Original Research Article

Respiratory distress in neonates with special reference to neonatal pneumonia

Shrikanth R[1], Harshita Tripathi[2*]

[1]Senior Resident, [2]Junior Consultant, Department of Pediatrics, MataChanan Devi Hospital, New Delhi, INDIA.
Email: madhushri1118@gmail.com

Abstract

Background: The clinical signs and symptoms of pneumonia in neonatal period are often nonspecific and it is widely recognized that pneumonia in newborn babies may not present with signs and symptoms typically seen in older children. Moreover none of the evaluation of simple clinical signs for diagnosis of pneumonia has focused on neonatal age group. **Methodology:** It was a prospective descriptive study carried at g Tertiary level neonatal intensive care unit (NICU) Hospital. All the babies born at or referred to NICU during the neonatal period of (0-28) days of birth and meeting the criteria for case definition were included in the study **Results:** In our study group the spectrum of respiratory distress included TTNB as the most common cause (45.33%). Other causes included pneumonia (24.66%), HMD (18%), MAS (7.33%), birth asphyxia (6%). Five babies had HMD with pneumonia, one baby had HMD with pneumonia with birth asphyxia, one baby had TTNB with birth asphyxia, three babies had HMD with birth asphyxia and 2 babies had MAS with birth asphyxia. **Conclusion:** In neonates with respiratory distress, presence of lethargy, poor feeding, chest retraction, tachypnea, hypothermia and adventitious sounds were significantly associated with pneumonia as compared to neonates with respiratory distress due to other causes.

Keywords: Respiratory Distress, Neonates, Neonatal Pneumonia

[*]**Address for Correspondence:**
Dr.HarshitaTripathi, Junior Consultant, Department of Pediatrics, Mata Chanan Devi Hospital, New Delhi, INDIA.
Email: madhushri1118@gmail.com
Received Date: 17/01/2018 Revised Date: 10/02/2018 Accepted Date: 01/03/2018
DOI: https://doi.org/10.26611/1014531

Access this article online

Quick Response Code:

Website: www.medpulse.in

Accessed Date: 08 March 2018

INTRODUCTION

Neonatal respiratory distress is one of the commonest disorders encountered within first 48-72 hours of life [1]. It is responsible for 20% of neonatal mortality. Incidence of respiratory disorders varies from 0.98 to 7.8% [2]. The spectrum of respiratory distress in neonates comprises of .

- Transient tachypnea of newborn,
- Pneumonia,
- Hyaline membrane disease,
- Meconium aspiration syndrome and
- Other miscellaneous causes.

In developing countries pneumonia accounts for more than 50% of respiratory distress in newborn. Neonatal pneumonia is divided into three categories on the basis of route and mode of acquisition of infection and age at presentation [3].

- congenital pneumonia
- Nosocomial pneumonia
- Aspiration pneumonia

The clinical signs and symptoms of pneumonia in neonatal period are often non specific and it is widely recognized that pneumonia in newborn babies may not present with signs and symptoms typically seen in older children. Moreover none of the evaluation of simple clinical signs for diagnosis of pneumonia has focused on neonatal age group.

The diagnosis of neonatal pneumonia is based mainly on radiologic picture of consolidation [4] and indirect markers of infections such as - Peripheral smear for bandemia, C-reactive protein, Micro ESR and Total Leukocyte Count.

The radiographic findings of neonatal pneumonia include nodular or coarse patchy infiltrates, diffuse haziness or granularity, air broncogram and lobar and sub lobar consolidation [4]. A clinical correlation of respiratory

distress with a positive blood culture is helpful in diagnosis of neonatal pneumonia but may not be helpful in cases where pneumonia is not associated with bacteremia [5]. Oxygen gradients and oxygen indices such as alveolar arterial oxygen gradient, and arterial alveolar oxygen ratio are useful derivatives of blood gas data that serve as clinical indicators of disease severity .[6]

Against this background, the study is planned to evaluate the neonates with respiratory distress to outline its spectrum and find the aetiology of neonatal pneumonia and to evaluate the value of oxygen indices as indicator of mortality in neonatal pneumonia.

METHODOLOGY

It was a prospective descriptive study carried at g Tertiary level neonatal intensive care unit (NICU) Hospital

Study population: All the babies born at or referred to NICU during the neonatal period of (0-28) days of birth and meeting the criteria for case definition were included in the study.

Sample size:150 consecutive newborns with respiratory distress were considered.

Estimation of sample size Minimum incidence of respiratory distresses in newborn, based on previous such studies, is around 9.6%. In total, screening of 1646 newborns over a period of 14 months provided 150 cases of respiratory distress. Consistent with previous studies, these 150 cases were sufficient for the study with a power of 80% and alpha error of 0.05.

