

# A Study of Respiratory Distress in Term Neonates in Early Neonatal Period

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## Abstract

**Introduction:** Respiratory distress is one of the most common cause of admission in Neonatal Intensive Care Unit and results from a variety of respiratory and non-respiratory etiologies. It accounts for significant morbidity and mortality in the newborn period.

**Aims and Objectives:** To identify the etiology of respiratory distress in early neonatal period and its immediate outcome.

**Materials and Methods:** All term neonates with respiratory distress in 1<sup>st</sup> week of life in a tertiary care hospital were consecutively recruited in the study for 1 year. Etiological profile was found and outcome was analyzed along with various neonatal, maternal, and labor factors leading to the distress.

**Results:** Out of 2152 cases admitted 655 developed distress with an incidence of 30.4%. Transient tachypnea of newborn (242) was the most common cause of distress, followed by perinatal asphyxia (144) and meconium aspiration syndrome (MAS) (93). Incidence was more in male babies and in those delivered by cesarean section. The major cause of mortality was perinatal asphyxia (30) followed by MAS (17) and congenital heart disease (4), overall mortality was 9.01%.

**Conclusion:** Knowledge about the etiological pattern of respiratory distress is essential in planning therapy to reduce morbidity and mortality due to distress. Timely recognition and management of high-risk pregnancies and appropriate decision about the time and mode of delivery is needed to reduce the incidence of respiratory distress.

**Key words:** Meconium aspiration, Neonate, Perinatal asphyxia, Pneumonia, Respiratory distress, Sepsis, Term, Transient tachypnea of newborn

## INTRODUCTION

Respiratory distress is one of the most common cause of admission (30-40%) in Neonatal Intensive Care Unit (NICU) and accounts for 20% of neonatal mortality in India.<sup>1</sup> Incidence of respiratory distress varies from 0.7% to 8.3% of live born babies in India.<sup>2</sup> Babies with respiratory distress are 2-4 times more likely to die than those without respiratory distress. It results from a variety of respiratory and non-respiratory causes, among them, transient tachypnea of newborn, respiratory distress syndrome, and perinatal asphyxia are the most common

causes. Although respiratory distress may represent a benign, self-limited process, it may also be the first sign of sepsis or serious cardiopulmonary disease. The overall incidence of respiratory distress in term babies is 4.2%. Early diagnosis and management can reduce the morbidity and mortality in the neonatal period.

## Aims and Objectives

The aim of the study is to identify the etiological factors of respiratory distress in early neonatal period and its immediate outcome.

## MATERIALS AND METHODS

Full-term (gestational age 37 weeks and above) neonates (both inborn and outborn) admitted in SNN Ward of Government Theni Medical College Hospital, within 1 year study period from August 2015 to July 2016, with respiratory distress, were consecutively recruited into this

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descriptive study after getting informed consent from the parents. Full-term neonates with respiratory distress admitted in NICU with onset of distress <7 days (early neonatal period) were studied. Cases lost to follow-up were excluded from the study. Respiratory distress was assessed using Downes score. At birth, weight was recorded and a detailed physical examination was performed to detect congenital anomalies. A special questionnaire was designed for the purpose of the study which included the name, age at admission, sex, date of admission, date of discharge or death, gestational age according to the date of last menstrual period of the mother, antenatal ultrasound or modified new ballards score, factors related to labor and delivery and maternal information such as age, parity, and illness. The final diagnosis of clinical conditions producing respiratory distress will be based mainly on careful scrutiny of the history, clinical, and radiological findings. Chest X-ray (CXR) was done in all cases. Complete blood counts, C-reactive protein, blood-culture, and sensitivity and echo in relevant cases. Appropriate management was done on individual basis as per the institutional protocol, cases were followed till death or discharge and immediate outcome was assessed.

## RESULTS AND OBSERVATION

Out of 2152 cases admitted during the study period, 655 term newborns were admitted with respiratory distress with an incidence of 30.4% (Table 1).

In the 655 cases with respiratory distress, transient tachypnea of newborn (TTN) was the most common cause found in 242 cases (36.95%), perinatal asphyxia was the second common cause found in 144 cases (21.98%), followed by meconium aspiration syndrome (MAS) in 93 cases (14.2%), congenital heart diseases (CHD) in 78 cases (11.91%), sepsis and pneumonia in 73 cases (11.14%), hyaline membrane disease in 1 case (0.16%), other causes such as congenital diaphragmatic hernia, congenital lobar emphysema, and congenital malformations were found in 24 cases (3.66%) (Table 2).

