ORIGINAL ARTICLE

Clinico-Etiological Profile and Outcome of Neonates with Respiratory Distress Admitted in Nepalgunj Medical College

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ABSTRACT

Introduction: The term respiratory distress is used to denote signs and symptoms of an abnormal respiratory pattern. A child with nasal flaring, tachypnea, chest wall retractions, stridor, grunting, dyspnea, or wheezing has respiratory distress Nasal flaring, although nonspecific, is an extremely important sign of distress in infants. Suprasternal, intercostal, and subcostal retractions are manifestations of increased inspiratory effort, weak chest wall, or both. **Aims:** To describe the etiological and clinical profile of neonate with respiratory distress, and to assess the outcome of respiratory distress. **Methods:** This study was hospital based cross-sectional study, conducted, Department of Pediatrics, Nepalgunj Medical college Teaching Hospital from October 2025 - April 2026. All newborn admitted during the study period were included in study. **Results:** A total 110 neonates were included in the study. Among them, 49.1% (54) had birth weight of > 2500 gm, 30.9%(34) weighed 1500-2499 gm, 20.0%(22) weighed <1500 gm. Regarding gestational age 53.6%(59) were >37 weeks, 28.2%(31) were between of 32-36 weeks and 18.2%(20) were <32 weeks. Male neonates predominated with male to female ratio of 1.56:1. Vaginal delivery accounted for 51.8%(57) of cases while cesarean section accounted for 48.2%(53). Chest retraction and tachypnea were the most common clinical presentation. Transient tachypnea of new born, Meconium aspiration syndrome were more common among term neonate whereas respiratory distress syndrome was more common among preterm neonates. Among the studied neonates, 68.2%(75) were discharged, 24.5%(27) were expired and 7.3%(8) left against medical advice. **Conclusion:** Prematurity was the most common cause of respiratory distress, with the majority of death due to Respiratory distress syndrome. Transient tachypnea of newborn and meconium aspiration syndrome were common in term neonates.

Keywords: Etiology; Outcome; Prematurity; Respiratory distress; Tachypnea

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INTRODUCTION

The term respiratory distress is used to denote signs and symptoms of an abnormal respiratory pattern. A child with nasal flaring, tachypnea, chest wall retractions, stridor, grunting, dyspnea, or wheezing has respiratory distress Nasal flaring, although nonspecific, is an extremely important sign of distress in infants. Suprasternal, intercostal, and subcostal retractions are manifestations of increased inspiratory effort, weak chest wall, or both. Grunting is most commonly heard in diseases with decreased functional residual capacity (e.g., pneumonia, pulmonary edema) or peripheral airway obstruction (e.g., bronchiolitis).[1] The most common causes of respiratory distress include Transient Tachypnea of newborn(TTN), Hyaline membrane disease(HMD), Meconium aspiration syndrome(MAS), Pneumonia and Birth asphyxia.[2] There are studies which have reported the incidence of respiratory distress in newborn babies to be ranging from 3.9 to 8% in admitted patients in Neonatal Intensive Care Unit (NICU).[3] In developed countries, improved diagnosis and treatment due to technical advancements and increased pediatric and neonatal specializations have led to an impressive fall in neonatal mortality. With the advancement of neonatal ventilation like HFO and ECMO, there is revolutionization in

the field of neonatology for respiratory disorders.[4] There are limited study done in Western part of Nepal, so this study was conducted to know the etiological and clinical profile of neonate with respiratory distress and their outcome, so that many more life of neonate could be saved.

METHODS

This was a hospital based cross-sectional study, conducted in the Neonatal ICU, Department of Pediatrics at Nepalgunj Medical college Teaching Hospital from October 2025 to April 2026. All newborn (preterm, term and post term) admitted during the study period were included in the study. Newborn older than 28 days, Neonates with respiratory distress unrelated to medical or congenital conditions (such as respiratory distress due to environmental factors), Infants with severe congenital malformations or major syndromic conditions and cases in which informed consent could not be obtained from parents or guardians, were excluded from the study.

Convenient sampling technique was used. Sample size was calculated by using formula (n) = $z^2(pq)/d^2$ For this purpose, incidence (7%)[5] total sample was 110. Written informed consent was obtained in the local language. Ethical clearance was obtained from Institutional Review Committee (IRC) of NGMCTH (Ref 38/082-083). before commencement of the study.

Detailed demographic and clinical profiles of all eligible patients were recorded. Information regarding age, sex, symptoms, duration of illness was collected. General conditions, systemic examination findings and vital parameter were documented. Routine investigation including CBC CRP blood grouping chest X ray were performed. The diagnostic criteria for respiratory distress syndrome were based on clinical history obtained from informants and physical examination findings.

