

## Original Research Article

# Prevalence of retinopathy of prematurity: a 3-year retrospective study

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### ABSTRACT

**Background:** Retinopathy of prematurity (ROP) is a vasoproliferative disease of premature infants which leads to permanent blindness. Early screening is needed to diagnose ROP and prevent blindness.

**Methods:** Retrospective study was conducted in 225 neonates from January 2018 to December 2020. All neonates with birth weight <2000 gm and/or gestational age <38 weeks were included. History of oxygen given to neonates and presence of sepsis in neonates was noted. The infant's pupil were dilated. Fundus examination was done. All the data was entered in MS-Excel 2016 and analyzed by SPSS (version 19). Chi-square test was done to calculate p value.

**Results:** Out of total of 225 neonates, 137 (60.88%) were males and 88 (39.12%) were females. The gestation age of neonates (in weeks) ranged from 25 to 40 (mean: 32.35). The birth weight of neonates (in grams) ranged from 570 to 2500 (mean: 1460). 21 (9.33%) were found to have ROP. The male neonates found with ROP were 16 (11.67%) while females were 5 (5.68%) ( $p > 0.05$ ). Out of 148 neonates who were given oxygen 19 (12.83%) developed ROP (odds ratio: 5.52). Out of 42 neonates who had sepsis, 2 (4.76%) developed ROP (odds ratio: 0.43).

**Conclusions:** The prevalence of ROP was 9.33%. The prevalence is showing a decreasing trend. ROP is not affected by gender. Oxygen given to neonates is associated with greater ROP. But sepsis in neonates is not associated with development of ROP.

**Keywords:** Oxygen, Prevalence, Retinopathy of prematurity, Sepsis

### INTRODUCTION

Retinopathy of prematurity (ROP) is a vasoproliferative disease that affects the developing retinal vascular system in premature infants.<sup>1</sup> It is characterized by the development of abnormal retinal vessels secondary to an incomplete vascularization of the retinal tissue due to hypoxia causing downregulation of vascular endothelial growth factor (VEGF) and death of endothelial cells.<sup>2</sup> This mechanism suggest that VEGF plays a vital role for the endothelium. Following closure of growing vessels, the retinal tissue in development becomes ischemic and hypoxic. This process upregulates VEGF leading neovascularization.<sup>3,4</sup>

Blindness and visual disability are the main long term visual outcomes of ROP. Globally, ROP is estimated to affect more than 50,000 infants annually.<sup>5</sup> The incidence

of ROP in India is reported to vary between 38-51.9% in low-birth-weight infants.<sup>1,2,6-9</sup>

With increased survival of premature infants due to advanced neonatal care, the number of children affected by ROP is rising in low- and middle-income countries.

ROP is a multifactorial disease. Many studies report several risk factors associated with this condition, some of which can cause severe ROP.<sup>7-11</sup> Low birth weight and pre-term births are common risk factors. Other risk factors are supplemented oxygen, prolonged mechanical ventilation, Apgar score, pulmonary complications, anemia, intraventricular hemorrhage. The identification of risk factors interfering with the progression of ROP and the knowledge on its etiology may help ophthalmologist and neonatologist to perform careful screening, execute accurate diagnosis and prevent development of the disease. Due to increasing neonatal

care and awareness about screening of new born babies for ROP, a change in its prevalence is anticipated.

While many studies have been conducted across the world, no such study of three years long duration has been conducted in this region.

## METHODS

After taking permission from institutional ethics committee a retrospective study was conducted from January 2018 to December 2020 at Department of Ophthalmology in association with Neonatal Intensive Care Unit (NICU), Geetanjali Medical College and Hospital, Udaipur.

### Inclusion criteria

All neonates with birth weight less than 2000 gm and/or gestational age less than 38 weeks were included. Any neonate with unstable clinical course who was considered to be at high risk of development of ROP, as determined by the neonatologist, was also included.

### Exclusion criteria

Neonates, whose parent refused consent were excluded from the study.

Old records of patients who were screened for ROP were searched. The infant's pupil were dilated with combination of phenylephrine (5%) + tropicamide (0.8%) eye drop which was diluted 1:1 with pharmaceutically available carboxy methyl cellulose eye drop, so that the final drop had 2.5% phenylephrine and 0.4% tropicamide. This drop was instilled twice at an interval of 10 minutes.

History of oxygen given to neonates and presence of sepsis in neonates was noted. The examination was done by binocular indirect ophthalmoscope and +28 diopter lens with scleral indentation after dilatation of pupils. Anterior segment and fundus findings were noted.

### Data analysis

All the data was entered in MS-Excel 2016 and analysed by SPSS (version 19). Maximum, minimum, mean and standard deviation were calculated. Chi-square test was done to calculate P value.  $P < 0.05$  was considered statistically significant.

## RESULTS

Out of a total of 225 neonates who were examined, 137 (60.88%) were males and 88 (39.12%) were females.