Maternal age was  $\leq 18$  or  $\geq 35$  in 63 cases, and 19-34 in 592 cases, 9.62% mothers were in extreme age group. Out of the 655 newborns with respiratory distress, 328 were born to primi mothers, 286 newborns were born to G2-G4 mothers, and 41 newborns were born to grand multipara mothers (G>4). Maternal illness such as GDM, pregnancy-induced hypertension, anemia was present in 197 mothers (30.08%) of babies with respiratory distress and absent in 458 mothers of babies with respiratory distress (69.92%) (Table 3).

Out of 655 newborns admitted for respiratory distress, prolonged labor was present in 107 deliveries (16.34%) and absent in 548 deliveries (83.66%). Prolonged rupture of membranes (PROM) was present in 89 deliveries (13.59%) and absent in 566 deliveries (86.41%). Meconium stained amniotic fluid (MSAF) was present in 150 deliveries (22.9%) and absent in 505 deliveries (77.10%) (Table 4).

There was a male predominance with 416 being male and 239 being females, which is also present in almost all the etiologies. Incidence of distress is more in babies delivered

**Table 1: Incidence**

Variable	n
Total number of admission	2152
Respiratory distress in term	655
Incidence (%)	30.4

**Table 2: Etiology of respiratory distress (n=655)**

Etiology	n (%)
TTN	242 (36.95)
Perinatal asphyxia	144 (21.98)
MAS	93 (14.20)
CHD	78 (11.91)
Sepsis and pneumonia	73 (11.14)
HMD	1 0.16
Others	24 3.66
Total	655 100

TTN: Transient tachypnea of newborn, MAS: Meconium aspiration syndrome, CHD: Congenital heart diseases, HMD: Hyaline membrane disease

**Table 3: Maternal characteristics**

Characteristics	n (%)
Age (years)	
$\leq 18$ or $\geq 35$	63 (9.62)
19-34	592 (90.38)
Parity	
Primi	328 (50.08)
2-4	286 (43.66)
>4	41 (6.26)
Illness	
Yes	197 (30.08)
No	458 (69.92)

**Table 4: Labor characteristics**

Characteristics	n (%)
Prolonged labor	
Yes	107 (16.34)
No	548 (83.66)
PROM	
Yes	89 (13.59)
No	566 (86.41)
MSAF	
Yes	150 (22.90)
No	505 (77.10)

PROM: Prolonged rupture of membranes, MSAF: Meconium stained amniotic fluid

at early term (346) and in those delivered by cesarean section (341) (Table 5).

Resuscitation was required in 202 cases (30.84%) and 453 cases did not need resuscitation (69.16%). 372 cases required oxygen supplementation by nasal oxygen, 217 cases required continuous positive airway pressure, and mechanical ventilator was needed by 66 cases. Out of the 655 newborns, 197 cases had abnormal CXR findings. Most of the cases of MAS and pneumonia had findings in radiograph. 213 (32.52%) cases were either discharged or died within 3 days and 442 cases were either discharged or died after 3 days (Table 6).

Out of 655 term newborns with respiratory distress 596 were discharged, 59 died. Mortality being 9.09%. Perinatal asphyxia is the leading cause of death with maximum case fatality rate (CFR = 50.85%) followed by MAS (28.81%) (Table 7).

