An Observational Study of Etiological Profile of Respiratory Distress in Neonates in a Tertiary Care Centre of Jaipur, Rajasthan

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ABSTRACT:

Background: The overall incidence of respiratory distress in term babies is (4.2%). The current incidence of Respiratory Distress Syndrome (RDS) in our country is 10-15/1000 live births and in preterm babies is 10-15%. Identification of the cause of respiratory distress is important for planning and provision of facilities for these babies and thereby achieving reduction in neonatal mortality. Aim of our study was to determine the etiological factors & risk factors of respiratory distress in newborn in tertiary care medical college hospital.

Materials and Method: This hospital based Observational study was conducted in the NICU of Mahatma Gandhi Medical College & Hospital, Jaipur. All newborns admitted with respiratory distress From August 2022 to December 2023 were included in the study.

Result: A total of 150 newborns were enrolled in this study. 61.33% were preterm, 38.67% were term. majority 60% were male whereas 40% were female. 40.67% had respiratory distress, followed by 26% had TTNB, 20.67% sepsis whereas minimum 0.67% had structural malformation followed by 4.67% CCHD and 7.33% pneumonia and 8% in perinatal asphyxia.

Conclusion: Respiratory distress syndrome (RDS) was the most prevalent diagnosis, affecting 40.67% of the cases, followed by transient tachypnea of the newborn (TTNB) at 26% and sepsis at 20.67%. The presence of Intra partum complications, such as prolonged rupture of the membranes and meconium-contaminated amniotic fluid, increases the risk of respiratory distress. Therefore, timely treatment of these diseases is necessary.

Keywords: Respiratory Distress Syndrome, TTNB, prolonged rupture of the membranes, meconium-contaminated amniotic fluid.

INTRODUCTION

National neonatal perinatal database of India (NNPD) defines respiratory distress as presence of any two of the following features: respiratory rate (RR) >60/minute, subcostal/intercostal recessions, expiratory grunt/groaning.[1] The overall incidence of respiratory distress in term babies is (4.2%). The current incidence of HMD in our country is 10-15/1000 live births and in preterm babies is 10-15%.[2]

It results from a variety of disorders of respiratory and non-respiratory etiology. Among them, transient tachypnoea of newborn, respiratory distress syndrome and perinatal asphyxia are commonest causes. Although respiratory distress may represent a benign, self-limited process, it may also be the first sign of sepsis or serious cardiopulmonary disease. In the preterm infant, both a decrease in the quantity and quality of surfactant contributes to decreased surfactant activity, resulting in RDS.[2,3]Male sex, low birth weight, delivery by caesarean section, gestational diabetes and pregnancy-induced hypertension are the risk factors for RDS in late preterm and full-term neonates.[4]

Identification of the cause of respiratory distress is important for planning and provision of facilities for these babies and thereby achieving reduction in neonatal mortality. In India only very few studies on cause of respiratory distress in term babies are available. Hence the present observational study was carried out with the objective to study the clinical profile of respiratory distress in neonates – it's etiology and outcome.

AIM AND OBJECTIVES

To determine the etiological factors & risk factors of respiratory distress in newborn in tertiary care medical college hospital.

MATERIAL AND METHODS

This hospital based Observational study was conducted in the NICU of Mahatma Gandhi Medical College & Hospital, Jaipur. All newborns admitted with respiratory distress From August 2022 to December 2023 were included in the study.

Inclusion Criteria:

All newborns (inborn and outborn) having respiratory distress were included in the study.

Exclusion Criteria:

Those who were not willing/ consenting to participate.

Data collection:

This observational study was done in the NICU of Mahatma Gandhi Medical College, Jaipur among all newborns with respiratory distress who were admitted between August 2022 to December 2023. Data was collected for all newborns included in the study with respiratory distress. General information, socioeconomic status, history and clinical examination findings of the patients were documented. Data regarding antenatal, natal and postnatal risk factors were documented. Time of onset of distress after birth and severity of distress were documented and the severity will be assessed by using Downe's& Silverman's score according to gestation of the newborn. Final risk factors and etiological factors were documented. Consent was taken from parent for study & ethical committee clearance was taken before starting study.

