Study of etiology and outcome in newborns presented with respiratory distress.

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Abstract:

Background: Almost 15% of total term babies and 29% of preterm babies present with respiratory distress. Respiratory distress contributes to a major portion of mortality among them. This study was conducted with the aim of analysing the etiology and outcome of respiratory distress in newborns at a tertiary care centre so as to focus on interventions to decrease the burden of the disease and also decrease the neonatal mortality. **Materials & Methodology:** In this prospective study 106 newborns, delivered at Civil Hospital Ahmedabad over a period of two months (December'19 and January'20) having respiratory distress were included in the study . Cases were investigated for the cause of respiratory distress and followed up for the outcome. **Results:** Among 106 newborns studied, 38(35%) neonates had Transient Tachypnea of newborn, 28(25%) were diagnosed to have respiratory distress syndrome, 12(11%) neonates had Meconium Aspiration Syndrome, 12(11%) neonates had birth asphyxia, 14(13.2%) neonates had sepsis, rest 6(5.5%) neonates had congenital anomalies related to respiratory tract. Meconium Aspiration Syndrome was found to be more common in term and post term neonates. 70% of newborns with meconium aspiration syndrome were complicated by Persistent pulmonary hypertension of newborn. Case fatality rate was maximum in Respiratory distress syndrome 10 (35%) followed by congenital anomalies 2 (33%) , meconium aspiration syndrome 3 (25%) , Birth Asphyxia 2 (16.7%) and sepsis 2 (14.7%). **Conclusion:** Transient Tachypnea of newborn accounts for 35% of newborns presented with respiratory distress and has good outcome without any mortality in our study. Whereas Respiratory distress syndrome is 2nd most common cause which accounts for significant amount of mortality (35%) which is, to some extent preventable.

Key Words: Down's scoring, Meconium aspiration syndrome, Prematurity, Respiratory distress syndrome, Silvermann Anderson scoring.

Introduction:

Respiratory distress is one of the most common reasons a newborn is admitted to the neonatal intensive care unit. 15% of term neonates and 29% of preterm neonates admitted to the neonatal intensive care unit develop significant respiratory morbidity[11]; this is even higher for neonates born before 34 weeks' gestation. Certain risk factors increase the likelihood of neonatal respiratory disease. These factors include

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prematurity, meconium-stained amniotic fluid (MSAF), caesarian section delivery, gestational diabetes, maternal chorioamnionitis, or prenatal ultrasonographic findings, such as oligohydramnios or structural lung abnormalities[1]. Respiratory distress can escalate to respiratory failure and cardiopulmonary arrest. Pulmonary disease may incite tachypnea, especially in neonates. If lung compliance is decreased, such as with transient tachypnea of the newborn (TTN), respiratory distress syndrome (RDS), pneumonia, or pulmonary edema, there is a decrease in tidal volume. To achieve sufficient minute ventilation, the respiratory rate must increase. Hypoxemia further increases tachypnea. Therefore, affected newborns present with marked tachypnea[1]. Because tachypnea is a nonspecific symptom, additional clinical findings aid in narrowing the cause to a respiratory disorder. Airway resistance increases when there is obstruction of air flow. Because lung compliance is worse at very low or very high FRC, achieving and maintaining physiologic FRC is essential in the management of respiratory disorders with poor compliance, such as RDS or TTN. On the other end of the spectrum, meconium aspiration syndrome (MAS) is an example of lower airway obstruction with air trapping. These newborns often have high lung volumes, which adversely affects their lung compliance. Regardless of the cause, it is vital to recognize symptoms and act quickly. If the newborn cannot sustain the extra work of breathing to meet its respiratory needs, respiratory failure follows. This failure may manifest as impaired oxygenation (cyanosis) or ventilation (respiratory acidosis)[4]. Without prompt intervention, respiratory arrest is imminent.
This study is to focus on analysis of the etiology and outcome of respiratory distress.

Materials and Methodology:

This prospective analytical study was done at Neonatal Intensive Care Unit of Civil hospital Ahmedabad in which we included the intramural neonates who were admitted with respiratory distress in NICU, Civil Hospital Ahmedabad during the month of December 2019 and January 2020 . All the Inborn newborns who presented with respiratory distress in this period are included in my study. Outborn newborns and newborns admitted with other complains are excluded from my study. Total number of patients observed were 106. Patients were classified according to timing of presentation of respiratory distress. Detailed Maternal history and Birth history and other significant history was noted. Relevant investigations (sceptic screen , chest x ray , ABGA)were done. Silvermann Anderson scoring and Downe's scoring was done and patients were monitored and appropriate treatment was given. Patients were observed during the course of treatment and classified according to their cause of respiratory distress. Mortality profile among those presented with respiratory distress was recorded and analysed.

