A Study to Evaluate Respiratory Distress in Term Neonates in Early Neonatal Period

Ananthoju Rushitha [1*], Hiru Navaney [2], Yogesh K Goel [3], Subhash Sylonia [4], K Rimi Singh [5]
[1] PG Resident, Department of Pediatrics, Saraswathi Institute of Medical Sciences (SIMS), Hapur, Uttar Pradesh, India
[2] Professor, Department of Pediatrics, Saraswathi Institute of Medical Sciences (SIMS), Hapur, Uttar Pradesh, India
[3] Professor & Head of the Department, Department of Pediatrics, Saraswathi Institute of Medical Sciences (SIMS), Hapur, Uttar Pradesh, India
[4] Professor & Head of the Department, Department of Radio Diagnosis, Saraswathi Institute of Medical Sciences (SIMS), Hapur, Uttar Pradesh, India
[5] Assistant Professor, Department of Pediatrics, Saraswathi Institute of Medical Sciences (SIMS), Hapur, Uttar Pradesh, India

* Corresponding Author: **Ananthoju Rushitha**

Article Info

ISSN (online): 2582-8940
Volume: 07
Issue: 03
Received: 30-06-2026
Accepted: 31-07-2026
Published: 29-08-2026
Page No: 288-293

Abstract

Background: Respiratory distress is one of the most common causes of neonatal morbidity and admission to neonatal intensive care units, particularly among term neonates. Although more frequently associated with prematurity, its occurrence in term neonates often signals significant underlying pathology such as infection, meconium aspiration, pulmonary hypertension, or delayed clearance of fetal lung fluid. This study evaluated the clinical profile, etiological spectrum, associated risk factors, and outcomes of respiratory distress in term neonates admitted to a tertiary care center.

Methods: This prospective observational study was conducted in the Department of Pediatrics and Neonatal Intensive Care Unit (NICU) of Saraswathi Institute of Medical Sciences, Hapur, over 18 months. A total of 150 full-term neonates (gestational age ≥37 weeks), both inborn and outborn, admitted with respiratory distress (defined as any two of: respiratory rate >60/min, subcostal/intercostal retractions, expiratory grunt) within 7 days of age were consecutively enrolled after informed parental consent. Severity was graded using Downe's scoring system (mild ≤3, moderate 4–6, severe ≥7). Etiology was established from history, clinical examination, and radiological (chest X-ray) findings, supported by C-reactive protein and blood culture where indicated. Data were analyzed in SPSS version 29.0 using descriptive statistics and the chi-square test, with $p<0.05$ considered significant.

Results: Transient tachypnea of the newborn (TTN) was the most common etiology (89, 59.3%), followed by meconium aspiration syndrome (28, 18.7%), respiratory distress syndrome (13, 8.7%), pneumonia (10, 6.7%), birth asphyxia (9, 6.0%), and congenital heart disease (1, 0.7%). By Downe's score, 58 neonates (38.7%) had mild, 64 (42.7%) had moderate, and 28 (18.7%) had severe respiratory distress. Severity was significantly associated with etiology ($\chi^2 = 138.88$, df = 10, $p<0.001$): severe distress predominated in birth asphyxia, respiratory distress syndrome, and congenital heart disease, whereas TTN was largely mild to moderate. Overall, 134 neonates (89.3%) recovered, 12 (8.0%) died, and 4 (2.7%) were discharged against medical advice. Severity of distress was significantly associated with outcome ($\chi^2 = 61.98$, df = 4, $p<0.001$): all 58 neonates with mild distress recovered, while 12 of 28 (42.9%) neonates with severe distress died.

Conclusion: Respiratory distress in term neonates remains a significant cause of early NICU admission. TTN is the most frequent etiology, followed by meconium aspiration syndrome, while infectious and structural causes are less common but carry a disproportionately severe course. Downe's score at presentation correlates strongly with both underlying etiology and final outcome, supporting its use as a simple bedside tool to triage term neonates with respiratory distress for the level of care required.

