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Research Article

Clinical study of respiratory distress in newborn

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ABSTRACT

Background: Respiratory distress in neonates is the most common cause of admission to a neonatal ICU in a tertiary care hospital. Identification of risk factors associated with development of severe distress and early diagnosis of cause is very important in the management of neonatal distress for better clinical outcome.
Methods: 100 consecutive born neonates with respiratory distress were studied and assessed for development of severe distress against onset, duration, oxygen requirement and outcome in terms of final diagnosis, mortality and treatment interventions. Serial chest X- rays were done at 1 hour and 6 hours of onset of distress to identify abnormal findings. Association of multi variable risk factors both maternal and neonatal was studied for development of severe respiratory distress.
Results: Transient tachypnoea of newborn (60%) was the commonest cause of newborn respiratory distress. Development of severe distress was more when onset is at 6 hours after birth (77%), duration persists more than 24 hours (65.5%) Oxygen requirement in number of days increases depending on diagnosis TTNB 100% for <1 day, MAS 95.4% for 2 days and RDS 100% for 3 days. Ventilation was done in 3 cases and there was no mortality.
Conclusions: Transient tachypnea of the newborn is the most common cause of respiratory distress in newborn. Almost 50% of newborn with respiratory distress develop severe respiratory distress which require intensive monitoring. Risk factors like high maternal age, primigravida mothers, more than 4 per vaginal examinations, meconium stained liquor, cesarean delivered newborns, Small for gestation age, and 1 min Apgar score less than 7, birth weight less than 2.5Kg and male sex of newborn were associated with severe respiratory distress in newborns.

Keywords: Respiratory distress, New-born, Risk factors, Chest x rays, Oxygen requirement

INTRODUCTION

Respiratory distress is the most common cause of neonatal admission in both term and preterm neonates. Respiratory distress may vary from 7-8% among live births. The incidence varies from 30% among preterm, 20% among post-terms to 4% in term babies.[1] TTN is found to be the commonest cause of respiratory distress followed by meconium aspiration syndrome, hyaline membrane disease, sepsis, and birth asphyxia. Congenital heart diseases and surgical causes of respiratory distress account only to a minor degree.[2]

Definition Respiratory Distress is diagnosed clinically by the presence of at least two of the following criteria:

- Respiratory rate of >60/minute,
- Retractions (sub costal, xiphoid and suprasternal recession),
- Flaring of the alae nasi,
- Expiratory grunt and Cyanosis at room air on two consecutive examinations at least 1 hour apart.[1]

The first breath and first cry have always been mystical signalling the beginning of a new life. A variety of disorders of respiratory system and non-respiratory disorders like intracranial injury, cardiac failure, metabolic disorders, septicemia and congenital malformations can manifest clinically with respiratory distress.

Improved diagnosis and treatment due to technological advancements and increased pediatric and neonatal specialization have led to an impressive fall in neonatal mortality. Ventilators have revolutionized the outcome of respiratory failure in neonates. Earlier therapies for pulmonary diseases were aimed at delivery of high concentration of O2. Newer therapies are aimed at alleviating the physiological abnormalities of the immature or diseased lung while avoiding potentially harmful levels of oxygen and positive pressure ventilatory support.

Nonetheless, the continued high incidence of premature birth and infants receiving poor prenatal care continues to test the abilities of the neonatologist. Early recognition and appropriate therapy of neonatal respiratory disease has impressive results. Continued efforts in prevention of premature birth, early recognition of fetal distress, maternal risk factors for neonatal sepsis and in diagnosis of diseases in utero will lead to further improvements in neonatal outcome.

Aim and objectives

1. To assess the immediate clinical outcome of respiratory distress in new-born.
2. To study the various Risk factors associated with development of severe respiratory distress in the new born.

METHODS

A prospective study was done among 100 new-borns born with respiratory distress in NRI medical college during a period of September 2013-December2014.

Sources of data: New-borns admitted to NICU of NRI Medical College, due to respiratory distress.

