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SPECTRUM OF RESPIRATORY DISTRESS IN NEWBORN - A STUDY FROM A TERTIARY LEVEL HOSPITAL

Neonatology

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ABSTRACT

OBJECTIVES: Most common cause of admission in Neonatal intensive care unit (NICU) is respiratory distress. There are many causes of respiratory distress, among them, transient tachypnoea of newborn, respiratory distress syndrome, meconium aspiration syndrome, perinatal asphyxia and sepsis are the commonest causes. The aim of this study was to identify the etiology of neonates admitted with respiratory distress in tertiary level hospital and also to study the immediate outcome of these babies.

METHODS: A retrospective study was conducted in level II and level III NICU in Department of Neonatology, Niloufer Hospital. Both Inborn and Outborn neonates presenting with respiratory distress were included in the study. Data was collected from all patients' records, admitted during the period from January to June 2016. SPSS software was used to formulate the results.

RESULTS: A total of 854 patients were admitted, among them 393 cases were due to respiratory distress (46 %). There was male predominance (55 %). Majority of cases were outborn (72.2%).Babies born preterm were 81%. The commonest cause of respiratory distress in our study was respiratory distress syndrome followed by meconium aspiration syndrome and transient tachypnea of newborn. Assisted ventilation was required by 59.7 % of cases. Overall mortality rate was 23.4 %. Most common cause of mortality was RDS followed by meconium aspiration syndrome and pneumonia.

CONCLUSION: Antenatal steroids should be administered to the eligible mothers at all levels of health care to decrease the mortality and morbidity of preterms. Early in-utero referral of high risk mothers to tertiary care centre should be advocated. Infrastructure and human resources in government setup should be strengthened to provide assisted ventilation to the babies.

KEYWORDS

respiratory distress, assisted ventilation, early referral, infrastructure, antenatal steroids

1. INTRODUCTION

Respiratory distress is one of the commonest disorders encountered within the first 48-72 hours of life. The incidence varies from 7-8% among live births with 30% among preterm, 20% among post term and 4% in term babies and is responsible for about 20% of neonatal mortality[1,2]. The spectrum of respiratory distress in neonates includes transient tachypnea of newborn, respiratory distress syndrome, meconium aspiration syndrome, congenital pneumonia, congenital heart disease, perinatal asphyxia, and congenital anomalies as tracheo-oesophageal fistula, and congenital diaphragmatic hernia[3]. The introduction of surfactant, mechanical ventilation, extra corporeal membrane oxygenation (ECMO), INO and non invasive monitoring devices has improved the management of respiratory distress in newborns significantly. Often the need for tertiary care can be predicted during the prenatal or intra partum period; ideally such infants should be born in institutions with appropriate facilities and personnel to manage the critically ill infant. An early identification and timely referral of a sick new born with respiratory distress delivered at peripheral health care centres plays a key role in reducing the morbidity and mortality. The aim of this study was to identify the commonest causes of respiratory distress in neonates admitted to a tertiary Teaching Hospital, and to know the immediate hospital outcome of these babies.

2. MATERIALS AND METHODS

A retrospective study was conducted in department of Neonatology, NILOUFER HOSPITAL,Hyderabad over a period of 6 months from January to June 2016. Data was collected from all case records admitted in the level II & level III units. All Inborn and Outborn neonates presenting with respiratory distress on admission were included in the study. Babies with multiple congenital malformations and admitted with other causes were excluded from the study.

Respiratory Distress was diagnosed by presence of at least 2 of the following[4]:

1. Respiratory rate of >60/min or more
2. Chest retraction (subcostal indrawing, xiphoid retraction, suprasternal indrawing)
3. Expiratory grunt/groaning

Data collected from the case files included detailed antenatal history, natal history and details regarding the onset of respiratory address, condition on admission and progression of RD during the hospital stay and the requirement of assisted ventilation. Clinical examination data on admission included: Weight, sex, gestational age, vital signs, degree of respiratory distress, in addition to any positive clinical findings reported. Investigations like Plain chest X-ray/abdomen, abdominal Ultra-sonography, 2D ECHO, cranial Ultra- sonography and laboratory evaluation were done wherever required. Duration of hospital stay and immediate hospital outcome of all cases were also recorded. Statistical analysis was performed using the SPSS software 20.0. Tables and graphs were formulated for the results.

