

## PREVALENCE AND ETIOLOGY OF RESPIRATORY DISTRESS IN NEWBORNS

Saeed Zaman, Lutufullah Goheer, Hassan Riaz

Combined Military Hospital Malir Cantt, Karachi

### ABSTRACT

**Objective:** To determine the prevalence and etiology of respiratory distress in the newborns delivered over the period of one year from 1<sup>st</sup> January 2008 to 31<sup>st</sup> Dec 2008.

**Study Design:** A descriptive study

**Place and Duration of Study:** The study was conducted in Armed Forces Hospital Sharurah Kingdom of Saudi Arabia over a period of one year from January 2008 to Dec 2008

**Patients and methods:** All live newborns delivered at Armed Forces Hospital Sharurah during the study period were included and observed for development of respiratory distress.

**Results:** All newborns (n=659), delivered at this hospital over the period of 12 months, were observed for respiratory distress. The overall prevalence of respiratory distress (RD) was 4.24%. Prevalence was 19.7% in preterm and 2.3% in full term. Transient tachypnea of newborn (TTN) was found to be the commonest 35.7% cause of Respiratory Distress (RD) followed by Hyaline membrane disease (HMD) 25%, meconium aspiration syndrome (MAS) 17.9%, congenital pneumonia 7.1% and other congenital anomalies 14.3%. TTN was found to be common among both term and preterm babies, while hyaline membrane disease was seen among preterm, and meconium aspiration syndrome among term and post term babies.

**Conclusion:** Respiratory distress is a common neonatal problem with significant morbidity and mortality. Majority of cases are due to TTN followed by hyaline membrane disease and meconium aspiration syndrome.

**Keywords:** Newborn; Respiratory distress; Transient Tachypnea of the Newborn; Meconium Aspiration Syndrome, Hyaline Membrane Disease.

### INTRODUCTION

Neonatal respiratory disorders account for most admissions to Neonatal intensive care units in the immediate newborn periods<sup>1</sup>. Respiratory distress is a common problem during the newborn period with considerable mortality. It accounts for nearly half of all deaths. It is a heterogeneous group of illnesses with varying prevalence, underlying etiology, clinical course and outcome<sup>2</sup>. Respiratory distress may be due to either medical or surgical cause<sup>3</sup>.

Respiratory distress is a common emergency responsible for 30-40% of admissions in the neonatal units. A working diagnosis should be made in the first few minutes of seeing the baby and immediate life saving measures should be undertaken<sup>4</sup>. The aim of initial assessment of the infant in respiratory distress is to identify life threatening

conditions that require prompt support, such as inadequate or obstructed airway (gaspings, choking, stridor), apnea or poor respiratory efforts, cyanosis, and circulatory collapse (bradycardia, hypotension, poor perfusion). The physician should manage these infants promptly with immediate oxygen support and possibly bag and mask ventilation. Therefore, resuscitation equipment and supplies should always be available for immediate use in the delivery room<sup>1</sup>. The most common etiology of neonatal respiratory distress is transient tachypnea of the newborn; this is triggered by excessive lung fluids, and symptoms usually resolve spontaneously<sup>5</sup>. Infants born by caesarean section at term are at increased risk for developing respiratory disorders compared with those born by vaginal delivery<sup>6</sup>. Over the past 20 years, there has been an increase in the rates of elective caesarean delivery at term in the western world, largely due to the management of previous caesarean section and breech presentation<sup>7</sup>. The prevalence of respiratory distress in infants admitted to the hospital increases due to increased rate of caesarean section<sup>8</sup>.

