INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

FREQUENCY AND RISK FACTORS OF RETINOPATHY OF PREMATURITY IN PRETERM BABIES OF TERTIARY CARE HOSPITAL: A CROSS-SECTIONAL STUDY

Original Research

Muhammad Ali Zia[1]*, Muhammad Tariq Nadeem[1], Talal Waqar[1], Ayesha Ali[1], Anum Pervaiz[1], Ali Shan Liaqat[1]
[1]Combined Military Hospital (CMH) Kharian, Pakistan.
Corresponding Author: Muhammad Ali Zia, Combined Military Hospital (CMH) Kharian, Pakistan, doctorsabpk@gmail.com
Acknowledgement: The authors acknowledge the support of the NICU staff of Combined Military Hospital, Kharian.

Conflict of Interest: None
Grant Support & Financial Support: None

ABSTRACT

Background: Retinopathy of prematurity (ROP) is a potentially preventable cause of childhood blindness that primarily affects preterm neonates with immature retinal vasculature. Improvements in neonatal survival have increased the population at risk, particularly in middle-income countries where standardized screening and optimal neonatal care may not be uniformly implemented. Identifying local prevalence and contributory risk factors is essential for developing effective screening strategies and reducing avoidable visual morbidity in this vulnerable population.

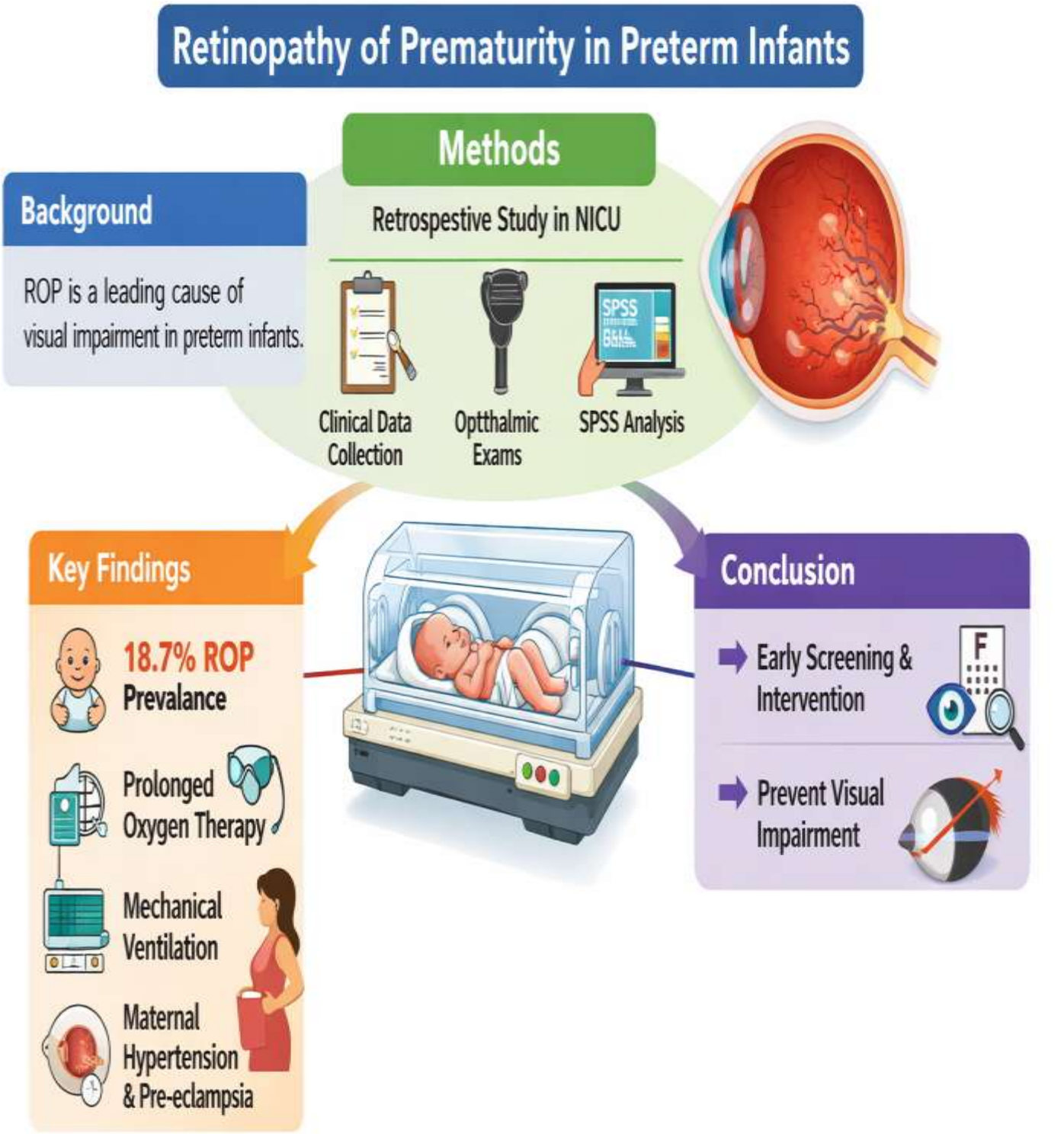
Objective: To determine the prevalence of retinopathy of prematurity and identify associated neonatal and maternal risk factors among preterm neonates admitted to a tertiary care hospital.

