Etiological Study of Respiratory Distress in Newborn

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ABSTRACT

Introduction: Respiratory distress is one of the commonest disorder encountered within the first 48-72 hours of life. Clinical presentation of respiratory distress in newborn include one or more of the following features- respiratory rate of ≥60/min, apnoea, chest retractions, grunting, nasal flaring, cyanosis. Early recognition and appropriate specific therapy of neonatal respiratory distress has impressive results. Study aimed to record the various causes, incidence, risk factors and mortality associated with respiratory distress in neonates admitted in NICU.

Material and Methods: The study was conducted over a period of 1 year in a tertiary care hospital in a total of 200 neonates.

Results: Out of 200 cases of Respiratory distress, 170 cases were due to Respiratory causes, 24 cases were of CNS causes, and 6 cases were due to Cardiac causes.

Conclusion: Respiratory Distress is one of the commonest cause of NICU admissions. Transient tachypnea of the newborn is the most common cause of respiratory distress in term babies whereas Hyaline membrane disease is common in preterm babies. Term babies presented with RD after 6hrs of birth were significantly associated with Pneumonia.

Keywards: Apnoea, Transient Tachypnoea of new born (TTNB), Respiratory Distress (RD), Hyaline Membrane Disease (HMD)

INTRODUCTION

Respiratory distress is one of the commonest disorders encountered within the first 48-72 hours of life. Respiratory distress is a symptom complex arising from disease processes that cause failure to maintain gaseous exchange. Clinical presentation of respiratory distress in newborn include one or more of the following features respiratory rate of ≥60/min, apnoea, retractions (sub costal, intercostal, xiphoid, suprasternal), grunting, nasal flaring, cyanosis.[1] Severity of respiratory distress in term babies is assessed by Downes score and in preterm babies it is assessed by Anderson Silverman score.

It occurs in 5-10% of live births and is responsible for about 20% of neonatal mortality.[1] Respiratory pathology is the commonest (32-54%) autopsy finding among early neonatal deaths

A variety of disorders of respiratory system like Transient tachypnea of the newborn, Hyaline membrane disease, Meconium aspiration syndrome, Pneumonia, Septicemia, Persistent pulmonary hypertension and Non respiratory disorders like Cardiac, Renal, Gastrointestinal, Neurological, Infectious, Metabolic disorders and Congenital anamolies can cause respiratory distress. Commonest cause of respiratory distress in term babies is Transient tachypnoea of new born

whereas in preterm babies it is Hyaline membrane disease.[1] Continued efforts in prevention of Premature birth, early recognition of fetal distress, identification of maternal risk factors and diagnosis of diseases in utero will further improve neonatal outcome. Early recognition and appropriate therapy of neonatal respiratory disease has impressive results. Though treatment is disease specific, common modalities of treatment include Resuscitation, Oxygenation, Surfactant replacement, Ventilation. Introduction of Continuous Positive Air way Pressure and Ventilators have revolutionized the outcome of respiratory failure in neonates.

Study aimed to record the various causes, incidence, risk factors and mortality associated with respiratory distress in neonates admitted in NICU.

MATERIAL AND METHODS

The study, hospital based descriptive cross sectional was conducted over a period of One year (Oct 2014 to Sep 2015) in a territory care hospital in a total of 200 neonates.

Investigations

Blood investigations – CBP, CRP, sepsis screen,blood culture, Chest X- ray,2D ECHO,Pulse Oximetry

Inclusion Criteria

All babies referred to NICU either preterm or term up to 28 days of life.

All Preterm,Term and Post term babies and all appropriate, Small and Large for gestational age babies,

Babies delivered vaginally or assissted by vaccum, forceps or caesarean sections.

Exclusion Criteria

Babies > 28 days,

Babies with congenital malformations like Anencephaly, Meningocele, Meningomyelocele, Encephalocele etc.

Babies treated outside and referred to Government hospital,

Babies with birth Wt. of <700gm.