DOI: https://doi.org/10.54660/IJMBHR.2026.7.3.288-293

Keywords: Respiratory distress, term neonate, transient tachypnea of the newborn, meconium aspiration syndrome, Downe's score, neonatal outcome

1. Introduction

Respiratory distress in the neonatal period remains one of the most frequent and clinically significant emergencies encountered in newborn care. It is typically recognized by tachypnea with a respiratory rate exceeding 60 breaths per minute, intercostal or subcostal chest retractions, expiratory grunting, nasal flaring, and varying degrees of central or peripheral cyanosis, reflecting increased work of breathing and impaired gas exchange soon after birth [1]. During normal physiological transition, the newborn

must rapidly adapt from a fluid-filled intrauterine environment dependent on placental oxygenation to independent air breathing with pulmonary circulation; when this transition is disrupted or incomplete, signs of respiratory compromise become evident, and prompt clinical evaluation is required to determine the underlying cause and initiate appropriate management [1, 2].

Although respiratory distress is more commonly associated with prematurity because of surfactant deficiency and structural lung immaturity, its occurrence in term neonates is particularly important and often signals significant underlying pathology [2]. In full-term infants, the lungs are usually structurally mature and adequately supplied with surfactant, so the appearance of respiratory compromise frequently indicates disease processes such as infection, meconium aspiration, pulmonary hypertension, or delayed clearance of fetal lung fluid. Overall incidence estimates range between approximately three and ten percent of live births, depending on population characteristics, obstetric practices, and availability of neonatal care facilities [3]. Among term neonates specifically, transient tachypnea of the newborn arises from delayed resorption of fetal lung fluid and typically presents within the first few hours after birth with mild to moderate tachypnea and minimal oxygen requirement [4]. Meconium aspiration syndrome results from intrauterine passage and aspiration of meconium-stained amniotic fluid, producing airway obstruction, chemical pneumonitis, surfactant inactivation, and potential pulmonary hypertension. Neonatal pneumonia and systemic sepsis may present with respiratory symptoms as part of a broader infectious process, while persistent pulmonary hypertension of the newborn reflects failure of the normal decline in pulmonary vascular resistance after birth.

Early clinical assessment using standardized scoring systems, such as Downe's score, provides objective measurement of respiratory severity based on cyanosis, chest retractions, grunting, air entry, and respiratory rate, facilitating prompt recognition of deterioration and guiding decisions regarding oxygen supplementation or ventilatory support [5]. Many available studies combine preterm and term populations or originate from tertiary centers in developed settings, limiting their applicability to local healthcare environments where obstetric practices, infection prevalence, and resource availability may differ [6]. Locally generated prospective data are therefore essential to define the burden of disease, identify predominant risk factors, and evaluate treatment responses within the specific population served by a given institution.

Against this background, the present study was undertaken to systematically characterize the incidence, etiological spectrum, predisposing maternal and perinatal factors, clinical severity, management requirements, and immediate outcomes of respiratory distress among term neonates admitted to the neonatal intensive care unit of a tertiary care teaching hospital.

2. Materials and Methods

2.1. Study design, setting, and duration

This prospective observational study was conducted in the Department of Pediatrics and Neonatal Intensive Care Unit (NICU) of Saraswathi Institute of Medical Sciences, Hapur, a tertiary care teaching hospital catering to both urban and rural populations of the surrounding region, over a total period of 18 months. A prospective design was chosen to enable systematic, real-time collection of clinical, demographic, and outcome-related data, thereby reducing recall bias and improving the reliability of observations. All enrolled neonates received standard clinical care according to existing institutional neonatal management protocols; no experimental intervention was introduced.

2.2. Sample size and study population

The required sample size was calculated using the standard formula for estimating prevalence in an observational study, $n = Z^2 \times P \times q / E^2$, taking $Z = 1.96$ (≈ 2), an estimated prevalence of respiratory distress (P) of 10%, $q = 1 - P = 0.9$, and an allowable error (E) of 5%. This yielded a minimum requirement of 144 neonates, which was rounded up to a final sample size of 150 full-term neonates with respiratory distress.

Inclusion criteria: (i) full-term neonates (gestational age ≥37 weeks) with respiratory distress; (ii) both inborn and outborn babies.

Exclusion criteria: (i) age at admission >7 days; (ii) babies with gross congenital anomalies.