Methods: This retrospective cross-sectional study was conducted in the Neonatal Intensive Care Unit of Combined Military Hospital, Kharian. Preterm neonates with a gestational age of ≤34 weeks and/or birth weight ≤1500 g were included. Clinical records were reviewed to extract neonatal variables, including gestational age, birth weight, APGAR scores, oxygen therapy, mechanical ventilation, and comorbidities, as well as maternal risk factors. Ophthalmological screening was performed using indirect ophthalmoscopy, and ROP was classified according to international guidelines. Data were analyzed using SPSS version 26.0. Associations were assessed using the Chi-square test, with a p-value <0.05 considered statistically significant.

Results: Among 188 preterm neonates, 35 developed ROP, yielding a prevalence of 18.7%. A significantly higher proportion of ROP was observed in neonates with gestational age ≤30 weeks (71.4%, p = 0.03) and birth weight ≤1000 g (57.1%, p = 0.05). Prolonged oxygen therapy exceeding seven days (68.6%, p <0.001), mechanical ventilation (62.9%, p <0.001), low APGAR score at five minutes (48.6%, p = 0.01), and bronchopulmonary dysplasia (37.1%, p <0.001) were strongly associated with ROP. Patent ductus arteriosus was also more frequent among affected neonates.

Conclusion: Retinopathy of prematurity remains a significant concern among preterm neonates, particularly those with extreme prematurity, low birth weight, and intensive respiratory support. Early screening, optimized neonatal care, and timely intervention are critical to reducing ROP-related visual impairment.

Keywords: Birth Weight, Infant, Premature, Mechanical Ventilation, Oxygen Inhalation Therapy, Retinopathy of Prematurity, Risk Factors, Screening.



INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

INTRODUCTION

Retinopathy of prematurity (ROP) remains one of the leading and most preventable causes of childhood blindness worldwide, primarily affecting preterm neonates whose retinal vasculature is incompletely developed at birth (1). First described in the 1940s, the epidemiology of ROP has evolved alongside advances in neonatal intensive care, which have markedly improved the survival of extremely low birth weight and very preterm infants. While these improvements represent a major success in perinatal medicine, they have also led to an increased population of infants at risk for ROP, thereby transforming the condition into a persistent public health challenge (2). If not detected and managed in a timely manner, ROP can progress to irreversible visual impairment or blindness, necessitating lifelong care and imposing substantial social and economic burdens on families and health systems. The global burden of ROP varies considerably across regions, reflecting differences in neonatal care standards, survival rates of preterm infants, oxygen administration practices, and the availability of structured screening programs. In high-income countries, severe ROP develops in approximately 6–12% of preterm infants weighing less than 1500 g, largely due to standardized neonatal protocols and robust screening systems (3). In contrast, middle- and low-income countries experience a higher incidence and severity of disease, particularly in settings where neonatal care has improved but remains inconsistent. Studies from Latin America and Southeast Asia report ROP prevalence ranging from 25% to 35% among preterm infants, with a disproportionate number progressing to advanced stages of the disease (4). This phenomenon, often described as the “third epidemic” of ROP, underscores the vulnerability of health systems in resource-limited settings.

South Asia bears a particularly high burden, with ROP affecting an estimated 30–50% of low birth weight infants, depending on the quality and accessibility of neonatal intensive care (5). The increased survival of preterm neonates, coupled with suboptimal oxygen monitoring and delayed ophthalmic screening, contributes significantly to this burden. Within Pakistan, available hospital-based studies suggest similarly alarming trends. Research conducted in Karachi documented an ROP incidence of approximately 32% among preterm infants (6), while a multicenter study from Lahore reported rates approaching 40% in neonates with birth weights below 1500 g (7). Despite these findings, national-level epidemiological data remain sparse, and systematic ROP screening is not uniformly implemented across neonatal intensive care units, particularly in peripheral and rural areas. This gap highlights a critical weakness in neonatal eye care services and emphasizes the urgent need for locally generated evidence to guide policy and practice (8). ROP is a multifactorial disease influenced by a complex interplay of neonatal, environmental, and maternal factors. Among neonatal determinants, gestational age and birth weight are consistently identified as the strongest predictors, with risk rising sharply in infants born before 32 weeks of gestation or weighing less than 1500 g. Oxygen therapy, although essential for survival, plays a central role in ROP pathogenesis when inadequately regulated, as prolonged or unmonitored exposure can disrupt normal retinal vascular development and trigger pathological neovascularization (9). Additional neonatal factors such as prolonged mechanical ventilation, neonatal sepsis, repeated blood transfusions, and intraventricular hemorrhage have also been associated with increased disease risk (10,11).