Inclusion criteria: All the babies of age group ≤ 28 days showing respiratory distress irrespective of the mode and place of delivery were included as cases. All neonates (preterm and term within 28 days of birth) presenting with respiratory symptoms characterized by any one of the following were included as cases. 1) Rapid, noisy or difficult breathing 2) Respiratory rate > 60/min 3) Chest retraction 4) Cough 5) Grunting

Exclusion criteria: Surgical problems causing respiratory distress were excluded from the study such as 1) Congenital malformations affecting respiratory tract 2) Congenital heart disease 3) Persistent pulmonary hypertension 4) Esophageal Artesia 5) Congenital diaphragmatic hernia etc.

RESULTS

Table 1: Spectrum of respiratory distress in neonates and mortality

Final diagnosis	No of cases (n=150)(%)	Expired (n=9)(%)	
Pneumonia	37(24.66)	3	(8.1%)
MAS	11(7.33)	2	(18.2%)
TTNB	68(45.33)	0	(0%)
HMD with pneumonia	5(3.33)	1	(20%)
HMD	27(18)	3	(11.1%)
Birth asphyxia	9(6)	3	(33.3%)

In our study group the spectrum of respiratory distress included TTNB as the most common cause (45.33%). Other causes included pneumonia (24.66%), HMD (18%), MAS (7.33%), birth asphyxia (6%). Five babies had HMD with pneumonia, one baby had HMD with pneumonia with birth asphyxia, one baby had TTNB with birth asphyxia, three babies had HMD with birth asphyxia and 2 babies had MAS with birth asphyxia. The overall mortality in the study was 6%.

Table 2: Occurrence of pneumonia and other causes of respiratory distress in relation to weight

Weight at admission (gms)	No of cases with respiratory distress (n=150) (%)	Pneumonia (n=42) (%)	Other causes of respiratory distress (n=108)	P value
<1000	5(3.3)	1(2.3)	4(3.7)	0.685
1000-1249	5(3.3)	3(7.1)	2(1.3)	0.105
1250-1499	15(10)	7(16.6)	8(7.4)	0.090
1500-1749	11(7.3)	3(7.1)	8(7.4)	0.956
1750-1999	16(10.6)	5(12)	11(10)	0.759
2000-2249	11(7.3)	3(7.1)	8(7.4)	0.956
2250-2499	14(9.3)	4(9.5)	10(9.2)	0.960
≥2500	73(48.6)	16(38)	57(52.7)	0.106
Total	**150**	**42**	**108**	

In our study group 73 (48.6%) babies were ≥ 2500 grams and 77 babies were <2500 grams. The frequency distribution of birth weight and cause of respiratory distress (pneumonia and other causes of respiratory distress) are showed in the table. (The mean weight at inclusion into the study in neonates with pneumonia was 2249 ± 842 grams and in neonates with respiratory distress due to other causes was 2446±784grams. P value was not significant)

Table 3: Comparison of mortality between pneumonia and other causes of respiratory distress with weight

Weight at admission (gms)	Pneumonia (n=42)	Expired (n-4)(%)	Other causes of respiratory distress(n=108) (%)	Expired (n=5) (%)	P value
<1000	1(2.3)	0	4(3.7)	3(60)	0.440
1000-1249	3(7.1)	0	2(1.3)	0	-
1250-1499	7(16.6)	1(25)	8(7.4)	0	0.467
1500-1749	3(7.1)	1(25)	8(7.4)	0	0.273
1750-1999	5(11.9)	1(25)	11(10)	0	0.312
2000-2249	3(7.1)	0	8(7.4)	0	-
2250-2499	4(9.5)	1(25)	10(9.2)	0	0.286
≥2500	16(38)	0	57(52.7)	2(40)	1.000
Total	**42**	**4**	**108**	**5**	**0.267**

The frequency distribution of the birth weight and outcome of all the neonates included in the study is depicted in the table. There was no significant association of mortality in pneumonia and other causes of respiratory distress with weight.

Table 4: Occurrence of pneumonia and other causes of respiratory distress in relation to gestational age

Gestational Age (weeks)	No of cases with respiratory distress (n=150) (%)	Pneumonia (n=42) (%)	Other cases of respiratory distress (n=108) (%)	P value
≤ 28	4(2.6)	0	4(3.7)	0.206
29-30	4(2.6)	1(2.3)	3(2.7)	0.892
31-32	17(11.3)	9(21.4)	8(7.5)	0.015*
33-34	20(13.33)	7(16.6)	13(12)	0.454
35-36	30(20)	9(21.4)	21(19.5)	0.786
37-41	75(50)	16(38)	59(54.6)	0.069
Total	**150**	**42**	**108**	

The frequency distribution of gestational age and cause of respiratory distress (pneumonia and other causes of respiratory distress) are showed in the table. Mean gestational age in pneumonia was 38.71±2.92 weeks and in respiratory distress due to other causes was 36.62± 3.3 weeks p value was significant.