Full-term neonates admitted to the NICU with features of respiratory distress were consecutively recruited after obtaining informed consent from the parents. Respiratory distress was defined as the presence of any two of the following clinical features: (1) respiratory rate greater than 60 per minute; (2) subcostal or intercostal retractions; (3) expiratory grunt.

2.3. Clinical evaluation and investigations

At birth, birth weight was recorded and a detailed physical examination was performed to detect congenital anomalies. A structured proforma captured demographic details (name, age at admission, sex, date of admission/discharge), gestational age (by last menstrual period, antenatal ultrasonography, or New Ballard score), and labor/delivery factors including mode of delivery, place of delivery, and perinatal complications such as prolonged rupture of membranes (>18 hours), prolonged labor (>18 hours), meconium-stained liquor, and antepartum hemorrhage. Maternal age (high-risk ≤18 or ≥35 years; low-risk 19–34 years), parity (risk group P0 or >P4; normal P1–P4), and comorbid illness during pregnancy were reviewed from clinical records. The severity of respiratory distress was assessed in every neonate using Downe's scoring system, with severity categorized as mild (score ≤3), moderate (score 4–6), or severe (score ≥7). The final etiological diagnosis was established primarily on the basis of detailed history, clinical examination, and radiological findings. A chest X-ray was performed in all cases; complete blood counts, C-reactive protein (CRP), blood culture and sensitivity, and echocardiography in relevant cases were carried out as part of the diagnostic evaluation.

2.4. Statistical analysis

Data were entered into a Microsoft Excel spreadsheet and, after verification for completeness and consistency, imported into IBM SPSS Statistics version 29.0 for analysis. Continuous variables were summarized as mean ± standard deviation, and categorical variables as frequencies and percentages. Associations between categorical variables (severity vs. outcome; etiology vs. severity) were tested using the chi-square test, with a p-value <0.05 considered statistically significant.

3. Results

A total of 150 term neonates admitted with respiratory distress within the first seven days of life were studied. Respiratory distress was noted at birth in 68 neonates (45.3%), within the first six hours of life in 55 (36.7%), and after six hours in 27 (18.0%). Tachypnea was universally present (150, 100.0%); chest retractions were observed in 113 neonates (75.3%), grunting in 76 (50.7%), and cyanosis in 50 (33.3%). Regarding mode of delivery, lower segment cesarean section accounted for 86 neonates (57.3%), normal vaginal delivery for 62 (41.3%), and assisted vaginal delivery for 2 (1.3%); 98 neonates (65.3%) were inborn and 52 (34.7%) outborn. Meconium-stained liquor was recorded in 36 neonates (24.0%) and prolonged rupture of membranes in 38 (25.3%).

3.1. Severity of respiratory distress

Downe's score ranged from 2 to 8 (mean 4.55 ± 1.62, median 4). On categorization, 58 neonates (38.7%) had mild respiratory distress, 64 (42.7%) had moderate distress, and 28 (18.7%) had severe distress (Table 1; Figure 1).

Table 1: Severity of Respiratory Distress in Term Neonates Based on Downe's Score (N = 150)

Severity	Frequency (n)	Percentage (%)
Mild (Downe's score ≤3)	58	38.7
Moderate (Downe's score 4–6)	64	42.7
Severe (Downe's score ≥7)	28	18.7
Total	150	100.0