**Correspondence:** Lt Col Dr Saeed Zaman, Classified Child Specialist, CMH Malir Cantt, Karachi

Email: saeed\_khattak2003@yahoo.com

Received: 09 April 2012; Accepted: 11 Dec 2012

Hyaline Membrane Disease is the commonest cause of respiratory distress in the newborn, particularly, in preterm infants. It carries a high mortality rate and the prevalence is more than that documented in the Western world<sup>9</sup>. The respiratory distress syndrome can occur in premature infants as a result of surfactant deficiency and under-developed lung anatomy. Intervention with oxygenation, ventilation, and surfactant replacement is often necessary. Prenatal administration of corticosteroids between 24 and 34 weeks gestation reduces the risk of respiratory distress syndrome of the newborn when the risk of premature delivery is high<sup>5</sup>.

The mortality from respiratory distress can be reduced by the use of preventive measures such as antenatal steroids, appropriate intra-partum care and attention to early stabilization after birth<sup>10</sup>. The more widespread availability of the basic intervention of oxygen and Continuous Positive Airway Pressure (CPAP) would have the greatest impact of decreasing HMD specific mortality around the world<sup>11</sup>. Preterm babies at increased risk of HMD should be delivered in centers where appropriate facilities and expertise for its management are available<sup>12</sup>.

Meconium aspiration syndrome is thought to occur in utero as a result of fetal distress by hypoxia. Treatment options are resuscitation, oxygenation, surfactant replacement, and ventilation. Other etiologies of respiratory distress include pneumonia, sepsis, pneumothorax, persistent pulmonary hypertension, and congenital malformations; treatment is disease specific<sup>5</sup>.

## **PATIENTS AND METHODS**

In this descriptive study all live newborns delivered at Armed Forces Hospital Sharurah during the study period from 1<sup>st</sup> January 2008 to 31<sup>st</sup> Dec 2008 were observed for respiratory distress and the objective was to determine the prevalence and etiology of respiratory distress in the newborns. Any newborn showing one or more of the following signs for more than two hours was considered to have respiratory distress. Tachypnoea 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.

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 based on last menstrual period date and clinical examination, birth weight and findings suggestive of respiratory distress were also noted. All babies with respiratory distress were treated in the neonatal intensive care unit. CBC, electrolytes, blood glucose, calcium and x-ray chest were obtained in all cases. Neonates with premature rupture of membranes, showing clinical signs of sepsis were also subjected to sepsis screening (Blood C/S, Urine C/S and CSF C/S). Cranial ultrasound and echocardiography were done whenever indicated. All babies with RD received standard care with monitoring of vital signs and oxygen saturation by cardiac monitors. Most of the newborns especially the premature babies received surfactant therapy, mechanical ventilation and were weaned off successfully.

Data was recorded on a predesigned performa. Results were analyzed using SPSS 16. Descriptive statistics were used to analyze results.

## **RESULTS**

The total number of live births during the study period was 655. Total number of spontaneous vaginal deliveries (SVD) were 524 and caesarean section deliveries were 131. Out of all these cases 28 newborns developed respiratory distress. The male and female ratio was equal. Premature newborns were 15, full term newborns were 12 and post term was 1. The mean age of newborns was 3.5 hrs. The overall prevalence of respiratory distress was 4.2%. Prevalence of RD among preterm, term

and post term was 19.7%, 2.3% and 8.3% respectively. The major causes of RD are shown in (Table1). TTN was found to be the commonest cause of RD (35.7%) and it was found to be the commonest cause of respiratory distress (RD) among both term and preterm babies. Hyaline membrane disease was the second commonest cause of RD (25%) and it was found in preterm babies. MAS was the third commonest cause of RD (17.9%) and it was found in term and post term new borns. Congenital heart disease, congenital diaphragmatic hernia, and Pierre Robin syndrome were found in 7.1%, 3.6% and 3.6% of cases respectively.

### DISCUSSION

The overall prevalence of respiratory

TTN was found to be the major cause of RD (35.7%), followed by Hyaline membrane disease, MAS, congenital anomalies and infection. In our study the pattern of RD is similar to the studies from developed countries<sup>3,5,23</sup>. In studies conducted in India and Turkey the prevalence of TTN is 42.7% and >40% respectively which is also comparable to our results.

