

Study of Respiratory Distress Syndrome Etiology in Neonates

P Jagadeesan¹, R Malai Arasu²

¹Senior Civil Surgeon, Department of Pediatrics, Government Headquarters Hospital, Ramanathapuram, Tamil Nadu, India, ²Chief Civil Surgeon, Department of Pediatrics, Government Headquarters Hospital, Ramanathapuram, Tamil Nadu, India

Abstract

Introduction: Respiratory distress (RD) is a medical emergency responsible for most of the admissions in neonatal intensive care units (NICUs) during neonatal period. It is a major contributor to neonatal morbidity and mortality and results from a variety of respiratory and non-respiratory etiology. It occurs in 0.96–12% of live births and responsible for about 20% of neonatal mortality. Aim of study is to find out the proportion of patients with different etiology of RD in neonates.

Methods: The present study is a prospective, descriptive study which was carried out at headquarters hospital. All the neonates with RD admitted in NICU admitted from April 2018 to March 2019 were selected for the present study. Detailed history including antenatal history, natal history, and postnatal history with thorough clinical examinations and investigations done in each case and were recorded in the performa.

Results: A total of 500 neonates were admitted and among them 375 were inborn (delivered in our hospitals) and 125 out-born (referred to our hospitals from outside). In inborn group, hyaline membrane disease was the most common cause (32%) of RD and in out-born congenital pneumonia/septicemia (34.4%). There was male preponderance in both inborn and out-born groups with male: female ratio 1.45:1 and 1.6:1 respectively.

Conclusions: Respiratory distress is one of the most common reasons an infant is admitted to the neonatal intensive care unit. The commonest causes of respiratory distress in this study was transient tachypnea of newborn (43.2%) followed by hyaline membrane disease (30.2%).

Key words: Etiology, Neonates, Respiratory distress, Respiratory distress, Syndrome

INTRODUCTION

Respiratory distress (RD) is a common medical emergency responsible for 30–40% of total admissions in the neonatal period.^[1] RD is one of the major causes of mortality and morbidity among the newborns. It occurs in 0.90–12% of live births and responsible for about 20% of neonatal mortality.^[1] There are many causes of RD in neonates these include^[2] transient tachypnea of newborns (TTNB), septicemia, meconium aspiration syndrome (MAS), hyaline membrane disease (HMD), perinatal asphyxia, congenital or acquired pneumonia, Persistent pulmonary hypertension of

the newborn, air leaks (Pneumothorax), congenital anomalies of upper airway (choanal atresia), gut (tracheoesophageal fistula, congenital diaphragmatic hernia) or lungs (lobar emphysema, congenital cystic adenomatoid malformation, cysts), cardiac shock or congenital heart disease (CHD), hematological causes (severe anemia, Polycythemia), neurological causes leading to hyperventilation like seizures and Metabolic causes like inborn errors of Metabolism.

Aim of this study is to find out the proportion of patients with different etiology of RD in neonates.

METHODS

This is a prospective descriptive study, carried out at neonatal units in government headquarters hospital, Tamilnadu. 50 neonates with RD admitted in Neonates intensive care unit (NICU) both male and female, inborn (37) and out-born (13) were included in the study. Study

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Corresponding Author: Dr. R Malai Arasu, Department of Pediatrics, Government Headquarters Hospital, Ramanathapuram, Tamil Nadu, India.

was conducted for the period of 1 year April 2018 to March 2019.

Inclusion Criteria

- Neonates inborn or out-born admitted to the neonatology units with symptoms and/or signs of RD
- Age <28 days.

Exclusion Criteria

- RD settled in first 2 h after birth, in inborn neonates by correction of hypothermia, hypoglycemia and not needed admission to NICU were excluded from the study.

Detailed history including antenatal history, natal history, and postnatal history with thorough clinical examinations and investigations done in each case and were recorded in the performa. The diagnosis of respiratory problems was based on guidelines recommended by the National Neonatology Forum (National Neonatal-Perinatal Database 2002–2003).^[3]

RD

Presence of at least two of the following criteria

- Respiratory rate >60/min
- Subcostal/intercostal recessions
- Expiratory grunt/groaning
- Flaring of alae nasi
- Central cyanosis in room air.

TTNB is diagnosed as RD in a term or borderline term or preterm neonate starting within 6 h after birth, often requiring supplemental oxygen, but recovering spontaneously within 3–4 days and showing characteristic X-ray changes, that is, Linear streaking at hilar and interlobar fluid.

