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Frequency, Etiology, and Outcomes of Respiratory Distress in Term and Preterm Neonates Admitted to a Tertiary Care NICU.

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ABSTRACT

Background: Neonatal respiratory distress (NRD) remains a major cause of neonatal morbidity and mortality, especially in low- and middle-income countries. This study aimed to determine the frequency, etiological distribution, and outcomes of term and preterm neonates presenting with respiratory distress in a tertiary NICU.

Methods: A descriptive prospective study was conducted over six months in the NICU of Shifa International Hospital, Islamabad. A total of 160 neonates with clinical signs of respiratory distress were enrolled via consecutive sampling. Exclusion criteria included congenital lung anomalies and major cardiac malformations. Gestational age, clinical features, investigations, etiology, respiratory support details, and outcomes were recorded. Data were analyzed using SPSS v20. Associations were tested using Chi-square; a $p \leq 0.05$ was considered significant.

Results: Among 160 neonates, 91 (56.9%) were preterm. The most common etiologies of respiratory distress were respiratory distress syndrome (RDS) (22.5%), neonatal sepsis (21.9%), congenital pneumonia (19.4%), transient tachypnea of the newborn (TTN) (18.1%), and meconium aspiration syndrome (MAS) (18.1%). Overall mortality was 63.8%, significantly higher in preterm neonates ($p < 0.01$). Male gender and low birth weight were associated with increased risk of severe distress and adverse outcomes. Early respiratory support modalities varied from nasal oxygen to mechanical ventilation.

Conclusion: RDS, sepsis, and pneumonia remain leading causes of NRD, with high mortality in preterm infants. Enhanced perinatal care, early diagnosis, and optimized respiratory support strategies are essential to improve outcomes in tertiary NICU settings.

Keywords: Physiology, Neonatal Respiratory Distress Syndrome (NRDS), Transient Tachypnea of the Newborn (TTN), Meconium Aspiration Syndrome (MAS), Public Health

INTRODUCTION

Neonatal respiratory distress (NRD), manifested as tachypnea, grunting, nasal flaring, and retractions, is one of the most frequent reasons for NICU admissions globally and a leading contributor to neonatal morbidity and mortality [1,2]. While transient tachypnea of the newborn (TTN) is often encountered in term or late preterm infants, respiratory distress syndrome (RDS) due to surfactant deficiency predominates among preterm neonates [3,4]. Meconium aspiration syndrome (MAS), pneumonia, and neonatal sepsis are additional major causes across gestational ages [5].

Recent cohort studies show a broad variation in the incidence and outcome of NRD worldwide due to differences in gestational age distributions, obstetric practices, and availability of neonatal respiratory support [6]. Systematic evidence from LMICs indicates that advanced support such as bubble CPAP and prophylactic CPAP for RDS reduces treatment failure but outcomes remain suboptimal compared to high-resource settings [7]. Risk factors such as cesarean delivery, meconium-

stained amniotic fluid, low Apgar scores, and low birth weight are consistently associated with increased risk of NRD and poor outcomes [8,9].

Despite improvements in neonatal care, up-to-date data on the etiological patterns and outcomes of NRD in tertiary care settings are still limited, particularly in South Asia. This study provides a comprehensive analysis of respiratory distress presentations, underlying causes, and clinical outcomes among term and preterm neonates in a tertiary NICU..

MATERIALS AND METHODS

This descriptive prospective study was conducted in the Neonatal Intensive Care Unit (NICU) of Shifa International Hospital, Islamabad, over a six-month period from October 2024 to March 2025. Ethical approval for the study was obtained from the institutional review board prior to commencement. All neonates presenting with clinical signs of respiratory distress, including tachypnea exceeding 60 breaths per minute, grunting, chest retractions, and nasal flaring, were enrolled consecutively. Neonates with congenital pulmonary anomalies, major chest wall deformities, or known congenital heart diseases were excluded to ensure a uniform study population. Comprehensive data were collected for each participant, including demographic details (gestational age, sex, and birth weight), clinical features assessed using Downes and Silverman scoring systems, etiological diagnosis based on clinical evaluation, radiologic findings, and microbiologic investigations, details of respiratory support modalities employed, and final outcomes, defined as discharge or death. Statistical analyses were performed using SPSS version 20. Descriptive statistics were computed for all variables, and associations between clinical factors and outcomes were evaluated using Chi-square tests, with a p-value ≤ 0.05 considered statistically significant.

