



**RETROSPECTIVE ANALYSIS OF NEONATAL RESPIRATORY DISTRESS SYNDROME  
IN PRETERM INFANTS: A COMPREHENSIVE STUDY AT PRINCE RASHID BEN AL-  
HASAN MILITARY HOSPITAL NICU**

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**ABSTRACT**

**Objective:** This study aims to investigate the incidence and influential factors of neonatal respiratory distress syndrome (RDS) among preterm infants admitted to the NICU at Prince Rashid Ben Al-Hasan Military Hospital in Jordan. **Methods:** A retrospective cross-sectional descriptive study was conducted on infants born before 34 weeks of gestation and admitted to the NICU between July 1, 2018, and July 1, 2019. Data were extracted from hospital records, including demographics, clinical details, and outcomes. RDS diagnosis was based on clinical symptoms and chest X-rays. Statistical analysis was performed using SPSS version 28. **Results:** Among 120 preterm neonates, 74 (65.5%) were diagnosed with RDS. RDS prevalence was notably higher in extremely preterm (90%) and very preterm (85%) infants compared to moderately preterm infants (30%). A significant inverse relationship was observed between gestational age and mortality rate, with extremely preterm neonates experiencing a 76% mortality rate. No substantial correlation was found between the timing of dexamethasone administration and mechanical ventilation requirement, nor between abnormal cranial ultrasound findings and gestational age. **Conclusions:** The study highlights a high prevalence of RDS in preterm neonates, particularly those with lower gestational ages, and underscores the critical impact of gestational age on neonatal mortality rates. The timing of antenatal corticosteroid administration significantly influences neonatal survival outcomes, emphasizing the need for precise timing to maximize benefits. Further large-scale studies are warranted to explore these findings and improve RDS management strategies in neonatal care.

**KEYWORDS:** Neonatal Respiratory Distress Syndrome, Preterm Infants, NICU, Gestational Age, Mortality, Dexamethasone, Retrospective Study, Jordan.

**INTRODUCTION**

Respiratory distress syndrome (RDS) continues to be a leading cause for premature infant mortality, but surfactant treatments have significantly reduced fatalities. It affects around 7% of newborns, leading to hospitalization for many preterm-born infants. While prevalent in preterm births, larger birth weights and later gestational ages also experience RDS, albeit less frequently.<sup>[1-5]</sup>

Historically, premature infants relied solely on oxygen until surfactant deficiency was identified in 1959, leading to the introduction of therapies like CPAP and antenatal corticosteroids, which reduced RDS cases after 1994. However, extremely low birth (ELBW) infants now face modified RDS with improved management.<sup>[6]</sup>

Preterm labor globally contributes to RDS in premature infants. Corticosteroids aid in reducing RDS incidence, but debates exist on their efficacy for enhanced respiratory function. Studies have shown conflicting outcomes regarding corticosteroids' impact on mortality and RDS incidence.<sup>[7][8]</sup> RDS remains a primary cause of NICU admissions, affecting 39-42% of infants weighing less than 1490 grams.<sup>[9][10]</sup> Despite advancements in perinatal care, RDS remains a significant challenge in neonatal care.<sup>[11]</sup> This study aims to analyze RDS incidence among three subsets of premature infants (less than 28 weeks, 28-32 weeks, and 32-24 weeks) and investigate associated influential factors.

**METHODOLOGY**

Conducted within the level III ward of Prince Rashid Ben Al-Hasan Military hospital in Northern Jordan, this

cross-sectional descriptive study encompassed infants admitted to the NICU due to RDS and born less than 34 weeks between July 1, 2018, and July 1, 2019. Patient information was retrieved from hospital records, encompassing details such as gender, weight, height, head, RDS history, mechanical ventilation, antenatal dexamethasone use, mortality, and cranial ultrasound results. RDS diagnosis relied on clinical symptoms and chest X-rays findings. The preterm infants were subdivided according to gestational age to extremely preterm (less than 28 weeks), very preterm (28 to less than 32 weeks), and moderate preterm (32 to 34 weeks).<sup>[12]</sup> Statistical analysis was performed using SPSS version 28, employing Student's T test, chi-Square, and

Mann-Whitney test where appropriate, considering significance at  $p < 0.05$ . Ethical clearance was obtained from the IRB of the Jordanian Royal Medical Services.

## RESULTS

A total of 120 preterm neonates were admitted to the NICU, with seven exclusions based on predefined criteria. About 65.5% of the infants, totaling 74, with an average birth weight of  $1323 \pm 275$  grams, were diagnosed with RDS. Notably, RDS prevalence was higher among extremely preterm and very preterm infants range compared to moderately preterm group (90% - 85% vs. 30%).

**Table 1: Demographics.**

Variables	n (%)
<b>Gender</b>	
Male	42 (37.2)
Female	71 (62.8)
<b>Birth weight</b>	
ELBW	9 (7.9)
VLBW	80 (70.7)
LBW	24 (21.4)
<b>Gestational age</b>	
Extremely preterm	12 (10.6)
Very preterm	74 (65.5)
Moderate preterm	27 (23.9)
<b>Mechanical ventilation</b>	
No	28 (24.8)
Yes	85 (75.2)

An intriguing finding emerged, revealing a notable inverse relationship between gestational age and the mortality rate ( $p = 0.05$ ,  $r = -0.01$ ), with a staggering 76% mortality rate among extremely premature neonates during their neonatal period.