Results:

There were total 524 newborns delivered at Civil Hospital Ahmedabad during the month of December 2019 and January 2020 out of which 106(20%) newborns presented with respiratory distress in Neonatal Intensive care unit of Civil Hospital Ahmedabad. Among 106 newborns studied, 38 (35%) neonates had Transient Tachypnea of newborn, 28 (25%) were diagnosed to have respiratory distress syndrome, 12 (11%) neonates had Meconium Aspiration Syndrome, 12 (11%) neonates had birth asphyxia, 14 (13.2%) neonates

had sepsis, rest 6 (5.5%) neonates had congenital anomalies related to respiratory tract. Out of 106, 60 (56.6%) were male and 46 (43.4%) were female. Male: Female=3:2 64(60%) neonates were preterm and 42(40%) were term neonates. Out of 64 preterm neonates 12 (18.75%) were <28 gestational weeks , 14 (21.8%) were between 28 weeks to 31 weeks, 14(21.8%) were between 32 weeks to 34 weeks, 24 (37.5%) were between 35 weeks to 37 weeks(Table 1).

Table 1: General characters of the study population (n=106)

Gestational age	No of patients	Percentages
<28 weeks	12	11.3%
28 weeks – 31 weeks	14	13.2%
32 weeks – 34 weeks	14	13.2%
35 weeks – 37 weeks	24	22.6%
37 weeks – 42 weeks	40	37.7%
>42 weeks	2	1.8%
Total	106	100%

According to my study Hyaline Membrane disease is more common in <31 weels of gestational age. But as gestational age increases (more than 32 weeks) other causes like birth asphyxia and sepsis also emerge as causes of respiratory distress. Transient Tachypnea Of Newborn is the major cause of respiratory distress in near term (35 weeks to 37 weeks) and term (>37 weeks) neonates. In my study out of total 106 newborn 18 (17%) preterms had weight <1000 gm ,22 (20.7%) neonates had weight between 1000 gm – 2000 gm , 31 (29%) neonates had weight between 2000 gm -2500 gm And 35 (33%) newborns had weight between >2500 gm. (Table 2) Case fatality rate was maximum in Respiratory distress syndrome 10 (35%) followed by congenital anomalies 2 (33%) , meconium aspiration syndrome 3 (25%) , Birth Asphyxia 2 (16.7%) and sepsis 2 (14.7%).(Graph 3) Out of 202 preterms delivered during the study period 156 (77%) had antenatal steroid coverage. And out of those 12 (7.7 %) preterms develop signs of respiratory distress. And 2 neonates expired (1.28%).

Out of 46 (33%) preterms who has not any antenatal steroid coverage 14 (30%) preterms developed signs of respiratory distress and 6 (13%) neonates expired.(Graph 2) 7 (50%) of newborns with meconium aspiration syndrome (14) were complicated by Persistent pulmonary hypertension of newborn. And 3 (40%) among them expired. (graph 4)

Table 2: Birth weight of the study population (n=106)

Birth weight	No of patients	Percentages
<1000 gm	18	16.9%
1000 gm – 2000 gm	22	20.75%
2000 gm -2500 gm	31	29.24%
>2500 gm	35	33%
Total	106	100%

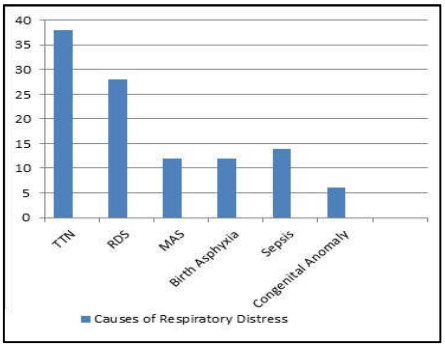
Table 3: Gestational maturity-wise Etiology of Respiratory Distress

Gestational Age	Hyaline Membrane Disease	Meconium Aspiration Syndrome	Transient tachypnoea of newborn	Birth Asphyxia	Sepsis	Congenital Anomaly	Total
<28 weeks	9	0	0	1	2	0	12
29-31 weeks	9	0	0	2	3	0	14
32-34 weeks	5	1	0	3	4	1	14
35-37 weeks	3	3	7	4	4	3	24
37-42 weeks	0	8	25	4	1	2	40
>42 weeks	0	0	2	0	0	0	2
Total	26	12	34	14	14	6	106

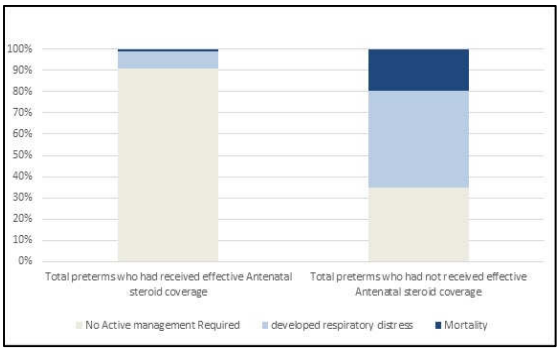
Table 4: Correlation between Gestational Age & Mortality Profile of Respiratory Distress:

