Open Access

Original Article

Frequency of Respiratory Distress Syndrome in Preterm Infants Delivered at Pak Emirates Military Hospital, Rawalpindi

Junaid Bashir, Zeeshan Ahmed, Muzammal Ghafoor*, Murtaza Hussain*, Saeed Zaman*, Muhammad Waleed Babar*

Pak Emirates Military Hospital/National University of Medical Sciences (NUMS), Rawalpindi Pakistan, *Combined Military Hospital/National University of Medical Sciences (NUMS), Rawalpindi Pakistan

ABSTRACT

Objective: To determine the frequency of Respiratory Distress Syndrome among preterm neonates born at the Pak Emirates Military Hospital.

Study Design: Cross-Sectional Study.

Place and Duration of Study: Pak Emirates Military Hospital, Rawalpindi Pakistan, from Aug 2020 to Mar 2021.

Methodology: One hundred and sixty-nine neonates with a gestational age of ≤34 weeks of either gender were included in this study. RDS was confirmed by reviewing neonatal medical charts. The frequency of RDS was seen in different groups according to gestational age, gender, weight, hypothermia, sepsis and jaundice.

Results: There were 169 patients; among them were 94 (55.6%) males and 75 (44.4%) females. 105 (62.1%) were born by caesarean section, and 64 (37.9%) were normal vaginal delivery. There were 26 (15.4%) neonates, with RDS, and 143 (84.6%) did not have RDS. Among our 169 sample, 26 (15.4%) were in <28 weeks, 96 (56.8%) were in the 28 to 32 weeks and 47 (27.8%) were in >32 week gestational groups. There were 34 (20.1%) who were <1000 g, there were 96 (56.8%) were between 1000 to 1500 g, and 39 (23.1%) were > 1500 g. Hypothermia was found in 43 (25.4%) of neonates; 126 (74.6%) did not have hypothermia. 63 (37.3%) neonates had sepsis, and 39 (23.1%) had jaundice.

Conclusion: RDS is a serious problem in our country. Health care providers must plan cost-effective and efficient strategies to detect and treat RDS in the developing world.

Keywords: Neonatal respiratory distress syndrome, Preterm, Perinatal asphyxia, Respiratory distress, Transient tachypnoea of the newborn

How to Cite This Article: *Bashir J, Ahmed Z, Ghafoor M, Hussain M, Khattak SZ, Babar MW. Frequency of Respiratory Distress Syndrome in Preterm Infants Delivered at Pak Emirates Military Hospital, Rawalpindi. Pak Armed Forces Med J 2022; 72(4): 1314-1317.*

DOI: https://doi.org/10.51253/pafmj.v72i4.7217

INTRODUCTION

Respiratory distress syndrome (RDS) is a principal reason for death and morbidity in the early neonatal period. It is linked to the degree of an infant's prematurity. It is one of the most diagnosed disorders encountered within the first 48-72 hours of life. Literature shows that RDS is a cause of thirty percent to forty percent of hospital admissions among newborns.[1] The prime reason for RDS is the scarcity of alveolar surfactants. The cause of the dearth of surfactant has been credited to the immaturity of Type II pneumocytes, and this results in decreased compliance of alveolar surface tension and lungs, diminished gas exchange and a need for raised ventilatory pressures. RDS clinically manifests as cyanosis, apnea, inspiratory stridor, grunting, nasal flaring, tachypnea, poor feeding, and retractions in the subcostal, intercostals, or suprasternal spaces.[2] These symptoms and signs are present when the neonate is born or appear soon after birth and eventually worsen within seventy-two hours of the infant's birth.[1,2] Before 1960, oxygen therapy was the only treatment for infants born with RDS. In the early 1970s, scientists developed continuous positive airway pressure (CPAP) and antenatal corticosteroid treatment was initiated in 1972. With more progress, following 1990, there was more development and novel ventilators, surfactant treatment, and developed ventilation techniques that came into existence, and they radically perfected the treatment options and improved the prognosis of RDS in infants.[3]