Maternal conditions further contribute to the complexity of ROP development. Evidence suggests that preeclampsia, maternal diabetes mellitus, and multiple gestations are linked with a higher likelihood of ROP in preterm infants, possibly through their effects on fetal growth, placental function, and perinatal stability (12,13). These associations reinforce the need for a comprehensive, multidisciplinary approach that integrates obstetric, neonatal, and ophthalmic care to effectively prevent and manage ROP. Given the substantial burden of ROP in Pakistan, the limited availability of consistent screening programs, and the paucity of contemporary local data, there is a pressing need to better characterize the magnitude of the problem and its determinants. Therefore, the objective of the present study is to determine the prevalence of retinopathy of prematurity and to identify associated neonatal and maternal risk factors among preterm newborns admitted to a tertiary care hospital, with the aim of informing evidence-based screening strategies and improving early prevention of avoidable childhood blindness.

METHODS

This retrospective cross-sectional study was conducted in the Neonatal Intensive Care Unit (NICU) of Combined Military Hospital, Kharian, in collaboration with the Departments of Neonatology and Ophthalmology. Medical records of preterm neonates admitted between June 2023 and June 2024 were reviewed to determine the prevalence of retinopathy of prematurity (ROP) and to identify associated risk factors. The study population comprised preterm infants delivered at the study center as well as those referred from other hospitals during the defined period. Eligibility criteria included neonates born at or before 32 weeks of gestation or with a birth weight of 1500 g or less. In addition, infants born between 32 and 34 weeks of gestation were included if they developed significant neonatal

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

complications during their NICU stay, such as sepsis, perinatal asphyxia, or the need for mechanical ventilation. Neonates who did not strictly meet these gestational age or birth weight criteria but required supplemental oxygen therapy for more than seven consecutive days were also screened for ROP, in line with broader clinical screening practices. Infants with major congenital anomalies, chromosomal abnormalities, inborn errors of metabolism, or those who died before the initial ophthalmological assessment were excluded from the analysis. The sample size was calculated using a web-based calculator for cross-sectional studies. Based on a previously reported local prevalence of ROP of 16% (14), a minimum sample size of 207 neonates was estimated, assuming a 95% confidence level and a 5% margin of error. Data were extracted using a predesigned structured proforma to ensure uniformity and completeness. Perinatal variables included maternal risk factors such as clinical or suspected sepsis, defined by the presence of offensive amniotic fluid, prolonged rupture of membranes exceeding 18 hours, maternal urinary tract infection, or documented fever greater than 38°C, as well as evidence of perinatal asphyxia. Postnatal variables included respiratory morbidity requiring oxygen therapy or mechanical ventilation, neonatal sepsis, need for phototherapy, and history of blood transfusions.

