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# **Original Research**

### Role of oxygen therapy in preventing retinopathy of prematurity in infants

Sanjeev Kumar Singh<sup>1</sup>, R.K. Jaiswal<sup>2</sup>

<sup>1</sup>M.B.B.S., M.S. Ophthalmology, Additional CMO Amethi, U.P., India; <sup>2</sup>Professor & Head, BRD Medical College, Gorakhpur, U.P., India

#### ABSTRACT:

**Background:** Retinopathy of prematurity (ROP) is an important cause of preventable blindness in children. The present study was conducted to assess role of oxygen therapy in preventing retinopathy of prematurity. **Materials & Methods:** 74 inborn very low-birth weight (VLBW) infants who underwent ROP screening were divided into 2 groups, group I before supplemental oxygen protocol and group II after supplemental oxygen protocol. Eye examinations were performed by trained pediatric ophthalmologists. Oxygen saturation levels of infants were measured by using Nellcor pulse oximeters. **Results:** There were 30 LBW infants in group I and 26 in group II. ROP stage 1 was seen in 22 and 20, stage 2 in 10 and 12, stage 3 in 3 and 2 and stage 4 in 2 and 3 in group I and II respectively. The mean supplemental oxygen at 36 weeks was seen in 35 and 32, supplemental oxygen at discharge was seen in 30 and 25, laser treatment in 15 and 8, retinal detachment in 4 and 1, plus disease was present in 13 and 6 and progression from stage 2 to 3 was seen in 8 and 4 in group I and II respectively. **Conclusion:** Oxygen supplementation found to be effective in preventing progression from stage 2 to stage 3 ROP in premature infants.

Key words: Low-birth weight, Oxygen, Retinopathy of prematurity

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Corresponding author: R.K. Jaiswal, Professor & Head, BRD Medical College, Gorakhpur, U.P., India

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#### **INTRODUCTION**

Retinopathy of prematurity (ROP) is an important cause of preventable blindness in children. It accounts for up to 10% of childhood blindness, and it is believed to account for 6-18% of childhood blindness in developed countries.<sup>1</sup> Recent advances in neonatal care in the last decade, have improved the survival rates for premature infants. Consequently, the incidence of ROP has increased in parallel. ROP is under constant epidemiological study around the world.<sup>2</sup>

Retinopathy of prematurity (ROP) is a vasoproliferative disorder of the retina occurring principally in new born preterm infants. It is an avoidable cause of childhood blindness. With the increase in the survival of preterm babies, ROP has become the leading cause of preventable childhood blindness throughout the world.<sup>3</sup>

The stages of ROP describe the ophthalmoscopic findings at the junction between the vascularized and avascular retina; stage 1 is a faint demarcation line, stage 2 is an elevated ridge, stage 3 is an extraretinal

fibrovascular tissue, stage 4 is a subtotal retinal detachment, while stage 5 is a total retinal detachment.<sup>4</sup> In addition, plus disease, which indicates significant vascular dilation and tortuosity observed at the posterior retinal vessels, may be present at any stage and reflects the increased blood flow through the retina.<sup>5</sup> The possibility that higher levels of oxygen would prevent progression of ROP later in the course of treatment after ROP has already developed has been studied in the supplemental therapeutic oxygen for prethreshold retinopathy of prematurity (STOP-ROP) trial.<sup>6</sup> The present study was conducted to assess role of oxygen therapy in preventing retinopathy of prematurity.

#### **MATERIALS & METHODS**

The present study comprised of 74 inborn very lowbirth weight (VLBW) infants who underwent ROP screening of both genders. All parents were informed regarding the study and their written consent was obtained. Demographic data such as name, age, gender etc. was recorded. Patients were divided into 2 groups, group I before supplemental oxygen protocol and group II after supplemental oxygen protocol. Eye examinations were performed by trained pediatric ophthalmologists. Oxygen saturation levels of infants were measured by using Nellcor pulse oximeters. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

#### **RESULTS Table I Distribution of infants**

Total- 74					
Gender	Boys	Girls			
Number	44	30			
4 1 1 1	20				

Table I shows that out of 74, boys were 44 and girls were 30.