Respiratory distress syndrome of the newborn, also called hyaline membrane disease, is the most common cause of respiratory distress in premature infants, correlating with structural and functional lung immaturity. Prevalence of RD among the preterms was 19.7% in our study and it was almost comparable to those reported from

**Table-1: Causes of respiratory distress in newborn( n=28)**

Primary diagnosis	Frequency	Percentage
Transient tachypnea of newborn	10	35.7%
Respiratory distress syndrome	7	25%
Meconium aspiration syndrome	5	17.9%
Others (Congenital heart disease / Pierre Robin syndrome / Congenital diaphragmatic hernia)	4	14.3%
Congenital pneumonia	2	7.1%
Birth asphyxia	-	-

distress in this study was 4.2%. Other studies from developed countries have reported prevalence's varying from 3% to 7%<sup>5,13-18</sup>. The prevalence of respiratory distress reported from Iran is 3.4%<sup>19</sup>. Indian studies have reported prevalence between 0.7% and 7%<sup>2</sup>. Our results are comparable with studies done in other parts of the world (Alok Kumar et al<sup>2</sup>, Malhotra et al<sup>20</sup>, Nielson et al<sup>14</sup>) which are almost same except MAS is higher in our study and birth asphyxia is almost zero which is similar to the study done by Nielson et al<sup>14</sup>.

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.

developed countries which vary between 28% and 53%. The prevalence of Hyaline membrane disease in a study from Aga Khan University Hospital, Karachi, Pakistan is from 12.8% to 45% which is comparable with our study.<sup>21, 22</sup>

MAS were found in term and post term newborns in 17.9% of cases. This result correlates with results from developed countries which range from 10 to 16% of cases. In India MAS was found in 10.6% of cases<sup>1, 2, 5</sup>. The higher prevalence of MAS in our centre was due to un-willingness for caesarean section despite cases of severe foetal distress and insistence for normal vaginal delivery. Most cases were treated by tracheal intubation and direct suctioning of meconium from trachea and oropharynx. One case developed pneumothorax after resuscitation and was treated successfully. Pneumothorax occurred in 3.5% of cases.<sup>1,5,15</sup>

Congenital malformation was found in 14.2% of cases (Congenital heart disease (7.1%), congenital diaphragmatic hernia (3.6%) and Pierre Robin syndrome (3.6%). All these cases were treated successfully and followed up regularly.

## CONCLUSION

Respiratory distress is a common neonatal problem with significant morbidity and mortality. Majority of cases are due to TTN which is self limiting disease and needs only observation. Prevalence of HMD can be reduced by prenatal administration of corticosteroids and similarly cases due to MAS could be reduced by improved ante partum, intra partum obstetrical management as well as the post delivery resuscitation of the newborn. Other less common causes of respiratory distress include pneumonia, sepsis, pneumothorax, congenital heart disease and congenital malformations. The treatment in these cases is disease specific.

