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Original Article

A PROSPECTIVE OBSERVATIONAL STUDY ON RESPIRATORY DISTRESS AND ITS MANAGEMENT IN NEONATAL INTENSIVE CARE UNIT

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ABSTRACT

OBJECTIVES: This study has been undertaken to estimate the proportion of respiratory distress in neonates, clinical signs and symptoms, the various etiological factors, maternal and neonatal risk factors associated with its development, the morbidity and mortality rate, need for various management modalties such as Continuous Positive Airway Pressure(CPAP), mechanical ventilation including use of surfactant and finally to assess the immediate clinical outcome of respiratory distress in new-born.

EXPERIMENTAL APPROACH: In this prospective observational study, 194 neonates admitted in the Department of Neonatal Intensive Care Unit (NICU) of Kovai Medical Center and Hospital in between April 2016 to September 2016 was analyzed.

FINDINGS: In the study period, it was observed that 23.07 % of new-born were having respiratory distress and the incidence rate was 3.54%. There has a higher occurrence of Respiratory Distress Syndrome(RDS) 42% followed by Transient Tachypnea of New-Born(TTNB) 29%.There was an adequate use of surfactant (Poractant alfa), Continuous Positive Airway Pressure(CPAP), mechanical ventilation in managing respiratory distress. Etiological factors were compared with outcome status and majority of the new-born with distress had survived significantly (*p=0.007).*

DISCUSSION: Pharmacists has major roles in the selection and rational use of antibiotics with appropriate drug dose preparation, dosage calculations and providing a better understanding about the importance of surfactant administration to other health care professionals.

CONCLUSION: It was concluded that RDS is one of the commonest causes of respiratory distress followed by TTNB. The appropriate management and adequate neonatal care had a significant impact in the reduction of mortality rate in NICU.

Key words: Respiratory Distress, Neonatal Intensive Care Unit, Risk Factors, Etiology, Poractant alfa

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INTRODUCTION

Respiratory distress is one of the common manifestation for which newborn seeks admission into NICU. It is one of the commonest disorders encountered within the first 48-72 hours of life. Majority of newborns develop severe distress immediately after birth. It accounts for significant morbidity and mortality. It occurs in approximately 0.96%-6% of live births, and is responsible for about 20% of neonatal mortalities.[1] Birth Asphyxia (BA), congenital pneumonia, immaturity, Respiratory Distress Syndrome (RDS), Intra Ventricular Hemorrhage (IVH) and neonatal infections are leading causes of neonatal mortality in India[2].

Newborns with gestational age between 28-30 weeks or weighing <1.5 kg are more prone to develop severe respiratory distress. Preterm labor is the most common problem (7% to 10% of deliveries) lead to the neonatal death in the second half of pregnancy and RDS is the most common cause of neonatal morbidity and mortality in preterm infants. The significant cause of RDS is deficiency of alveolar surfactants due to immaturity of Type II pneumocyte, resulting low compliance of lungs, alveolar surface tension, decreased gas exchange and a demand for high ventilatory pressures.[3] The clinical manifestation of RDS includes apnea, cyanosis, grunting, inspiratory stridor, nasal flaring, poor feeding, tachypnea, retractions in the intercostals, subcostal, or suprasternal spaces.[4]

A variety of respiratory and non-respiratory disorders manifest clinically as respiratory distress. Many of the conditions causing respiratory distress are preventable. Early recognition and prompt management are required. The weight and gestation of the new born and the degree of respiratory compromise would be the key factors to decide the level of care the infant would require and if the baby is premature it is important to know if antenatal steroids have been given or not.

As preterm care is increasing more use of surfactant, CPAP, mechanical ventilation has been seen in managing respiratory distress in newborn. This study was undertaken with the aim to know the most common etiological factors responsible for neonatal respiratory distress and effect of modern advancements like bubble CPAP and mechanical ventilation on the outcome of newborns with severe distress.[5]

Aims and objective

The objectives of the study were as follows:

1) To study the various etiological factors, maternal and neonatal risk factors responsible for development of respiratory distress.
2) To estimate the proportion of respiratory distress in the new-borns.
3) To determine the severity of respiratory distress in neonates admitted in NICU.
4) To work together with physicians and other healthcare provider's in patient's pharmacotherapy management of respiratory distress in NICU.
5) To study the need for CPAP, mechanical ventilation and surfactant therapy in newborn's with respiratory distress.
6) To assess the immediate clinical outcome of respiratory distress in newborn's.

Early recognition and prompt management are required. A few may need ventilator support but this treatment is often not available and when available may be expensive but it is possible to increase survival of neonates and improve the quality of life only through prompt and adequate management of neonates which is not possible without respiratory intensive care and adequate ventilation.