RESULTS

Table No 1: Demographic profile of cases according to Gestational Age, Gender and Weight

Variable	Frequency	Percent
Gestational Age		
Extreme preterm [<28week]	15	10.00
Preterm [28 to 34week]	38	25.33
Late preterm[34 to<37week]	39	26.00
Term [37 to 42 weeks]	58	38.67
Post term [> 42 weeks]	0	0.00
Gender		
Male	90	60
Female	60	40
Weight		
<1000gms	15	10.00
1000 – 1499gms	38	25.33
1500 – 2500gms	39	26.00
2500gms and above	58	38.67

Table 1 showed the distribution of cases according to period of gestation that 38.67% were term, 26% were late preterm, 25.33% were preterm whereas minimum 10% were extreme preterm. Distribution according to sex of baby showed that majority 60% were male whereas minimum 40% were female. Distribution according to weight of baby showed that majority 38.67% were >2.5kg, followed by 26% were between 1.5 – 2.5 kg, and 25.33% were between 1-1.5 kg whereas minimum 10% were <1kg.

Table 2: Distribution of study population according to Maternal Age, Maternal Parity and Intrapartum Complication

Variable	Frequency	Percentage
Maternal Age		
20 - 25 Years	31	20.67
26 – 30 Years	78	52.00
31 – 35 Years	41	27.33
Mean (Maternal Age)	27.52 ± 4.5	
Maternal Parity		
Primi	65	43.33
Multigravida	85	56.67
Intrapartum Complication		
Eclampsia	2	1.33
APH	15	10.00
Fever	4	2.67
GDM	11	7.33

Hypothyroidism	8	5.33
Oligohydramnious	10	6.67
Polyhydramnious	12	8.00
PROM	41	27.33
Obstructed labour	11	7.33
MSL	18	12.00
No Complication	88	58.67

Table 2 showed the distribution of study population according to maternal age revealed that majority of the mothers were from 26-30 years age group i.e. 52% followed by 27.33% from 31-35 years and 20.67% from 20-25 years age group. Majority of the mothers were primigravida i.e. 56.67% and 43.33% were multi gravida. Distribution according to intra partum complication revealed that majority of cases 27.33% had PROM, 12% had MSL, 10% had APH whereas minimum 1.33% had eclampsia, fever 2.67% and 5.33% had hypothyroidism.

Table 3 : Distribution of study population according to final diagnosis

Final diagnosis	**Frequency**	**Percent**
RDS	61	40.67
TTNB	39	26.00
Neonatal Sepsis	31	20.67
MAS	17	11.33
Pneumonia	11	7.33
Perinatal Asphyxia	12	8.00
CCHD	7	4.67
Structural Malformation	1	0.67

Table 3 showed that 40.67% had respiratory distress, followed by 26% had TTNB, 20.67% sepsis whereas minimum 0.67% had structural malformation followed by 4.67% CCHD and 7.33% pneumonia and 8% in perinatal asphyxia.

Table 4 : Distribution of study population according to Management of Respiratory distress (MENTION THE HIGHEST MODE USED)

Management	**Frequency**	**Percent**
Conventional ventilation	52	34.67
CPAP	16	10.67
HFO	17	11.33

NIPPV	33	22.00
HHHFNC	32	21.33
Total	150	100.00

Table 4 showed that 34.67% treated by conventional ventilation, followed by 22% by NIPPV, 21.33% by HHHFNC whereas minimum 10.67% by CPAP followed by 11.33% by HFO

Table 5: Distribution of study population according to duration of hospital stay

Duration of hospital stay	**Frequency**	**Percent**
<3 days	42	28.00
3 to 7 days	45	30.00
>7 days	63	42.00
Total	150	100.00

Table 5 showed that maximum 42% neonates had stay of >7days followed by 30% for 3 – 7 days whereas minimum 28% for <3 days. Most of the extreme preterm and very preterm neonates had stay of >7 days as compare to term neonates.

Table 6: Distribution of study population according to outcome

Final outcome	**Frequency**	**Percent**
Survived and discharged	128	85.33
DAMA/LAMA	6	4.00
Death	16	10.67
Total	150	100.00

Table 6 showed that among the neonates taken into study, maximum 85.33% were Survived and discharged followed by 4% DAMA/LAMA whereas minimum 10.67% were died.