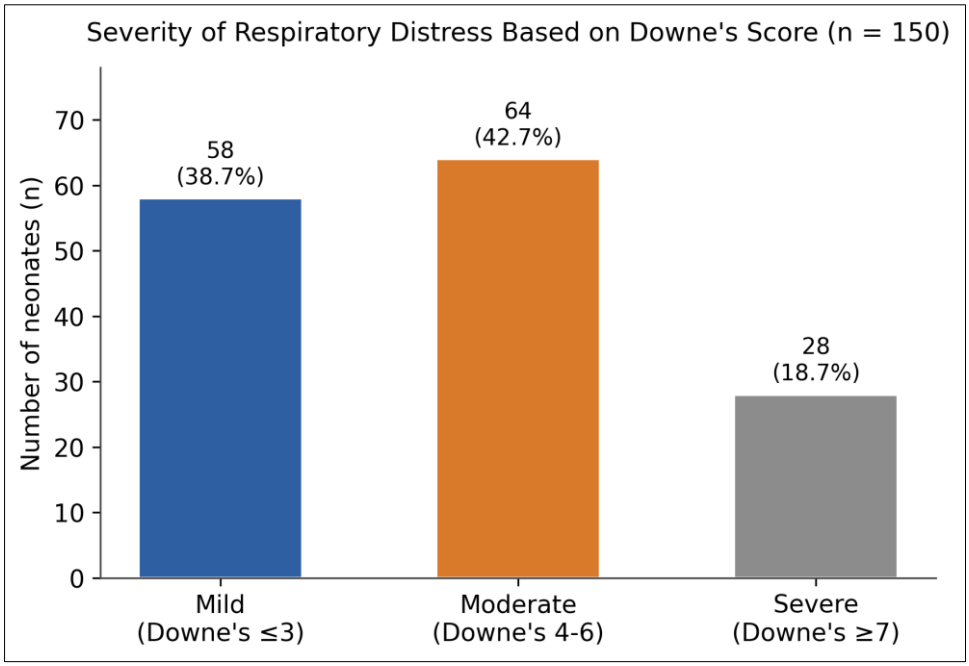

Fig 1: Severity of respiratory distress in term neonates based on Downe's score (N = 150).

3.2. Etiological distribution

Transient tachypnea of the newborn (TTN) was the most common etiology, accounting for 89 cases (59.3%), followed by meconium aspiration syndrome (MAS) in 28 neonates (18.7%). Respiratory distress syndrome (RDS) was identified in 13 neonates (8.7%), pneumonia in 10 (6.7%), birth asphyxia in 9 (6.0%), and congenital heart disease (CHD) in 1 neonate (0.7%) (Table 2; Figure 2). Chest radiography showed hyperinflation in 89 neonates (59.3%), pulmonary infiltrates in 38 (25.3%), a ground-glass appearance in 13 (8.7%), and normal findings in 10 (6.7%). CRP was positive in 20 neonates (13.3%) and blood culture positive in 11 (7.3%).

Table 2: Etiological Distribution of Respiratory Distress in Term Neonates (N = 150)

Etiology	Frequency (n)	Percentage (%)
Transient tachypnea of the newborn (TTN)	89	59.3
Meconium aspiration syndrome (MAS)	28	18.7
Respiratory distress syndrome (RDS)	13	8.7
Pneumonia	10	6.7
Birth asphyxia	9	6.0
Congenital heart disease (CHD)	1	0.7
Total	150	100.0

