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Original Research Article

Evaluation of etiology and clinical spectrum of respiratory distress in neonates admitted in tertiary care NICU

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ABSTRACT

Background: Neonatal period is defined as up to first 28 days of life and further divided into very early (birth to <24 h), early (birth to <7 days), and late neonatal period (7 days to <28 days). Neonatal period is the most vulnerable period of human life as it accounts for very high morbidities and mortalities and most of these are preventable. India contributes to one-fifth of global live births and more than a quarter of neonatal deaths**.** Respiratory distress is most common cause of NICU admission Aim of current study was to determine the etiology of respiratory distress in neonates presenting in NICU, clinical spectrum of respiratory problems in neonates having respiratory distress and the management of respiratory distress**.**

Methods: The present study was a prospective, observational, comparative study. This study was conducted from January 2019 to October 2019 at Mata Channan Devi hospital Janakpuri, New Delhi. 80 patients were included in this study.

Results: In our study 93.75% cases of respiratory distress was of respiratory origin, while 3.75% was due to cardiac cause and 2.5% was central nervous system due to birth asphyxia and in our study group most common clinical finding of respiratory distress was tachypnea found in 97.5% of patients. Result showed, overall incidence of respiratory distress among in borns was 10.34%. In our study TTNB was most common cause of respiratory distress among new born.

Conclusions: There was no significant difference of incidence in male and female babies. The etiology varies with gestational age. In spite of all advances in primary maternal care, delivery and early new born care respiratory distress is still the most common cause of morbidity and NICU admission in newborn babies.

Keywords: Respiratory distress, New-born, Transient tachypnea, Neonatal pneumonia

INTRODUCTION

Neonatal period is defined as up to first 28 days of life and further divided into very early (birth to <24 h), early (birth to <7 days), and late neonatal period (7 days to <28 days).[1] Neonatal period is the most vulnerable period of human life as it accounts for very high morbidities and mortalities and most of these are preventable. India contributes to one-fifth of global live births and more than a quarter of neonatal deaths.[2] Nearly, 0.75 million neonates died in India every year. The neonatal mortality rate (NMR) in India is 26 per 1000 live births.[3] Respiratory distress is one of the commonest disorders encountered within the first 48-72 hours of life. Respiratory distress occurs in approximately 7 % (5-10%) of infants.[4] Respiratory pathology is the commonest (32-54%) autopsy finding among early neonatal deaths.[5] The spectrum of respiratory distress in neonates includes pneumonia, transient tachypnea of the newborn (TTNB), respiratory distress syndrome (RDS), meconium aspiration syndrome (MAS)

and other miscellaneous causes. In developing countries there is a paucity of studies on causes of respiratory distress in neonates and all respiratory distress in neonates are treated as pneumonia at the first referral unit.[6]

There has been a tremendous advance in the management of respiratory distress such as newer High frequency ventilators, early surfactant replacement therapy, extra corporeal membrane oxygenation (ECMO) and advanced monitoring devices. Earlier therapies for pulmonary diseases were aimed at delivery of high concentration of O_2. Newer therapies are aimed at alleviating the physiological abnormalities of the immature of diseased lung while avoiding potentially harmful level of oxygen and positive pressure ventilator support. In spite, of these recent advances the average annual rate of reduction of NMR was only modest. There have been very less clinical studies on the neonatal respiratory distress in our country. The clinical presentation of respiratory distress in the new-born includes apnoea, cyanosis, grunting, inspiratory stridor, nasal flaring, poor feeding, and tachypnoea (more than 60 breaths per Minute). There may also be retractions in the intercostal, subcostal, or supracostal spaces. The etiology of RD depends on the age of onset of symptoms, gestational age, and maternal factors.

METHODS

The study design was prospective, descriptive, cross-sectional hospital-based study, carried out from Feb 2019 to Oct at Mata channan devi hospital New Delhi. All the babies of age group ≤28 days showing signs of respiratory were included as case during this time frame were included in the study. Babies who were admitted after 28 days of birth and who took lama were excluded from the study. Minimum incidence of respiratory distress in new-born, based on previous such studies was around 9.6%. In total, 760 new-borns were got admitted in same time frame of 9 months during previous year. Consistent with previous studies, the 80 cases were supposed to be sufficient for the study with 3% margin of error, the minimum required sample size at 5% level of significance.