3. RESULTS

Total number of admissions during the study period was 854. Number of cases presenting with respiratory distress was 393, representing 46 % of all cases admitted. Hundred and nine cases were inborn (27.7%) and 284 cases were outborn (72.2%). Two hundred and eighteen (55.4%) cases were males while 175 (44.5%) cases were females representing male to female ratio 1.24:1. Weight of studied groups ranged from 500gm to 6000 gm with mean of 1667 gm. Majority of the cases were appropriate for gestational age (258 cases; 65.6%). Gestational age of all neonates included in the study ranged from 26 – 41 weeks with mean of 32.8 weeks. Preterm constituted 81% (n=319) cases.

Table 1: Clinical criteria-history-of the commonest causes of respiratory distress.

Clinical criteria	TTN	RDS		MAS	ASPHYXIA	PNEUMONIA
		GROUP I	GROUP II			
GA(w)						
Range	28-40	25-<32	32-36	34-41	32-38	30-39
Mean	35.7	28.3	33.5	37.5	35.8	34.9
Number of each						
group	34	112	162	40	9	29
Percentage (%)	8.6	28.4	41.2	10.1	2.2	7.3
Sex ratio	*1.2:1*	*1.2:1*	*1.3:1*	*1.2:1*	*1.25:1*	*1.07:1*
Weight (gm)						
Range	1.18 – 6.0	0.5-1.75	0.75-2.5	1.8-3.75	1.6-2.8	0.98-3.0
Mean	2.42	1.06	1.55	2.71	2.16	2.03

The gestational age, sex and weight according to common causes of respiratory distress are shown in Table 1. There is a male predominance is in all groups. The commonest cause of RD in our study was RDS followed by MAS, TTNB, pneumonia and asphyxia. RDS is the most common cause in the preterms.

In this study, respiratory distress syndrome (N=270, 68.7%), Meconium aspiration syndrome (N=40, 10%), transient tachypnoea of newborn (N=34, 8.6%), Pneumonia (N=29, 7.3%), perinatal asphyxia (N=9, 2.2%) were found common causes of respiratory distress. Other causes (N=9, 2.2%) included congenital heart disease and surgical causes like congenital diaphragmatic hernia and tracheoesophageal fistula.

TABLE 2: Ventilatory support no. (%) of common causes of respiratory distress

	TTN	RDS		MAS	ASPHYXIA	PNEUMONIA
		GROUP I	GROUP II			
Nasal CPAP	13	36	60	14	3	5
	(38.2%)	(32%)	(37%)	(35%)	(33.3%)	(17.2%)
IMV	1	51	34	12	1	5
	(2.9%)	(45.5%)	(21%)	(30%)	(11.1%)	(17.2%)

Table 2 depicts the requirement of ventilator support in neonates with various causes of RD. Assisted ventilation was required in 235 (59.7%) cases, like mechanical ventilation 104 (26.4%) and bubble CPAP 131 (33.3%).

TABLE 3: Outcome of common causes of respiratory distress no. (%).

	TTN	RDS		MAS	ASPHYXIA	PNEUMONIA
		GROUPI	GROUP II			
Discharged	34	66	137	29	9	21
	(100%)	(59%)	(84.5%)	(72.5%)	(100%)	(72.4%)
Died	0	46	25	11	0	8
		(41%)	(15.4%)	(27.5%)		(27.5%)

Number of cases with respiratory distress died was 92 cases representing mortality rate of 23.4 %. Mortality was highest in neonate with RDS with gestational age < 32 wks (41%) followed by meconium aspiration and pneumonia (each 27.5%).

4. DISCUSSION

The importance of Respiratory distress in neonates can be realized from the fact that the neonates with respiratory distress are 2-4 times more likely to die than those without respiratory distress[5]. Knowledge of the causes of respiratory distress is important for plan and provision of basic facilities for sick and low birth weight newborns[6]. In our study, respiratory distress constituted 46 % of all cases admitted in the unit during the study period. On the contrary, many other studies reported a much lower percentage of cases with respiratory distress in the admission of their NICU. Mathur el al.[6], found in their study that 29% of all the admissions to their neonatal unit were due to respiratory distress. This discrepancy could be explained on the basis that our unit is tertiary referral unit receiving mostly complicated cases, while in the study of Mathur in India, their neonatal unit was only a primary care unit and 51% of their neonates were delivered at home.

The commonest causes of respiratory distress in our study were RDS (68.5%), MAS (10%), TTN (8.5%) and Pneumonia (7.3%).This is in contrast to other studies which reported that TTNB was the most common cause. Kumar and Bhat[7] who found that TTN was the most common cause of RD in their unit. It constituted >40% of their cases. Also Kasp et al[8], stated that TTN represents 33-50% of RD in neonates. This could be because the study population in our study included babies admitted to level II and level III NICU.