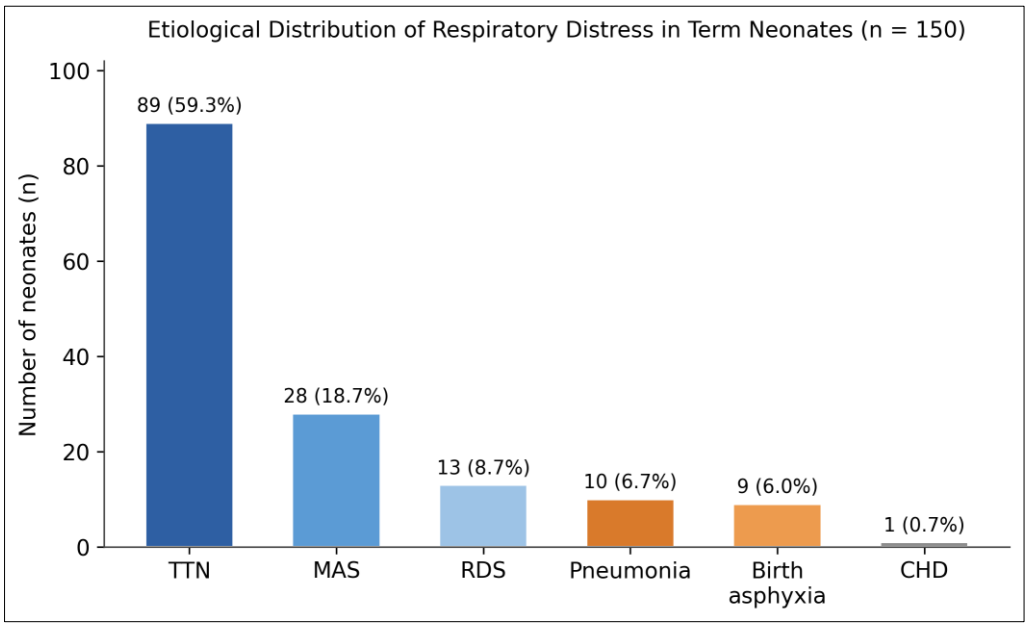

Fig 2: Etiological distribution of respiratory distress in term neonates (N = 150). TTN, transient tachypnea of the newborn; MAS, meconium aspiration syndrome; RDS, respiratory distress syndrome; CHD, congenital heart disease.

3.3. Association between etiology and severity

A statistically significant association was found between etiology and severity of respiratory distress ($\chi^2 = 138.88$, df = 10, $p<0.001$). TTN was distributed largely across mild (50/89) and moderate (39/89) categories, with no severe cases. In contrast, RDS (13/13), birth asphyxia (9/9), and the single case of CHD were exclusively severe, while MAS spanned mild (8), moderate (15), and severe (5) categories (Table 3).

Table 3: Association Between Etiology and Severity of Respiratory Distress (N = 150)

Etiology	Mild n (%)	Moderate n (%)	Severe n (%)	Total
TTN	50	39	0	89
MAS	8	15	5	28
RDS	0	0	13	13
Pneumonia	0	10	0	10
Birth asphyxia	0	0	9	9
CHD	0	0	1	1
Total	58	64	28	150

3.4. Management and NICU course

Nasal prongs were the most common mode of oxygen delivery (77, 51.3%), followed by continuous positive airway pressure (CPAP) in 55 neonates (36.7%) and mechanical ventilation in 18 (12.0%). Surfactant therapy was required in 13 neonates (8.7%). Most neonates (130, 86.7%) did not require antibiotics; first-line antibiotics were initiated in 9 (6.0%) and antibiotic upgradation was required in 11 (7.3%). The mean duration of NICU stay was 5.75 ± 1.92 days (range 3–10 days); 98 neonates (65.3%) stayed ≤6 days and 52 (34.7%) stayed ≥7 days. No complications were recorded in 114 neonates (76.0%); persistent pulmonary hypertension of the newborn occurred in 16 (10.7%), sepsis in 11 (7.3%), and pneumothorax in 9 (6.0%).

3.5. Outcome and its association with severity

At discharge, 134 neonates (89.3%) had recovered, 12 (8.0%) died, and 4 (2.7%) were discharged against medical advice (DAMA) (Figure 3). Severity of respiratory distress at presentation was significantly associated with outcome ($\chi^2 = 61.98$, df = 4, $p<0.001$). All 58 neonates (100.0%) with mild distress recovered. Among the 64 neonates with moderate distress, 62 (96.9%) recovered and 2 (3.1%) were DAMA, with no deaths. Among the 28 neonates with severe distress, 14 (50.0%) recovered, 12 (42.9%) died, and 2 (7.1%) were DAMA.