Continuous positive airway pressure (CPAP) is an important treatment modality for respiratory distress syndrome (RDS) in neonates. It can be applied via nasal prongs, using a conventional ventilator or nasal mask through a bubble circuit or a CPAP driver. Bubble CPAP (bCPAP) is one of the low cost nasal CPAP delivery systems.[6, 7, 8]

HFNC is heated, humidified high flow nasal cannula. Flow rates of more than two-liter per minute of air or

blended oxygen cum air have been used to described as high flow, which are delivered through thin and tapered nasal cannulae after heating and humidification. Pressure in HFNC is flow driven which in turn reduces the work of breathing by preventing pharyngeal collapse.[9]

Surfactant replacement therapy is an established effective and safe therapy for immaturity-related surfactant deficiency[10] .The administration of exogenous surfactant for the treatment of RDS in preterm infants is probably the most thoroughly evaluated therapy currently used in neonatal intensive care units. Surfactant replacement reduces mortality and morbidity rates in premature infants, reduces duration of ventilatory support, number of complications and medical costs.[11, 12] Surfactant was given to infants with clinical signs of RDS (tachypnea, cyanosis on room air) who required more than 30-40% O_2 in inhaled air according to the severity and maturity. The surfactant-deficient lung of the immature infant characteristically has decreased lung compliance, increased elastic recoil, and reduced functional residual capacity. In infants with RDS, surfactant administration rapidly improves oxygenation by increasing functional residual capacity and reversing atelectasis. The acute changes in lung volume following surfactant administration increase the surface area available for gas exchange. Though oxygenation improves quickly, changes in lung compliance occur more gradually and prevent lung injury which mostly occurs from ventilator support.

Surfactant, preferably natural, is administered to all newborn patients under 26 weeks GA with FiO2 > 0.30 and those over a GA of 26 weeks with FiO2 > 0.40 occasionally depending upon clinical condition of neonate. Dosage for preventive purposes is to be at least 100 mg/kg, although clinical and pharmacokinetic data indicate 200 mg/kg as ideal. Early administration using INSURE (INtubate – SURfactant – Extubate to CPAP) technique reduces the need for MV and subsequent Bronchopulmonary Dysplasia (BPD).[13] Effects of surfactant therapy were assessed based on O_2 saturation (determinate by pulse oximetry), gas analyses in arterial and capillary blood, the clinical condition of the child and chest X-ray. The animal-derived surfactants, poractant alfa (Curosurf), calfactant and beractant (Survanta)[14, 15] have been shown to be associated with decreased requirement for ventilator support,[16] fewer pneumothoraces and reduced mortality when compared with treatment with first-generation synthetic surfactants.

The goals of ventilatory management during the early stages of RDS are to maintain adequate oxygenation and ventilation, while minimizing ventilator-induced lung injury. All forms of mechanical ventilation of the immature lung probably promote some degree of ventilator-induced lung injury.[17] The development of new ventilatory modalities may be required to decrease ventilator-induced lung injury and to maximize the beneficial effects of surfactant therapy.[18, 19, 20]

METHODOLOGY

The present study was conducted in the Department of Neonatology, Kovai Medical Center and Hospital, Coimbatore between April 2016 and September 2016 (over a period of 6 months). This study was approved by Institutional Ethics Committee.

Inclusion criteria:

- Both in born and out born neonates admitted to Neonatal ICU with respiratory distress

Exclusion criteria

- Babies more than 28 days
- Neonates with genetic/congenital abnormalities
- Patients not fulfilling inclusion criteria and cases with incomplete data were not included

45 neonates were enrolled for the study with respiratory distress out of 194 neonates admitted in NICU and were studied by clinical examination and relevant investigations. The severity of distress was

assessed with the help of radiological findings. The association of variable risk factors both maternal and neonatal was studied for the development of severe respiratory distress. They were assessed for the development of distress against time of onset, etiology, requirement of surfactant, CPAP, mechanical ventilation and immediate outcome.

Data was collected for all newborns included in the study with respiratory distress. General information, socioeconomic status, history and clinical examination findings of mother and newborn was documented. Newborns with respiratory distress were shifted to NICU for further management. Liveborn neonates 34 0/7-40 6/7 weeks gestational age admitted to the NICU with respiratory compromise were identified when a neonate required delivery room intervention with either oxygen or ventilation and admission to a NICU for further respiratory support.

Time of onset of distress and the severity of the distress was documented, with series of X-rays done at specific intervals. Depending on the clinical diagnosis of respiratory distress, relevant investigations were sent and newborns were managed as per protocols. Interventions done in the form of CPAP / mechanical ventilation / surfactant therapy / treatment and mortality was documented to assess the clinical outcome against the final diagnosis.

A special questionnaire was designed for the purpose of the study. The following information was taken: name, age at admission, sex, date of admission and date of discharge or death. Neonatal data included: body weight, gestational age according to the date of last menstrual period of the mother, singleton or multiple births, Apgar score if available, need for resuscitation after birth. The administration of antenatal steroids to improve lung maturity and as a preventive measure for other complications was noted. Factors related to labor and deliveries were assessed including: type of delivery (vaginal or caesarean section= elective or emergency), place of delivery (home or hospital), complications (prolonged rupture of membranes >18 hr, prolonged labor, meconium staining of liquor, ante partum haemorrhage and others). The cases were diagnosed clinically by the presence of at least two of the following criteria, namely RR of 60/min or more, subcostal indrawing, xiphoid retraction, suprasternal indrawing, nasal flaring, expiratory grunt and cyanosis at room temperature. These infants were examined in detail with particular emphasis on gestational age, sex, weight, cyanosis; Chest x-ray was sent for all patients which helped in assessing the severity of distress.