The data from study population was collected using the preformed pre coded preform including name, age at admission, sex, and residence of the family, type of delivery, place of delivery (home or hospital), complications like prolonged rupture of membranes >18 hr, prolonged labour, meconium staining of liquor, antepartum haemorrhage and others. The cases were diagnosed clinically by the presence of at least 2 of the following criteria, namely RR of 60/min or more, subcostal retraction, xiphoid retraction, suprasternal retraction, flaring of alae nasi, expiratory grunt and cyanosis at room temperature.

The Pearson's correlation coefficient and the chi-square test of association was used to determine if there is a relationship between two categorical variables, $p<0.05$ was considered statistically significant. Descriptive statistics was analysed with SPSS version 17.0 software.

RESULTS

The present study was descriptive in nature where incidence, etiology, clinical spectrum, and outcome of new-borns with respiratory distress were studied. During the study period 706 deliveries were conducted in the hospital. Among them 553 were born via LSCE and 123 were born via normal vaginal delivery. Out of these babies 73 (10.34%) developed respiratory distress (Table 1).

Table 1: Incidence of respiratory distress.

Mode of delivery	No of live birth	No of inborns admitted in nursery	Inborn babies with respiratory distress	Incidence of respiratory distress among total no of live birth (%)
LSCS	533	132	59	11.07
NVD	173	24	14	8.1
Total	706	156	73	10.34

During the study period total 172 (156 in borns and 16 out borns) new-borns admitted in nursery out of which 80 (73 inborn and 7 out born) were admitted for respiratory distress. With overall incidence rate of 46.5% among NICU admissions making respiratory distress the most common cause of NICU admission. The male to female ratio was 1.1:1 among cases. The incidence of respiratory distress was a little more in babies born via LSCS then NVD. Among study subjects 2 babies were extremely low birth weight (<1000 g), 7 babies were very low birth weight (1000-1499 g), 25 babies were low birth weight (1500-2499 g) and most of the babies i.e., 46 babies have normal birth weight. In age wise distribution of babies in study group, 1 baby was extremely pre term (<28 weeks), 19 babies were pre term (28- 34 weeks), 34 babies were late pre term (35-37 weeks), and 26 babies were full terms born after 37 weeks.

In present study 93.75% cases of respiratory distress was of respiratory origin, while 3.75% was due to cardiac cause and 2.5% was central nervous system due to birth asphyxia. Among 80 cases 58.75% had TTN 17.5% had RDS, pneumonia 15%, congenital heart disease 3.75% and 3.75% case of birth asphyxia (Table 2). The severity of respiratory distress was determined by Anderson Silverman score (AS score). The study showed 26.25% of

new-borns had mild respiratory distress (AS score <3), 56.25% had moderate respiratory distress (AS score 3-7) and 17.5% babies had severe respiratory distress (AS score >7).

Table 2: Etiology of respiratory distress.

Diagnosis	N	%
TTN	47	58.75
RDS	14	17.5
Pneumonitis	12	15
CHD	3	3.75
MAS	2	2.5
Birth asphyxia	2	2.5

If considering the age at admission, around 87.5% of babies presented before 6hrs, 8.8 % presented between 6-24hrs while only 3.8 % babies presented with the signs of respiratory distress after 24 hrs. In our study group most common clinical finding of respiratory distress was tachypnoea found in 97.5% of patients followed by retractions 89%, nasal flaring 82.5%.

Table 3: Severity of respiratory distress.

Anderson Silverman Scoring	N	%
<3	21	26.2
3-7	45	56.3
>7	14	17.5

Cyanosis was least common symptom 4% the new-born presented with. The chest X-ray finding were mostly consistent with the etiology. In TTNB 28 X-rays showed prominent bronco vascular margins and 7 had fissure accentuation. In MAS both the X-rays showed infiltrations along with hyperinflations. X-rays in RDS has ground glass appearance in 12 cases out of 14 cases. The X-rays of Pneumonia had varying presentation. Among 14 preterm babies 11 newborns had RDS, 2 had TTNB and 1 was primarily diagnosed as pneumonia. In subgroup of late preterm babies (N=39), 25 of them had TTNB (25 babies) as primary etiology, while 9 had pneumonia and 2 had RDS. In full term neonates (N=26) most common etiology was again TTNB (20 babies), 2 have MAS and other 2 new-borns have congenital heart disease.