HMD is diagnosed when following three criteria are present: (a) preterm neonates; (b) RD having onset within 6 h of birth; and (c) Amniotic fluid L/S ratio of <1.5, or negative gastric aspirate shake test, or skiagram of chest showing poor expansion with air bronchogram/reticulogranular pattern/ground glass opacity.

MAS is diagnosed in the presence of at least two of the following: (1) meconium staining of the liquor or staining of nails or umbilical cord or skin; (2) RD soon after birth; and (3) Radiological evidence of aspiration pneumonitis (atelectasis or hyperinflation).

Congenital Pneumonia is diagnosed in the presence of RD with: (a) positive blood culture or (b) if any two of the following are present: (1) existing or predisposing factors characterized by one of the following (a) maternal

fever (>38°C) (b) foul smelling liquor; (c) prolonged rupture of membrane (>18 h) (2) clinical picture of sepsis characterized by any of the following; (a) poor feeding, (b) lethargy, (c) poor reflexes, (d) hypo or hyperthermia, (e) abdominal distension; and (3) X-ray picture suggestive of pneumonia characterized by any of the following; nodular or coarse patchy infiltrates, diffuse haziness or granularity, air bronchogram, and lobar or sub lobar consolidation. (4) Positive septic screen.

Birth Asphyxia

Definition I

- Moderate birth asphyxia: Slow gasping breathing at 1-min of age
- Severe birth asphyxia: No breathing at 1-min of age.

Definition II

- Birth asphyxia: Apgar score of less than 7 at 1 min of age
- Moderate birth asphyxia: Apgar score between 4 and 6 at 1-min of age
- Severe birth asphyxia: Apgar score of 3 or less at 1-min of age.

Septicemia (Systemic Bacterial Infection)

Culture negative (clinical)

In an infant having clinical picture suggestive of septicemia, the presence of any one of the Following criteria is enough for assigning probable diagnosis of infection:

1. Existence of predisposing factors: Maternal fever or foul smelling liquor or prolonged Rupture of membranes (>18 h) or gastric polymorphs (>5 per high power field)
2. Positive septic screen: two of the four parameters - total leucocytes count (TLC) <5000/mm, band to total polymorph ratio of >0.2, absolute neutrophil count <1800, and micro ESR >10 mm 1st h
3. Radiological evidences of pneumonia.

Culture positive sepsis

In an infant having clinical picture suggestive of septicemia, pneumonia or meningitis along with either of the following.-isolation of pathogens from blood or Cerebrospinal fluid or urine or abscess (es) -pathological evidence of sepsis on autopsy.

Investigations

- X-ray chest anteroposterior view:
- Septic screening:
 - i. TLC
 - ii. Absolute neutrophil count
 - iii. Immature to total neutrophil (I/T ratio)
 - iv. C-reactive protein
- Blood culture and sensitivity.

RESULTS

Out of 50 neonates admitted, 37 were inborn (delivered in our hospitals) and 13 out-born (referred to our hospitals from outside). Sex wise distribution of neonates admitted in NICU with RD is shown in Table 1. There was male preponderance in both the groups (neonates born in hospital and outside the hospital).

The distribution of cases of RD based on the diagnosis is shown in Table 2. The most common cause of RD in neonates born in hospital was HMD (32%) and in neonates born outside the hospital, was congenital pneumonia/septicemia (34.4%).

DISCUSSION

The sex ratio in the present study was 1.53:1 overall, with male predominance which is consistent with study conducted by Ali^[4] (1.48:1). Male predominance was also shown by Hjalmarson^[5] (1.7:1), Mishra^[6] (1.5:1) and Malhotra *et al.*,^[7] (1.08:1).

In our study, male predominance was 60% and preterm babies with RD constituted 54%. Overall, the most common cause of RD in our study was HMD (28%). The study done by Haque *et al.*,^[8] showed that there was male predominance (64.6%) and most of babies admitted in NICU with RD were preterm babies (65.6%). The commonest causes of RD in this study was TTNB (43.2%) followed by HMD (30.2%).

Santosh *et al.*,^[9] observed that out of 76 babies with RD, 35 (46%) babies had TTNB, 24 (31.5%) babies had RD syndrome (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.