Method of collection of data

Data was collected for all newborns included in the study with respiratory distress. General information, socioeconomic status, detailed history of mother during her pregnancy and delivery and clinical examination findings in the baby was documented. Time of onset of distress and the severity of the

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distress was documented and the severity was assessed by using Downes and Silverman and Anderson clinical scoring. Depending on the history and clinical examination, relevant investigations were sent for final diagnosis and newborns were managed as per protocol. Risk factors, onset and severity of respiratory distress and reasons for death were documented to assess the clinical outcome against the final diagnosis.

STATISTICAL ANALYSIS

Chi square test was used to analyze the data. SPSS 11.5 is used to analyze the data.

RESULTS

Etiology of Respiratory Distress
Out of 200 cases studied with Respiratory distress, 170 cases were due to Respiratory causes, 24 cases were of CNS causes, and 6 cases were due to Cardiac causes.

Gender wise distribution of cases
Out of 200 cases, incidence of respiratory distress was found in 59% in male babies and 41% in female babies.

Place of delivery of cases
Out of 200 cases 86% of cases were born in hospital and rest of them (14%) at home.

Socioeconomic status of cases
As most of the people coming to this hospital belong to low socioeconomic class, 54% of cases were born to parents belonging to lower class while only 6.5% belong to lower middle class.
Gestational wise distribution of cases
In the present study 55% cases were term, 2% were post term while 43% were pre term babies

Weight wise Distribution Of Cases
In the present study 59% were <2.5 kg, 40% were between 2.5 -4 kg and only 1% were>4kg weight.
Out of 200 cases, no risk factors were identified in 89 cases. Hypertension(46) was the commonest risk factor noted, followed by Oligo hydramnios(11), HTN +Poly hydramnios +Twins(10), Gestational DM(10), Fever(8), HTN + Oligohydramnios(6), abortions(6),Twins(4), PROM(4), UTI(4) and Polyhydramnios(2).

A PGAR Score of Cases
Normal APGAR of 8-10 was found in 50% cases while APGAR of 4-7 in 43.5% and <3 was in only 6.5%.

O_2 Saturation of Cases
Most of cases (47%) had O_2 saturation between 80-90%, 30% of cases had >90%, 15% cases had saturation of 70-80% while only 8% had <70%.

Diagnosis of the Cases
Out of 200 cases, TTNB (30%) was the commonest cause of Respiratory Distress followed by HMD(23%), Pneumonia(12%), Birth asphyxia (12%), MAS (11%), Sepsis(9%), and CHD(3%).

Gestational age (in weeks) of cases in relation to diagnosis
In the present study, incidence of HMD in <28weeks was 100% whereas in 28-32weeks it was 44.4%. Incidence of TTNB in 28-32weeks is 33.3%, in 33-36weeks it was 78.5% and in 37-38weeks it was 57.2%. Incidence of Pneumonia in 28-32weeks was 22.3%, 33-36weeks it was 14.3%, and in 37-38weeks it was 25%. Incidence of MAS in 33-36weeks is 7.2% in 37-38weeks it was 17.8% and it 100% in >39weeks (Chi-square test; p-value <0.001 significant).

Downes score in relation to Diagnosis
In term babies most of TTNB cases had Downes score of 0-3 in 92.9%,while in MAS it was 4-6 in 54.5% followed by 7-10 in 36.4%. But in Pneumonia it was 4-6 in 77.8% followed by 7-10 in 22.2% (Chi-square test; p-value <0.001 significant).
Anderson Silverman score of cases in relation to diagnosis: In Preterm babies all the TTNB cases had Anderson score of 0-3,while in HMD it was 4-6 in 63.6% followed by 7-10 in 36.4% but score of 4-6 and 7-10 is seen equal proportions in Pneumonia (Chi-square test; p-value <0.001 significant).

Outcome of cases
Out of 200 cases 83% cases were discharged, while 17% expired.