Clinical parameters routinely documented in patient records were reviewed, including birth weight, length, head circumference, gestational age, and daily assessments of vital signs, neurological status, neonatal reflexes, and respiratory and cardiovascular function. Gestational age was confirmed using the New Ballard Score when necessary. Ophthalmological screening for ROP commenced from the fourth week of postnatal life and was repeated at one- to two-week intervals. Prior to examination, pupillary dilation was achieved using cyclopentolate 0.1% and phenylephrine 0.1% eye drops. Retinal evaluation was performed by trained ophthalmologists using indirect ophthalmoscopy with a 28-diopter lens, eyelid speculum, and scleral depression, while RetCam imaging was utilized in selected cases for documentation and follow-up. ROP was classified according to internationally accepted criteria, and infants diagnosed with stage 3 ROP or more severe disease were treated with laser photocoagulation. Follow-up ophthalmic examinations were continued weekly or biweekly in accordance with guidelines recommended by the American Academy of Pediatrics and affiliated professional bodies, until complete retinal vascularization was achieved or the disease regressed following treatment. Ethical approval for the study was obtained from the Institutional Review Board of Combined Military Hospital, Kharian, and the study was conducted in accordance with established ethical standards. Informed consent for ophthalmological screening and use of clinical data for research purposes had been obtained from parents or legal guardians at the time of NICU admission as per hospital policy. Data analysis was carried out using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were summarized as frequencies and percentages. The incidence of ROP was calculated as a proportion of screened neonates. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test where appropriate. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 188 preterm neonates were included in the final analysis. The distribution of gestational age showed that 38.3% of neonates were born at or before 30 weeks, 28.2% were between 31–32 weeks, and 33.5% were between 33–34 weeks. Male neonates constituted 54.8% of the cohort, while females accounted for 45.2%. With respect to birth weight, 25.5% of neonates weighed ≤1000 g, 42.6% weighed between 1001–1500 g, and 31.9% had a birth weight greater than 1500 g. Vaginal delivery was the predominant mode of birth, accounting for 58.5% of cases, whereas 41.5% were delivered via cesarean section. Retinopathy of prematurity was diagnosed in 35 neonates, yielding an overall prevalence of 18.7%. A markedly higher proportion of ROP cases occurred among infants with a gestational age of ≤30 weeks compared with those without ROP (71.4% vs. 30.7%), demonstrating a statistically significant association ($p = 0.03$). Birth weight ≤1000 g was also strongly associated with ROP, with more than half of affected neonates falling into this category (57.1% vs. 18.3%, $p = 0.05$). Prolonged oxygen therapy exceeding seven days was significantly more frequent among neonates who developed ROP compared with those who did not (68.6% vs. 22.2%, $p < 0.001$). Similarly, mechanical ventilation was required in 62.9% of neonates with ROP, compared with 14.4% in the non-ROP group ($p < 0.001$). Lower APGAR scores at five minutes (≤5) were observed in nearly half of the ROP group (48.6%), contrasting with 11.8% among unaffected neonates, indicating a significant association ($p = 0.01$). Bronchopulmonary dysplasia was also substantially more prevalent in the ROP group (37.1% vs. 9.8%, $p < 0.001$), while patent ductus arteriosus occurred more frequently among neonates with ROP (22.9% vs. 9.2%, $p = 0.04$). Other neonatal variables, including sepsis, blood transfusions, respiratory distress syndrome, intraventricular hemorrhage, and congenital anomalies, were observed more often in neonates with ROP; however, these associations did not reach statistical significance within the studied sample. The pattern of intraventricular hemorrhage severity did not differ meaningfully between groups, suggesting a limited role in ROP development in this cohort.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Analysis of maternal factors revealed that maternal hypertension was significantly more common among mothers of neonates who developed ROP compared with those whose infants did not (40.0% vs. 22.2%, p = 0.03). Pre-eclampsia demonstrated a strong association with ROP, affecting 28.6% of mothers in the ROP group versus 9.8% in the non-ROP group (p < 0.001). Antenatal steroid exposure was notably higher among neonates with ROP (80.0% vs. 6.5%, p = 0.03), and prolonged rupture of membranes was also significantly associated with ROP development (37.1% vs. 13.7%, p < 0.001). Maternal age, gestational diabetes mellitus, multiple gestations, mode of delivery, and maternal infections did not show statistically significant associations with ROP in this study population. To identify independent predictors of retinopathy of prematurity, a multivariable logistic regression analysis was performed including clinically and statistically relevant variables identified on univariate analysis. After adjustment for potential confounders, gestational age ≤30 weeks, birth weight ≤1000 g, prolonged oxygen therapy exceeding seven days, mechanical ventilation, low APGAR score at five minutes, bronchopulmonary dysplasia, maternal pre-eclampsia, and prolonged rupture of membranes remained independently associated with the development of ROP. Neonates born at ≤30 weeks of gestation demonstrated significantly higher odds of ROP compared with those born at 33–34 weeks. Similarly, extremely low birth weight infants (≤1000 g) showed a markedly increased adjusted risk. Prolonged oxygen exposure and mechanical ventilation emerged as strong postnatal predictors, even after controlling for gestational age and birth weight. Among maternal factors, pre-eclampsia and prolonged rupture of membranes retained statistical significance, indicating an independent contribution to ROP risk beyond neonatal factors. Other variables, including sepsis, blood transfusion, respiratory distress syndrome, and maternal hypertension, did not remain significant after adjustment, suggesting confounding effects in univariate analysis.