DISCUSSION

Respiratory distress is a major contributor to newborn admission in NICU. It also contributes to significant morbidity and mortality. Respiratory distress is not a disease per se, but a common manifestation of varying disorders of both respiratory and non-respiratory etiology. These disorders may have onset immediately following birth or few hours after birth depending on the underlying condition and gestational age of the baby. Various factors both antenatal and postnatal influence the occurrence of distress. Since it is a major cause of neonatal morbidity and mortality, knowledge about its cause is essential in planning the guidelines for management. Many maternal co morbid conditions, factors related to delivery

and neonatal factors like gestational age and birth weight influence the incidence of distress. In our study, according to maternal age revealed that majority of the mothers were from 26-30 years age group i.e. 52% followed by 27.33% from 31-35 years and 20.67% from 20-25 years age group. Mean age was 27.52 ± 4.5 yr. Majority of the mothers were primigravida i.e. 56.67%. Similarly, Assel Mohammed Wadi et al found that maximum 76.6% mothers were in between 19 – 34 yr age groups and 41.9% were primigravida.[5]

In our study, according to intra partum complication revealed that majority of cases 27.33% had PROM, 12% had MSL, 10% had APH whereas minimum 1.33% had eclampsia, 2.67% had fever and 5.33% had hypothyroidism. Similarly, Harshini BP et al found that maternal intra partum risk factor was prolonged rupture of membranes for respiratory distress 49.31%, followed by multiparity 19.8%.[6]

In our study, according to period of gestation showed that majority of cases 61.33% were Preterm. Among which 26% were late preterm, followed by 25.33% were preterm whereas minimum 10% were extreme preterm. While 38.67% of the babies were full Term in this study. Similarly, Ahmed MK et al found that 151(51.7%) babies were born prematurely.[7]Also P. Chandini et al found that there were 122 (61%) pre-term babies, 68 (34%) term and 10 (5%) post-term neonates who were admitted with respiratory distress.[8] Akaffou AE et al. (2019) found that the newborns were full term (78%), premature (19%), post-term (3%).[9]

In our study, distribution according to sex of baby showed that majority 60% were male whereas 40% were female. Similarly, Akaffou AE et al observed that 1920 newborns were admitted, 232 of whom were admitted (146 boys and 86 girls).[9]

In our study, distribution according weight of baby showed that majority 61.33% were Low birth weight (LBW: <2.5KG), Among which 26% were between 1.5 – 2.5 kg, and 25.33% were between 1-1.5 kg whereas minimum 10% were <1kg. Whereas 38.67% had weight of >2.5kg. Similarly Mugdha Todkar et al observed that most of the neonates were weighing between1500-2500gms (48.94%) and Preterm babies were more in number.[10]

In our study, distribution according to diagnosis showed that 40.67% had respiratory distress syndrome, followed by 26% had TTNB, 20.67% sepsis whereas minimum 0.67% had structural malformation followed by 4.67% CCHD and 7.33% pneumonia and 8% in perinatal asphyxia. Number of Preterm neonates are more in our study hence respiratory distress syndrome and sepsis were common findings. Similarly, Mugdha Todkar et al found that respiratory distress syndrome was the most common cause of respiratory distress (27.36%) followed by transient tachypnoea of newborn (19.47%).[10] Ahmed MK et al also found that transient tachypnoea of the newborn (45.2%), Congenital pneumonia (22.2%), and Late-onset sepsis (10.9%) were the most common causes of respiratory distress.[7]

In our study, management of respiratory distress showed that 34.67% treated by conventional ventilation, followed by 22% by NPPV, 21.33% by HHHFNC whereas minimum 10.67% by CPAP followed by 11.33% by HFO. Similarly, Mugdha Todkar et al observed that oxygen therapy by continuous positive airway pressure (CPAP) was needed in 41.06%, and mechanical ventilation by 23.16%.[10] Ahmed MK et al also found that 32.1% of these infants required respiratory support in the form of invasive and non-invasive ventilation.[7] Also Haquea et al

found that CPAP is needed for 4.1% cases.[11] NIPPV are not readily available in most of the Indian NICU setup hence they use CPAP as a primary mode for non-invasive ventilation.

