

A Study of Incidence of Retinopathy of Prematurity in Infants Born with Respiratory Distress in a Tertiary Care Center in Central IndiaNupur Sharma¹, Syed Hamza², Vaishnavi Panchal², Pulkit Gupta², Rahul Agarwal³, Chandramohan S. Reddy⁴¹Associate Professor, Dept. of Ophthalmology, L.N. Medical College and Research Centre, Bhopal, Madhya Pradesh²Junior Resident, Dept. of Ophthalmology, L.N. Medical College and Research Centre, Bhopal, Madhya Pradesh³Professor & Head of Department, Dept. of Ophthalmology, L.N. Medical College and Research Centre, Bhopal, Madhya Pradesh⁴Professor & Head of Department, Dept. of Pediatrics, L.N. Medical College and Research Centre, Bhopal, Madhya Pradesh

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Conflict of interest: Nil

Abstract:**Purpose:** Aim of this study is to estimate the incidence of retinopathy of prematurity (ROP) in infants born with respiratory distress and to assess the respiratory variables leading to it at a tertiary care center.**Methodology:** Infants born with respiratory distress during the time period of August 2021 to August 2023 were selected for this retrospective study. A total of 550 high risk infants were studied and inference formulated based on evaluation of pulmonary variables such as - respiratory distress, oxygen dependency, mechanical ventilation, apnea, asphyxia, etc. Data was collected and analyzed.**Results:** Out of 550 infants screened, 12 developed retinopathy of prematurity. Pulmonary distress was found to be the predominant risk factor. We found association of respiratory distress in 50% infants who received oxygen supplementation. Other associated risk factors we found were apnea in 6.25%, mechanical ventilation in 6.25% and asphyxia in 3.12% infants.**Conclusion:** We conclude that respiratory distress is the most important risk factor for causing retinopathy of prematurity and all low birth weight infants need to be screened for ROP to prevent childhood blindness.**Keywords:** ROP, Prematurity, Pulmonary Distress, Asphyxia, Apnea.

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Introduction

Retinopathy of prematurity (ROP) is one of the leading causes of preventable blindness in preterm infants which results from a multifactorial impairment of retinal development leading to complete retinal detachment.[1] It was first observed incidentally among neonates born prematurely in the late 1940's, also known as retrolental fibroplasia.[2] It is currently the leading preventable cause of childhood blindness worldwide. [3]

Earlier, oxygen dependency and the use of supplemental oxygen for improving survival amongst preterm neonates was thought to have been the contributory factor for development of ROP.(2) Now, other risk factors have emerged which can individually or synergistically cause ROP, such as - Respiratory failure, birth asphyxia, ventilator support especially lasting more than 7 days, congenital heart disease, broncho-pulmonary dysplasia (BPD), multiple blood transfusions, anemia, sepsis, intra-

ventricular hemorrhage, necrotizing enterocolitis, abnormal glucose levels, pneumothorax, hypotension, prenatal & postnatal steroid therapy, parenteral nutrition etc. were also found to be involved in development of ROP.[4,5] Oxygen dependency and supplemental oxygen plays an immense role in the pathogenesis of ROP, i.e, both hypoxia and hyperoxia alter the levels of growth factors like VEGF which is immaculate for normal retinal vascular development.

Hence, pathogenesis of ROP depends upon quality of care received, including oxygen supplementation with monitoring in order to achieve and maintain safe oxygen saturation levels.[6] Most cases of ROP are mild in severity and resolve spontaneously except a few patients which develop severe ROP progressing to retinal detachment and if not treated, complete blindness eventually.[7] Oxygen supplementation is needed most commonly in neonates

with pulmonary distress. This study was thereby conducted as a hospital based study with the purpose of assessing incidence of ROP and to evaluate variables related to pulmonary stress leading to pathogenesis of retinopathy of prematurity.

Methodology

This study was conducted as a record based retrospective study where records of all the neonates admitted in NICU from 1st August 2021 to 30th August 2023 were obtained from Department of Pediatrics, J.K. Hospital, Bhopal. High risk neonates were then filtered from these with the inclusion criteria of factors such as asphyxia, apnea, respiratory distress or oxygen supplementation and mechanical ventilation in any period of gestation. Exclusion criteria being neonates who were admitted in NICU only for a few hours. The data of high risk neonates was profoundly analyzed keeping in

mind the gestational age and the above mentioned risk factors. The ROP screening data of these high risk neonates was studied depending on the incidence of ROP.

Statistical Analysis: Data was compiled using MS excel and analyzed using SPSS software version 20. Hospital based incidence of retinopathy of prematurity was calculated. Data was grouped and expressed as percentages. Appropriate statistical test was applied.

Results

A total of 550 infants were admitted in NICU, amongst which ROP developed in 12, thus, the estimated incidence of ROP in present study was 2.2%. Out of 550 records, 252 high risk neonates were included in the study, thus, incidence of development of ROP in high risk neonates was 4.7%.