Table 5: Occurrence of pneumonia and other causes of respiratory distress in relation to mode of delivery

Mode of delivery	Total No of cases with RD (n=150) (%)	Pneumonia (n=42) (%)	Other causes of respiratory distress (n=108) (%)	P value
NVD	36(24)	7(19.5)	29(81.5)	0.190
LSCS	114(76)	35(30.7)	79(69.3)	

The frequency distribution of mode of delivery and cause of respiratory distress (pneumonia and other causes of respiratory distress) are showed in the table. 76% of cases were delivered by LSCS out of which 35 were pneumonia and 79 were due to other causes of respiratory distress. 36 (24%) babies were delivered by NVD out of which 7 were pneumonia and 29 were due to other causes. No significant association was found between Correlation of pneumonia and other causes of respiratory distress with mode of delivery.

Table 6: Comparison of pneumonia and other causes of respiratory with signs and symptoms

Signs and symptoms	Total no of cases with RD (n=150) (%)	Pneumonia (n=42)		Other causes of respiratory distress (n=108)		P value
		No of cases	%	No of cases	%	
Lethargy	9	6	14.3%	3	2.8%	0.015
Poor feeding	8	7	16.7%	1	0.9%	0.001
Chest retraction	85	34	81.0%	51	47.2%	<0.001
Rapid breathing	132	32	76.2%	100	92.6%	0.006
(RR≥60)	15	9	21.4%	6	5.6%	0.004
Grunting	25	10	23.8%	15	13.9%	0.143
Hypothermia	5	5	11.9%	0	0.0%	0.001

(temp<36.5)						
(temp<36.5)						
Fever	0	0	0.0%	0	0.0%	-
(temp>37.5)	3	2	4.8%	1	0.9%	0.189
Shock	2	1	2.4%	1	0.9%	0.483
Hypoglycaemia	6	3	7.1%	3	2.8%	0.350
Adventitious sounds	58	25	59.5%	33	30.6%	0.001
Absent NNR	30	6	14.3%	24	22.2%	0.275

In neonates with respiratory distress, presence of lethargy, poor feeding, chest retraction, tachypnea, hypothermia and adventitious sounds were significantly associated with pneumonia as compared to neonates with respiratory distress due to other causes.

DISCUSSION

During the period a total of 1646 babies were delivered during the study period, out of which 157 babies had clinical signs of respiratory distress. 7 cases of respiratory distress due to surgical causes were excluded from study as per exclusion criteria. In the present study incidence of respiratory distress is 9.5% of all live births inclusive of surgical causes. According to National Neonatal-Perinatal Database report [7] incidence of respiratory distress is 6%. In most of the studies incidence rate is 2.8% to 7.8% which is lower than us but in the study done by Mathur *et al* [8] incidence rate was high (29%) because it was study done purely on referred patients.

Out of 150 babies, 96(64%) were male and 54(36%) babies were female neonates with male: female ratio being 1.77:1. Similar results have also been seen in other studies. In a study done by Mathur *et al* male babies were 67.33%. According to Khatua *et al* [9], male: female ratio was 1.94:1

In the present study 65.3% babies were < 2000 grams and 34.7% babies were >2000grams. Our findings are similar to Malhotra*et al*[10] whose study showed 66% babies <2000grams and 34% babies >2000grams.

In the present study the most common cause of respiratory distress was Transient Tachypnea of Newborn (45.33%) which was similar to finding seen by Kumar andBhat. Other significant causes were pneumonia (24.66%), HMD (18%), MAS (7.33%), Birth asphyxia (6%).

We found that in 6 cases pneumonia coexisted with other conditions such as RDS Birth asphyxia . 7 cases of respiratory distress due to surgical causes were excluded from study as per exclusion criteria. In surgical causes there were 4 cases of pneumothorax, 2 cases of cardiac aetiology and 1 case of trachea oesophageal fistula.

In study by Kumar andBhat and Nielsen *et al*, TTNB was the most common aetiology of respiratory distress. The spectrum of respiratory distress in neonates in the present study were similar to earlier studies (18.7% to 51.7%) though Mathur *et al* study showed higher incidence of pneumonia (68.66%). The high incidence of pneumonia in our study is due to the fact that we considered sepsis screen, chest X ray, blood culture, clinical signs and risk factors for sepsis in diagnosing pneumonia. In other studies it was based on blood culture and/or chest x ray.