## REFERENCES

1. Aly H. Respiratory disorders in the newborn: identification and diagnosis. *Pediatr Rev.* 2004; 25:201-208.
2. Kumar A, Bhat BV. Epidemiology of respiratory distress of newborns. *Indian J Pediatr.* 1996; 63:93-98.
3. Kumar A, Bhatnagar V. Respiratory distress in neonates. *Indian J Pediatr.* 2005; 72: 425-428.
4. Mathai SS, Raju U, Kanitkar M. Management of Respiratory Distress in the Newborn. *MJAFI.* 2007; 63:269-272.
5. Hermansen CL, Lorah KN. Respiratory distress in the newborn. *Am Fam Physician.* 2007; 76:987-994.
6. Kolas T, Saugstad OD, Daltveit AK, Nilsen ST, Oian P. Planned cesarean versus planned vaginal delivery at term: comparison of newborn infant outcomes. *Am J Obstet Gynecol.* 2006; 195:1538-1543.
7. Zanardo V, Simbi AK, Franzoi M, Solda G, Salvadori A, Trivisanuto D. Neonatal respiratory morbidity risk and mode of delivery at term: influence of timing of elective caesarean delivery. *Acta Paediatr.* 2004; 93:643-647.
8. Ersch J, Roth-Kleiner M, Baeckert P, Bucher HU. Increasing incidence of respiratory distress in neonates. *Acta Paediatr.* 2007; 96:1577-1581.
9. Ghafoor T, Mahmud S, Ali S, Dogar SA. Incidence of respiratory distress syndrome. *J Coll Physicians Surg Pak.* 2003; 13:271-273.
10. Bhutta ZA, Yusuf K, Khan IA. Is management of neonatal respiratory distress syndrome feasible in developing countries? Experience from Karachi (Pakistan). *Pediatr Pulmonol.* 1999; 27:305-311.
11. Kamath BD, Macguire ER, McClure EM, Goldenberg RL, Jobe AH. Neonatal mortality from respiratory distress syndrome: lessons for low-resource countries. *Pediatrics.* 2011; 127:1139-1146.
12. Haque KN, Waheed KAI. Evidence based guidelines for the management of neonatal respiratory distress syndrome (RDS) in Pakistan: Personal Observations and Pragmatic Opinion. *Pak Paed J.* 2010; 34(4):169-179.
13. Bonafe L, Rubaltelli FF. The incidence of acute neonatal respiratory disorders in Padova county: an epidemiological survey. *Acta Paediatr.* 1996; 85:1236-1240.
14. Nielsen TF, Hokegard KH. The incidence of acute neonatal respiratory disorders in relation to mode of delivery. *Acta Obstet Gynecol Scand.* 1984; 63:109-114.
15. Navaei F, Aliabadi B, Moghtaderi M, Kelishadi R. Predisposing factors, incidence and mortality of pneumothorax in a neonatal intensive care unit in Isfahan, Iran. *Zhongguo Dang Dai Er Ke Za Zhi.* 2010; 12:417-420.
16. Le Ray C, Boithias C, Castaigne-Meary V, l'Helias, Vial M, Frydman R. Caesarean before labour between 34 and 37 weeks: what are the risk factors of severe neonatal respiratory distress?. *Eur J Obstet Gynecol Reprod Biol.* 2006; 127:56-60.
17. Yoder BA, Gordon MC, Barth WHJ. Late-preterm birth: does the changing obstetric paradigm alter the epidemiology of respiratory complications? *Obstet Gynecol.* 2008; 111:814-822.
18. Fedakar A, Aydogdu C. Clinical features of neonates treated in the intensive care unit for respiratory distress. *Turk J Pediatr.* 2011; 53:173-179.
19. Dehdashtian M, Riazi E, Aletayeb MH. Influence of mode of delivery at term on the neonatal respiratory morbidity. *Pak J Med Sci.* 2008; 24(3):556-559.
20. Malhotra AK, Nagpal R, Gupta RK, Chhajta DS, Arora RK. Respiratory distress in newborn: treated with ventilation in a level II nursery. *Indian Pediatr.* 1995; 32:207-211.
21. Ventolini G, Neiger R, Mathews L, Adragna N, Belcastro M. Incidence of respiratory disorders in neonates born between 34 and 36 weeks of gestation following exposure to antenatal corticosteroids between 24 and 34 weeks of gestation. *Am J Perinatol.* 2008; 25:79-83.
22. Ersch J, Roth-Kleiner M, Baeckert P, Bucher HU. Increasing incidence of respiratory distress in neonates. *Acta Paediatr.* 2007; 96:1577-1581.
23. Fedakar A, Aydogdu C. Clinical features of neonates treated in the intensive care unit for respiratory distress. *Turk J Pediatr.* 2011; 53:173-179.