Preterm labour is the most frequent setback, noted in seven to ten percent of deliveries, resulting in neonatal mortality in the second half of pregnancy. RDS is the primary trigger of neonatal mortality and morbidity among preterm infants.[4] Several researchers have confirmed an inverse association between gestational age and RDS among infants.[5] There is still a need for more research on respiratory distress syndrome, as it remains a major neonatal issue.[6]

RDS is a severe complication among preterm babies. The burden of RDS varies according to the

Correspondence: Dr Junaid Bashir, Department of Paediatrics, Pak Emirates Military Hospital, Rawalpindi, Pakistan.

Received: 10 Aug 2021; revision received: 10 Feb 2022; accepted: 21 Feb 2022

frequency of preterm births. Preterm birth rates in different regions of the world were evaluated in 2010, and it was found to be 5% in European countries to 18% in some African countries. Preterm birth rates were highest in Asia, 7.2% in Eastern Asia, 13.6% in South Eastern Asia and 13.3% in Southern Asia. More than 60% of preterm babies were born in South Asia and Sub-Saharan Africa.[7] Thus, the frequency of RDS, therefore, varies geographically.

In Pakistan, a study published in 2003 and conducted by Ghafoor *et al*.[8] had ninety-four neonates who had developed RDS. Among these 94 neonates, 88 (93.61%) were preterm babies, 6 (6.38%) were full-term, and there were more male babies (65.95%). RDS was recognized in 1.72% of total live births, 37.28% of preterm and 0.11% of term neonates born at the hospital. The incidence of RDS was 100% at 26 or fewer weeks of gestation, 57.14% at 32 weeks, and 3.70% at 36 weeks. The mortality with RDS was 41 (43.61%). In a study by Zaman *et al.* where data was collected in 2008 in Saudia Arabia, 659 infants were observed with respiratory distress after birth. The total respiratory distress (RD) prevalence was 4.24%. However, among preterm infants, it was noted 19.7% and 2.3% among full-term infants.[9] A study published in 2003, conducted by Bhutta *et al*. suggests that in developing countries, the incidence of RDS is estimated at 2-3 % of all live births.[10] However, the exact recent incidence of RDS is unknown because of the paucity of current epidemiological studies on this rather common problem in Pakistan. In this study, we aimed to determine the frequency of RDS among preterm infants, and then we considered the importance of some related factors.

METHODOLOGY

This study was a cross-sectional study conducted at Pak Emirates Military Hospital Rawalpindi Pakistan from August 2020 to March 2021. The sample size was calculated by taking the prevalence of RDS in preterm infants as 19.7%, with 8% margin of error and 6% confidence level of 95%.[11]

The Ethics Committee reviewed our research protocol and approved (PEMH A/28/EC/316/2020 dated 1 July 2020). A total of 169 patients were included in this study.

Inclusion Criteria: Preterm babies born alive before 34 weeks of pregnancy with respiratory distress based on the manifestation of two or more of the following signs: an abnormal respiratory rate (bradypnea <30 breaths/minute, tachypnea > 60 breaths/min, respiratory pauses, or apnea) or signs of laboured breathing (nasal flaring, xyphoid recessions, expiratory grunting intercostal recessions), with or without cyanosis, were included in the study.

Exclusion Criteria: Patients with congenital malformation, meningitis, tuberculosis, pneumonia, and malnutrition were excluded from the study.

Informed consent was taken from the patient parents. A pretested checklist was utilized to gather the essential data from the neonates' charts. RDS was confirmed by reviewing neonate medical charts. Information about the patient history and clinical examination findings were noted. Statistical Package for Social Sciences (SPSS) version 24.0 was used for the data analysis. Qualitative variables were summarized as frequency and percentages. Chi-square test was applied to find out the association.The p value ≤ 0.05 was considered significant.