The diagnosis of clinical conditions producing respiratory distress was based mainly on careful scrutiny of the history, clinical and radiological findings which clearly determine the etiology factor. Continuous monitoring of oxygen saturation was done using pulse oximeter. ABG analysis was done frequently in unstable babies and with changes in ventilator settings. Blood glucose was monitored regularly, sepsis was adequately managed when clinically indicated, and endotracheal tube and blood culture sensitivity were ordered if septicaemia, pneumonia or any other infections was suspected.

Neonates were attempted to resuscitate with modalties such as Bubble CPAP as long as improvements are seen. At times of severe distress or at increased life threatening conditions from RDS newborns are rescued with surfactant therapy (INSURE Technique) and then switch off to BCPAP with improved status of the neonate. The mode of administration of the surfactant was noted. Moreover, at other severe conditions of distress or sepsis babies are isolated and maintained under ventilation. Babies were weaned off the ventilator when they showed clinical, radiological improvements and normal blood gases. HFNC, Hood O_2 was the other modalties majorily found at mild distress. Other treatment strategies included administration of Anti-biotics as a prophylaxis for infections, Cafffeine citrate for apnoea and supportive care with Iron, Vitamin and calcium supplements.

The mothers are allowed to visit their babies in NICU at due intervals to provide with skin-to-skin contact

and kangaroo care as a means of maintaining temperature to maximize the maternal-infant bonding experience, and for breast deeding. Total Parenteral Nutrition (TPN) was given to provide enough energy and amino acids to prevent a negative balance and to promote early growth by increasing protein synthesis and nitrogen retention. At improved state, they are shifted to the wards to the mother side and so were followed in the ward for duration of hospitalization and outcome.

IBM SPSS Statistics software version 20 was used for the statistical analyses. Chi-Square Test and ANOVA were used. Significance of individual variables were found by Chi-Square Test and the One- way ANOVA test was performed to compare the Risk Factors and Etiology. A value for $p<0.05$ was considered statistically significant

RESULTS

During our study period, out of the 194 neonates screened for the study, 45 (23.07 %) of them developed respiratory distress.In our study, among neonates who developed respiratory distress, preterm neonates were more in number 29(64%)[Figure 1]. 71% of male infants developed distress when compared to 29% of females [Figure 2]

Among the study population, majority of the delivery, 31 (86.7%), was done through Caesarean section (LSCS) which is a predisposing factor for respiratory distress.[Figure 3.Among the study population, 57.8% cases occurred in those with Gestational Age >35 weeks when compared to 24.4%, 17.8% newborns with gestational age 30-35, 25-30 weeks respectively. [Figure 4]

Based on the baby weight of the study population, 18(40%) cases were neonates weighing between 1-2kg followed by 16(35%), 9(20%) and 2(4%) weighing within 2-3 kg, 3-4kg and 0.5-1 kg respectively. [Figure 5].Based on the various clinical signs and symptoms observed, 29(64%) cases showed chest retraction as the major clinical findings followed by grunting 26(57%),and tachypnea 24(53%).[Table 1]

Among the various etiological factors studied, the commonest causes for respiratory distress in neonates were RDS 19 (42%) cases followed by 13(29%) TTN, 2(4%) with Birth asphyxia,1 (2%) Pneumonia, and 1 (2%) with MAS.[Figure 6].In our study population, majority of the mothers were not administered antenatal steroids 36(80%) which increased the risks for developing respiratory distress in the preterm.[Figure 7]

Based on the various Chest-X ray findings taken, hazziness 13(29%)was found to be the major characteristic feature underlying respiratory distress which was followed by air bronchogram 9(20%),ground glass appearance 8(18%).Transverse fissure 5(11.1%) has significant value in the diagnostic approach for TTN, likely opacification 2(4%) for MAS. [Table 4]

The neonates were classified according to the severity of respiratory distress and accordingly 21(45%) neonates had mild distress, 19(40%) cases had moderate distress and 5(10.6%) cases were with severe respiratory distress [Table 6]. Among the neonates who developed distress, 14(31%) cases were administered with Poractant alfa (Curosurf), 1(2%) case was given both Poractant alfa (Curosurf) and Beractant (Survanta) and the remaining 30 (67%) cases were not administered with any surfactants and were managed through other modalities [Figure 8].

In the overall study, 43(96%) neonates survived with 2(4%) deathsThere were two deaths. The first one was a male infant born at 27^{+4} weeks gestation and weighing 1.03 gm who died as a consequence of intra ventricular hemorrhage. The second infant was also a male born at 40 weeks' gestation with a weight of 2.5 kg. She died from worsening metabolic disorder.

We looked at the influence of the type of delivery on the development of RDS. Of the boys, 28% developed RD following cesarean section vs 4% following vaginal delivery. Also 11% of the girls delivered by

cesarean section developed RDS vs 2% for those delivered vaginally. From this we conclude that there exists some difference in the incidence of RDS within the same sex group, by type of delivery. For the population as a whole, 39% developed RDS after cesarean section v/s 6% after vaginal delivery, a major difference.12% of male infants developed mild distress, 15% developed moderate distress and 5% developed severe distress. 9% of female infants developed mild distress, 4% developed moderate distress and none developed severe distress [Table 2]

25% of newborns of gestational age 25-30 weeks developed mild distress, 50% developed moderate distress and 25% developed severe distress. 54.5% of newborns of gestational age of 30-35 weeks developed mild distress, 36.3% developed moderate distress and 9.09% developed mild distress. 50% of newborns of gestational age of >35weeks developed mild distress and 42.30% developed moderate distress and 7.69% developed severe distress [Table 3].