Although a tendency for hospital stays was observed among extremely preterm neonates, this difference did not reach statistical significance ( $p = 0.159$ ). Furthermore, no substantial correlation was found between the timing

of dexamethasone administration and the necessity for mechanical ventilation ( $p = 0.286$ ).

Additionally, the study didn't find any association between abnormal cranial ultrasound findings and gestational age ( $p = 0.067$ ). Overall, these findings underscore the intricate nature of neonatal outcomes and the multifactorial elements influencing mortality, hospital stays, and medical interventions among extremely premature infants.

**Table 2: Analysis of Different Factors Among Three Groups.**

Gestational Age	Weight Mean $\pm$ SD gr	HC Mean $\pm$ SD Cm	Length Mean $\pm$ SD Cm	RDS n (%)	Mortality n (%)	Hospital Stay Mean $\pm$ SD (days)
Extremely preterm	1074 $\pm$ 101.2	23.67 $\pm$ 1.88	34.54 $\pm$ 2.1	12/20 (60)	18/20 (90)	60 $\pm$ 21
Very preterm	1530.83 $\pm$ 157.5	29.02 $\pm$ 5.62	39.32 $\pm$ 5.65	37/59 (62.7)	39/59 (61)	28 $\pm$ 14.3
Moderate preterm	2170 $\pm$ 230.25	32.13 $\pm$ 2.08	42.52 $\pm$ 4.66	15/34 (44.1)	33/34 (97)	21 $\pm$ 7.3
P value	0.00*	0.00*	0.00*	0.308	0.04*	0.159

HC: head circumference

## DISCUSSION

The occurrence and intensity of RDS are predominantly influenced by gestational age, emphasizing the significance of preventing premature birth. Ensuring quality prenatal care and advocating for a healthy maternal lifestyle hold immense importance in this

context, signifying pivotal measures in mitigating the risk and severity of RDS in infants.<sup>[1]</sup>

The striking inverse relationship between gestational age and mortality rates highlights the vulnerability of extremely premature neonates during their early neonatal period. However, the absence of clear correlations

between RDS and sex or birth weight raises queries about the condition's multifaceted etiology. Similarly, the lack of gender-based differences in neonatal mortality rates challenges conventional assumptions.

The study's indication of potential extended hospital stays for extremely preterm neonates hints at clinical nuances impacting their care, though further exploration is warranted due to the absence of statistical significance. Moreover, the absence of a strong correlation between the timing of dexamethasone administration and mechanical ventilation suggests complexities in treatment responses.

The lack of association between abnormal cranial ultrasound findings and gestational age emphasizes the intricate interplay of various clinical factors in neonatal outcomes, urging further comprehensive investigation into these complex dynamics.

Khattab, A. *et al.*'s findings mirrored a significant proportion of neonatal admissions attributed to RDS, consistent with the observations of Arit *et al.* and Caner *et al.*, albeit with varied percentages. In our study, the smaller sample size may have influenced the inability to detect significant disparities in RDS frequencies across different gestational ages.<sup>[3][13][14]</sup> Nonetheless, it's noteworthy that extremely and moderately preterm neonates consistently exhibited higher occurrences of RDS, underscoring the vulnerability of these groups to respiratory distress. These variations in findings emphasize the need for larger-scale studies to better comprehend RDS frequencies and their relationship with gestational age in neonatal admissions.

Arit *et al.*'s results emphasized the heightened vulnerability of neonates with lower gestational ages to increased mortality rates. Their findings shed light on the critical association between gestational age, birth weight, and neonatal survival, aligning with the observations outlined in our study. Similarly, Findanoviski *et al.*'s research echoed these trends, further reinforcing the relationship between gestational age and mortality risks.<sup>[13][15]</sup>

Our study, along with the referenced research, collectively underscores the importance of gestational age as a determining factor in neonatal mortality rates. It highlights the significance of monitoring and addressing the specific needs and risks associated with infants born at lower gestational ages to improve their chances of survival. Understanding and acknowledging this relationship between gestational age and mortality rates are crucial in developing targeted interventions and specialized care strategies for vulnerable neonatal populations.

Our study's correlation between the extended interval of corticosteroid administration and decreased mortality rates aligns with the insights offered by Morris *et al.*,

solidifying the notion that an optimal timing window for administering antenatal corticosteroids significantly impacts neonatal survival outcomes.<sup>[1]</sup> This emphasizes the need for precise timing in corticosteroid administration to expect maximum benefits in reducing mortality rates among premature neonates. Understanding and implementing this optimal timing can be pivotal in enhancing the efficacy of corticosteroid treatments for better neonatal outcomes.

A distinctive aspect of our study, compared to several others, is the revelation that RDS may occur in over half of preterm neonates  $\leq 34$  gestation, shedding light on potential associations with other crucial factors. However, limitations, such as our small sample size and incomplete medical records, constrain our analysis. Future studies should incorporate additional variables like APGAR scores, surfactant therapy, and the number of antenatal corticosteroids doses for a more comprehensive evaluation.

## CONCLUSION

The prevalence of RDS was notable among preterm neonates with a gestational age of less than 34 weeks. Our findings underscore the significant impact of the timing of antenatal dexamethasone administration on the neonatal mortality rate attributed to RDS.

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