When comparing babies with respiratory distress as per their weight 2 new-borns were ELBW and both had RDS, In the sub group of VLBW babies (N=7) all new-borns have RDS. In the subgroup of LBW babies (N=25) 11 new-borns have TTN, 6 have pneumonia, 5 have RDS and 2 new-borns have birth asphyxia. In the subgroup of new-born with normal weight (N=46), 36 new-borns have TTNB as primary diagnosis, 6 have RDS. Total 47 babies had TTNB out of which 39 (83%) were born by LSCS and 8 (17%) were born by NVD with ODD ratio of 2.12. In our study 2 babies died during treatment. Out then one was ELBW and other was VLBW and both the babies got expired belongs to 28-34 weeks post gestational age group. Both the babies that expired in study group had RDS.

DISCUSSION

Incidence rate of respiratory distress in our study of 10.34% was similar to the previous studies done by Judith et al (10.5%) and Thomas et al (8.3%).[7,8] Incidence of respiratory distress in total NICU admission in our study was 46.5% which was higher from studies of Keerti Swarnkar et al (17.27%) and Hibbard (28.8%).[7,9] Our study has 93.75% cases of respiratory distress was of respiratory origin, while 3.75% was due to cardiac cause and 2.5% was central nervous system due to birth asphyxia.

Table 4: Etiology of respiratory distress.

Studies	Study neonates	TTNB (%)	RDS (%)	MAS (%)	Pneumonia (%)	BA (%)	CHD (%)
Present study	All neonates	58.75	17.5	2.5	15	2.5	3.75
Kumar et al.[4]	All neonates	42.7	9.3	10.6	17	3.3	--
Swarnkar et al.[9]	All neonates	40.7	17.2	9.3	7.9	11.4	3.6
Brahmaiah et al.[10]	All neonates	30	23	11	12	12	3
Kommawar et al.[11]	All neonates	40	26.6	7.75	6.5	12.25	4.75
Sodawat et al.[12]	All neonates	32.6	24.1	9.3	19.3	7.5	4
Nagendra et al.[13]	All neonates	14.5	18.8	12.5	14.3	12.5	4
Sivakumaran et al.[14]	Term neonates	37	.16	14.2	11.44	22	11.91
Mehta et al.[15]	All neonates	7.27	13.13	11.52	46.36	19.03	2.42
Thomas et al.[16]	All neonates	19	8.6	12.1	44		

Similarly, the study done by Brahmaiah et al reported 85% cases of respiratory distress were due to respiratory origin, 12% were CNS origin and 3% were of cardiac origin.[10] TTNB is most common cause in most of the studies including present study. It was similar to previous studies The male to female ratio was 1.1:1 among cases. The results were similar to the study done by Sodawat et al, Sahoo et al, Nagendra et al, Brahmaiah, et al.[10-17] Most new-borns had mild to moderate severity (82.5%) of respiratory distress. The study done by Brahmaiah (81%) and Sahoo et al (83%) showed similar results.[10,17] Most of the new born were present within 6 hrs. of birth (87.5%),

this result was comparable to studies done by Sodawat et al (80%) and Brahmaiah et al (77%).[10,17]

Limitations

Limitation of current study was it was done on small scale with limited patients and on single centre. Hence result of this study may not be similar in different demographic profile.

CONCLUSION

Respiratory is most common cause of NICU admission in both pre term and term babies. TTNB in term and RDS in pre-term babies is most prevalent etiology of respiratory distress. Our study showed there is no significant difference between male and female babies in terms of incidence and etiology. Most babies present within 6 hrs of birth with RD. the most common clinical sign of RD is tachpnoea. There is 2.12 times more likely hood of developing TTN in LSCS delivery then a normal delivery. In spite of all advances in primary maternal care, delivery and early new born care respiratory distress is still the most common cause of morbidity and NICU admission in new-born babies. It in turns causes huge burden over the health system and anxiety of parents.

Recommendations

A large-scale multicentre trail is needed to gather more knowledge about etiology and management of this condition. So, the results can be generalized. It will help in making new guidelines and also help government to generate programs to reduce the burden on health system.

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