Inclusion criteria

All new-borns admitted to NICU of NRI medical College, within 72 hrs of birth due to respiratory distress.

Exclusion criteria

1. All new-borns admitted to NICU NRI with onset of respiratory distress after 72 hrs.
2. Outside born new-borns admitted with respiratory distress.

Method of data collection

Data was collected for all new-borns included in the study with respiratory distress. General information, socioeconomic status, history and clinical examination findings of mother and new born was documented. New born with respiratory distress were shifted to NICU for further management. Time of onset of distress was documented and the severity of the distress was documented and the severity was assessed by using Silverman and Anderson clinical scoring. X-ray was done at 1 hour/6 hours in all new-borns and was reported by the radiologist for abnormal findings. Depending on the clinical diagnosis of respiratory distress, relevant investigations were sent and new-borns were managed as per protocol. Duration of O2 therapy, intervention done in the form of surgical/bubble CPAP/ventilator/surfactant therapy/ treatment and mortality was documented to assess the clinical outcome against the final diagnosis.

Chi square test was used to analyse the data with $p<0.05$ considered as statistically significant.

RESULTS

Out of the 100 cases, 69 new-borns were male babies and 31 female babies. Majority of the mothers (60%) were in the age group of 22-30 years and belonged to upper lower socio economic class. 40% were primipara and Caesarean section was mode of delivery in 75% with 38% meconium stained liquor.

Table 1: Final diagnosis versus severity of respiratory distress.

	Frequency	Severe distress	%
Final Diagnosis	**n=100**	**n=48**	
Transient tachypnea of newborn (TTNB)	60	18	30%
Meconium Aspiration Syndrome (MAS)	31	22	72.9%
Respiratory Distress Syndrome (RDS)	6	6	100%
Acyanotic Congenital Heart disease(ACHD)	1	1	100%
Congenital diaphragmatic Hernia (CDH)	1	1	100%
Sepsis	1	0	

With regards to birth weight, low birth weight (<2.5 kg) was seen in 27 cases and 24 cases were small for gestational age (SGA). 72% of new-borns had 1MIN APGAR score less than 7.

With regards to the severity of the respiratory distress, Majority of the new-borns had severe respiratory distress (48%) and moderate respiratory distress (46%) compared to mild distress (6%) based on the Silverman and Anderson clinical scoring.

100% of new-borns with respiratory distress was diagnosed with RDS (6 out of 6) and 72.9% was with

diagnosis of MAS (22 out of 31) had developed severe respiratory distress as compared to 30% of the neonates with respiratory distress with diagnosis of TTNB (18 out of 60) (Table 1).

Duration of respiratory distress

65.5% of the new-borns (19 out of 29) with duration of respiratory distress more than 24 hours developed severe respiratory distress compared to 39.72% of new-borns (29 out of 75) with duration of less than 24 hours (p=0.0006).

Table 2: Duration of oxygen therapy versus severity of respiratory distress.

No of days	Frequency	Severe distress						
o_2 required	n=100	n=48	Mean	Std deviation	Minimum	Maximum		
0	8	18	1.25	0.46291	1.00	2.0		
1	62	22	1.2909	0.45837	1.00	2.00		
2	20	6	2.8947	0.56713	2.00	4.00	Duration	Oxygen days
3	6	1	4.6667	2.06559	1.00	7.00	r *	0.87
4	1	1	6.0000	0.00000	6.00	6.00	P value	0.001
5	3	0	7.0000	0.00000	7.00	7.00	Total	100
Total	100	48	2.0761	1.55651	1.00	7.00		

f=77.676; p<0.001; very highly Significant*; r coefficient factor

Table 3: Risk factors for development of severe respiratory distress.