RESULTS

There were 169 patients included in the study. There were 94 (55.6%) males and 75 (44.4%) females. 105 (62.1%) were born by caesarean section, and 64 (37.9%) were normal vaginal delivery. There were 26 (15.4%) neonates with RDS, and 143 (84.6%) did not have RDS. There were 34 (20.1%) who were <1000g, there were 96 (56.8%) were between 1000 to 1500 g, and 39 (23.1%) were >1500g. Among our sample, there were 26 (15.4%) whose gestational age was <28 weeks, 96 (56.8%) were between 28 to 32 weeks, and 47 (27.8%) whose gestational age was >32 weeks. Hypothermia was found in 43 (25.4%) of neonates; 126 (74.6%) did not have hypothermia. 63 (37.3%) neonates had sepsis, and 39 (23.1%) had jaundice. (Table-I)

Table-I: Characteristics of Study Subjects(n=169)

Characteristics	Categories	Frequency (%)
Respiratory Distress Syndrome (RDS)	Yes	26 (15.4)
	No	143 (84.6)
Type of delivery	C/Section	105 (62.1)
	Normal Vaginal Delivery	64 (37.9)
Gender	Male	94 (55.6)
	Female	75 (44.4)
Weight in grams	<1000	34 (20.1)
	1000 to 1500	96 (56.8)
	>1500	39 (23.1)
Gestational Age	< 28 weeks	26 (15.4)
	28 to 32 weeks	96 (56.8)
	<32 weeks	47 (27.8)
Hypothermia	Yes	43 (25.4)
	No	126 (74.6)
Sepsis	Yes	63 (37.3)
	No	106 (62.7)
Jaundice	Yes	39 (23.1)
	No	130 (76.9)

Among those 26 (15.4%) patients with RDS in the gestational age category of < 28 weeks, there were 80% who had belonged to the weight category of 1000 to 1500 grams. In the gestational age category of 28 to 32 weeks of gestation, RDS was rather equally distributed for all weight categories. It was present in 30.77%, 30.77% and 38.46% in <1000 grams, 1000 to 1500 g and > 1500 g category, respectively. Of those neonates who were <28 weeks and had RDS, 60% were males. Among 28 to 32 weeks who had RDS, there were 46.15% who had RDS. Among >32 weeks of gestations and those with RDS, 62.50% were males. In those neonates who were <28 gestation weeks and had RDS, we found hypothermia in 40% of such neonates. Among those between 28 to 32 gestation weeks who had RDS, 53.85% had hypothermia (*p*-value=0.046). None had hypothermia among those who were >32 weeks of gestational age and had RDS. Perhaps it would have been interesting to note the severity of RDS. However, this was not feasible in our study. When looking at the mode of delivery and RDS, we found that among those who were < 28 weeks and had RDS, 80% were of caesarean birth. Among those who were 28 to 32 weeks of gestational age and had RDS, 61.54% were born of caesarean section. Among those who were > 32 weeks of gestational age and had RDS, 75% were born of caesarean section (Table-II).

Table-II: Comparison of Factors Among Age Groups (n=169)