Table 1: Demographic and Clinical Characteristics of Study Sample

Demographic Variables	**Total Sample (n = 188)**	**n (%)**
Gestational Age (weeks)		
≤ 30 weeks	72	38.3%
31-32 weeks	53	28.2%
33-34 weeks	63	33.5%
Gender		
Male	103	54.8%
Female	85	45.2%
Birth Weight (grams)		
≤ 1000 g	48	25.5%
1001-1500 g	80	42.6%
> 1500 g	60	31.9%
Mode of Delivery		
Vaginal Delivery	110	58.5%
Cesarean Section	78	41.5%

Table 2: Association Neonatal Risk Factors with ROP Among Study Sample

Neonatal Risk Factors	**Total Sample (n = 188)**	**ROP Group (n = 35, 18.7%)**	**Non-ROP Group (n = 153, 81.3%)**	**P-value**
Gestational Age (weeks)				0.03*
≤ 30 weeks	72 (38.3%)	25 (71.4%)	47 (30.7%)	
31-32 weeks	53 (28.2%)	8 (22.9%)	45 (29.4%)	

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Neonatal Risk Factors	Total Sample (n = 188)	ROP Group (n = 35, 18.7%)	Non-ROP Group (n = 153, 81.3%)	P-value
33-34 weeks	63 (33.5%)	2 (5.7%)	61 (39.9%)	
Birth Weight (grams)				0.05
≤ 1000 g	48 (25.5%)	20 (57.1%)	28 (18.3%)	
1001-1500 g	80 (42.6%)	10 (28.6%)	70 (45.8%)	
> 1500 g	60 (31.9%)	5 (14.3%)	55 (35.9%)	
Oxygen Therapy (>7 days)	58 (30.9%)	24 (68.6%)	34 (22.2%)	0.00*
Sepsis	28 (14.9%)	10 (28.6%)	18 (11.8%)	0.07
Blood Transfusion	41 (21.8%)	15 (42.9%)	26 (17.0%)	0.09
Respiratory Distress Syndrome	92 (48.9%)	22 (62.9%)	70 (45.8%)	0.07
Intraventricular Hemorrhage				0.64
Grade 1	9 (4.8%)	1 (2.9%)	8 (5.2%)	
Grade 2-4	12 (6.4%)	5 (14.3%)	7 (4.6%)	
Patent Ductus Arteriosus (PDA)	22 (11.7%)	8 (22.9%)	14 (9.2%)	0.04*
Congenital Anomalies	18 (9.6%)	6 (17.1%)	12 (7.8%)	0.09
APGAR Score at 5 minutes				0.01*
≤ 5	35 (18.6%)	17 (48.6%)	18 (11.8%)	
> 5	153 (81.4%)	18 (51.4%)	135 (88.2%)	
Mechanical Ventilation	44 (23.4%)	22 (62.9%)	22 (14.4%)	0.00*
Bronchopulmonary Dysplasia (BPD)	28 (14.9%)	13 (37.1%)	15 (9.8%)	0.00*

*=P< 0.05

Table 3: Association of Maternal Risk Factors with ROP Risk Among Study Sample

Maternal Risk Factors	Total Sample (n = 188)	ROP Group (n = 35, 18.7%)	Non-ROP Group (n = 153, 81.3%)	P-value
Maternal Age (years)				0.42
< 25 years	70 (37.2%)	15 (42.9%)	55 (35.9%)	
25-35 years	95 (50.5%)	18 (51.4%)	77 (50.3%)	
> 35 years	23 (12.2%)	2 (5.7%)	21 (13.7%)	
Maternal Hypertension	48 (25.5%)	14 (40.0%)	34 (22.2%)	0.03*
Gestational Diabetes Mellitus	35 (18.6%)	8 (22.9%)	27 (17.6%)	0.49
Pre-eclampsia	25 (13.3%)	10 (28.6%)	15 (9.8%)	0.00*
Antenatal Steroid Use	38 (20.2%)	28 (80.0%)	10 (6.5%)	0.03*
Multiple Gestations	20 (10.6%)	5 (14.3%)	15 (9.8%)	0.45
Mode of Delivery				0.54

Maternal Risk Factors	Total Sample (n = 188)	ROP Group (n = 35, 18.7%)	Non-ROP Group (n = 153, 81.3%)	P-value
Cesarean Section	78 (41.5%)	23 (65.7%)	55 (35.9%)	
Vaginal Delivery	110 (58.5%)	12 (34.3%)	98 (64.1%)	
Prolonged Rupture of Membranes	34 (18.1%)	13 (37.1%)	21 (13.7%)	0.00*
Maternal Infection (e.g., UTI)	42 (22.3%)	16 (45.7%)	26 (17.0%)	0.09

Table 4: Multivariable Logistic Regression Analysis for Independent Predictors of ROP