Table 1: Distribution According to Baseline Characteristics Of Neonates

Baseline Characteristics		Frequency (N = 550)	Percentage
Gestational Age (Weeks)	<28	18	3.3
	28-37	525	93.8
	≥37	16	3
Birth Weight (Kg)	<1	26	4.8
	1 - <1.5	203	37
	1.5 - <2	253	46
	2 - <2.5	46	8.3
	≥2.5	22	4

Mean gestational age of neonates in this study was 33.41± 2.32 weeks and majority of them belonged to 28-37 weeks of gestation and thus, were premature (93.8%). Similarly, majority of neonates were low birth weight with mean weight of 1.54±0.4 kg. (Table 1)

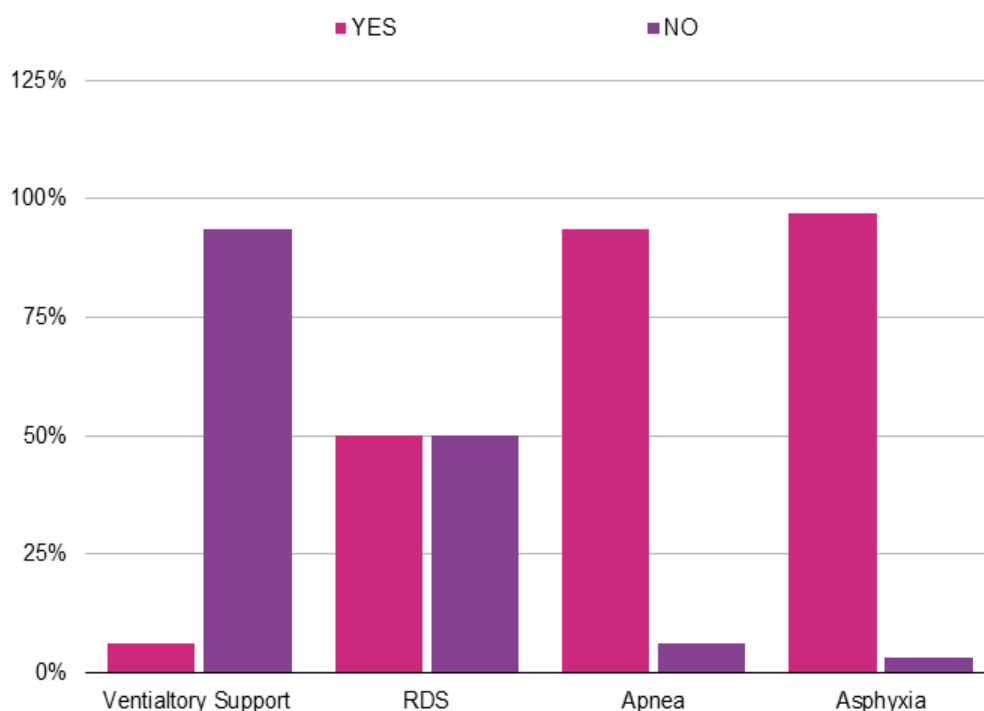


Figure 1: Association of Development of ROP with Risk Factors

In the present study, respiratory distress was observed to be the predominant risk factor for pathogenesis of ROP. It was seen in 50% infants who received oxygen supplementation. Associated risk factors were apnea (6.25%), asphyxia (3.12%) and mechanical ventilation (6.25%). (Figure 1)

Discussion

Retinopathy of prematurity, if undetected can result in life-long blindness. Various literatures suggest multiple risk factors for development of ROP. This study focused on associated pulmonary stress in pathogenesis of ROP. Pulmonary distress is the most important known risk factor involved in the pathogenesis of retinopathy in preterm infants. Assessing the risk factors linked with retinopathy of prematurity is helpful for early and prompt diagnosis, management as well as prognosis of the disease. In this study, most common risk factor for development of ROP was respiratory distress followed by apnea & mechanical ventilation in 6.25% neonates each. Least common was birth asphyxia amongst various pulmonary risk factors for development of ROP.

The findings were supported by various literature which concluded that neonates who are most preterm or have associated neonatal morbidity, e.g. poor weight gain, hyperglycemia, sepsis and respiratory distress syndrome are at greater risk of ROP.[9,10] Conversely, Robert et al in their study proved that antenatal corticosteroids if given within 48 hours of preterm delivery may reduce the risk of respiratory distress syndrome, oxygen requirement and risk of ROP due to poorly controlled oxygen therapy.[11]

Development of ROP is explainable in neonates with pulmonary stress as they are more likely to receive supplemental oxygen therapy. This can also lead to abnormally high oxygen saturation which in turn suppresses angiogenic growth factors, particularly erythropoietin and vascular endothelial growth factor (VEGF), which further leads to cessation of retina vessel growth and loss of some existing retinal vessels.[12,13] Whereas, in term neonates, exposure to high oxygen concentrations causes loss of existing vessels not seen with controlled oxygen delivery, which mainly causes cessation of vessel growth.[14] In a similar study by Mamta et al, prevalence of ROP was 18.8% in 160 neonates, most delivered by 33-34 weeks (56.9%), 28% by 30-32 weeks, 33.3% by <32 weeks. Among the 30 neonates with ROP, 24(80%) had birth weight <1500 g with occurrence of ROP being significantly associated. [15]

Conclusion

Since, low birth weight and premature infants are more prone to develop pulmonary stress owing to immature lung vasculature, all the low birth weight

and preterm neonates need screening for retinopathy of prematurity to prevent childhood blindness.

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