Statistical Analysis

All necessary information was recorded in the predesigned proforma. Data entry and statistical analysis were performed using Microsoft Excel 2010 and Statistical Package for the Social Sciences (SPSS) version 20 for Windows. Mean, frequency, percentage, standard deviation, chi-square test were used for data analysis.

RESULTS

Baseline Characteristics and Demographics

A total of 110 neonates with respiratory distress were included in the final analysis. The baseline demographic and clinical characteristics of the study population are presented in Table I.

The mean birth weight of the study population was 2462.3 ± 762.8 grams, with nearly half (49.1%) having normal birth weight (≥2500 grams). Very low birth weight (<1500 grams) neonates constituted 20.0% of the study population. The mean gestational age was 35.7 ± 3.4 weeks, with a majority (53.6%) being term neonates (≥37 weeks). There was a slight male predominance with 67 males (60.9%) and 43 females (39.1%), giving male-to-female ratio was 1.56:1. Vaginal delivery (51.8%) and cesarean section (48.2%) were almost equally distributed. The mean maternal age was 26.1 ± 4.5 (Mean ± SD) years, with the majority of mothers (60.9%) in the 20-30 year age group. Antenatal steroids were administered to only 26.4% of mothers. Maternal risk factors such as hypertension and diabetes mellitus were present in 11.8% and 19.1% of mothers respectively.

Parameter	Frequency (n)	Percentage (%)	Mean±SD
Birth Weight (gram)			2462.3±762.8
<1500	22	20.0	
1500-2499	34	30.9	
≥2500	54	49.1	
Gestational Age (weeks)			35.7 ±3.4
<32	20	18.2	
32-36	31	28.2	
≥37	59	53.6	
Sex			
Male	67	60.9	
Female	43	39.1	
Mode of delivery			
Vaginal(NVD)	57	51.8	
Cesarean section (CS)	53	48.2	
Parity			
Primipara	44	40.0	
Multipara	66	60.0	
Maternal Age(years)			26.1 ±4.5
<20	8	7.3	
20-30	67	60.9	
>30	35	31.8	
Antenatal Steroids			
Received	29	26.4	
Not Received	81	73.6	
History of Preterm Labour			
Present	14	12.7	
Absent	96	87.3	
Maternal HTN			
Present	13	11.8	
Absent	97	88.2	
Maternal DM			
Present	21	19.1	
Absent	89	80.9	

Table I: Baseline Demographic and Clinical Characteristics of Study Population (n=110)

Clinical Feature	Present (n)	Present (%)	Absent (n)	Absent (%)
Tachypnea(RR>60/min)	25	22.7	85	77.3
Retractions	37	33.6	73	66.4
Grunting	22	20.0	88	80.0
Cyanosis	18	16.4	92	83.6
Tachycardia(HR>160/min)	9	8.2	101	91.8

Table II: Distribution of Clinical Features at Presentation

Among the clinical features of respiratory distress, chest retractions were the most common finding observed in 33.6%(37) of neonates, followed by tachypnea in 22.7% (25). Grunting was present in 20.0% (22), while cyanosis was noted in 16.4%(18) of neonates. Tachycardia was the least common clinical feature, observed in only 8.2% (9) of the study population. (Table II)

Transient Tachypnea of Newborn (TTN) was the most common etiology, accounting for 31.8% (35) of all cases. Meconium Aspiration Syndrome (MAS) was the second most common cause, seen in 25.5% (28) of neonates. Respiratory Distress Syndrome (RDS) was diagnosed in 20.0%(22) of cases. Early Onset Neonatal Sepsis (EONS) contributed to 13.6% (15) of cases, while Birth Asphyxia (BA) accounted for 9.1% (10) of cases. (Figure 1)

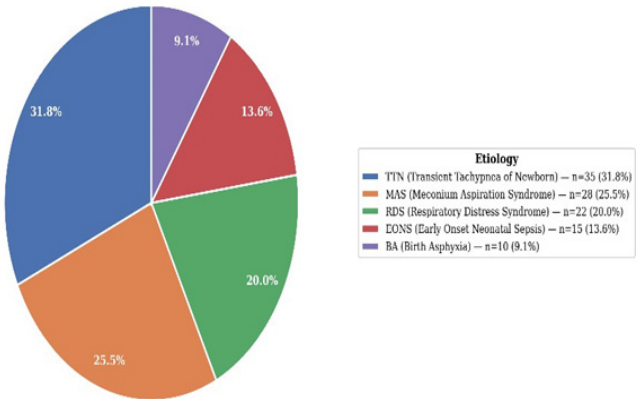

Figure 1: Etiological Distribution of Respiratory Distress in Neonates (N=110)