Variable	Adjusted Odds Ratio (aOR)	95% Confidence Interval	P-value
Gestational age ≤30 weeks	3.84	1.61 – 9.15	0.002
Birth weight ≤1000 g	3.12	1.29 – 7.54	0.011
Oxygen therapy >7 days	4.67	1.98 – 11.03	<0.001
Mechanical ventilation	4.21	1.77 – 10.02	0.001
APGAR score ≤5 at 5 minutes	2.96	1.26 – 6.94	0.013
Bronchopulmonary dysplasia	3.08	1.29 – 7.33	0.010
Patent ductus arteriosus	1.92	0.78 – 4.74	0.15
Sepsis	1.64	0.69 – 3.91	0.26
Pre-eclampsia	2.87	1.22 – 6.74	0.015
Prolonged rupture of membranes	2.91	1.25 – 6.76	0.013
Antenatal steroid use	1.41	0.58 – 3.42	0.44

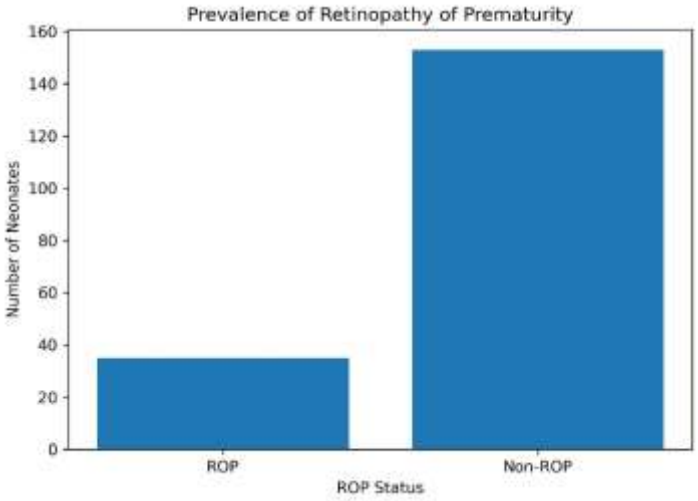


Figure 2 Prevalence of Retinopathy of Prematurity

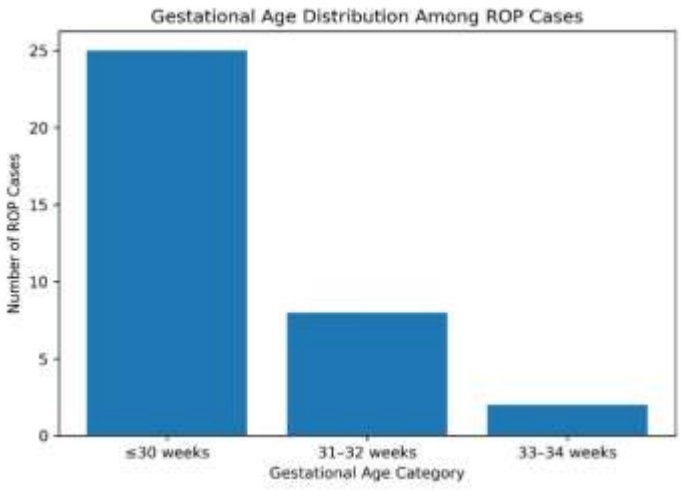


Figure 2 Gestational Age Distribution Among ROP Cases

DISCUSSION

Retinopathy of prematurity remains a major and preventable cause of childhood visual impairment, particularly in settings where survival of preterm neonates has improved without parallel expansion of standardized screening and neonatal care practices. The present

study contributes region-specific evidence by demonstrating a prevalence of ROP of 18.7% among preterm newborns admitted to a tertiary care facility, reinforcing the ongoing clinical and public health relevance of this condition. This prevalence falls within the range reported from comparable middle-income settings and reflects both improving neonatal survival and persistent gaps in optimal perinatal and postnatal care. The findings underscore gestational age and birth weight as the most influential neonatal determinants of ROP. A substantially higher proportion of affected infants were born at or before 30 weeks of gestation, supporting the well-established inverse relationship between gestational maturity and retinal vascular development. Previous investigations have consistently shown that extreme prematurity markedly increases susceptibility to disordered retinal angiogenesis, placing these infants at the highest risk of ROP development (15,16). Although the risk declined with increasing gestational age, the presence of ROP among infants born at 31–34 weeks highlights that vulnerability is not confined to the most premature group, particularly in environments with variable neonatal care standards (17). Birth weight demonstrated a similarly strong association, with infants weighing ≤1000 g exhibiting the greatest risk. This finding aligns with existing evidence identifying extremely low birth weight as a robust predictor of ROP, reflecting the close correlation between fetal growth restriction, immature retinal vasculature, and postnatal environmental exposures (18). While infants in the 1001–1500 g category showed comparatively lower risk, the persistence of ROP in this group emphasizes the need for inclusive screening strategies rather than reliance on weight thresholds alone.