Gestational Age	Hyaline Membrane Disease	Meconium Aspiration Syndrome	Transient tachypnoea of newborn	Birth Asphyxia	Sepsis	Congenital Anomaly	Total
<28 weeks	7	0	0	0	1	0	8
29-31 weeks	3	0	0	0	1	0	4
32-34 weeks	0	0	0	0	0	0	0
35-37 weeks	0	1	0	1	0	1	3
37-42 weeks	0	2	0	1	0	1	4
>42 weeks	0	0	0	0	0	0	0
Total	10	3	0	2	2	2	19

Graph 1 Causes of Respiratory Distress

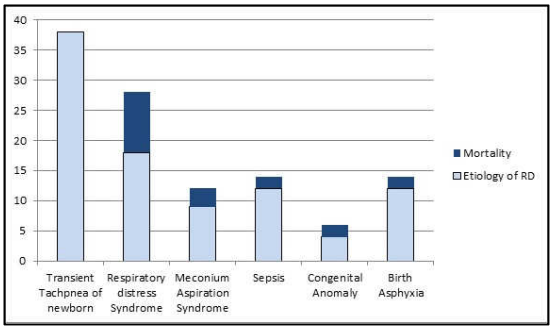


Graph 2: Correlation between antenatal steroids and development of respiratory distress syndrome

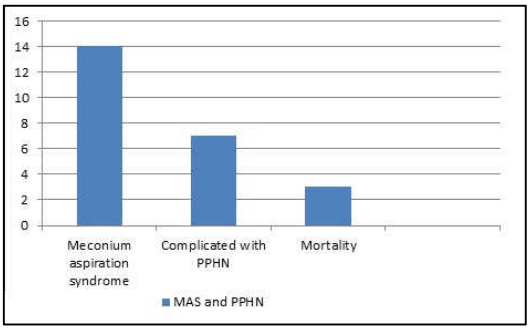


TTN= Transient Tachypnea of Newborn, RDS= Respiratory Distress Syndrome, MAS= Meconium Aspiration Syndrome

Graph 3 Mortality profile



Graph 4: Mortality in children of Meconium aspiration Syndrome



Discussion:

Respiratory distress is one of the major cause of neonatal mortality. Almost 70% of Sick Newborns with various illnesses present with respiratory distress. Respiratory Distress contributes to 30 % of the mortality of Neonates. A higher incidence in males was observed in the present study as well as in various earlier studies[2,4]. From my study it was apparent that preterms are more prone to develop respiratory distress, so it can be concluded that as gestational age decreases there is more chance to develop respiratory distress comparable to earlier studies[2]. A study from Nagendra et al'2017 showed that out of total of 48 neonates who developed respiratory distress 32 were preterms (66%) and 16 were born at term (34%). While in my study 64(60%) neonates were preterm and 42(40%) term. It was observed during the time course of management of preterms that Antenatal Steroid coverage to mother within 24 hours of anticipating delivery improves the outcome of preterm neonates, decreases need of surfactant comparable to earlier studies[3,7]. According to Crowley et al'2003 demonstrated that antenatal corticosteroid administration was associated with a 50% reduction of neonatal respiratory distress (typical odds ratio, 0.49; 95% confidence interval, 0.41 to 0.60), and that this effect was more marked when delivery occurred after 24 hours and within 7 days of drug administration[7]. In term babies, almost 70% of newborns developed respiratory distress due to Transient tachypnea of newborn which has good outcome without any mortality in my study comparable to earlier study from Joseph et al'2020.[10] Meconium Aspiration Syndrome was found to be more common in term neonates in my study. In meconium aspiration syndrome 40% of cases were complicated due to development of Persistent pulmonary hypertension of newborn[9]. Various morbidities and mortalities among the patients of birth asphyxia depended upon the severity. Newborns who had congenital anomalies like Tracheoesophageal fistula, Diaphragmatic hernia had variable outcome in my study depending upon the gestational age , birth weight , associated congenital anomalies , timing of surgery and perinatal management.

Conclusion:

Transient tachypnea of new-born is the most common cause of respiratory distress among new-borns which develops immediately after birth with good outcome. Maximum mortality was due to Respiratory distress syndrome. Newborns with low gestational age, birth weight are more prone to develop respiratory distress therefore maximum attention should be given on maternal health during pregnancy and quality maternal and child health care services. Antenatal Steroid coverage to mother within 24 hours of anticipating delivery will improve the outcome of preterm neonates, decrease need of surfactant. Early recognition of Hyaline Membrane Disease & early surfactant administration helps to decrease morbidity & mortality in preterm neonates. If facilities for preterm care are not available and premature delivery is anticipated, then it is better to transfer baby in utero to tertiary care hospital for better management. Therefore, better & combined maternal & child health will go a long way in improving perinatal outcome & decreasing mortality seen due to different causes of respiratory distress.

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