The gestation age of neonates (in weeks) ranged from 25 to 40 (mean age: 32.35). The gestation age of male neonates (in weeks) ranged from 25 to 40 (mean age

32.21±2.71) while that of females ranged from 25 to 38 (mean age: 32.57±2.92).

The birth weight of neonates (in grams) ranged from 570 to 2500 (mean weight: 1460). The weight of male neonates (in grams) ranged from 750 to 2500 (mean weight 1440±360) while that of female neonates (in grams) ranged from 570 to 2160 (mean weight: 1480±360).

**Table 1: Distribution of mean weight and mean age of neonates found with ROP.**

	Mean weight±SD	Mean age±SD
<b>Male</b>	1.182±0.229	30.43±2.27
<b>Female</b>	1.101±0.408	30.2±3.34
<b>P value</b>	0.33	0.41

**Table 2: Distribution of neonates found with ROP according to sex.**

	Number of neonates with ROP	Percentage	P value
<b>Male</b>	16	11.67	0.13
<b>Female</b>	5	5.68	
<b>Total</b>	21		

Of all the 225 neonates examined, 21 (9.33%) were found to have ROP. The number of male neonates found with ROP were 16 (11.67%) while females were 5 (5.68%). This difference was not statistically significant.

**Table 3: Distribution of neonates found with ROP according who were given oxygen.**

	O <sub>2</sub> given yes	ROP yes	Odds ratio
<b>Male</b>	94	15	5.52
<b>Female</b>	54	4	
<b>Total</b>	148	19 (12.83%)	

Out of 148 neonates who were given oxygen 19 (12.83%) developed ROP. Out of 77 neonates who were not given oxygen, only 2 (2.59%) developed ROP. The odds for having ROP in neonates who were given oxygen was calculated to be 5.52.

**Table 4: Distribution of neonates found with ROP according to presence of sepsis.**

	Sepsis yes	ROP yes	Odds ratio
<b>Male</b>	29	1	0.43
<b>Female</b>	13	1	
<b>Total</b>	42	2 (4.76%)	

Out of 42 neonates who had sepsis, 2 (4.76%) developed ROP. Out of 183 neonates who were not having sepsis, 19 (10.38%) developed ROP. The odds for having ROP in neonates who were given oxygen was calculated to be 0.43.

## DISCUSSION

ROP is a potentially blinding but easily preventable ophthalmic disorder, provided eye screening is done at appropriate time. Our study is probably the first retrospective study of a long duration of 3 years that has been conducted in this region. We examined a huge number of 225 neonates of which males and females were 137 and 88 respectively.

The prevalence of ROP in our study was found to be 9.33%. We noted a changing trend of prevalence of ROP over time. A study by Bolton et al conducted long back in 1974 had found the prevalence of ROP to vary from 38-51.9%.<sup>6</sup> But the studies conducted recently from 2006 to 2019 have found the prevalence from 19.2% to 30%.<sup>12-15</sup> The prevalence of ROP has been found to be decreasing from 1974 to 2019. This could be due to improved neonatal intensive care unit care, increased awareness amongst neonatologist and pediatrician and early screening of pre-term neonates.

Also, results of prevalence can vary according to design, duration and sample size of the study. A study done by Mehta et al in 2017 found the prevalence of ROP to be 1.44% only. This low prevalence could be due to different selection criteria of the study such as gestation age <34 weeks and birth weight <1700 grams only and a small sample size of 69 neonates.<sup>16</sup>

We found prevalence of ROP to be more in males as compared to females. The prevalence of ROP in males was 11.68% while in females was 5.68% (Table 2). But this difference was not found to be statistically significant ( $p>0.05$ ). Other studies also have not found significant difference in prevalence of ROP among males and females.<sup>12-14</sup>

We found that oxygen given to pre-term neonates have a significant effect on ROP. In our study 12.83% neonates who received oxygen, developed ROP as compared to only 2.59% of neonates who developed ROP who did not receive oxygen. This showed that neonates who receive oxygen are 5.52 times more susceptible to development of ROP. This finding is in sync with other studies which also found that oxygen to neonates leads to retinal vasoconstriction retinal avascularity.<sup>17-19</sup> Later, when oxygen is discontinued, it leads to hypoxia and release of VEGF, which has been associated with the development of ROP.<sup>20-21</sup>

We found a greater number of male neonates as compared to female neonates who received oxygen to develop ROP (15.9% versus 7.4%) (Table 3). But this difference was not statistically significant ( $p>0.05$ ).

We did not find any significant correlation between sepsis and ROP. Out of 42 neonates who also had sepsis, only 2 (4.76%) developed ROP (Table 4). The odds ratio was found to be a mere 0.43. This finding is at variance

with other studies which found higher ROP amongst the neonates who had sepsis.<sup>22,23</sup> This could be due to better NICU care and close monitoring of the pre-term neonates at tertiary care centre, thereby hampering the development of ROP.

## CONCLUSION

The prevalence of ROP was 9.33%. The prevalence is showing a decreasing trend. ROP is not affected by gender. Oxygen given to neonates is associated with greater ROP. But sepsis in neonates is not associated with development of ROP.

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