Postnatal respiratory support emerged as a critical modifiable risk factor. Prolonged oxygen therapy and mechanical ventilation were both strongly associated with ROP, consistent with the pathogenic role of oxygen-induced vascular dysregulation. Excessive or poorly monitored oxygen exposure has been shown to suppress normal retinal vessel growth followed by pathological neovascularization, a mechanism repeatedly demonstrated in clinical and experimental studies (19,20). The strong association observed with mechanical ventilation further supports the contribution of severe respiratory illness and oxidative stress to retinal injury, reinforcing the importance of meticulous oxygen targeting and non-invasive respiratory strategies where feasible (21,22). Bronchopulmonary dysplasia, which often reflects cumulative oxygen and ventilator exposure, was also significantly associated with ROP, highlighting the interconnected nature of neonatal respiratory morbidity and retinal outcomes (21). Maternal factors played a meaningful role in shaping neonatal risk. Hypertensive disorders of pregnancy, pre-eclampsia, and prolonged rupture of membranes were significantly more common among mothers of infants who developed ROP. These conditions are known to impair placental perfusion and fetal oxygenation, potentially predisposing the immature retina to postnatal vascular instability (22). The observed association between antenatal steroid exposure and ROP warrants cautious interpretation. While antenatal steroids are a cornerstone of preterm care due to their benefits in reducing neonatal mortality and respiratory distress, their association with ROP in this cohort may reflect confounding by indication, as steroids are more frequently administered in pregnancies at high risk of extreme prematurity rather than exerting a direct causal effect (23).

The strengths of this study include its clearly defined inclusion criteria, comprehensive assessment of both neonatal and maternal risk factors, and the use of standardized ophthalmological screening protocols within a tertiary care setting. These factors enhance the internal validity of the findings and their applicability to similar clinical environments. However, several limitations merit consideration. The retrospective design relied on existing medical records, which may be subject to incomplete documentation and residual confounding. The absence of detailed analysis of ROP severity stages and treatment outcomes limited the ability to differentiate predictors of mild versus severe disease. Additionally, although multivariable analysis was undertaken, the sample size constrained the inclusion of all potential confounders, and longer-term visual outcomes were not assessed. Future research would benefit from prospective, multicenter designs incorporating standardized oxygen monitoring data, postnatal weight gain trajectories, and detailed staging of ROP severity. Such studies could better delineate causal pathways and inform targeted interventions. Despite these limitations, the present findings reinforce the critical importance of early identification of high-risk neonates and the implementation of regionally tailored screening and prevention strategies. Strengthening neonatal respiratory care, optimizing maternal health, and ensuring timely ophthalmological surveillance remain central to reducing the burden of avoidable childhood blindness due to retinopathy of prematurity.

CONCLUSION

This study highlights retinopathy of prematurity as a meaningful and ongoing challenge among preterm neonates in a tertiary care setting, emphasizing its close association with both neonatal immaturity and perinatal clinical factors. The findings underscore that infants born very preterm or with low birth weight, particularly those requiring prolonged respiratory support and intensive neonatal care, remain at the greatest risk of developing ROP. In addition, maternal conditions reflecting compromised intrauterine environments contribute substantially to disease susceptibility. Collectively, these observations reinforce the importance of vigilant neonatal monitoring, judicious use of oxygen and ventilatory support, and integrated maternal–neonatal care. The study supports the need for

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

context-specific screening protocols and early intervention strategies to reduce preventable visual impairment and improve long-term outcomes for this vulnerable population.

AUTHOR CONTRIBUTIONS

Author	Contribution
Muhammad Ali Zia*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Tariq Nadeem	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Talal Waqar	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Ayesha Ali	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Anum Pervaiz	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Ali Shan Liaqat	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

REFERENCES

1. Hong EH, Shin YU, Cho H. Retinopathy of prematurity: a review of epidemiology and current treatment strategies. Clinical and Experimental Pediatrics. 2022 Mar;65(3):115.

2. Wang S, Liu J, Zhang X, Liu Y, Li J, Wang H, Luo X, Liu S, Liu L, Zhang J. Global, regional and national burden of retinopathy of prematurity among childhood and adolescent: a spatiotemporal analysis based on the Global Burden of Disease Study 2019. BMJ Paediatrics Open. 2024;8(1).

3. Rauf A, Saigol HK, Chauhan K, Akbar S, Chaudhary NI. Prevalence of Retinopathy of Prematurity in Premature Neonates Visiting Sir Gangaram Hospital Lahore. Pakistan Journal of Medical & Health Sciences. 2023 Mar 22;17(02):206-.

4. Tan Z, Isaacs M, Zhu Z, Simkin S, He M, Dai S. Retinopathy of prematurity screening: A narrative review of current programs, teleophthalmology, and diagnostic support systems. Saudi Journal of Ophthalmology. 2022 Jul 1;36(3):283-95.

