

## Research Article

# Frequency of Retinopathy of prematurity and its risk factors

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## ABSTRACT

**Objective:** To determine the frequency of retinopathy of prematurity and its risk factors.

**Material and methods:** This cross sectional study was conducted at Department of Pediatrics Bahawal Victoria Hospital, Bahawalpur from February 2017 to August 2017. Total 50 neonates were selected. ROP was assessed in selected babies.

**Results:** Out of 50 neonates, 21 (42%) neonates were males and 29 (58%) neonates were females. Out of 50 neonates, ROP was developed in 8 (14%) neonates. Mean gestational age of babies with ROP was 30.63 weeks and that of non ROP babies was 32.10 weeks, which was statistically significant ( $p=0.024$ ). In total oxygen therapy was given to 33 (66%) babies out of 50. All the 8 (24.2%) babies who developed ROP had received oxygen (>24 hours), while no ROP was seen in babies not requiring oxygen. The association was statistically significant with p value 0.026.

**Conclusions:** For premature infants with birth weight less than 1200 grams, who has received prolonged oxygen therapy, associated respiratory distress and had received exchange transfusion the screening of ROP should be done at most appropriate time that is 32 - 40 weeks of gestational age. Timely referral of detected ROP cases for early treatment prevents blindness. There is a need for the obstetricians, neonatologist and ophthalmologist to work in close co-operation to prevent blindness due to ROP.

**Keywords:** Gestational age, Low birth weight, Premature infants, ROP

## INTRODUCTION

Retinopathy of prematurity (ROP) is a vasoproliferative disorder of the eye affecting preterm infants which can progress to cause visual impairment or blindness.<sup>1</sup> Recent advances in neonatal care in the last decade, have improved the survival rates for premature infants.<sup>2</sup> Consequently, the incidence of ROP has increased in parallel.<sup>3</sup> ROP is an important cause of childhood blindness in both developed and developing countries. This view is also expressed

by the World Health Organization's "Vision 2020 programme".<sup>4</sup>

Research has identified several factors which have been shown to have some causal association with ROP. However, three factors have shown consistent and significant association with ROP: low gestational age, low birth weight and prolonged exposure to supplementary oxygen following delivery.<sup>5</sup> Other putative risk factors include mechanical ventilation, sepsis intraventricular haemorrhage, anaemia, high

number of blood transfusions, apnoea, male gender and poor postnatal weight gain. It is difficult to determine whether these factors are actual predictors of ROP or if they reflect the severity of illness.<sup>6</sup>

A number of studies, prospective as well as retrospective have been done in developed countries to find out the frequency and specific features of ROP present in their own populations.<sup>7</sup> Pakistan is a developing country with poor health indicators. It is currently the sixth most populous country in the world. The majority of the population (66%) lives in rural areas.<sup>6</sup> Intensive care facilities for premature infants are costly and specialized services are less likely to be established in remote and rural areas. Therefore, survival rates for premature neonates in these rural areas are low and ROP is not a significant cause of blindness there. However, in the urban cities where adequate neonatal care facilities are available, it can be predicted that ROP will emerge as an important cause of childhood blindness.

In the light of the above background, we decided to conduct a study to determine the incidence of ROP in the premature infants admitted in our hospital and to determine the risk factors associated with ROP.

## MATERIAL AND METHODS

This cross sectional study was conducted at Department of Pediatrics Bahawal Victoria Hospital, Bahawalpur from February 2017 to August 2017.

Total 50 babies having birth weight 800 gram to 1500 gram, gestational age from 28 weeks to 40 weeks, either male or female were selected. Weight of the patients was measured by using digital weighing machine. Gestational age was estimated according to maternal history, obstetric ultrasonography, if taken during the first trimester of pregnancy and was confirmed by physical examination of the newborns themselves. Retinopathy of prematurity staging

was defined according to the International ROP classification.<sup>8</sup>

All the collected data was entered in SPSS version 17 and analyzed. Mean and SD was calculated for categorical data like gestational age, Duration of oxygen supplementation (hours), Oxygen concentration (%), Weight (grams). Frequencies were calculated for ROP, gender and risk factors.