Gestational Age	Categories	Respiratory Distress Syndrome n(%)	No Respiratory Distress Syndrome n(%)	*p*-value
Gender by Gestational Age				
<28 weeks of gestation	Male (n=17) Female (n=9)	3 (17.7) 2 (22.2)	14 (82.7) 7 (77.8)	0.778
28 to 32 weeks of gestation	Male (n=52) Female (n=44)	6 (11.5) 7 (15.9)	46 (88.5) 37 (84.1)	0.533
>32 weeks of gestation	Male (n=25) Female (n=22)	5 (20.0) 3 (13.6)	20 (80.0) 19 (86.4)	0.562
Mode of Delivery by Gestational Age				
<28 weeks of gestation	C/Section (n=16) NVD (n=10)	4 (25.0) 1 (10.0)	12 (75.0) 9 (90.0)	0.345
28 to 32 weeks of gestation	C/Section (n=52) Normal Vaginal Delivery (n=44)	8 (15.4) 5 (11.4)	44 (84.6) 39 (88.6)	0.566
>32 weeks of gestation	C/Section (n=37) Normal Vaginal Delivery (n=10)	6 (16.2) 2 (20.0)	31 (83.8) 8 (80.0)	0.778
Hypothermia by age				
<28 weeks of gestation	Yes (n=5) No (n=21)	2 (40.0) 3 (14.3)	3 (60.0) 18 (85.7)	0.190
28 to 32 weeks of gestation	Yes (n=29) No (n=67)	7 (24.1) 6 (9.0)	22 (75.9) 61 (91.0)	0.046
>32 weeks of gestation	Yes (n=9) No (38)	0 (0.0) 8 (21.1)	9 (100.0) 30 (78.9)	0.131
Weight (grams) by Gestational Age				
<28 weeks of gestation	<1000 (n=6) 1000 to 1500 (n=17) > 1500 (n=3)	1 (16.6) 4 (23.5) 0 (0.0)	5 (83.4) 13 (76.5) 3 (100.0)	0.624
28 to 32 weeks of gestation	<1000 (n=16) 1000 to 1500 (58) > 1500 (n=12)	4 (25.0) 4 (6.9) 5 (22.7)	12 (75.0) 54 (93.1) 17 (77.3)	0.062
>32 weeks of gestation	<1000 (n=12) 1000 to 1500 (n=21) > 1500 (n=14)	0(0.0) 3 (14.3) 5 (35.7)	12 (100.0) 18 (85.7) 9 (64.3)	0.049

DISCUSSION

The total proportion of neonates with respiratory distress syndrome was 15.38% in our sample data. RDS was observed to be in 23% of neonates who had been admitted to the NICU and had belonged to the gestational age category of >28 weeks in a study conducted by Parkash *et al.*[11] Caner *et al.*[12] showed the incidence of RDS was noted to be 40.6% among 613 infants who were premature and were admitted to the

neonatal intensive care unit. Aynalem *et al.*[13] noted the proportion to be 42.9%. On the contrary, few researchers from developed nations have described prevalence's varying from 3% to 7%.[14-16] The reasons for this disparity in epidemiology may be due to dissimilarities in the categorized gestational age of the participant. In addition, discrepancy observed in these researches may have been due to disparities in the study settings, including more advanced maternal newborn care facilities in certain locations compared to others. Furthermore, study design, sample size and socio-demographic characteristics of the population may also result in the differences between studies.

Our data further showed that the RDS was about 20% among those who were < 28 weeks and about 14% among those between 28 to 32 weeks. RDS incidence was about 17% among those > 32 weeks. This finding showed that all preterm infants with gestational age ≤ 34 weeks are at approximately equal risk for RDS. Our study shows that RDS may be affected by gestational weight, hypothermia and mode of delivery. A similar finding was noted by a study done by Saboute *et al.*[17] The results of our study show that RDS is a prevalent issue and certain factors are more related to it than others. Therefore, physicians need to be aware of the presence of RDS in the preterm neonate population so efficient treatment can be provided, as the prognosis of RDS treatment is much improved. Therefore, identifying RDS as quickly as possible would save lives.[18]

LIMITATIONS OF STUDY

We did not collect data of variables such as socioeconomic factors, the mother's educational level, nutritional status, and birth interval. All of these could have a significant effect on RDS.

CONCLUSION

Respiratory Distress Syndrome (RDS) is a serious problem in our country. Therefore, health care providers must plan cost-effective and efficient strategies to detect and treat RDS in the developing world.

Conflict of Interest: None.

Author's Contribution

JB: Data collection, data analysis, results and discussion of literature, ZA: Data analysis, data interpretation, discussion of liteature and reviwe, MG: Review of article, results and correction, MH: Data analysis and results review, SZK: Discussion and review of article, MWB: Review of article, discussion and correction.

