



**“A CLINICO-ETIOLOGICAL PROFILE AND OUTCOME OF NEONATES WITH RESPIRATORY DISTRESS ADMITTED IN NEONATAL INTENSIVE CARE UNIT OF TERTIARY CARE CENTRE IN WESTERN MAHARASHTRA”**

<b>Ezhildevi P*</b>	Junior resident, Department of Paediatrics, Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra, India. *Corresponding Author
<b>Jayapriya L</b>	Senior resident, Department of Paediatrics, Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra, India.
<b>Sachin T Bandichode</b>	Associate Professor, Department of Paediatrics, Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra, India.
<b>Moin Tamboli</b>	Assistant Professor, Department of Paediatrics, Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra, India

**ABSTRACT** **Background:** Respiratory distress is one of the most common reason a neonate is admitted to neonatal intensive care unit. A variety of disorders of respiratory system and non respiratory causes manifest clinically with respiratory distress. Certain maternal risk factors increases the risk of respiratory distress in a neonate. Therefore, early identification of the risk factors, diagnosis and immediate intervention is crucial for the better clinical outcome of neonates with respiratory distress. **Methods And Findings:** 507 neonates admitted to NICU during a period of 2 years , who developed respiratory distress were studied. These neonates were assessed based on onset, duration, oxygen requirement, treatment interventions and immediate outcome. Serial chest xrays were done at 1 hour, 6 hours and more than 6 hours of onset of distress to detect abnormal findings. Association of various risk factors leading to respiratory distress in neonates was studied. **Results:** The most common cause was Respiratory distress syndrome (25.64%). 66.66% developed respiratory distress in <24 hours and 48.32% had severe respiratory distress. Most of the neonates with respiratory distress developed abnormal xray findings at 6 hours(48.71%) . 52.07% needed o2 therapy and 32.54% needed ventilator support. 92.71% newborns with respiratory distress survived and 7.29% expired. **Conclusion:** Respiratory distress in newborns is more common in neonates weighing 1000-1500 gms. The risk factors included preterm, small for gestational age, primigravida mothers and maternal age of >30 yrs. Respiratory distress is common in neonates born to mothers with no risk factors, followed by premature rupture of membranes. The common cause of respiratory distress in newborns is respiratory distress syndrome. The most common cause of death in newborns with respiratory distress is respiratory distress syndrome.

**KEYWORDS :** Respiratory distress, Meconium aspiration syndrome, Respiratory distress syndrome, Transient tachypnea of newborn.

### INTRODUCTION

Respiratory distress is one amongst the foremost reason a newborn is admitted to neonatal intensive care unit.<sup>[1]</sup> 15% of term neonates and 29% of late preterm neonates admitted to the neonatal intensive care unit develop significant respiratory morbidity, this is even higher for neonates born before 34 weeks of gestation.<sup>[2]</sup> A wide range of disorders of respiratory system and non respiratory causes manifest clinically with respiratory distress. Certain factors like prematurity, meconium stained amniotic fluid, cesarean section delivery, gestational diabetes, chorioamnionitis, or prenatal ultrasonographic findings, such as oligohydramnios or structural lung abnormalities increase the probability of neonatal respiratory distress. Therefore, it is imperative that any physician caring for newborn babies can promptly acknowledge the signs and symptoms of respiratory distress, differentiate various causes and initiate management methods to forestall vital complications and death. Therefore the purpose of this study is to spot the etiology, risk factors of respiratory distress in newborn who are all admitted in neonatal intensive care unit and verify their immediate outcome.

### MATERIALS AND METHODS:

All neonates admitted to Dr V.M. government medical college, Solapur NICU during a period of 2 years from December 2017 to December 2019 who developed respiratory distress were studied.

### Inclusion Criteria:

1. Both in-born and out-born neonates admitted to NICU with respiratory distress, due to respiratory and non respiratory disorders (ex: intraventricular haemorrhages, congenital heart defects, congenital anomalies including respiratory system)
2. Babies more than 28 weeks of gestational age.

### Exclusion Criteria:

1. Newborn babies more than 28 days of life.
2. Babies born less than 28 weeks of gestational age.

Institutional Ethical Committee approval was taken. Written expressed consent was taken from the parents and data was collected for all newborns enclosed within the study with respiratory distress.

General information, socioeconomic status, history and clinical examination findings of mother and newborn was documented. It was a prospective observational study. Newborn babies were diagnosed as respiratory distress, which was defined as presence of one or more of following clinical features:

1. Respiratory rate >60 breaths/minute
2. Chest wall retractions
3. Grunting
4. Nasal flaring
5. Cyanosis

History, examination and investigations were done to find out numerous aetiologies of respiratory distress. Time of onset of distress was documented and therefore the severity of the distress was also documented and the severity was assessed by using Silverman & Anderson clinical scoring. Serial x-rays was done at 1 hour and 6 hours in all newborns and were reported by the radiologist for abnormal findings.