Respiratory distress syndrome was the most common cause of respiratory distress in our study. It constituted 68.7 % of cases. Forty one percent of cases occurred in those with gestational age ranging from 26- <32weeks, their mean weight was 1060gm, while the remaining 59% of cases occurred in those with gestational age ranging from 32-36weeks, and their mean weight was 1550gm. There is predominance of male affection in cases with respiratory distress syndrome with to ratio >1.2:1. In our study, ventilatory support was needed in 77.5% of cases with gestational age <32weeks. Thirty two percent of cases needed nasal CPAP, while 45.5% of cases needed intermittent mandatory ventilation. While in those with gestational age (32-37 weeks), 58% of cases needed ventilator support. Thirty seven percent of cases needed nasal CPAP while the remaining 21% of cases needed to be put on IMV. The overall mortality rate of cases with respiratory distress syndrome in our study was 25.9%(N=71) (41% in cases <32 weeks gestation, and 15.4% in those with 32-36 weeks gestation). This high mortality rate could be attributed to many factors; the most important of them is deficit of surfactant replacement therapy in our unit and delayed referral of cases to the unit. The study by Mamtha et al[9] who reported a mortality rate N=93/262 (35.49%) which was higher than our study. Steven el al[10]., reported that mortality rate of respiratory distress syndrome decreased by approximately 50% over the last decade with the advent of surfactant therapy.

Meconium aspiration syndrome (MAS) was the second most common cause of respiratory distress in our study (10%). Males were more affected with male/female ratio of 1.2:1. However, Mathur et al[6] in their study of the causes of respiratory distress in neonates found that meconium aspiration syndrome represented only 4% of their cases. This could be explained with less availability of prenatal care and intrapartum monitoring of high risk pregnancies and delay of referral to tertiary care centre. Overall mortality rate of cases of meconium aspiration in our study was 27.5%. Mellinda[11] stated that mortality rate for meconium aspiration syndrome resulting from severe parenchymal pulmonary disease and pulmonary hypertension is as high as 20% which is similar to our study. Sixty five percent of cases needed ventilator support, 35% were put on nasal CPAP and 30% were put on IMV which was similar to Wiswell et al[12], who reported that mechanical ventilation is required by approximately 30% of infants with meconium aspiration syndrome. High frequency oscillation and jet ventilation are alternate effective therapies in MAS cases[13].

TTN was the third most common (8.5 %) cause of respiratory distress in our study. In many studies, TTN was found to be the commonest cause which was not consistent with our study [2,14]. Their mean Gestational age was 35.7 weeks, and their mean weight was 2420gm. Several studies showed, term babies and male predominance to be associated with TTN[15,16].In this study, more than half of the TTN cases were near term baby but their birth weight was normal. Assisted ventilation in the form of bubble CPAP (bCPAP) was required in 38.2 % cases and mechanical ventilation was required in 2.9% without any mortality. Zaazou MH et al[15]. found 37.9% neonates had respiratory distress due to TTN and among them 11.5% cases required nasal CPAP with no mortality.

Neonatal Pneumonia is an important and common cause of neonatal morbidity and mortality. We found Pneumonia as the fourth common (16.1%) cause of respiratory distress in this study. Mean gestational age was 34.9 weeks and mean weight was 2034 grams. Assisted

ventilation was required in 34.4%, in the form of mechanical ventilation (17.2 %) and bCPAP (17.2 %). The mortality rate among these babies was 27.5%. One study reported that case fatality rate is 33.3% in the cases with neonatal sepsis[17].

Perinatal asphyxia was the fifth most common cause of respiratory distress in our study. It constituted 2.2 % of cases. Their mean gestational age was 35.8 weeks, and their mean weight was 2168 gm. Males are affected mainly with male to female ratio 1.25:1. Nessa L et al[17] found 52% newborn had respiratory distress who had perinatal asphyxia which is much higher than our study but on the contrary, many other study showed low incidence of perinatal asphyxia[2,14,15]. Ventilatory support was needed in 44.4% of cases in our study of which 33.3% of cases were put on nasal CPAP and 11.1% of cases were put on intermittent mandatory ventilation. No mortality was noted in cases of perinatal asphyxia presenting with respiratory distress. This study does not reflect the true incidence of perinatal asphyxia as respiratory distress is not a common presentation of perinatal asphyxia.

Conclusion:

Prevention of preterm delivery, administration of antenatal steroids to mothers with threatened preterm delivery and appropriate management of RDS with surfactant therapy and early CPAP may reduce neonatal mortality. Strengthening of peripheral centres and empowerment of tertiary care hospitals with regard to human resources and infrastructure can further decrease the morbidity and mortality in neonates with RD. Early identified and timely referral can save number of outborn babies.

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