Deaths in relation to diagnosis
Leading cause of death in the study is noted in cases of HMD (47%) followed by Septicemia (23.6%), Pneumonia (11.7%), Severe Birth asphyxia (5.9%), MAS (5.9%) and CHD(5.9%). No deaths had occurred in TTNB cas
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Reasons for Deaths of Cases
Hyaline membrane disease was the cause of death in 47% while 23% died due of Septicemia (with features of DIC), Severe Birth asphyxia in 12%, Pulmonary hemorrhage in other 12% and underlying Congenital heart disease in 6% deaths (figure-2).
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Place of birth in relation to deaths
In the present study deaths were significantly high in home deliveries (23 out of 28) (Chi-square test; p-value <0.001 significant).

Time of death of cases
In the present study most of the cases died within one day (54%), while others (46%) cases died after one day (max. within 6 days).

Anderson Silverman score of cases in relation to deaths
Anderson Silverman score of >4 was observed in deaths in Preterm babies. None of the deaths had score of <3 (Chi-square test; p-value <0.001 significant).

Downes score of cases in relation to deaths
Downes score in all expired Term babies was >7 (Chi-square

Risk factors	No of cases	Percentage
No risk factors	89	44.5
Gestational diabetes	10	5.0
Hypertension	46	23.0
Heart disease	0	0
Poly hydramnios	2	1.0
Oligo hydramnios	11	5.5
Fever with rash	0	0
Asthma	0	0
Twins	4	2.0
Abortions	6	3.0
PROM	4	2.0
Fever	8	4.0
UTI	4	2.0
Smoking	0	0
Alcohol	0	0
Epilepsy	0	0
Drugs	0	0
Diabetes +hypertension	0	0
Hypertension+polyhydramnios+twins	10	5.0
Hypertension+ oligo hydramnios	6	3.0
Total	200	100

Table-1: Risk factors for respiratory distress

Diagnosis	No. of cases	Percentage
TTNB	60	30
RDS	46	23
PNEUMONIA	24	12
BIRTH ASPHYXIA	24	12
MAS	22	11
SEPSIS	18	9
CHD	6	3

Table-2: Diagnosis

Figure-1: Deaths in relation to diagnosis

Figure-2: Reasons for deaths of cases

test; p-value <0.001 significant).
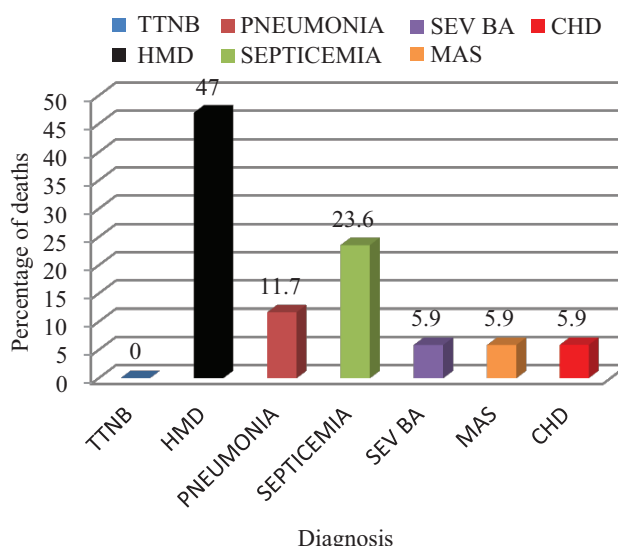
DISCUSSION

Out of these total 200 cases identified to have RD, 170 cases were due to Respiratory causes, 24 cases were due to CNS causes and Other 6 cases were due to cardiac causes (out of 6, 3 were VSD, 2 were PDA and 1 was ASD). Based on Downes and Anderson Silverman score, Mild respiratory distress was observed in 32%, Moderate in 49% and Severe in 19%. In the present study commonest cause of RD was TTNB (30%) followed by RDS (23%).