Fedakar and Aydoğdu^[10] reported that 20.4% cases with RD were premature, 64.4% were males and TTNB was the most common (76.7%) cause for admission in NICU followed by MAS (8.3%), RDS (HMD) (6.3%), birth asphyxia (3.8%), sepsis (2.1%), pneumonia (1.7%), multiple congenital anomalies (0.4%), inborn metabolic disease (0.4%), and aspiration pneumonia (0.4%).

Qian *et al.*,^[11] study showed that most common of RD was HMD. Zaman *et al.*,^[12] showed that TTNB was found to be the commonest (35.7%) cause of RD followed by HMD (25%). Mathur *et al.*,^[13] found that pneumonia to be the most common cause (68.6%) of RD in neonates.

Table 1: Gender ratio of neonates and admitted in NICU respiratory distress

No of cases of respiratory distress	Male	Female	Total	Ratio
Inborn	22	15	37	1.46:1
Out born	8	5	13	1.60:1

NICU: Neonates intensive care unit

Table 2: Distribution of respiratory distress syndrome cases as per diagnosis

Disease	In born No. of cases (%)	Out born No. of cases (%)
HMD	11 (29.72)	3 (23.07)
Congenital pneumonia/Septicemia	9 (24.32)	4 (30.76)
Transient Tachypnea of Newborn	5 (13.51)	2 (15.38)
Meconium aspiration syndrome	4 (10.81)	1 (7.69)
Perinatal Asphyxia	3 (8.10)	1 (7.69)
Congenital heart disease	2 (5.4)	1 (7.69)
Surgical causes (TOF, CDH)	2 (5.4)	0 (0)
Diaphragmatic eventration)		
Inborn error of metabolism	1 (2.7)	0 (0)
Aspiration pneumonia	0 (0)	1 (7.69)

CDH: Congenital diaphragmatic hernia, TOF: Tetralogy of Fallot

CONCLUSIONS

Respiratory distress is one of the most common reasons an infant is admitted to the neonatal intensive care unit. The commonest causes of respiratory distress in this study was transient tachypnea of newborn (43.2%) followed by hyaline membrane disease (30.2%). Learning to readily recognize respiratory distress in the newborn and understanding physiologic abnormalities associated with each of the various causes will guide optimal management.

REFERENCES

1. Meena R, Kopal MR, Dhanwadkar SS, Kumari NB. A clinical study of respiratory distress in neonates. *Int J Contemp Pediatr* 2019;6:2292-5.
2. Mathai SS, Raju U, Kanitkar M. Management of respiratory distress in the newborn. *Med J Armed Forces India* 2007;63:269-72.
3. National Neonatology Forum. National Neonatal Perinatal Data Base Report for the Year 1995. Secretariat. New Delhi: National Neonatology Forum; 1996.
4. Ali Z. Neonatal bacterial septicaemia at the mount hope women's hospital, Trinidad. *Ann Trop Paediatr* 2004;24:41-4.
5. Hjalmarson O. Epidemiology and classification of acute neonatal respiratory disorders. *Acta Paediatr Scand* 1981;70:773-83.
6. Mishra PK. Respiratory distress in new-born a prospective study. *Indian Pediatr* 1986;24:77-80.
7. Malhotra AK, Nagpal R, Gupta RK, Chhajta DS, Arora RK. Respiratory distress in neonates. *Indian Pediatr* 1995;32:207-11.
8. Haque A, Baki MA, Begum T, Akhter S, Begum S, Nahar N, *et al.* Etiology of respiratory distress in newborn. *Birdem Med J* 2013;3:19-22.
9. Santosh S, Kumar K, Adarsha E. A clinical study of respiratory distress in newborn and its outcome. *Indian J Neonatal Med Res* 2013;1:2-4.
10. Fedakar A, Aydoğdu C. Clinical features of neonates treated in the intensive

- care unit for respiratory distress. Turk J Pediatr 2011;53:173-9.
11. Qian LL, Liu CQ, Guo YX, Jiang YJ, Ni LM, Xia SW, *et al.* Current status of neonatal acute respiratory disorders: A one-year prospective survey from a Chinese neonatal network. Chin Med J 2010;123:2769-75.
 12. Zaman S, Goheer L, Riaz H. Prevalence and etiology of respiratory distress in newborns. Pak Armed Forces Med J 2013;63:22-5.
 13. Mathur NB, Garg K, Kumar K. Respiratory distress in neonates with special reference to Pneumonia. Indian J Pediatr 2002;39:529-37.

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