REFERENCES

1. Al-Riyami N, Al Hadhrami A, Al Lawati T, Pillai S, Abdellatif M, Jaju S. Respiratory Distress Syndrome in Neonates Delivered at Term-gestation by Elective Cesarean Section at Tertiary Care Hospital in Oman. Oman Med J 2020; 2020(35): e133.
2. Nakahara M, Goto S, Kato E, Itakura A, Takeda S. Respiratory Distress Syndrome in Infants Delivered via Cesarean from Mothers with Preterm Premature Rupture of Membranes: A Propensity Score Analysis. J Pregnancy 2020; 2020: 5658327.
3. Choudhary PK, Piparsania S, Sagar U. A study to determine the incidence of respiratory distress syndrome among neonates in a tertiary care hospital. J Adv Med Dent Sci Res 2020; 8(9): 173-175.
4. Rahmawati E, Anggraeni MD, Setiyowati E. Cesarean Delivery and Respiratory Distress Syndrome in Late Preterm Infants. Caring: Indonesian J Nurs Sci 2020; 2(2): 38-43.
5. Shi Y, Muniraman H, Biniwale M, Ramanathan R. A review on non-invasive respiratory support for management of respiratory distress in extremely preterm infants. Frontiers Pediatr 2020; 8(2): 270-274.
6. Gortner L, Tutdibi E. Respiratory disorders in preterm and term neonates: an update on diagnostics and therapy. Z Geburtshilfe Neonatol 2011; 215(4): 145-151.
7. Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller AB, Narwal R, et al. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. Lancet 2012; 379(9832): 2162-2172.
8. Ghafoor T, Mahmud S, Ali S, Dogar SA. Incidence of respiratory distress syndrome. J Coll Physicians Surg Pak 2003; 13(5): 271-273.
9. Zaman LCDS, Goheer L, Riaz H. Prevalence and etiology of respiratory distress in newborns. Pak Armed Forces Med J 2013; 63(1): 22-25.
10. Bhutta ZA, Yusuf K, Khan IA. Is management of neonatal respiratory distress syndrome feasible in developing countries? Experience from Karachi (Pakistan). Pediatr Pulmonol 1999; 27(5): 305-311.
11. Parkash A, Haider N, Khoso ZA, Shaikh AS. Frequency, causes and outcome of neonates with respiratory distress admitted to Neonatal Intensive Care Unit, National Institute of Child Health, Karachi. J Pak Med Assoc 2015; 65(7): 771-775.
12. Caner I, Tekgunduz KS, Temuroglu A. Evaluation of Premature Infants Hospitalized in Neonatal Intensive Care Unit between 2010-2012. Eurasian J Med 2015; 47(1): 13-20.
13. Aynalem YA, Mekonen H, Akalu TY, Habtewold TD, Endalamaw A, Petrucka PM, et al. Incidence of respiratory distress and its predictors among neonates admitted to the neonatal intensive care unit, Black Lion Specialized Hospital, Addis Ababa, Ethiopia. PLoS One 2020; 15(7): e0235544.
14. Hermansen CL, Lorah KN. Respiratory distress in the newborn. Am Fam Physician 200; 76(7): 987-994.
15. Kamath BD, Macguire ER, McClure EM, Goldenberg RL. Neonatal mortality from respiratory distress syndrome: lessons for low-resource countries. Pediatrics 2011; 127(6): 1139-1146.
16. Bonafé L, Rubaltelli FF. The incidence of acute neonatal respiratory disorders in Padova county: an epidemiological survey. Acta Paediatr 1996; 85(10): 1236-1240.
17. Saboute M, Kashaki M, Bordbar A, Khalessi N, Farahani Z. The incidence of respiratory distress syndrome among preterm infants admitted to neonatal intensive care unit: a retrospective study. Open J Pediatr 2015; 5(04): 285-289.
18. Minuye Birihane B, Alebachew Bayih W, Yeshambel Alemu A, Belay DM, Demis A. The burden of hyaline membrane disease, mortality and its determinant factors among preterm neonates admitted at Debre Tabor General Hospital, North Central Ethiopia: A retrospective follow up study. PLoS One 2021; 16(3): e0249365.