Diagnosis	<32wks n(%)	32-36wks n(%)	≥37wks n(%)	MeanGA (wks) ±SD	P-value
TTN (n=35)	0 (0)	8 (22.9)	27 (77.1)	38.0 ±1.3	<0.001*
MAS (n=28)	0 (0)	8 (28.6)	20 (71.4)	37.7 ±1.5	
RDS (n=22)	17 (77.3)	5 (22.7)	0 (0)	30.4 ±0.8	
EONS (n=15)	2 (13.3)	6 (40.0)	7 (46.7)	35.8 ±2.2	
BA (n=10)	1 (10.0)	5 (50.0)	4 (40.0)	35.4 ±2.6	

Table III: Distribution of Gestational Age Category across Etiologies

Comparison of mean gestational age across the five diagnostic categories showed a statistically significant difference ($F = 138.4$, $df = 4, 105$, $p < 0.001$). Post-hoc analysis (Tukey's HSD) demonstrated that the mean gestational age in RDS (30.4 ± 0.8 weeks) was significantly lower than all other groups ($p < 0.001$). TTN had the highest mean gestational age (38.0 ± 1.3 weeks), significantly higher than EONS ($p = 0.006$) and BA ($p = 0.010$). No significant difference was observed between TTN and MAS ($p = 0.756$). Notably, 77.3% of RDS cases occurred in neonates <32 weeks gestation, while 77.1% of TTN and 71.4% of MAS cases occurred at term. (Table III)

Maternal Risk Factor	TTN (n=35)	MAS (n=28)	RDS (n=22)	EONS (n=15)	BA (n=10)	Total (n=110)	p value
Maternal Infection	7 (20.0)	6 (21.4)	5 (22.7)	8 (53.3)	6 (60.0)	32 (29.1)	0.015*
Meconium Stained Liquor	4 (11.4)	19 (67.9)	0 (0)	1 (6.7)	1 (10.0)	25 (22.7)	<0.001*
PV Leaking	8 (22.9)	4 (14.3)	5 (22.7)	5 (33.3)	4 (40.0)	26 (23.6)	0.289
PV Bleeding	5 (14.3)	2 (7.1)	3 (13.6)	2 (13.3)	1 (10.0)	13 (11.8)	0.876
Oligo-hydramnios	6 (17.1)	3 (10.7)	2 (9.1)	4 (26.7)	3 (30.0)	18 (16.4)	0.260
No Risk Factor	7 (20.0)	2 (7.1)	9 (40.9)	1 (6.7)	1 (10.0)	20 (18.2)	0.018*

*Statistically significantat p<0.05, Statistical Test Applied:Chi-square Test of Independence

Table IV: Distribution of Maternal RiskFactors across Etiologies

Each maternal risk factor was compared across the five etiological groups using the Chi-square test. Meconium Stained Liquor (MSL) was significantly associated with MAS, presenting

67.9% of MAS cases (χ^2=54.32, df=4, p<0.001) Maternal infection was significantly associated with EONS and BA, observed in 53.3% and 60.0% of these cases respectively (χ^2=12.34, df=4, p=0.015). The absence of any maternal risk factor was most commonly seen in RDS (40.9%) (χ^2 = 11.89, df = 4, p = 0.018).

Complication	TTN (n=35)	MAS (n=28)	RDS (n=22)	EONS (n=15)	BA (n=10)	Total (n=110)	p value
None	21 (60.0)	10 (35.7)	3 (13.6)	5 (33.3)	2 (20.0)	41 (37.3)	
Infection/ Sepsis	8 (22.9)	6 (21.4)	9 (40.9)	8 (53.3)	5 (50.0)	36 (32.7)	
NEC	1 (2.9)	1 (3.6)	3 (13.6)	1 (6.7)	1 (10.0)	7 (6.4)	
IVH	0 (0)	0 (0)	4 (18.2)	0 (0)	1 (10.0)	5 (4.5)	0.002*
Pneumothorax	3 (8.6)	5 (17.9)	1 (4.5)	1 (6.7)	1 (10.0)	11 (10.0)	
Pulmonary Hemorrhage	0 (0)	1 (3.6)	2 (9.1)	0 (0)	0 (0)	3 (2.7)	
Mixed Complications	2 (5.7)	5 (17.9)	0 (0)	0 (0)	0 (0)	7 (6.4)	

Table V:Distribution of Complications across Etiologies(n=110)

The overall complication rate was 62.7%(69). A statistically significant association was found between complications and etiology (χ^2 = 48.51, df = 24, p = 0.002). No complications were observed in 60.0% of TTN cases, indicating its relatively benign nature. RDS had the highest complication rate (86.4%), with infection/sepsis being the most common complication (40.9%), followed by IVH (18.2%) and NEC (13.6%). MAS was associated with pneumothorax in 17.9% of cases.