Table-2 shows the incidence of various causes of RD in the present study.
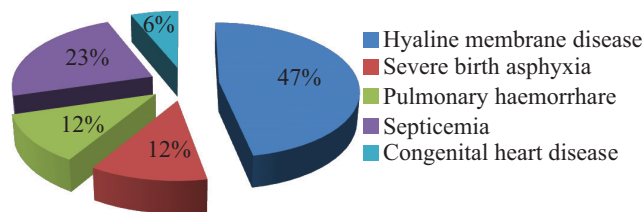
Findings of the present study are compared with other previous studies as follows

From the above table it was found that the findings of the present study were similar to studies by Guyon G et al[4], Rubaltella FF[5], C. Dani[7], Reali MF etal (1998) but contrary to studies by Nagendra K et al[14], T.S. Raghu Raman et al (2001)[12], Kumar et al.[3]

Incidence of MAS was high in present study in more than 37weeks and similar results were obtained in Dargaville and Copnell et al (2006), Singh et al (2009), Guyon et al (2009).[9]

Incidence of TTNB was high in late preterm and term babies (90%) in this study and similar results were obtained in studies done by Jain et al (2009) and Riskin et al (2005).[11] In normal vaginal delivery cases incidence of TTNB was high which was contrary to studies by Milner et al (1978)[9], Jain et al (2009) and Riskin et al (2005).[11]

Majority (53.3%) of the male babies had high incidence of TTNB in the present study. Similar results were obtained in Jain et al (2009) and Riskin et al (2005).[11] But as per C.Dani[7] and Nagendra K et al[14] there was no significant association with gender.

Incidence of Pneumonia in the present study was less than 1.5 kg babies is 2%. Similar results were obtained in NICHD Neonatal research network Stoll et al[2] (1996) (1.9%) between 1991-93 and 1.5% between 1998-2000 but incidence was 1.9% in less than 1kg and 0.28% in 1.5-2.5kg babies.

Mode of Delivery

Only 31.5% of cases were born through caesarean section and rest (68.5%) of them were born through Normal vaginal delivery. Contrary results were obtained in studies by C Dani et al[7], EJ Geller et al, Jean Bernard et al, Guyon et al.[9] The plausible reason might be that most of the cases were referred from peripheries where there were no facilities for caesarean section.

In the study by Riskin et al[11] 50.7% of the babies born by caesarean section had respiratory distress while only 22.4% of babies born by normal vaginal delivery had developed Respiratory distress.

Gender

In the present study males (59.5%) have increased Respiratory

Distress compared to females (40.5%). Similar results were obtained in M Luerti et al[8] and Herbert C Miller et al.[9] but there was no significant association of Respiratory Distress with gender was observed in C. Dani et al[9] and Nagendra K et al.[14]

Place of Delivery
In the present study, 86% of cases were born in hospital and rest of them (14%) at home. Incidence of pneumonia was high (21.4%) in home deliveries when compared to institutional deliveries which is similar to study by Kumar et al (68.7%).[3] In the present study mortality was significantly associated with place of delivery. i.e; 23 out of 28 home delivered babies were expired.

Parity
In our study primi gravida (56.5%), second gravida(35.5%), multi gravida (8%). There is increased risk of respiratory distress in primi gravida probably due to prolonged delivery. Similar results were obtained in C Dani[7] but NB Mathur et al[13] multigravida was the risk factor for RD where as in M Lureti et al[8] there was no significant association between multigravida and RD.

Maternal age
In the present study only 2% of mothers belong to age group above 30 yrs whose babies were found to have severe Respiratory Distress which was found to be a risk factor. The above results were in accordance with the studies by C Dani[7] and Alwyn Smith.[10]

Birth weight
In the present study birth weight of <2.5 kg were 59%, 2.5-4kg were 40% and >4kg were 1%, severe RD was observed in <2.5 kg (41.4%).
Similar results were obtained in M Lureti et al[8], Kwang Sunlee et al[6], C Dani et al[7] and Herbert C Miller et al[9] where increased Respiratory Distress was observed with decrease in birth weight especially of <2.5 kg.