## RESULTS

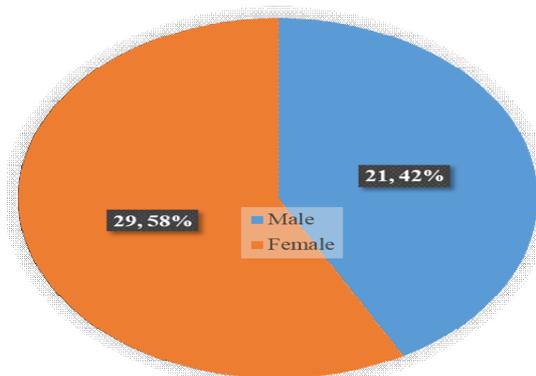
Out of 50 neonates, 21 (42%) neonates were males and 29 (58%) neonates were females. (Fig. 1).

Out of 50 neonates, ROP was developed in 8 (14%) neonates. (Fig. 2) Weight of neonates was 800 gm to 1500 gm. Patients were divided into seven groups. In weight group 801-900gm, out of 4 patients ROP was found in 3 (75%) neonates. In weight group 901-1000 gram weight group, ROP was developed in 2 (33.33%) neonates out of 6 neonates. Among the 3 patients of weight group 1001-1100 gm, ROP was seen in 1 (33.3%) patients. Out of 6 neonates of 1101-1200 neonates, ROP was noted in 1 (16.6%) patients. Total 5 patients belonged to weight group 1201-1300 gm but no evidence of ROP was noted, similarly in weight group 1301-1400 gm, no evidence of ROP was noted in 11 neonates. In weight group 1401-1500 gm, out of 15 neonates, ROP was developed in 1 (6%) neonate. (Table 1) Mean gestational age of babies with ROP was 30.63 weeks and that of non ROP babies was 32.10 weeks, which was statistically significant ( $p=0.024$ ) using independent sample t-test. (Table 2) Table 3 demonstrates the incidence of ROP on oxygen administration. In total oxygen therapy was given to 33 (66%) babies out of 50. All the 8 (24.2%) babies who developed ROP had received oxygen (>24 hours), while no ROP was seen in babies not requiring oxygen. The association was statistically significant with  $p$  value 0.026. Various risk factors and their statistical significance with ROP were given in Table 4. Exchange transfusion, respiratory distress syndrome (RDS) and septicaemia were the risk factors that showed significant association with ROP ( $P < 0.05$ ). No

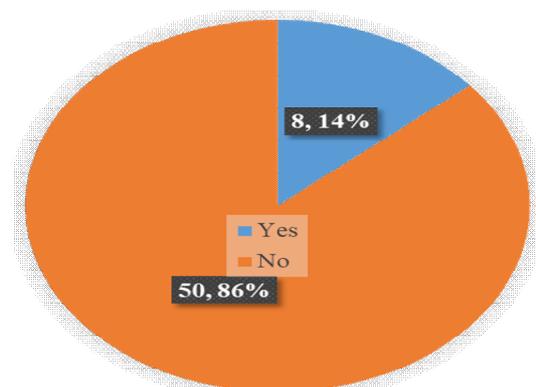
statistically significant relation was found between apneic spells, surfactant administration, blood transfusion, hyperbilirubinemia, phototherapy, septicaemia and ROP. None of the maternal factors like pregnancy induced hypertension

(PIH), anti-partum haemorrhage (APH), hypoxic ischemic encephalopathy (HIE), premature rupture of membrane (PROM) or antenatal steroids did not show any significant association with ROP ( $p=0.686$ ).

**Fig. 1:** Gender distribution



**Fig. 2:** Frequency of ROP



**Table 1:** Distribution of neonates according to birth weight

BW (gm)	Total	ROP	%
801-900	4	3	75.0
901-1000	6	2	33.3
1001-1100	3	1	33.3
1101-1200	6	1	16.6
1201-1300	5	0	0.0
1301-1400	11	0	0.0
1401-1500	15	1	6.0
Total	50	8	16.0

**Table 2:** Distribution according to gestational age.

Gestational age	ROP		Total	% age
	Yes	No		
28 weeks	2	1	3	66.6
29 weeks	0	2	2	0.0
30 weeks	2	3	5	40.0
31 weeks	1	4	5	20.0
32 weeks	2	18	20	10.0
33 weeks	0	6	6	0.0
34 weeks	1	6	7	14.3
35 weeks	0	2	2	0.0

**Table 3:** Oxygen administration and incidence of ROP.

Oxygen administration	ROP		Total	P value
	Yes	No		
Yes	0 (0%)	17 (100%)	17	0.026
No	8 (24.2%)	25 (42%)	33	
Total	8 (16%)	16 (84%)	50	