The etiological factors were compared with severity of Respiratory distress and there was a significance difference, (p=0.024)[Figure 12]. 92.3% of newborns with TTNB developed mild distress and 7.69% developed moderate distress and none developed severe distress. 36.84% of newborns with HMD developed mild distress and 42.10% developed moderate distress and 21.05% developed severe distress.

The Outcome status of the neonates were compared with the etiological factors .Majority of the babies with distress survived and has a significant difference (*p=0.007)[Figure10]*.The various signs and symptoms were compared with the etiological factors and analysed giving a significant relationship with apnea, (*p=0.002)*

The surfactant administration was compared with the etiological factors giving a significance (*p=0.013)*[Table 16].The anti-microbials administered were compared with the various etiological factors and had a significant relationship (*p=0.001)*[Table 17].The Maternal Risk Factors were compared with the Severity of distress, but there was no significance difference, (p=*0.519)*[Table 18]

DISCUSSION

In the study conducted by Diana A Racusin *et al*[21] the incidence of respiratory distress was more in neonates delivered by caesarean section than born vaginally. In our study, 87% of neonates were delivered by CS and 13% vaginally. Hence, the result suggested that the incidence of respiratory distress may be more common after caesarean delivery.

In the study conducted by Liu *et al*[22] it was said that the higher risk factors such as caesarean delivery, maternal fetal infection, PROM are closely or related to infants with RDS. In this study, incidence of RDS (42.2%) was higher compared to other etiological factors. It was also observed that the risk factors related to RDS were elective caesarean section, severe birth asphyxia, maternal-foetal infection, PROM, and male sex while in our study the major risk factors were PROM, PIH, APH, Multiple birth and GDM.

In the study conducted by Santhosh Seta *et al*[23] showed 58% of term babies and 42% were preterm developed respiratory distress. In this study, 64% of preterm babies and 36% of term babies developed respiratory distress. Also, the preterm babies were more in number with male predominance, most of them were delivered vaginally. In our study more incidence were seen in male neonates, and most of them were delivered by caesarean section.

Moreover, 92.2% survived and 7.8% were expired among respiratory distress cases admitted to NICU. The common cause was preterm and RDS. Similar to this study, the incidence of respiratory distress usually occur in neonates was preterm and RDS in our study.

Numan Nafie Hameed *et al*[24] stated that RD in full term newborns was an important problem in NICU, especially due to TTN and elective Caeserean Section.

The study conducted by Joice Fabiola Meneguel *et al*[25] showed anticorticosteroids were effective in reduction of morbidity among premature newborn among the population studied but in our study only 80% mothers were given corticosteroids.

The study conducted by Gian Maria Pacifei *et al*[26] it was said that the caffeine citrate is a drug of choice for treatment of apnea in premature babies and is an easy drug to be administered orally or intravenously. Similarly, in our study caffeine citrate is administered for treating apnoea.

In the study conducted by Jeya Balaji *et al*[27] it was observed that the early institution of CPAP in the management of RDS in premature neonates can reduce the need for MV and surfactant therapy with minimum complication. Similarly, in our study CPAP was used for the management of RDS in premature neonates.

In our study there was a significant increased risk of RDS associated with premature twins. Similar study was observed in D Hacking *et al*[28] Pankti D Desai *et al*[29] and Keerthi Swarnakar *et al*[30] concluding that the twin pregnancy was present in significant number of cases of TTN and RDS

In the study conducted by Ann Reininger *et al*[31] stated that among premature infants with mild-to-moderate RDS, transient intubation for surfactant administration reduces MV.Similarly a study conducted by Henrik Verder *et al*[32] stated that in babies with moderate to severe RDS treated with NCPAP, a single dose of surfactant reduce the need for subsequent MV. According to the study by Prashant S *el al*[33] Pankaj M Buch *et al*[34] bubble CPAP was found to be safe and effective means of treating mild and moderate grade RDS. In our study also CPAP was an effective and safe mode for treating respiratory distress.

Mary F Block *et al*[35] conducted a study with a conclusion that methylprednisolone had failed to reduce the development of RDS in premature neonates during pregnancy with minimal effects on foetal maturation. In contradiction to this, according to a study conducted by Pankti D Desai *et al*[36] the mortality is lower in neonates whose mother had taken adequate ANC (30%) as compared to those who had not (60%).Also the mortality found to be 73.68% in neonates having ground glass appearance on chest x ray as compared to 35.71% in neonates having reticulo-granular pattern on chest x ray. While in our study the most commonly seen chest x ray findings was haziness (28.8%) which was followed by ground glass appearance and reticulo-granular pattern.