5. Koc E, Bas AY. Retinopathy of Prematurity (ROP): From the Perspective of the Neonatologist. Global Pediatrics. 2024 Feb 5:100159.

6. Thacker PG, Repka MX. Retinopathy of Prematurity. InPrinciples of Neonatology 2024 Jan 1 (pp. 545-551). Elsevier.

7. Borțea CI, Stoica F, Boia M, Iacob ER, Dinu M, Iacob R, Iacob D. Risk factors associated with retinopathy of prematurity in very and extremely preterm infants. Medicina. 2021 Apr 27;57(5):420.

8. Boo NY, Ang EL, Ang EB. Retinopathy of Prematurity in Very Low Birthweight Neonates of Gestation Less Than 32 weeks in Malaysia. Indian Journal of Pediatrics. 2024 Jan 11:1-8.

9. Borțea CI, Stoica F, Boia M, Iacob ER, Dinu M, Iacob R, Iacob D. Risk factors associated with retinopathy of prematurity in very and extremely preterm infants. Medicina. 2021 Apr 27;57(5):420.

10. Raffa LH, Fatani M, Alghamdi R. Insights into Risk: Exploring Retinopathy of Prematurity and Short-term Comorbidities in Moderate-to-Late Preterm Infants. Nigerian Journal of Clinical Practice. 2024 Jan 1;27(1):124-30.

11. Paramitha IP, Loebis R, Sampurna MT. Retinopathy of Prematurity (ROP): A Review of Clinical and Demographic Risk Factors. Retinopathy of Prematurity (ROP): A Review of Clinical and Demographic Risk Factors. 2023 Dec 26;139(1):13-.

12. Phruksarudee K, Sungprem K, Montriwet M. Association of Oxygen Therapy Concentration and Duration with Retinopathy of Prematurity Incidence at Naresuan University Hospital. Siriraj Medical Journal. 2024 Mar 1;76(3):160-6.

13. Mannan MA. Frequency and risk factors of retinopathy of prematurity among preterm neonates in a tertiary care hospital of Bangladesh. Clin Pediatr Neonatol. 2023;3(1):11-7.

14. Protsyk O, García Serrano JL. Mechanical Ventilation, Retinal Avascularity and Rate of Vascularisation: A Triad of Predictors for Retinopathy of Prematurity Treatment. Journal of Personalized Medicine. 2024 Mar 31;14(4):379.

15. Choi HJ, Shin BS, Shin SH, Kim EK, Kim HS. Critical period of oxygen supplementation and invasive ventilation: implications for severe retinopathy of prematurity. Italian Journal of Pediatrics. 2024 Apr 1;50(1):58.

16. Yazib SA, Choo MM, Khaliddin N, Ong CP, Choo YM, Kamar AA, et al. The association of cytokine levels and postnatal factors with retinopathy of prematurity. Indian J Ophthalmol. 2025;73(Suppl 1):S139-s43.

17. Özdek Ş, Ozdemir HB, Ozen Tunay Z, Bayramoglu SE, Alyamac Sukgen E, Kır N, et al. Clinical and Demographic Characteristics of Treatment Requiring Retinopathy of Prematurity in Big Premature Infants in Turkiye: Report No. 1 (BIG-ROP Study). Ophthalmologica. 2024;247(5-6):293-303.

18. Nieves-Moreno M, Yeo D, Patel HI, Reddy MA. The frequency of severe corneal opacities in premature infants. J aapos. 2021;25(4):221.e1-.e5.

19. Boskabadi H, Abrishami M, Shoeibi N, Kakavandi M, Moradi M, Zakerihamidi M. Incidence of Retinopathy of Prematurity in Neonates with Neonatal Sepsis. Arch Iran Med. 2023;26(5):248-51.

20. Isaacs M, Shah SP, Dai S, Cartwright D. Increased risk of retinopathy of prematurity since increased O(2) saturation targets: A multi-centre study. J Paediatr Child Health. 2023;59(9):1067-74.

21. Gül C, Kaplan Ö C, Akbaş YB, Aksöz P, Kelebek M, Kaldırım H. Investigation of the rates of retinopathy of prematurity and other diseases in infants born late preterm: is routine ROP examination required? Eye (Lond). 2025;39(5):913-7.

22. Lekha T, Balakrishnan D, Giridhar A, Alex D, Goyal A. Retinopathy of Prematurity in Extreme Preterm and Extreme Low-birth-weight Infants: Incidence, Course, and Risk Factors. Middle East Afr J Ophthalmol. 2023;30(3):136-40.

23. Sankar BK, Amin H, Pappa P, Riaz KM. Risk Factors of Retinopathy of Prematurity: A Prospective Study. Indian J Public Health. 2025;69(1):111-4.

