Maternal risk factors           | No. of patients | Percentage |
|---------------------------------|-----------------|------------|
| Premature rupture of membranes  | 26              | 13.83%     |
| Meconium-stained amniotic fluid | 21              | 11.17%     |
| Hypertension                    | 17              | 9.04%      |
| Maternal pyrexia                | 11              | 5.85%      |
| Foul smelling liquor            | 5               | 2.66%      |
| Diabetes mellitus               | 4               | 2.13%      |

Among neonates admitted with respiratory distress common diagnosis were transient tachypnea of newborn (34.57 %), sepsis (20.74 %), respiratory distress syndrome (11.17 %), meconium aspiration syndrome (9.04 %), hyaline membrane disease (8.51 %) & birth asphyxia (5.85 %),

**Table 4: Diagnosis**

| Diagnosis                      | No. of patients | Percentage |
|--------------------------------|-----------------|------------|
| Transient tachypnea of newborn | 65              | 34.57%     |
| Sepsis                         | 39              | 20.74%     |
| Respiratory distress Syndrome  | 21              | 11.17%     |
| Meconium Aspiration Syndrome   | 17              | 9.04%      |
| Hyaline Membrane Disease       | 16              | 8.51%      |
| Birth Asphyxia                 | 11              | 5.85%      |

|                                 |   |       |
|---------------------------------|---|-------|
| Congenital Heart Disease        | 5 | 2.66% |
| Hypoxic Ischemic Encephalopathy | 4 | 2.13% |
| Apnea of prematurity            | 3 | 1.60% |
| Tracheo Oesophageal Fistula     | 3 | 1.60% |
| Aspiration Pneumonia            | 2 | 1.06% |
| Congenital Diaphragmatic Hernia | 2 | 1.06% |

Majority neonates were discharged uneventfully (86.71 %) & mortality was observed among 16 neonates (8.51 %).

**Table 3: Immediate outcome**

| Outcome   | No. of patients | Percentage |
|-----------|-----------------|------------|
| Discharge | 162             | 86.17%     |
| Mortality | 16              | 8.51%      |

## DISCUSSION

Respiratory distress is among the most important reasons for admission to a neonatal intensive care unit. The clinical diagnosis of respiratory distress in a newborn is suspected if the respiratory rate is greater than 60 per minute in a quite resting baby, presence of grunting and/or there are inspiratory subcostal/intracostal retractions.<sup>6</sup>

Certain risk factors increase the likelihood of neonatal respiratory disease, such as prematurity, meconium-stained amniotic fluid (MSAF), caesarian section delivery, gestational diabetes, maternal chorioamnionitis or prenatal ultrasonographic findings, such as oligohydramnios or structural lung abnormalities.<sup>7,8</sup>

The incidence of respiratory distress varies in relation to various predisposing and underline factors like gender, gestational age, body weight, poor infrastructure, lack of skilled health resources, poor monitoring system etc. Short- and long-term problems, such as chronic lung disease, respiratory failure, and even death, can result from failing to diagnose and treat the underlying cause of respiratory distress in newborns.<sup>9</sup>

In study by Anita L et al.,<sup>10</sup> out of 1694 live deliveries during the study period, the prevalence of respiratory distress was 6.55% in the total live deliveries while 30.83% in admitted cases in Neonatal Intensive Care Unit. Tachypnea was the most common presentation 77 (69.36%). Survival rate was 95.50% while mortality rate accounted for 4.50%.

Kommawar A et al.,<sup>11</sup> noted that, maximum admissions were on day 1 of life (77.25%) followed by on day 2 (22.50%), majority were male (57.75%), had birth weight between 1 – 1.499 kg (48.25%). Out of 400 Neonates with respiratory distress, 281 (70.25%) had low birth weight and remaining 119 (29.75%) neonates had normal birth weight.

In study by Palod PH et al.,<sup>12</sup> out of 281 neonate's majority were male (n=181), weighing between 1.5 – 2.5 kg (n=185). There were 35 deaths (12.5%) and 246 patients survived (87.5%). Most common causes for respiratory distress were respiratory distress syndrome (31.3%), neonatal septicemia including pneumonia (28.1%), TTBN (16.7%).

Mohammad Kamil et al.,<sup>13</sup> studied 292 neonates admitted with respiratory distress were included in the study. Around 151 (51.7%) babies were born prematurely. The mode of delivery was LSCS in 254 (87.16%) neonates. The most important risk factors were delivery by Caesarian section and maternal infection (49%). Transient tachypnea of the newborn (45.2%), Congenital pneumonia (22.2%), and Late-onset sepsis (10.9%) were the most common causes of respiratory distress. 32.1% of these infants required respiratory support in the form of invasive and non-invasive ventilation. Only 3 infants (1.03%) expired during the study period, due to severe RDS and late referral to the hospital.

P. Chandini et al.,<sup>14</sup> noted that among the 720 newborns admitted in NICU, 200 (28 %) cases were admitted with Respiratory distress. Of them, 116 babies (58%) were delivered vaginally

and 84 (42%) by lower segment caesarean section. There were 122 (61%) pre-term babies, 68 (34%) term and 10 (5%) post term neonates who were admitted with respiratory distress. The majority of cases were clinically presented with tachypnea, flaring of alae nasi, and chest indrawing. The respiratory distress resolved on the 4th day in majority of cases.

In study by Kshirsagar VY et al.,<sup>15</sup> noted that among 100 neonates, 90% of the distress cases were of respiratory in origin and high severity of distress was observed among 27% newborns. The proportion of respiratory distress was higher, 51% in males and low APGAR score was reported in 14% cases. Among respiratory etiology of respiratory distress, high proportion was of TTNB 35.55%. The maternal and new born factors like maternal age >30 years (32%), gestational age 28-30 weeks (87.5%), gravid 2 and 3 mothers (35%), female gender (32.6%), low birth weight (70%) developed severe distress respectively. The recovery rate of respiratory distress due to respiratory etiology was of 88.8%.

In the last 3 decades several improvements have been introduced to reduce the incidence, severity and mortality of neonatal respiratory distress. Among these milestones are the induction of lung maturation with antenatal steroids, centralization of high-risk pregnancies to tertiary perinatal centers, usage of surfactant to treat immature lungs and introduction of new methods of mechanical ventilation and the use of nasal CPAP.<sup>16</sup> Improved prenatal care, early detection and referral of high-risk pregnancies, closer connectivity between referral hospitals and health centers, close monitoring of labour to detect foetal distress, and early intervention where warranted can all help to minimize respiratory distress incidence and infant mortality.

## CONCLUSION

Symptoms and signs observed in neonates with respiratory distress were tachypnea, flaring of alae nasi, chest in drawing. Common diagnosis was transient tachypnea of newborn, sepsis, respiratory distress syndrome, meconium aspiration syndrome, hyaline membrane disease & birth asphyxia. Majority neonates were discharged uneventfully & mortality was observed among 8.51 % neonates.

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