Risk factor	Frequency (n=100)	Severe distress (n=48)	p value*
Age of Mothers (years)			
< 21	25	14	0.007
22-30	60	21	
>30	15	13	
Socio economic status			
Upper middle	12	7	
Lower middle	28	26	0.02
Upper lower	60	15	
Parity			
Primi	40	25	0.001
Gravida 2 to 3	33	16	
Multigravida	26	7	
Liquor			
Clear	62	22	0.0002
Meconium stained	38	26	
Mode of delivery			
Caesarean	75	37	
Normal vaginal	25	11	0.005
Gestation of the baby			
SGA	24	20	
LGA	10	6	<0.0001
AGA	66	22	
1 min APGAR score			
<7	72	38	
>7	28	10	0.004
Birth weight (kg)			
<2.5	27	16	
2.5-3.5	66	30	<0.001
>3.5	7	2	
Newborn Sex			
Female	31	10	
Male	69	38	0.005

p<0.05 considered as statistically significant

Duration of oxygen therapy

Majority (62%) of new-born with respiratory distress required oxygen treatment for less than 24 hours as compared to 30% of new-born with respiratory distress (20% for 2 days, 6% for 3 days, 1% for 4 days, 3% for 5 days) required O2 treatment for more than 24 hours (Table 2).

15 babies were put on Bubble CPAP; surgical intervention was done in one case of Congenital Diaphragmatic Hernia which also required ventilator care. In the present study out of all the 100 babies the mortality was 0%.

Risk factors of the severe respiratory distress

In the present study, a significant association was between certain risk factors and severity of respiratory distress.

The risk factors which found to be statistically significant ($p<0.05$) were age of mothers, socio economic status, parity, liquor, mode of delivery, gestation of baby, 1min APGAR score, birth weight and sex of the new-born (Table 3).

DISCUSSION

Etiology and diagnosis

In the present study out of 100 cases identified with respiratory distress, 98% were respiratory in origin.48% of the new-born had severe respiratory distress while 46% had moderate respiratory distress and 6% had mild respiratory distress. The commonest cause for respiratory distress was Transient tachypnoea of Newborn (60%) followed by Meconium Aspiration Syndrome (31%) and RDS (6%). Similar result was seen in the study done by Guyon G, where the commonest cause for respiratory distress in new-borns was TTNB (72%) followed by MAS and RDS (38%).[3] However in a study done by Kumar A, it was seen that the RDS was found to be the commonest (42.7%) cause of respiratory distress followed by TTNB (17.0%), MAS (10.7%), Sepsis (9.3%) and birth asphyxia (3.3%).[4] This variability in the present study was due to increase no of cesarean deliveries during the study period giving rise to more no of TTNB cases

Severity of distress

77% of the new-borns (7 out of 9) with the onset of respiratory distress after 6 hours of birth developed severe distress compared to 45.3 % (34 out of 75) and 43% (7 out of 16) new-born with onset of respiratory distress at birth and between 0-6 hours of birth respectively. Similar results were seen in a study done by Michal Rygl.[5]

In the present study it was seen that 65.5% of the new-borns (19 out of 29) with duration of respiratory distress more than 24 hours developed severe respiratory distress compared to 39.72% of new-borns (29 out of 75) with duration of less than 24 hours. Similar results were observed in the study done by Derek C, where neonates (34 out of 71) with the duration of respiratory distress of more than 24 hours developed severe respiratory distress.[6]

Duration of oxygen therapy

In our study majority (62%) required O2 less than 24 hours which implied O2 requirement depends on the severity of respiratory distress. Gabriel J studied the neonates born with respiratory distress requiring supplemental oxygen and it was seen that 8% required supplemental oxygen for at least an hour.[7] The discrepancy in the present study may be due to more number of TTNB (60%) which do not require more O2 due to less severity of distress On the contrary new-borns with MAS (99%) and RDS (100%) required more O2 as they tend to develop more severe distress.