## DISCUSSION

During the study period, a total of 2152 newborns were admitted in our SNN, of which a total of 655 term newborns were admitted with onset of respiratory distress in early neonatal period. These 655 babies were included in the study, and the clinical profile of respiratory distress and its immediate outcome were analyzed. The incidence of respiratory distress in our study was 30.43%, with more cases occurring in males (63.5%) and early term (52.8%) which is similar to the study titled "Etiology of respiratory distress in Newborn" by Haque *et al.*<sup>3</sup> In our study TTN was the most common cause of respiratory distress, perinatal asphyxia was the second most common cause followed by MAS and CHD which is similar to "Neonatal respiratory distress in Omduran Maternity Hospital" by Abdelrahman *et al.*<sup>4</sup> and Santosh *et al.*<sup>5</sup> In our study, mortality rate was 9.01% with perinatal asphyxia (50.8%) being the leading cause of death followed by MAS (28.8%) and CHD (6.7%) which is similar to "Respiratory Distress in Full-Term Neonates in the first week of life in Basrah Maternity Hospital" by Wadi *et al.*<sup>6</sup> CFR was least for TTN (0%) and highest for Perinatal Asphyxia (20.83%) followed by MAS (18.28%). In our study, 52.06 % of cases were delivered by lower segment cesarean section which is more than cases delivered by vaginal delivery which is similar to "Neonatal respiratory distress in early neonatal period and its outcome" by Swarnkar *et al.*<sup>7</sup> Only 30.1% of babies had abnormal CXR findings which necessitates clinical and other investigations to find the etiology. Maternal illness, maternal age, parity, prolonged labor, PROM, and MSAF also influence the occurrence of

**Table 5: Neonatal characteristics**

Characteristics	TTN	PA	MAS	CHD	Sep and Pn	HMD	Other
<b>Sex</b>							
Male (416)	153	86	64	50	48	1	0
Female (239)	89	58	29	28	25	0	10
<b>GA</b>							
37-38 (346)	133	68	33	53	42	1	16
≥39 (309)	109	76	60	25	31	0	8
<b>MOD</b>							
LSCS (341)	145	48	53	48	33	0	14
Vaginal (314)	97	96	40	30	40	1	10

TTN: Transient tachypnea of newborn, MAS: Meconium aspiration syndrome, CHD: Congenital heart diseases, HMD: Hyaline membrane disease, LSCS: Lower segment cesarean section, GA: Gestational age, MOD: Mode of delivery

**Table 6: Therapeutic parameters**

Parameters	TTN	PA	MAS	CHD	Sep and Pn	HMD	Other
<b>NFR</b>							
Yes (202)	9	141	26	7	17	0	2
No (453)	233	3	67	71	47	10	22
<b>O2 Req</b>							
Hood (372)	220	36	16	45	39	0	16
CPAP (217)	22	73	58	30	31	1	2
MV (66)	0	35	19	3	3	0	6
<b>CXR</b>							
ABN (197)	37	11	88	28	24	1	8
Normal (458)	205	133	5	50	49	0	16
<b>Days of Rx</b>							
≤3 days (213)	134	30	22	18	2	0	7
>3 days (442)	108	114	71	60	71	1	17

TTN: Transient tachypnea of newborn, MAS: Meconium aspiration syndrome, CHD: Congenital heart diseases, HMD: Hyaline membrane disease, CXR: Chest X Ray, CPAP: Continuous positive airway pressure, NFR: Need for resuscitation, PA: Perinatal asphyxia, MV: Mechanical ventilation, ABN: Abnormal

**Table 7: Etiology-wise distribution of outcome: (n=655)**

Etiology	Total	Discharged	Death	CFR
TTN	242	242	0 (0)	0
Birth asphyxia	144	114	30 (50.85)	20.83
MAS	93	76	17 (28.81)	18.28
CHD	78	74	4 (6.78)	5.13
Sepsis and pneumonia	73	70	3 (5.08)	4.10
HMD	1	1	0 (0)	0
Others	24	19	5 (8.48)	20.83
Total	655	596	59 (100)	9.09

TTN: Transient tachypnea of newborn, MAS: Meconium aspiration syndrome, CHD: Congenital heart diseases, HMD: Hyaline membrane disease, CFR: Case fatality rate

distress which are amenable to prevention by timely obstetric management.

## CONCLUSION

Respiratory distress is a common cause of newborn admission in NICU. TTN is the most common cause of respiratory distress in term newborns, followed by perinatal asphyxia, meconium aspiration, and CHD. Sepsis and

pneumonia varies in different centers. A small proportion of respiratory distress is due to other causes such as congenital diaphragmatic hernia, anemia, congenital lobar emphysema, and congenital anomalies. Although TTN is the most common cause of distress, it is usually self limited and carries good prognosis. The main causes for death are perinatal asphyxia, MAS, sepsis, and pneumonia. Hence, any measure to reduce the morbidity and mortality associated with respiratory distress should be aimed at effective management of these conditions. Various neonatal, maternal, and labor characteristics should also be addressed for better management and prevention of distress.

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