The neonates were tagged as RDS if they developed respiratory distress within six hours and chest xray showed one or more of the following: poor expansion with air bronchogram, reticulogranular pattern and ground glass opacity. Neonates developing respiratory distress immediately after birth and chest xray showing one or more of following: hyperinflation, prominent perihilar marking and interlobar fissure oedema, were labelled as TTN. MAS was tagged when neonates had meconium staining of one or more of the following: liquor, nails, umbilical cord and skin, with xray chest showing emphysematous changes and bilateral patchy infiltrates with atelectasis.

Newborns with any history of lethargy/dullness, poor sucking/feeding and complete blood count (CBC) with total leukocyte count (TLC) either >30,000 or <5000 per microlitre were tagged as sepsis. Pneumonia was labelled to those neonates who developed respiratory distress at any age during neonatal period with chest xray showing bilateral patchy opacities. Neonates having history of delayed cry, low Apgar score <3 for 5 minutes and ABG showing acidosis with PH <7.0 were labelled as having birth asphyxia. Depending on the

clinical diagnosis of respiratory distress, relevant investigations were sent and newborns were managed as per protocol. Duration of O2 therapy, intervention done in the form of surgical / ventilator /surfactant therapy/ treatment and mortality was documented to assess the clinical outcome against the final diagnosis.

Outcome was measured in terms of discharged, i.e. fully recovered in terms of improvement in signs and symptoms, and the presence of all of the following:

1. No sign of respiratory distress
2. Oxygen (O2) saturation >95% on room air
3. Taking mother feed more than 4 times per day.

The other outcome was death.

Analysis of data was performed using unpaired t test and Z test of proportion.

P<0.05 was considered statistically significant.

P<0.01 was considered statistically highly significant

**RESULTS:**

The present study comprised of 507 (49.46%) newborns with respiratory distress, out of 1025 (100%) neonates were admitted in neonatal intensive care unit. It was observed that, out of 507 newborn with respiratory distress distribution of cases according to gestational age, reported in preterm was 59.36% term was 36.68%, and post term was 03.96% . Newborns born to mothers with gestational diabetes mellitus reported was 08.48%, pregnancy induced hypertension was 12.22%, premature rupture of membrane was 17.55%, no risk factors reported was 49.11% (Table 1).

Out of 507 neonates with respiratory distress, 427(84.22%) developed respiratory distress with clear liquor and 80 (54.79%) newborns delivered with meconium stained liquor. Respiratory distress syndrome was seen in 130 (25.64%) followed by transient tachypnea of newborn in 96 (18.93%) cases. Sepsis was observed in 20 (03.94%), birth asphyxia in 70 (13.85%) and meconium aspiration syndrome was noted on 80 (15.77%) (Table 2). Severity of respiratory distress by using Silverman Anderson score, revealed that mild, moderate and severe respiratory distress was seen in 33 (06.52%), 229 (45.16%), 245 (48.32%) respectively.

Out of 371 (73.17%) neonates who developed abnormal xray findings, 73 (14.39%), 247 (48.71%), 51 (10.05%) neonates had significant changes in the chest xray within 1 hour, 6 hours and >6 hours respectively.(Table 3). The newborns with respiratory distress, 44 (08.67%) needed surgical intervention, 165(32.54%) needed ventilator support, 107(21.10%) needed surfactant therapy, 264 (52.07%) needed o2 therapy. 470 (92.71%) neonates who were admitted to NICU with respiratory distress survived, while 37 (07.29%) expired. The mortality was seen maximum in neonates with respiratory distress syndrome (35.17%) followed by birth asphyxia (13.51%). (Table 4).

**Table-1: Distribution Of The Cases According To Maternal Risk Factors**

MATERNAL RISK FACTORS	CASES	PERCENTAGE
GESTATIONAL DIABETES MELLITUS	43	08.48
PREGNANCY INDUCED HYPERTENSION	62	12.22
PREMATURE RUPTURE OF MEMBRANES	89	17.55
OLIGOHYDRAMNIOS	22	04.34
POLYHYDRAMNIOS	14	02.76
MATERNAL PYREXIA	28	05.54
NO RISK FACTORS	249	49.11

**Table-2: Distribution Of Cases According To The Cause Of Respiratory Distress**

CAUSE	CASES	PERCENTAGE
TRANSIENT TACHYPNEA OF NEWBORN	96	18.93
RESPIRATORY DISTRESS SYNDROE	130	25.64
SEPSIS	20	03.94
BIRTH ASPHYXIA	70	13.85