Outcome	TTN (n=35)	MAS (n=28)	RDS (n=22)	EONS (n=15)	BA (n=10)	Total (n=110)	p value
Discharged	31 (88.6)	18 (64.3)	11 (50.0)	12 (80.0)	3 (30.0)	75 (68.2)	0.002*
Death	2 (5.7)	7 (25.0)	9 (40.9)	2 (13.3)	7 (70.0)	27 (24.5)	
LAMA	2 (5.7)	3 (10.7)	2 (9.1)	1 (6.7)	0 (0)	8 (7.3)	

Statistical Test Applied:Chi-square Test of Independence

Table VI: Outcome across Etiologies: Outcome across Etiologies

The overall mortality rate was 24.5%(27), while 68.2%(75) were discharged successfully, and 7.3% (8) left against medical advice(LAMA). Birth Asphyxia had the highest mortality rate (70.0%), followed by RDS(40.9%). TTN had the best prognosis with 88.6% discharged successfully and the lowest mortality rate (5.7%). Mortality in MAS was 25.0%, primarily due to associated complications like pneumothorax and pulmonary hemorrhage. EONS had a mortality rate of 13.3%.

DISCUSSION

In our study mean birth weight was 2462.3±762gm, 49% (54) of babies were of >2500 gms, and 30.9% of babies were of 1500-2500 gm, 20.0% (20) were of <1500 gm, which was similar to study done by Lamichhane A et al where mean birth weight was 2.25+0.63kg, 50.45% were Low birth weight, 10.81% were Extremely low birth weight, 38.74% were of normal weight[3], which was comparable to study done by P chandini et al, showed 34% babies with birth weight >2.5 kg, 52% of babies with 2.5-1.5 kg and 14% of babies with birth weight <1.5 kg.[6]

In our study mean gestational age was 35.7±3.4 weeks, majority 53.6%(59) were of >37 weeks, 28.2% (31) were of 32-36 weeks, and 18.2% were of <31 weeks, which was comparable to study done by Lamichhane A et al, showed 40.54% were term neonates(>37 weeks) and 59.46% were preterm neonates.[3] Gunasekhar RS et al showed 58.22% were term gestation, 23.54 % were of 34-37 weeks, and 18.23% were of less than 34 weeks.[7]

In our study 60.9%(67) were male and 39.1%(43) were female with male to female ratio of 1.5:1. This was similar to study done by Kumar.S where 57.14% were male, 42.86%[8] were female. other study done by Gaurav et al and Sahoo et al showed 56.3% male, 43.7% female, 56.66% male and 43.34%[9,10] female consecutively. It was observed that male preponderance with ratio of 1.5:1.[11-13]

In our study 51.8%(57) babies were delivered by Normal vaginal delivery(NVD) and 48.2%(53) were delivered by cesarean section(CS). This was similar to study done by Kumar.S where 60% of delivery were NVD and 40%[8] were CS, which was comparable with other study by Lamichhane A et al showed 49.95% had normal vaginal delivery, 51.35% had LSCS and 2.70%[3] had vaccum delivery. Study by Gaurav et al showed 69.10% had LSCS and 30.9%[9] had NVD. In our study 60.9% (67) of mother belonged to the 20-30 years age group while 31.8%(35) were older than 30 years. These findings were comparable to study conducted by Kumar. S in which 47.25% (86)of mothers were aged 25-30 year and 1.1%(2) were older than 35 year.[8]

In our study 33.6%(37) of babies had chest retraction, 22.7% (25) had tachypnea, 20.0% (22) had grunting. Similar findings were reported by Barkiya et al where 83% of babies had tachypnea and 83%[14] had chest retraction. Another study conducted by Lamichhane A et al reported that 69.36% of babies had tachypnea, 12.61% had grunting and 9.01%[3] had chest retraction. In our study 31.8% (35) of babies had transient tachypnea of newborn(TTNB), 25.5% had meconium aspiration syndrome (MAS), 20.0% (20) had Respiratory distress syndrome.(RDS). These findings were comparable to those reported by Ramya et al where 40.45% of babies had RDS, 22.27% had TTN and 14.09%[15] had MAS. TTNB was commonly observed among babies delivered vaginally in study conducted by Barkiya S.M.[14] Another study by Kshirsagar VY et al[16] reported TTN as the most common cause of respiratory distress.