In our study, maximum 42% had stay of >7days followed by 30% for 3 – 7 days whereas minimum 28% for <3 days. Our study was in line with the previous studies conducted by Assel Mohammed Wadi et al 54.5% were needed >3 days hospital stays.[5]

In our study, maximum 85.33% were Survived and discharged followed by 4% DAMA/LAMA whereas minimum 10.67% were died. Mugdha Todkar et al found that Survival being 81.58% with early detection of respiratory distress and appropriate management.[10] Ahmed MK et al also found that only 3 infants (1.03%) of infants expired during study period.[7]

SUMMARY

A hospital based observational study, conducted on newborns inborn and outborn having respiratory distress admitted in NICU of Mahatma Gandhi Medical College & Hospital, Jaipur from August 2022 to December 2023.

Following were **observations**

- Mean maternal age was 27.52 ± 4.5 yr.
- Majority of the mothers were primigravida i.e. 56.67%.
- Among intra partum complications, majority of cases 27.33% had PROM, 12% had MSL, 10% had APH.
- Majority of cases 61.33% were preterm while 38.67% were full term.
- Majority 78.67% were inborn while rest were out-born.
- 54% were delivered through cesarean section while 46% were delivered through vaginal route.
- Majority 60% were male baby.
- Majority of the neonates 65.33% doesn't need resuscitation while 34.67% needed resuscitation in various forms. Those who needed resuscitation, maximum 15.33% needed initial steps & minimum 1.33% needed chest compression and adrenaline.
- Majority 61.33% of the neonates were <2.5kg (LBW) while 38.67% were >2.5kg whereas minimum 10% were <1kg.
- Maximum 40.67% had respiratory distress, followed by 26% had TTNB, 20.67% had sepsis and 11.33% had MAS. whereas minimum 0.67% had structural malformation followed by 4.67% CCHD and 7.33% pneumonia and 8% in perinatal asphyxia.
- Maximum 34.67% were treated by conventional ventilation, followed by 22% by NPPV, 21.33% by HHHFNC.
- In maximum 54.24% were given for <5days whereas minimum 22.03% for >14 days.
- Maximum 42% had stay of >7days followed by 30% for 3 – 7 days whereas minimum 28% for <3 days.
- Maximum 85.33% were Survived and discharged. 4% DAMA/LAMA whereas 10.67% were died.

CONCLUSION

- **Prevalence and Demographics**: The majority of cases (61.33%) were preterm, and a significant portion of the newborns (78.67%) were inborn. Most of the neonates (60%) were male, and a substantial number (34.67%) required resuscitation at birth.

- **Common Causes**: Respiratory distress syndrome (RDS) was the most prevalent diagnosis, affecting 40.67% of the cases, followed by transient tachypnea of the newborn (TTNB) at 26% and sepsis at 20.67%.
- **Interventions and Outcomes**: The majority of the neonates were managed with conventional ventilation (34.67%), and early surfactant rescue was provided in 28% of preterm neonates. Antibiotics were administered in 78.67% of cases. The study reported a high survival rate of 85.33%, with 10.67% mortality.
- Presence of labour complications like prolonged rupture of membranes and meconium stained amniotic fluid increase the incidence of respiratory distress. Hence timely management of these conditions is needed.
- The presence of Intra partum complications, such as prolonged rupture of the membranes and meconium-contaminated amniotic fluid, increases the risk of respiratory distress. Therefore, timely treatment of these diseases is necessary. Therefore, indications for cesarean section should be considered.
- Future efforts should focus on improving antenatal care to prevent preterm births, ensuring the availability of advanced respiratory support in NICUs, and continuing research to enhance the understanding and management of respiratory distress in newborns.

LIMITATIONS

- Long-term complications and outcomes were not monitored as this was outside the scope of the study.
- One of the primary limitations of this study is its observational design, which inherently restricts the ability to establish causal relationships between identified risk factors and respiratory distress in newborns.
- the lack of long-term follow-up data prevents an assessment of the extended impact of respiratory distress on neonatal health and development.

Ethical Approval

This study was approved by the Ethical Committee of Mahatma Gandhi Medical College, Jaipur, Rajasthan, India.

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Conflict of Interest

None declared.

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