Wendy Yee *et al*[37] conducted a study where development of respiratory distress were associated with gestational age at time of elective caesarean delivery. A similar study was conducted by Matthias Roth- Kleinera *et al*[38] stating that severe RDS occur in babies after CS.

The study conducted by C. Dani *et al*[39] demonstrated that gestational age, birth weight, maternal age, elective and emergency caesarean section (CS), and male sex were risk factors for RDS, while gestational age, maternal diseases, twinning, birth weight, operative vaginal delivery, elective and emergency CS, and male sex were risk factors for TT.

LIMITATIONS OF STUDY

No Control group was taken for comparative analysis of the efficacy

The role of many confounding factors could not be evaluated because of the limited sample size.

CONCLUSION

Following conclusion can be drawn from our study.

Respiratory distress is a common reason for a neonate seeking medical attention in NICU. Majority of newborns develop distress immediately after birth. In our study a higher prevalence of distress in preterm babies (gestational age <40 weeks) was found compared to term babies. The number of male newborns with respiratory distress was predominant.

There was a higher incidence of RDS compared to other etiological factors. In most of the cases Chest X-

ray findings correlated with the clinical picture .We observed a major impact of risk factors like baby weight, mode of delivery, gestational age, maturity and maternal risk factors on the various etiological factors involved in our study.

Early provision of intensive observation and care of high-risk newborn infants significantly reduced the morbidity and mortality associated with RDS and other underlying causes for distress.The use of surfactant, appropriate ventilatory and non-ventilatory modalties increased the survival rate.

It was revealed from our study that clinical pharmacist had a greater impact in the management of distress such as providing drug information to health care professionals, assuring the efficacy of various modalties for the management undertaken and in extending a better understanding about the surfactant significance to the health cre providers and patient care givers.

TABLES

TABLE 1: Clinical Signs And Symtoms Distribution

SIGNS	FREQUENCY	PERCENTAGE (%))
Grunting	26	58
Apnea	9	20
Retraction	29	64
Tachypnea	24	53
Nasal flaring	4	9
Cyanosis	15	33
Poor feeding	16	36
Poor activity	9	20

Among the study population, Retraction was found to be the major one which was followed with Grunting, Apnea, tachypnea and other characteristic features of respiratory distress.

Comparing the severity among the gender, 12% of male infants developed mild distress, 15% developed moderate distress and 5% developed severe distress and among the females 9% of infants developed mild distress, 4% developed moderate distress and none developed severe distress

TABLE 2: Gender V/S Severity Of Distress

		SEVERITY OF DISTRESS			Total
		MILD	MODERATE	SEVERE	
GENDER	MALE	12	15	5	32
	FEMALE	9	4	0	13
Total		21	19	5	45

TABLE 3: Gestational Age V/S Severity Of Distress

		SEVERITY OF DISTRESS			Total
		MILD	MODERATE	SEVERE	
GESTATIONAL AGE	25-30	2	4	2	8
	30-35	6	4	1	11
	>35	13	11	2	26

Total	21	19	5	45

The neonates born at a Gestational Age of > 35 weeks shown a distress significantly.25% of newborns of gestational age 25-30 weeks developed mild distress, 50% developed moderate distress and 25% developed severe distress.

TABLE 4: Gender V/S Mode Of Delivery

		MODE OF DELIVERY		Total
		LSCS	VAGINAL	
GENDER	MALE	28	4	32
	FEMALE	11	2	13
Total		39	6	45

Of the boys, 28% developed RD following cesarean section v/s 4% following vaginal delivery. Also 11% of the girls delivered by cesarean section developed RDS v/s 2% for those delivered vaginally. From this we conclude that there exists some difference in the incidence of RDS within the same sex group, by type of delivery.Based on the various Chest-X ray findings taken, hazziness 13(29%)was found to be the major characteristic feature underlying respiratory distress which was followed by air bronchogram 9(20%),ground glass appearance 8(18%).Transverse fissure 5(11.1%) has significant value in the diagnostic approach for TTN, likely opacification 2(4%) for MAS.

TABLE 5: CHEST X-RAY FINDINGS

CHEST X-RAY FINDINGS	FREQUENCY	PERCENTAGE (%)
Haziness	13	28.8
Ground glass appearance	8	17.7
Reticulo -granular pattern	2	4.44
Air bronchograms	9	20
Transverse fissure	5	11.1
Low lung volume	2	4.44
Pneumothorax	4	8.88
Opacification	2	4.44

The neonates were classified according to the severity of respiratory distress and accordingly 21(45%) neonates had mild distress, 19(40%) cases had moderate distress and 5(10.6%) cases were with severe respiratory distress.