In study by P chandini et al TTNB was most common cause of respiratory distress in term babies and Hyaline membrane disease was most common in preterm babies[6], which was comparable to our study, where 77.3% (17) RDS occur in <32 weeks and 77.1%(27) TTNB, 71.4% (20) MAS occur in term neonates.

In our study 68.2% (75) neonates were discharge, 24.5%(27) neonates were expired, among which 33.3% (9) expired due to RDS, 25.9%(7) due to MAS , 25.9% (7) due to birth asphyxia, 2 due to neonatal sepsis and TTNB, where as 7.3% (8) babies went in Leave against medical advice. This study was similar to study by Maryam I et al, which showed 83.5% were discharge and 16.5%[17] were expired, among which majority of death due to RDS.

LIMITATION

This study was conducted at single centre with relatively small sample size and in limited time frame.

CONCLUSION

Prematurity was the most common cause of respiratory distress, with the majority of death due to RDS. Major action should be taken to prevent premature delivery. TTNB and MAS were common in term neonates, therefore every delivery should be planned and necessary action should be taken in time.

REFERENCES

1. Vincent JL, Moore FA, Bellomo R, Marini JJ. Textbook of Critical Care. Elsevier Health Sciences; 2022,p612.
2. Manasa K and Bhuvana D. Clinical Profile and Outcomes of Respiratory Distress in Neonates- A Cross Sectional Study. Med J Clin Trials Case Stud 2024, 8(2):000368
3. Lamichhane A, Panthee K, Gurung S. Clinical Profile of Neonates with Respiratory Distress in a Tertiary Care Hospital. J Nepal Med Assoc 2019 Dec 31;57(220)
4. Journal of Cardiovascular Disease Research Current Editorial Team – 2010. J. Cardiovasc. Dis. Res. 2010 Jan;1(1):3–8.
5. Subramani A, Jacangelo JG. Emerging desalination technologies for water treatment: A critical review. Water Research [Internet]. 2015 May;75:164–87. Available from: https://www.sciencedirect.com/science/article/pii/S0043135415001050
6. P. Chandini, B. Sunitha Kumari. Clinicoetiological profile and outcome of neonatal respiratory distress in tertiary care hospital, Guntur. IJCMR 2020;7(1):A16-A19.
7. Gunasekhar RS, RaoSS.A study of neonatal morbidity and mortality in government general hospital, Srikakulam Andhra Pradesh, India. Int J Contemp Pediatr 2019;6:1485-90.
8. Kumar S. " Study of Clinico-Etiological Factors of Respiratory Distress in Neonates and Its Immediate Outcome In NICU." EJCM, vol. 15, no. 1, 2025, pp. 224-231.
9. Gaurav, Naik SA, Ahmad ST.The epidemiology of neonatal respiratory distress in atertiary care neonatal Centre Kashmir India. Int JContemp Pediatr 2023;10:1040-3.
10. Sahoo MR, Vasundhara A, Rao MS, Alekhya J, Nagasree P. Clinicoetiological profile and risk assessment of newborn with respiratory distress in a tertiary care centre in South India. Int J Contemp Pediatr. 2015;2:433-9.
11. Swarnakar K, Swarnakar M. Neonatal respiratory distress in early neonatal period and its outcome. Int J Biomed Adv Res 2015;6:643-7.
12. Gouyon JB, Ribakovsky C, Ferdynus C, Quantin C, Sagot P, Gouyon B; Burgundy Perinatal Network. Severe respiratory disorders in term neonates. Paediatr Perinat Epidemiol 2008;22:22-30.
13. Clark RH. The epidemiology of respiratory failure in neonates born at an estimated gestational age of 34 weeks or more. J Perinatol 2005;25:251-7.
14. Barkiya SM, Venugopal N, Kumari V. ClinicoEtiological Profile and Outcome of Neonatal Respiratory Distress. Int J Sci Stud 2016;3(11):189-192.
15. Ramya, Meghashree, et al Clinico-Etiological Profile and Outcome of Neonatal Respiratory Distress in Tertiary Care Hospital, Raichur , J. Cardiovasc .Dis. Res ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023
16. KshirsagarVY, KshirsagarAY, MohiteRV.Clinical profile and outcome of respiratory distress in newbornsadmitted in rural tertiary health care centre of Maharashtra, India. Int J ContempPediatr 2019;6:713-7.
17. Maryam I, Ali SM, Firdaus U. Clinico-epidemiological profile and outcomes of respiratory distress in newborns prospective observational study in a tertiary care. Int J Contemp Pediatr 2024;11:1590-5.