Risk factors

Maternal factors

Maternal age

In the present study it was seen that 86% of the new-borns (13 out of 15) born to mothers with maternal age >30 developed severe respiratory distress compared to 56% (14 out of 25) and 35% (21 out of 60) new-borns born to mothers below 21 years & between 22-30 years respectively. Similar results were observed in the study done by Dani C, where it was observed that mothers >32 years of age were at a higher risk of delivering babies with respiratory distress.[8]

Parity

In the present study 62.5% of the new-borns (25 out of 40) born to Primigravida mothers developed severe respiratory distress when compared to 48.4% (16 out of 33) and 35% (7 out of 26) new-borns born to 2nd and 3rd Gravida and multigravida. Similar results were observed in the study done by Dani C, it was seen that the incidence of respiratory distress was more in the first pregnancy and after the fourth pregnancy.[8] However Mathur NB has shown that multigravida was a risk factors for developing respiratory distress in new-borns.[9] Prolonged labour in the primigravida may be the reason for development of respiratory distress in neonates in the present study.

Liquor

68.4% of new-borns (26 out of 38) born to mothers with meconium stained liquor developed severe respiratory

distress compared to 35.40% of the new-borns (22 out of 62) born to mother with clear liquor. Similar observations were observed in the study done by Rygal M, where meconium stained liquor had more chances of developing respiratory distress 58.8% when compared to 21.14%.[5]

Mode of delivery

49.3% of new-borns (37 out of 75) born by cesarean section developed severe respiratory distress compared to 44% of the new-borns (11 out of 25) born by normal vaginal route. Similar findings were observed in studies done by Dani C, Geller EJ, Jean-Bernard G, where it was noticed that caesarian delivered babies have more chances of neonatal respiratory distress when compared to normal vaginal delivery.[3,8,10]

Fetal risk factors

Gestation

In the present study it was seen that 83.6% of new-borns (20 out of 24) with SGA developed severe respiratory distress compared to 60% (6 out of 10) and 33.3% (22 out of 62) new-borns with LGA and AGA respectively. Similar findings were observed in a study done by Lee KS et al, where it was seen that SGA babies had a significantly higher association with the incidence of respiratory distress when compared to AGA or LGA babies.[11]

1 min Apgar score

In the present study it was seen that 53% of new-borns (38 out of 72) with 1 min Apgar of less than 7 developed severe respiratory distress compared to 36% (10 out of 28) with 1 min Apgar more than 7 . Study done by Lureti M has shown that a Low Apgar score at 1st and 5th min <7 was associated with an increased risk of respiratory distress when compared to babies with Apgar score more than 7.9 at 1 minute of age and 8.4 for 5 minutes of age.[12]

Birth weight

In the present study it was seen that 59.25% of the new-borns (16 out of 27) with birth weight of <2.5 kgs had developed severe respiratory distress compared to 50% (30 out of 66) and 28.5% (2 out of 67) with birth weight of 2.5-3.5 kgs and >3.5kgs respectively. In the study done by Lureti M, it was seen that the risk of neonatal respiratory distress markedly increased with decreasing birth weight compared to babies weighing more than 2500 g at birth.[12]

Baby sex

In the present study it was seen that 55% of the new-borns (38 out of 69) male babies developed severe respiratory distress compared to 32.20% (10 out of 31) female babies. Lureti M shows the frequency of neonatal respiratory distress was higher in males than compared with females Similarly Miller HC shows that the incidence of severe respiratory distress was almost three times higher among males than females.[13] However in the study done by Dani C, it was observed that that there is no significant association with respiratory distress and the sex of the baby.[8]

CONCLUSION

Transient tachypnea of the newborn is the most common cause of respiratory distress in newborn. Almost 50% of newborn with respiratory distress develop severe respiratory distress which require intensive monitoring. Risk factors like high maternal age, primigravida mothers, more than 4 per vaginal examinations, meconium stained liquor, cesarean delivered newborns, Small for gestation age, and 1 min Apgar score less than 7, birth weight less than 2.5Kg and male sex of newborn were associated with severe respiratory distress in newborns. Clinical assessment of severe respiratory distress against its onset and duration will help in early diagnosis. Immediate clinical outcome of newborn respiratory distress in term of mortality rate is variable and depends on the cause of newborn distress.

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