TABLE 6: Distribution Of Rds According To Severity

SEVERITY	FREQUENCY	PERCENTAGE (%)
Mild	21	44.7
Moderate	19	40.4
Severe	5	10.6

FIGURES

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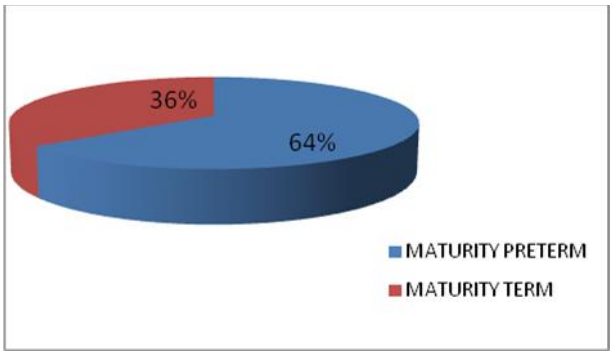

FIGURE 1: Maturity Distribution

Comparing the maturity distribution it was found that the preterm neonates, 64%, were more affected with respiratory distress compared to term neonates, 36%

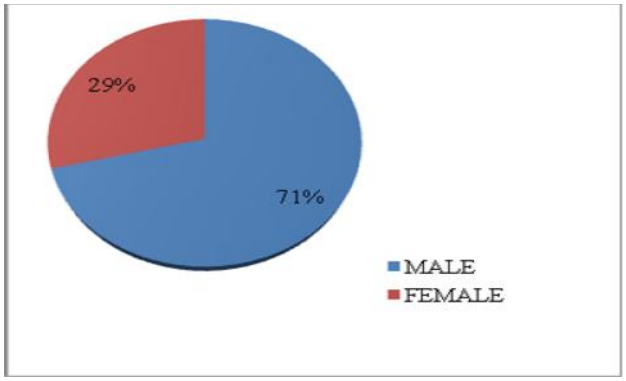

FIGURE 2: Gender Wise Distribution

This figure depicts the gender distribution which gives a clear picture of the male predominance of respiratory distress among the study population. The males, 71%, were being affected compared with females 29%.

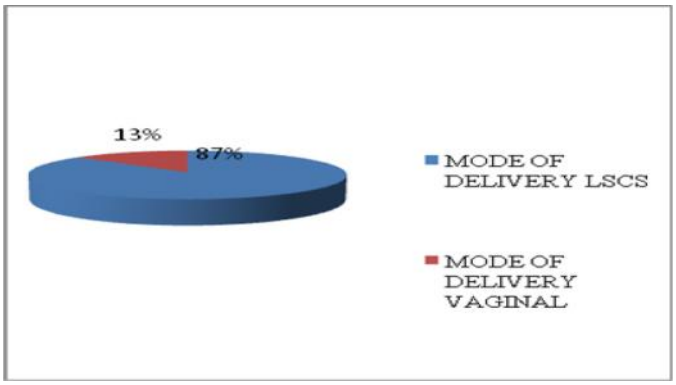

FIGURE 3: Mode Of Delivery Distribution

The Mode of delivery can be majorly being of two types: Vaginal or Lower Caesarean Section.

The respiratory distress was found to be more among the neonates who has been delivered through LSCS, 87% compared to those by vaginal 13%

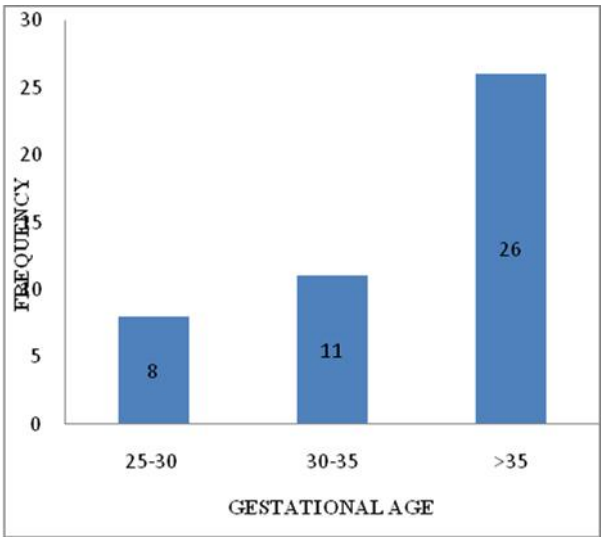

FIGURE 4: Gestational Age Wise Distribution

According to the Gestational Age, 57.8% cases occurred in those with Gestational Age >35 weeks when compared to 24.4%, 17.8% newborns with gestational age 30-35, 25-30 weeks respectively.

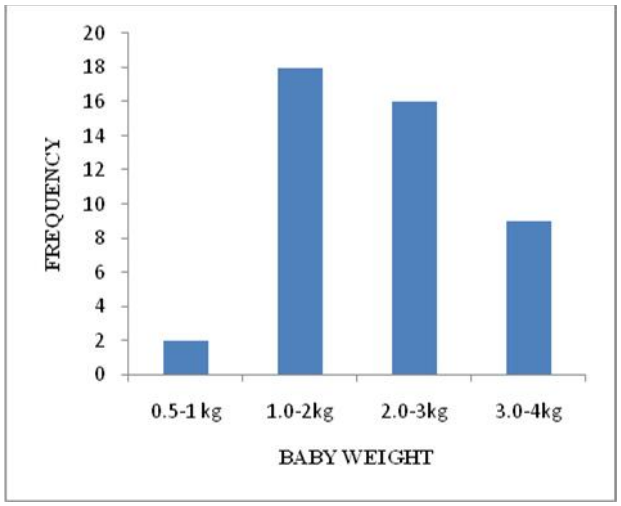

FIGURE 5: Baby Weight Distribution

Based on the baby weight of the study population, 18(40%) cases were neonates weighing between 1-2kg followed by 16(35%), 9(20%) and 2(4%) weighing within 2-3 kg, 3-4kg and 0.5-1 kg respectively.