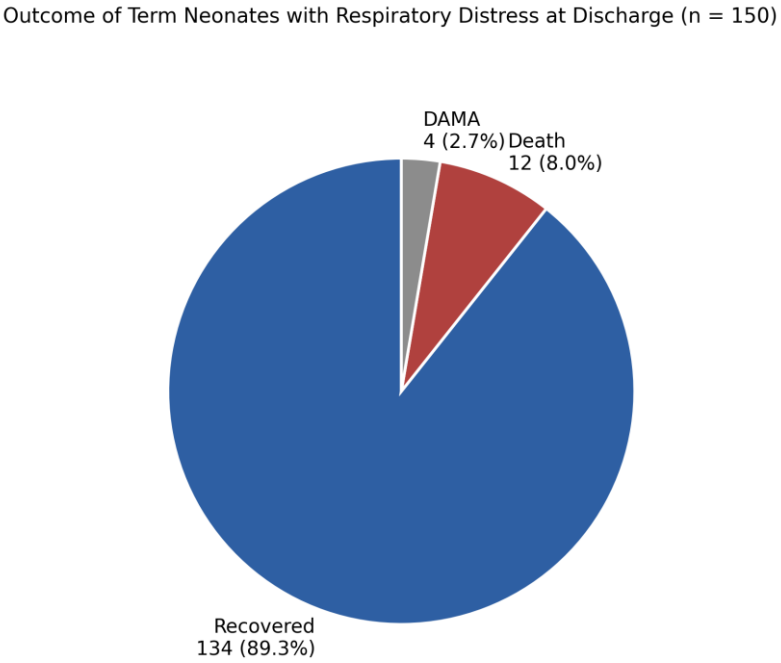

Fig 3: Outcome of term neonates with respiratory distress at discharge (N = 150). DAMA, discharged against medical advice.

4. Discussion

In this prospective observational study of 150 term neonates with respiratory distress admitted within the first week of life, TTN was the leading etiology (59.3%), followed by MAS (18.7%), a pattern consistent with the well-recognized epidemiology of term respiratory morbidity in which delayed clearance of fetal lung fluid predominates over other, more severe causes [7]. This distribution is broadly comparable to that reported by Sodawat *et al*., who found that respiratory distress in their hospital-based cohort arose from a mix of pulmonary and extra-pulmonary conditions and emphasized that accurate diagnosis requires systematic clinical evaluation supported by targeted investigations [10]. Similarly, Nema and Mittal reported tachypnea, chest indrawing and nasal flaring as the dominant presenting features in their cohort, consistent with the universal presence of tachypnea (100%) and high frequency of retractions (75.3%) observed here [13].

Downe's score was used in the present study to objectively grade severity, and most neonates (81.3%) had mild-to-moderate disease, with only 18.7% classified as severe — findings that mirror the observation of Harshini *et al*. that early recognition of severity and prompt initiation of treatment are critical determinants of survival and recovery in neonates with respiratory distress [8]. The strong association demonstrated here between etiology and severity, with RDS, birth asphyxia and CHD presenting almost exclusively as severe disease while TTN remained confined to the mild-to-moderate range, reinforces the concept that the underlying cause of respiratory compromise — rather than gestational age alone — determines the clinical trajectory in term infants, a point similarly emphasized by Palod *et al*. in their analysis of the clinical spectrum of neonatal respiratory disorders [9].

Perinatal risk factors identified in this cohort — meconium-stained liquor (24.0%) and prolonged rupture of membranes (25.3%) — are consistent with the multifactorial origin of neonatal respiratory morbidity described by Sunil *et al*., who reported significant associations between respiratory distress syndrome and factors such as elective cesarean delivery, premature rupture of membranes, and male sex in their case-control study [11]. In the present cohort, lower segment cesarean section was the mode of delivery in 57.3% of neonates, higher than the rate of normal vaginal delivery, which is in keeping with the recognized contribution of cesarean delivery, particularly when performed electively, to a higher incidence of transient respiratory morbidity in term neonates.

With regard to management, most neonates in this study were managed with non-invasive respiratory support: nasal prongs (51.3%) and CPAP (36.7%) sufficed for the majority, while mechanical ventilation and surfactant therapy were required in a smaller proportion (12.0% and 8.7%, respectively), corresponding closely to the severe-etiology subgroup (RDS, birth asphyxia, CHD). The judicious use of antibiotics, reserved for neonates with clinical or laboratory evidence of infection (13.3% required first-line or upgraded antibiotics), is in line with the emphasis placed by Sah *et al*. on early diagnosis and structured clinical management to reduce the burden of neonatal respiratory disease while avoiding unnecessary antimicrobial exposure [12].

The overall recovery rate of 89.3% and mortality of 8.0% observed in this study are comparable to outcomes described by Afroze *et al*. in their prospective tertiary-center study, where early diagnosis, timely therapeutic intervention, and availability of advanced neonatal intensive care were identified as key determinants of survival [14]. The strong association between severity at presentation and final outcome demonstrated here — with universal recovery in mild disease against a 42.9% mortality in severe disease — underscores the prognostic value of a simple, bedside severity score obtainable at the time of admission, and supports its use for early triage and counselling of parents regarding expected clinical course.