MECONIUM ASPIRATION SYNDROME	80	15.77
CONGENITAL HEART DISEASE	20	03.94
PRIMARY PERSISTENT PULMONARY HYPERTENSION OF NEWBORN	39	07.69
PNEUMOTHORAX	6	01.18
PNEUMOIA	5	00.98
SURGICAL CAUSES	41	08.08

**Table – 3 : Distribution Of The Cases According To The Chest XRAY**

FINAL DIAGNOSIS	TOTAL CASES	ABNORMAL CHEST X RAY FINDINGS							
		AT 1 HOUR		AT 6 HOURS		AT >6 HRS		TOTAL	
		No	%	No	%	No	%	No	%
TRANSIENT TACHYPNEA OF NEWBORN	96	16	16.66	40	41.66	0	0.00	56	58.33
MECONIUM ASPIRATION SYNDROME	80	25	31.25	45	56.25	6	7.5	76	95.00
RESPIRATORY DISTRESS SYNDROME	130	13	10.00	117	90.00	0	0.00	130	100.00
CONGENITAL HEART DISEASE	20	1	05.00	15	75.00	4	20.00	20	100.00
SURGICAL CASES	41	12	29.26	18	43.90	0	0.00	30	73.17
SEPSIS	20	0	0.00	0	0.00	2	10.00	2	10.00
BIRTH ASPHYXIA	70	3	04.28	7	01.00	4	05.72	14	20.00
PRIMARY PERSISTENT PULMONARY HYPERTENSION	39	0	0.00	2	05.12	30	76.92	32	82.05
PNEUMOTHORAX	6	0	0.00	1	16.66	5	83.33	6	100.00
PNEUMONIA	5	3	60.00	2	40.00	0	0.00	5	100.00
TOTAL	507	73	14.39	247	48.71	51	10.05	371	73.17

**Table 4: Distribution Of Mortality Cases According To Etiology**

ETIOLOGY	DEATH	PERCENTAGE
TRANSIENT TACHYPNEA OF NEWBORN	0	00.00
RESPIRATORY DISTRESS SYNDROME	13	35.17
SEPSIS	4	10.81
BIRTH ASPHYXIA	5	13.51
MECONIUM ASPIRATION SYNDROME	3	08.10
CONGENITAL HEART DISEASE	3	08.10
PPHN	3	08.10
PNEUMOTHORAX	1	02.70
PNEUMONIA	1	02.70
SURGICAL CASES	4	10.81

**DISCUSSION:**

In the present study it was seen preterm was reported 301 (59.36%), term 186 (36.68%), Post term 20 (03.96%). This was similar to the study done by Dr. Pushpak H Palod et al<sup>[4]</sup> showed preterm 67.26%,

term 32.75% In the present study it was observed higher maternal age to be a risk factor for developing respiratory distress in newborns. Similar results were observed in the study done by C.Dani<sup>[5]</sup> where it was observed that mothers > 32 years of age were at a higher risk of delivering babies with respiratory distress. It showed the maternal risk factor for respiratory distress in newborn which was more common with premature rupture of membranes, followed by pregnancy induced hypertension and gestational diabetes mellitus respectively. This was similar to the study conducted by Dr. Sayid M Barkiya et al<sup>[6]</sup> showed that premature rupture of membrane was most common risk factor for respiratory distress of newborn followed up pregnancy induced hypertension and gestational diabetes mellitus respectively.

Respiratory distress in newborn was more common in caesarean section 353 (69.63%) compared to newborns born by vaginal delivery 154 (30.37%). Similar findings were observed in studies done by C.Dani et al<sup>[5]</sup>, EJ Geller et al<sup>7</sup> & Jean- Bernard Gouyon et al<sup>[8]</sup> where it was noticed that caesarian delivered babies have more chances of neonatal respiratory distress when compared to normal vaginal delivery.

It was seen that maximum respiratory distress in newborns developed <24 hrs, that is at the time of birth or within first day, which was 338 (66.66%); Similar studies done by Dr Sayid M Bakriya et al<sup>[6]</sup> showed that most of the cases developed respiratory distress at the time of birth and first day was 80%, the cause of respiratory distress in newborns was maximum in respiratory distress syndrome, which was 130 (25.64%), followed by distress due to transient tachypnea of newborn 96 (18.93%), Similar study done by Pushpak H.Palod et al<sup>[4]</sup> shown that RDS 31.3% was the most common cause of respiratory distress of newborn followed by congenital pneumonia was 28.1%, TTN was 16.7%. In contrary to our study, study done by Ankush Kommawar et al<sup>[9]</sup> has results of Transient tachypnea of newborn 40% was most common cause of respiratory distress followed by RDS was 26.75%, This contrary can be explained by study conducted by Ankush Kommawar et al<sup>[9]</sup> had more number of term babies compared preterm babies.