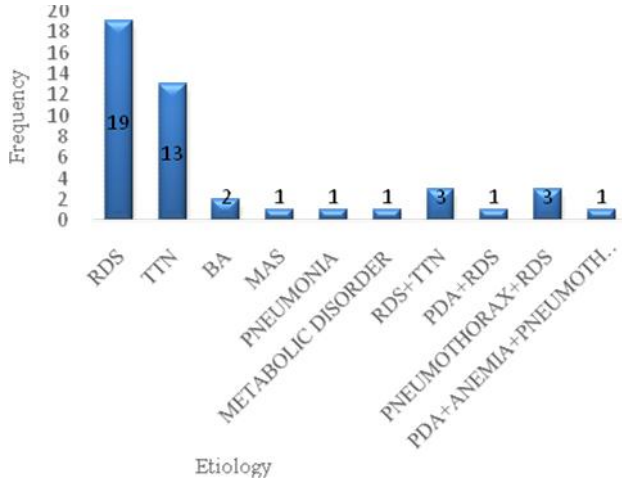

FIGURE 6: Etiology Wise Distribution

Among the various etiological factors studied, the commonest causes for respiratory distress in neonates were RDS 19 (42%) cases followed by 13(29%) TTN, 2(4%) with Birth asphyxia,1 (2%) Pneumonia, and 1 (2%) with MAS

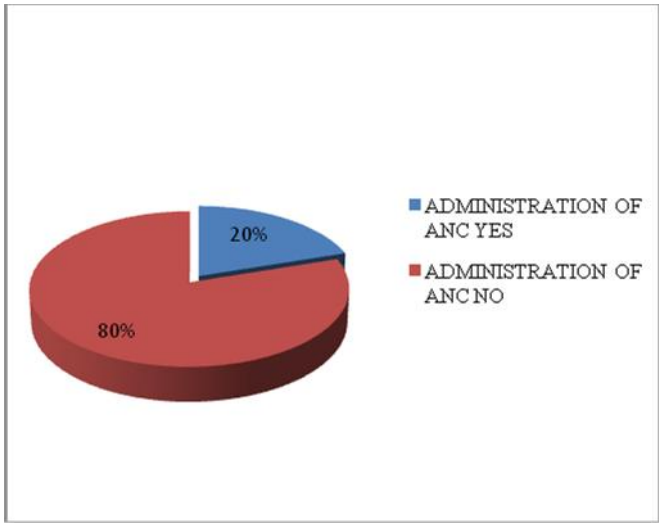

FIGURE 7: Antenatal Steroid (Ans) Administration Distribution

In our study population, majority of the mothers were not administered antenatal steroids 36(80%) which modified the risks for developing respiratory distress in the preterm.

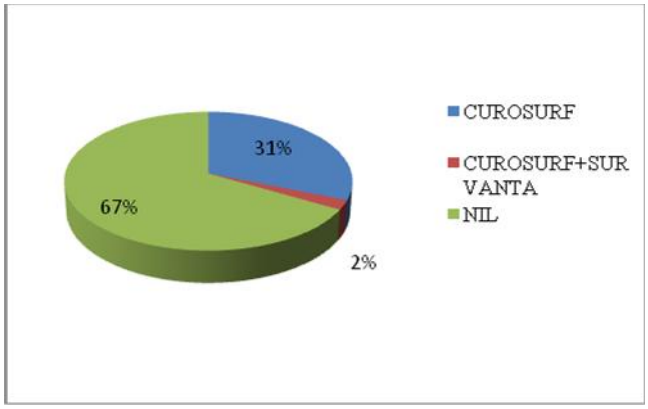

FIGURE 8: Distribution Of Administration Of Surfactant

Among the neonates who developed distress, 14(31%) cases were administered with Poractant alfa (Curosurf), 1(2%) case was given both Poractant alfa (Curosurf) and Beractant (Survanta) and the remaining 30 (67%) cases were not administered with any surfactants and were managed through other modalities.

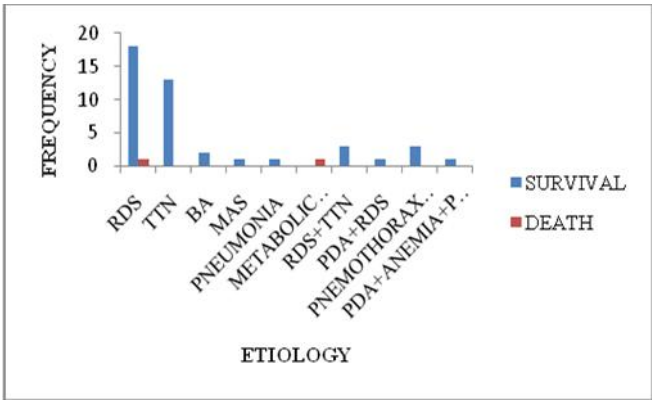

FIGURE 9: Distribution Of Outcome Status

In the overall study, 43(96%) neonates survived with 2(4%) deaths.[Table 12] There were two deaths. The first one was a male infant born at 27^{+4} weeks gestation and weighing 1.03 gm who died as a consequence of intra ventricular hemorrhage. The second infant was also a male born at 40 weeks' gestation with a weight of 2.5 kg. She died from worsening metabolic disorder.