The overall mortality rate in the present study was 6% which is lower than reported by other studies. The mortality rate in pneumonia was 8.1%. With the advent of newer antibiotics and better infrastructure facilities the mortality rate in neonates with respiratory distress has gradually fallen over the years. Also the fact that these studies were old and included high number of home deliveries and out born babies contributes to high mortality.[3,10]

There was no significant difference in mean weight in neonates with pneumonia and in neonates with respiratory distress due to other causes. In the present study it was noted that there was decreasing trend in mortality with increasing weight of neonates which is in accordance with the earlier studies on respiratory distress [8,9].

In the present study the mortality in neonates with pneumonia weighing less than 2000 gm was 15.8% as compared to 4.3% in those weighing 2000 gms or more and was significant (p value 0.044). Khatua *et al* also found high mortality in those weighing less than 2000 gms (70%) as compared weighing greater than 2000 gms (18%). Misra *et al* also found higher mortality in LBW neonates with respiratory distress.

There was no significant association in of pneumonia or other causes of respiratory distress due to other causes with gestational age of neonates. A decreasing trend in mortality was observed with increase in gestational age which is similar to findings of previous studies [3,8]

We did not find any co-relation between mode of delivery and development of neonatal pneumonia. Our findings are similar to that of Thomas *et al*[2]

In the present study out of 150 neonates having respiratory distress 145 (96.6%) babies presented within 72 hours of birth. 37 had pneumonia and 108 babies had respiratory distress due to other causes. 5(3.33%) babies presented after 72 hours and all 5 cases were pneumonia. Causes of early respiratory distress were TTNB, HMD and MAS which usually presents within first 72 hours, while pneumonia in neonates occurs both in the

immediate neonatal period and as late as 28 days of age. So we had 96.6% babies presenting within 72hours. Mortality rate was 9.8% in neonates with pneumonia whose age at presentation was less than 72 hours as compared to 0% in those presenting after 72 hours. The antenatal history in mothers of likely predisposing factors for development of pneumonia in the neonate was taken. Maternal fever (>38 C within one week preceding the delivery for greater than 24 hours), prolonged rupture of membranes (>24hours) and foul smelling liquor were considered as risk factors for sepsis in neonates. Presences of any one of these risk factors was considered as positive. 20% of babies having any risk factor was found to have pneumonia as compared to 7.5% in those having respiratory distress due to other causes. Presence of risk factors for sepsis was significantly associated with development of neonatal pneumonia (p value 0.038).Our results are similar to previous studies.[2,8]

CONCLUSION

Incidence of respiratory distress is 9.5%. Respiratory distress is more common in males as compared to females. The most common cause of respiratory distress is transient tachypnea of newborn (45.33%). Other conditions included pneumonia, HMD, MAS, birth asphyxia. Neonates with pneumonia weighing <2000gm and those presenting within 72hours of birth have higher mortality

REFERENCES

1. Misra PK. Respiratory distress in newborn. Indian pediatr 1987; 24: 77-80.
2. Thomas S, Verma IC, Singh M, Menon PSN. Spectrum of respiratory distress syndrome in north India, A prospective study. Indian J Pediatr 1981; 48: 61-65.
3. Singh M, Deorari A K. Pneumonias in newborn babies. Indian j pediatr 1995; 62 : 293-306.
4. Swischuk LE, Radiology of the newborn and young infant. Baltimore: Williams and Wilkins. 1980, p59-65.
5. Ramji S. Respiratory distress in newborn. Bull NNF 1999; 13 : 31-34.
6. WHO: Clinical signs and etiological agents of pneumonia, sepsis and meningitis in young infants. Report of meeting Geneva 21-24 Nov 1989. Programme for control of acute respiratory infections Geneva, WHO-1990.
7. National Neonataology Forum, National Neonatal – Perinatal data base: report for the year 2002-2003. New Delhi: Department of Pediatrics, AIIMS. 2004
8. N.B. Mathur, K. Garg and S. Kumar*, respiratory distress in neonates with special referrance to neonatal pneumonia. Indian Pediatrics 2002; 39:529-537.
9. Khatua SP, Gangwal A, Basu P, Palodhi PK. The incidence and etiology of respiratory distress in newborn. Indian pediatrics. 1979 Dec;16(12):1121-6.
10. Malhotra AK, Nagpal R, Gupta RK, Chhajta DS, Arora RK. Respiratory distress in newborn: treated with ventilation in a level II nursery. Indian pediatrics. 1995 Feb;32(2):207-11

Source of Support: None Declared
Conflict of Interest: None Declared