Out of 507 cases, 33 (06.52%), 229 (45.16%), 245 (48.32%) had mild, moderate and severe respiratory distress respectively. 407 (80.27%) developed abnormal xray findings in 73 (14.39%), 247 (48.71%), 51(10.05%), within 1 hour, 6 hours and >6 hours respectively. Out of total 507 newborns with respiratory distress, 44 (08.67%) needed surgical intervention, 165 (32.54%) needed ventilator support, 107(21.10%) needed surfactant therapy, 264(52.07%) needed o2 therapy.

Out of 37 total deaths, 13 (35.17%) newborns died of respiratory distress syndrome, 5 (13.51%) newborns died of birth asphyxia. Similar studies done by Dr Sayid M Barkiya et al<sup>[6]</sup> and Dr Ankush Kommawar et al<sup>[9]</sup> observed that most common causes for mortality were respiratory distress syndrome(61.62%) and prematurity.

## CONCLUSION:

Respiratory distress in newborns is more common in neonates weighing 1000-1500 gms. The risk factors included preterm, small for gestational age, primigravida mothers and maternal age of >30 yrs, caesarean section, >4 pervaginal examinations. Respiratory distress is common in neonates born to mothers with no risk factors, followed by premature rupture of membranes and pregnancy induced hypertension. The outcome of neonates with respiratory distress having 1 minute APGAR score  $\leq 7$  was poor when compared to 1 min APGAR score of  $>7$ . The common cause of respiratory distress in newborns is respiratory distress syndrome, followed by transient tachypnea of newborn. The foremost common cause of death in newborns with respiratory distress was respiratory distress syndrome followed by birth asphyxia.

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## Abbreviations:

NICU- neonatal intensive care unit

RD- respiratory distress

TTN- transient tachypnea of newborn

RDS- respiratory distress syndrome

## REFERENCES:

1. Edwards MO, Kotecha SJ, Kotecha S. Respiratory distress of the term newborn infant. Paediatric Respiratory Rev. 2013;14(1):29-36
2. Hibbard JU, Wilkins I, Sun L, et al; Consortium on Safe Labor. Respiratory morbidity in late preterm births JAMA. 2010;304(4):419-425.
3. Arit prakash, Nighat Haider, Zubair Ahmed Khoso, Abdul sattat Shaikh Frequency, causes and outcome of neonates with respiratory distress admitted to neonatal intensive care unit , National Institute of Child health, Karachi. JPMA.65:771;2015
4. Pushpak H.Palod, Bhagwat B. Lawate, Mahesh N Sonar, Sneha P. Bajaj a study of clinical profile of neonates with respiratory distress and predictors of their survival admitted in neonatal intensive care unit of tertiary care hospital 10.18203/2349-3291.ijcp20174724
5. C. Dani, M F Reali, G Bertini, L Wiechmann, A Spagnolo, M Tangucci, F Rubaltelli\*: Risk factors for the development of respiratory distress syndrome and transient tachypnoea in newborn infants. Eur Respir J 1999; 14: 155s-159.
6. Sayid M Barkiya et al clinic-etiological profile and outcome of neonatal respiratory distress 10.17354/ijss/2016/82
7. EJ Geller , J M Wu, M L Jannelli, T V Nguyen and A G Visco: Neonatal outcomes associated with planned vaginal versus planned primary cesarean delivery. Journal of Perinatology (2010);30:258-264.
8. Jean-Bernard Gouyon , C Ribakovsky , C Ferdynus , C Quantin , P Sagot and B Gouyon: Severe respiratory disorders in term neonates. Paediatric and Perinatal Epidemiology; Volume 22 Issue 1: 22 - 30
9. Ankush Kommawar et al study of respiratory distress in newborn 10.18203/2349-3291.ijcp20170695.
10. P.Brahmaiah, K.Rami Reddy Etiological study of respiratory distress in newborn October 2017 ICV:77:83
11. Kirsti H N: Disease Early Postnatal Dexamethasone Therapy for the Prevention of Chronic Lung.Pediatrics 2001;108:741-748.
12. Rajavaranu Chandrasekhar et al clinical study of respiratory study in newborn 10.18203/2349-3291.ijcp20162364.
13. Meharban Singh, Care of the newborn 7th edition.: 273-8 management of newborn 8th edition
14. Kumar A, Bhat BV: Respiratory distress in newborn .Indian J Mater 3
15. Avery's disease of the newborn, Neonatology and pathophysiology and Child Health 1996; 7: 8-10.