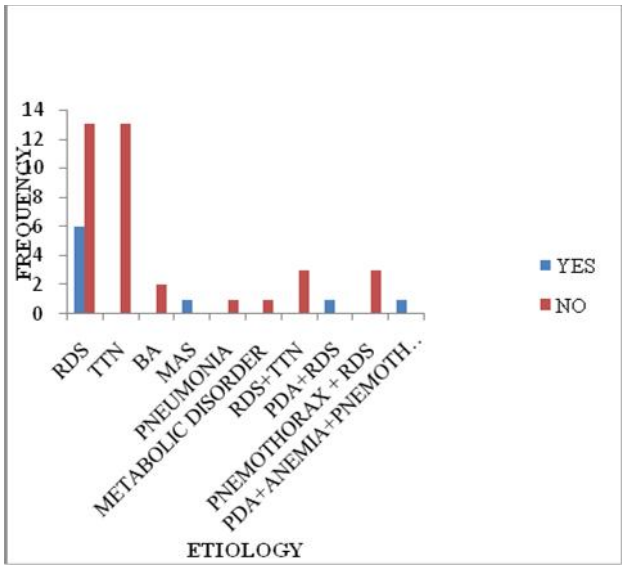

FIGURE 10: Comparison Of Outcome Status With Etiology

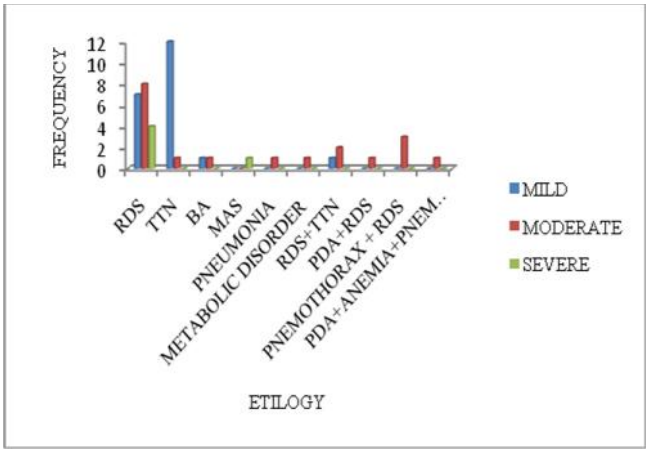

FIGURE 11: Comparison Of Etiology With Severity Of Distress

The etiological factors were compared with severity of Respiratory distress and there was a significance difference, (p=0.024).

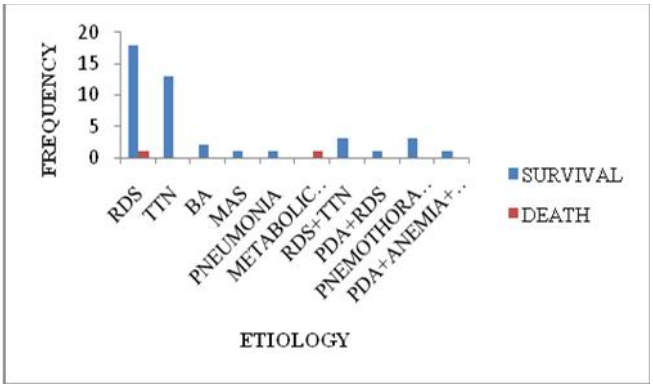

FIGURE 12: Distribution Of Outcome Status

The Outcome status of the neonates were compared with the etiological factors .Majority of the babies with distress survived and has a significant difference (*p=0.007)*

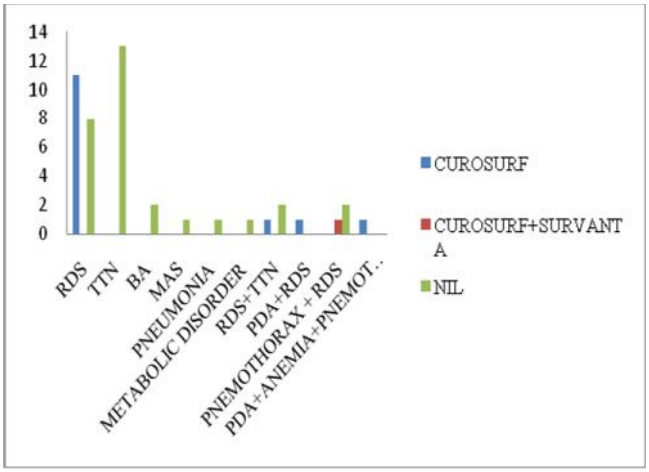

FIGURE 13: Comparison Of Surfactant Adinistration With Etiology

The surfactant administration was compared with the etiological factors giving a significance (*p=0.013).*

DECLARATIONS

CONFLICTS OF INTEREST

The Authors(s) declares that they have no conflict of interest to disclose.

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Authors' contribution:

All authors were responsible for study design development, execution of the research, analysis of the data, and writing of the manuscript.

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