**Table 4:** Various Risk factors and their statistical significance with ROP.

Risk factor	Total babies	Babies with ROP	Odd's ratio		P value
			OR	95% CL	
Oxygen	33	8	-	-	0.027
RDS	20	7	0.064	0.007-0.575	0.003
Septicemia	26	6	0.118	0.013-1.046	0.028
Exchange transfusion	3	2	0.073	0.006-0.936	0.003
Blood transfusion	9	3	0.278	0.052-1.479	0.117
Apnoea	5	1	0.316	0.047-2.118	0.797
Surfactant	8	1	1.400	0.148-13.242	0.768
Hyper-bilirubinemia	37	5	1.920	0.388-9.489	0.131
Phototherapy	37	5	1.920	0.388-9.489	0.131
HIE	1	0	-	-	0.659
APH	3	0	-	-	0.436
PIH	8	1	1.400	0.148-13.242	0.768
PROM	28	5	0.726	0.153-3.439	0.686
Antenatal steroids	12	1	2.484	0.274-22.536	0.406

## DISCUSSION

Retinopathy of prematurity is a bilateral vasoproliferation in retina of premature baby or low birth weight babies which sometimes progresses to cause visual impairment or blindness. It is an avoidable cause of childhood blindness and its control is given priority in “WHO Vision 2020” programme. Its secondary prevention, i.e. its early treatment to prevent blindness, requires qualified ophthalmologists to screen babies at risk soon after birth.

The overall incidence of ROP in the present study was 16%. Various Indian and International studies had reported overall incidence 17.5% to 51.9% and 10.0% to 45.4% respectively.<sup>9-11</sup>

A study by Patilet al<sup>12</sup> on 40 babies <32week or <1250grams had reported overall incidence of ROP 17.5% and none with severe ROP, while other studies on babies <35week or <1500grams have reported overall incidence around 20% and

severe ROP in 7%. However, in most instances it is not possible to compare studies, as the inclusion criteria are different. Some centres include only smaller preterm babies, while others have more liberal inclusion criteria.

The mean birth weight of the ROP babies was 1043gms while that of non-ROP babies 1334gms. Lower birth weight was significantly associated with increased incidence (p=0.007) and severity (p=0.017) of ROP. The incidence of ROP was 38.9% in babies weighing ≤1250 gms at birth. The mean gestational age of the ROP babies was 30.63 weeks while that of non- ROP babies 32.1 weeks. The incidence of ROP was 33.33% in babies born ≤32 weeks of gestational age. No ROP seen after 34 week of gestation.

Oxygen is the prime factor for causation of the initial insult leading to ROP.<sup>13-14</sup> The concentration and fluctuation of oxygen administration are the key factors. Sudden discontinuation of oxygen and duration of oxygen therapy are also incriminated

in the pathogenesis of ROP. Oxygen acts partly through vascular endothelial growth factor, plays a central role in retinal vessel development and in ROP. It is important to note that other biochemical mediators are also involved in the pathogenesis of retinopathy. Oxygen therapy was given to 33 (66%) babies. All the 8 (24.2%) babies who developed ROP had received oxygen, while no ROP was seen in babies not requiring oxygen. The association was statistically significant with *p* value 0.027.

Respiratory distress syndrome (*p*=0.003), exchange transfusion (*p*=0.003) and septicaemia (*p*=0.028) were other significant factors associated with the development of ROP. All these situations require oxygen administration and so could be indirectly associated with ROP. Out of 8 babies who developed ROP 5 (62.5%) were in stage 1, 3 (37.5%) were in stage 2 and no baby developed stage 3 or higher disease. So no severe ROP was seen in the study group. Possible causes could be monitored and judicious use of oxygen and earlier screening. Other causes could be smaller sample and relatively lower number of extremely premature babies. Similar results have been seen in other studies also.<sup>15</sup>

Though gender did not significantly influence the incidence but female predominance of ROP was seen (*p*=0.778) in the present study. On univariate analysis birth weight, gestational age, oxygen administration, RDS, sepsis, exchange transfusion and mechanical ventilation were found to be significant factors. Hence, meticulous fundus examination with indirect ophthalmoscopy in all preterm babies with birth weight  $\leq$ 1500gms is essential non-invasive method for early detection of ROP and its progression.<sup>16-17</sup>

## CONCLUSION

This study concludes that ROP is an important complication of prematurity. In most of the cases it does not require treatment but close follow up. Screening should be intensified in the presence of factors like oxygen administration, RDS and exchange transfusion. Better management of risk

factor may reduce the chances of progression to visual threatening disease. Timely referral of detected ROP cases for treatment prevents blindness. There is need for the obstetricians, neonatologist and ophthalmologist to work in close co-operation to prevent blindness due to ROP.

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