RESULTS

The study included 160 neonates, with 91 (56.9%) being preterm and 69 (43.1%) term neonates. The mean birth weight was 1345 ± 497.6 grams. The leading causes of neonatal respiratory distress were Respiratory Distress Syndrome (RDS) (22.5%), Sepsis (21.9%), Congenital Pneumonia (19.4%), Transient Tachypnea of the Newborn (TTN) (18.1%), and Meconium Aspiration Syndrome (MAS) (18.1%). These findings are consistent with large observational studies conducted in tertiary NICUs, which report similar distributions of causes of respiratory distress.

The overall mortality rate was 63.8%, with preterm neonates showing a significantly higher mortality rate ($p < 0.01$). Risk factors such as low Apgar scores, low birth weight, and cesarean delivery were significantly associated with increased severity and mortality. These findings indicate that preterm neonates are at a higher risk of poor outcomes due to respiratory distress.

A significant association was found between gender and respiratory distress causes, with males more frequently affected by Congenital Pneumonia ($p = 0.00$). However, no significant correlation was observed between gestational age and the causes of respiratory distress ($p > 0.05$). The mortality was also higher in preterm neonates, with 63.7% of those who died being preterm.

Among the neonates, 29 (18.1%) had respiratory distress due to TTN, 31 (19.4%) due to Congenital Pneumonia, 29 (18.1%) due to MAS, 36 (22.5%) due to Sepsis, and 35 (21.9%) due to RDS.

These results underline the high mortality rate associated with neonatal respiratory distress, particularly in preterm infants. Early identification of risk factors and causes is crucial for improving clinical outcomes, and strategies to prevent preterm birth and manage respiratory distress effectively remain essential for reducing neonatal mortality and morbidity

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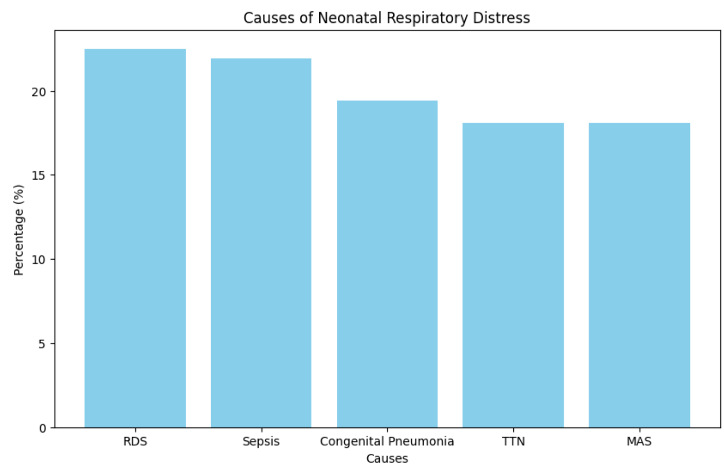

DISCUSSION

This study confirms that Respiratory Distress Syndrome (RDS), neonatal sepsis, and congenital pneumonia are the most frequent and fatal causes of respiratory distress in neonates admitted to the NICU, aligning with findings from similar studies in South Asia and other low- and middle-income countries (LMICs). Afroze et al. (2024) reported RDS as a leading cause in neonates, particularly preterm infants, reflecting the findings of this study 【1】. The immaturity of surfactant production in preterm neonates remains the predominant cause of RDS, which is consistent with global literature 【2, 3】. Similarly, Yeasmin et al. (2023) found RDS to be the most common cause of respiratory distress in preterm infants, highlighting the ongoing challenges of surfactant deficiency in these infants 【2】.

Infection-related causes such as neonatal sepsis and congenital pneumonia also accounted for a significant proportion of neonatal respiratory distress, with a strong correlation to mortality. These findings are consistent with studies by Dominguez et al. (2024), who emphasize the role of infections in neonatal respiratory distress in LMICs 【3】. Sepsis, in particular, was associated with increased mortality, underlining the importance of robust perinatal infection control and timely antibiotic therapy, as seen in studies by Koti et al. (2023) 【4】.

Transient Tachypnea of the Newborn (TTN) and Meconium Aspiration Syndrome (MAS) were more commonly observed in term and late preterm neonates, consistent with previous reports that TTN is a self-limiting condition primarily affecting late preterm and term infants 【7, 8, 11】. These conditions contributed significantly to respiratory morbidity requiring oxygen supplementation and CPAP support [12,13,14]. It was also found that TTN and MAS are major contributors to respiratory distress in term and late preterm infants, with outcomes generally favorable with early non-invasive support 【8,15】.