This study is limited by its single-center design and relatively short follow-up restricted to the duration of the index NICU admission, without assessment of longer-term respiratory or neurodevelopmental outcomes. Nonetheless, the prospective design, use of a standardized severity score, and complete outcome ascertainment for all enrolled neonates strengthen the internal validity of the findings.

5. Conclusion

Respiratory distress in term neonates remains a significant clinical problem and a common reason for early NICU admission. Transient tachypnea of the newborn is the most frequent cause, followed by meconium aspiration syndrome, while respiratory distress syndrome, pneumonia, birth asphyxia and congenital heart disease account for a smaller but disproportionately severe share of cases. Downe's score at presentation correlates significantly with both the underlying etiology and the final outcome, and most neonates who present with mild-to-moderate distress and receive timely, appropriately escalated respiratory support achieve favorable outcomes. These findings support vigilant perinatal and neonatal care, with particular attention to early-term and cesarean-delivered infants, and reinforce the value of a structured, severity-based approach to the initial management of respiratory distress in term neonates.

References

1. Suprenant S, Coghlan MA. Respiratory distress in the newborn: an approach for the emergency care provider. Clin Pediatr Emerg Med. 2016;17(2):113-121.
2. Hermansen CL, Mahajan A. Newborn respiratory distress. Am Fam Physician. 2015;92(11):994-1002.
3. Pramanik AK, Rangaswamy N, Gates T. Neonatal respiratory distress: a practical approach to its diagnosis and management. Pediatr Clin North Am. 2015;62(2):453-469.
4. Edwards MO, Kotecha SJ, Kotecha S. Respiratory distress of the term newborn infant. Paediatr Respir Rev. 2013;14(1):29-37.
5. Ainsworth SB. Pathophysiology of neonatal respiratory distress syndrome: implications for early treatment strategies. Treat Respir Med. 2005;4(6):423-437.
6. Monica NF, Pamela S, Juan QL, Li J. Recent understanding of pathophysiology, risk factors and treatments of neonatal respiratory distress syndrome: a review. Sci Lett. 2017;5(1):70-78.
7. Alhassen Z, Vali P, Guglani L, Lakshminrusimha S, Ryan RM. Recent advances in pathophysiology and management of transient tachypnea of newborn. J Perinatol. 2021;41(1):6-16.
8. Harshini B, Ananda Kumar T, Kumar G, Khan I. An etiological study of respiratory distress in neonates in a tertiary care medical college hospital. Pediatr Rev Int J Pediatr Res. 2020;7(1):22-26.
9. Palod PH, Lawate BB, Sonar MN, Bajaj SP. 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. Int J Contemp Pediatr. 2017;4(6):2027-2031.
10. Sodawat R, Garg P, Singh C, Sharma P. Clinico-epidemiological study of respiratory distress in newborn and associated risk factors. Int J Contemp Pediatr. 2018;5(4):1576-1582.
11. Sunil B, Nithya E, Girish N. Study on risk factors of respiratory distress syndrome in term neonates: a retrospective case-control study. Int J Contemp Pediatr. 2019;6(6):2577.
12. Sah VK, Singh SK, Yadav SK, Giri A, Kumar P. Clinical profile and outcome of neonates with respiratory distress admitted to a tertiary care hospital. Birat J Health Sci. 2023;8(1):1978-1981.
13. Nema A, Mittal SK. Clinical profile of neonates with respiratory distress. [Journal details not provided].
14. Afroze S, Rahman T, Mallik T, Rima SA, Pandita A, Shahidullah M. Outcome of neonates with respiratory distress in a tertiary center NICU of Bangladesh: a prospective study. Bangladesh J Med Sci. 2024;23(3):812-817.

How to Cite This

Rushitha A, Navaney H, Goel YK, Sylonia S, Singh KR. A study to evaluate respiratory distress in term neonates in early neonatal period. Int J Med All Body Health Res. 2026;7(3):288-293. doi:10.54660/IJMBHR.2026.7.3.288-293.