APGAR Score
In the present study APGAR score of < 7 were 50% whereas APGAR score of <3 were only 6.5%, decrease in score was associated with increase in RD. Similar results were obtained in M Leureti et al.[8]
Fidanovski et al observed that low APGAR at 1 min was associated with prolonged NICU stay and Jean Bernard Gouyon et al[9] observed that APGAR of <3 at 1 and 5 min were associated with increased RD and prolonged NICU stay.

Time of onset of RD
In the present study 77% had developed RD within 1 hr of life whereas 7% had RD after 6 hrs of life. 50% of these 7% babies had Pneumonia and other 50% had Sepsis. So, babies who had respiratory distress after 6hrs were mainly due to infection.

Anderson Silverman Score
In the present study Anderson score of >7 was observed in 20% of preterm babies.
50% of deaths in preterm had score of 4-6 whereas 50% had

score of >7. So score of >4 was significantly associated with mortality.

Downes score
In the present study Downes score of > 7 was observed in 12.7%.Score of > 7 is mostly associated with MAS (44.4%) followed by Pneumonia (22.2%).
All the deaths (100%) in term babies was significantly associated with score of >7.

Risk factors
In the present study no risk factors were observed in 44.5%cases. Most common risk factor observed in study was HTN (31%) followed by Oligohydramnios (8.5%), Twin pregnancy (7%), Polyhydramnios (6%), Gestational Diabetes Mellitus (5%), PROM(4%). HTN was mostly associated with TTNB (17.4%), MAS (17.4%), Birth asphyxia(17.4%), and Sepsis (17.4%). GDM most commonly associated with TTNB. Oligohydramnios most commonly associated with TTNB (54.5%) followed by Pneumonia (36.4%) and HMD (9.1%).
PROM was significantly associated with pneumonia (50%), and HMD (50%).
In the present study Pneumonia and Sepsis together constitutes 21% of which C-Reactive Protein was positive in 90.9%, Blood culture was positive in 36.3%, Leucopenia (<4000/cumm) was seen in 45.5%. Near similar results were observed in Kumar et al in which blood culture positivity was seen in 47.6%

Mortality
In the present study mortality was 17% and deaths are due to Hyaline membrane disease (47%), Septicemia (23%), Severe birth asphyxia (12%), Pulmonary hemorrhage (12%) and CHD (6%). Among the deaths 44% were Inborn while 56% were Outborn babies, probable cause for high mortality in Out born might be due to home deliveries and delay in referral. 23 out of 28 babies who were home delivered had expired.

Limitations
This study was conducted in only one hospital with a limited sample size.
Mortality was little high as there was delay in transfer of babies from peripheries and were brought in terminal stages. Maternal risk factors like Advanced maternal Age (>30Yrs), Primigravida, Meconium stained liquor, Caesarean delivery and home delivery. Neonatal risk factors like Small for gestational age neonates, APGAR score <7, High Anderson Silverman score, High Downes score, Birth weight of <2.5kgs and Male babies developed severe respiratory distress. Maternal Hypertension and Diabetes were commonly associated with respiratory distress in neonates

CONCLUSION
Respiratory Distress is one of the commonest cause of admissions in NICU. Transient tachyponea of the newborn is the most common cause of respiratory distress in term babies whereas Hyaline membrane disease is common in preterm babies. Clinical assessment of Severe respiratory distress by

Anderson Silverman score in Preterm and Downes score in Term babies may be helpful in assessing clinical outcome. Term babies presented with RD after 6hrs of birth were significantly associated with Pneumonia. Most of the babies expired due to RD were within 24 hrs of birth. Mortality was high in Outborn and Home delivery babies.

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