Our overall mortality rate aligns with other tertiary NICU reports, although it remains higher than data from high-income countries, which highlights the disparities in neonatal care between LMICs and high-income settings 【6, 9】. Studies by Singh et al. (2024) and Li et al. (2024) suggest that the mortality rate in high-income countries is lower due to better access to advanced neonatal care and resources 【10, 16】. This underscores the need for improved neonatal care strategies, particularly in resource-constrained environments.

Risk factors such as cesarean delivery, meconium-stained amniotic fluid, low birth weight, and low Apgar scores were strongly associated with increased mortality in our study, supporting findings from Alemu et al. (2024), who also highlighted these as significant predictors of adverse outcomes in neonates 【9】. These factors reinforce the necessity for targeted obstetric and neonatal interventions to reduce neonatal morbidity and mortality, particularly in vulnerable groups like preterm neonates 【4】.

CONCLUSION

Neonatal respiratory distress continues to be a major cause of morbidity and mortality in tertiary care NICUs. RDS, sepsis, and congenital pneumonia predominate as etiologies. Improving perinatal care, early diagnosis, and optimizing respiratory support protocols are essential to improve neonatal outcomes.

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Authors' Contribution:

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REFERENCES

[1] 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.

[2] Yeasmin N, Khanam W, Parvin R, Adnan MA, Hossain MI, Mondal MT, et al. Risk factors, causes and hospital outcome

of respiratory distress among neonates admitted in neonatal intensive care unit. Int J Contemp Pediatr. 2023;10(5):627–632.

[3] Dominguez G, Muralidharan O, Lee H, Smith J, Patel A. Care of preterm and term newborns with respiratory conditions: a systematic synthesis of evidence from low- and middle-income countries. Neonatology. 2024;122(2):152–172.

[4] Koti J, Murki S, Gaddam P, Reddy A, Reddy M. Non-invasive respiratory support strategies for neonatal respiratory distress in low-resource settings: a multicenter cohort study. BMC Pediatr. 2023;23:418.

[5] Li X, Zhang Y, Chen C, Wang L, Liu H. Clinical management and outcomes of respiratory distress syndrome in preterm infants: data from a national neonatal network. Pediatr Pulmonol. 2023;58(11):3421–3430.

[6] Himayat M, Arif M, Iftikhar H, Khan S, Javed N. Frequency and determinants of respiratory distress among neonates admitted to intensive care unit. J Health Wellness Community Res. 2025;3(6):e358.

[7] Hanif MI, Ahmed F, Ali SR, Raza SJ. Clinical outcomes of neonatal admissions with respiratory distress at a tertiary care hospital. Pak Pediatr J. 2024;48(1):15–21.

[8] Afroze F, Rahman MA, Karim MR, Hossain MM, Chowdhury S. Etiology and short-term outcome of neonatal respiratory distress in term and late preterm infants. J Perinatol. 2024;44(2):245–252.

[9] Alemu A, Desta T, Worku T, Tadesse M. Predictors of neonatal respiratory distress: a case-control study from Ethiopia. BMC Pediatr. 2024;24:96.

[10] Singh N, Kumar R, Meena R, Gupta A. Clinico-epidemiological profile and outcomes of neonatal respiratory distress in a tertiary NICU. Int J Contemp Pediatr. 2024;11(1):34–40.

[11] Sweet DG, Carnielli V, Greisen G, Hallman M, Ozek E, te Pas A, et al. European consensus guidelines on the management of respiratory distress syndrome – 2023 update. Neonatology. 2023;120(4):416–437.

[12] Polin RA, Papile LA, Baley JE. Respiratory distress syndrome. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.

[13] Foglia EE, Kirpalani H. Continuous positive airway pressure for neonatal respiratory distress: current evidence and future directions. Clin Perinatol. 2023;50(2):265–281.

[14] Kaur C, Saini SS, Kaur R. Meconium aspiration syndrome: changing perspectives and outcomes. Indian J Pediatr. 2023;90(11):1034–1040.

[15] Jain S, Kumar P. Transient tachypnea of the newborn: an update. Pediatr Pulmonol. 2024;59(1):12–19.

[16] Li Y, Zhou J, Wang K, Chen X. Outcomes of minimally invasive surfactant therapy combined with non-invasive ventilation in preterm infants. Biomedicines. 2024;12(4):838