#### Table II Incidence of ROP

Parameters	Group I (37)	Group II (37)	P value
LBWI	30	26	0.05
ROP			
Stage 1	22	20	0.01
Stage 2	10	12	
Stage 3	3	2	
Stage 4	2	3	

Table II shows that there were 30 LBW infants in group I and 26 in group II. ROP stage 1 was seen in 22 and 20, stage 2 in 10 and 12, stage 3 in 3 and 2 and stage 4 in 2 and 3 in group I and II respectively. The difference was significant (P < 0.05).

#### Table III Comparison of parameters

Parameters	Group I	Group II	P value
Supplemental oxygen at 36 weeks	35	32	0.92
Supplemental oxygen at discharge	30	25	0.05
Laser treatment	15	8	0.01
Retinal detachment	4	1	0.01
Plus disease present	13	6	0.01
Progression from stage 2 to 3	8	4	0.02

Table II, graph I shows that mean supplemental oxygen at 36 weeks was seen in 35 and 32, supplemental oxygen at discharge was seen in 30 and 25, laser treatment in 15 and 8, retinal detachment in 4 and 1, plus disease was present in 13 and 6 and progression from stage 2 to 3 was seen in 8 and 4 in group I and II respectively.

#### **Graph I Comparison of parameters**



#### DISCUSSION

The stages of ROP describe the ophthalmoscopic findings at the junction between the vascularized and avascular retina; stage 1 is a faint demarcation line, stage 2 is an elevated ridge, stage 3 is an extraretinal fibrovascular tissue, stage 4 is a subtotal retinal detachment, while stage 5 is a total retinal detachment.<sup>7</sup> In addition, Plus disease, which indicates significant vascular dilation and tortuosity observed at the posterior retinal vessels, may be present at any stage and reflects the increased blood flow through the retina.<sup>8</sup>

Terry first described retrolental fibroplasia with implication of oxygen therapy as the causative agent. However, reports have found ROP in cases without oxygen therapy and even after oxygen therapy, not all premature infants develop ROP.<sup>9</sup> 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>10</sup> The present study was conducted to assess role of oxygen therapy in preventing retinopathy of prematurity.

In present study, out of 74, boys were 44 and girls were 30. Colaizy et  $al^{11}$  in their retrospective cohort study performed of premature infants undergoing ROP screening before (cohort A) and after (cohort B) implementation of an oxygen therapy protocol to inhibit further progression for those with stage 2 ROP or worse. In cohort A, without oxygen therapy protocol (2002-2007), 44% (54/122) of infants progressed beyond stage 2, compared to 23% (24/103) of infants after protocol implementation (cohort B, 2008–2012). No significant differences between cohort A and B were found for gestational age, birth weight, survival, sepsis, bronchopulmonary dysplasia, oxygen at discharge, or need for diuretics. Infants with stage 2 ROP in cohort B, with oxygen therapy protocol, had significantly decreased risk of ROP beyond stage 2, compared to cohort A, correcting for birth weight and necrotizing differences in enterocolitis.

We found that there were 30 LBW infants in group I and 26 in group II. ROP stage 1 was seen in 22 and 20, stage 2 in 10 and 12, stage 3 in 3 and 2 and stage 4 in 2 and 3 in group I and II respectively. The mean supplemental oxygen at 36 weeks was seen in 35 and 32, supplemental oxygen at discharge was seen in 30 and 25, laser treatment in 15 and 8, retinal detachment in 4 and 1, plus disease was present in 13 and 6 and progression from stage 2 to 3 was seen in 8 and 4 in group I and II respectively. Hakeem et al<sup>12</sup> found that out of the studied 172 infants, 33 infants (19.2%) developed ROP in one or both eyes; 18 (54.5%) cases stage 1, 9 (27.3%) cases stage 2, and 6 (18.2%) cases stage 3. None of the studied neonates presented ROP at stages 4 or 5. The six cases diagnosed as ROP stage 3 underwent laser ablative therapy. Univariate analysis showed that there was a significant relationship between the occurrence of ROP and gestational age (P = 0.000), sepsis (P = 0.004), oxygen therapy (P = 0.018), and frequency of blood transfusions (P = 0.030). However, an insignificant relationship was found between the occurrence of ROP and sex, mode of delivery, birth weight, respiratory distress syndrome, patent ductus arteriosus, intraventricular hemorrhage, hypotension, phototherapy, duration of oxygen therapy, mechanical ventilation, and CPAP (all P > 0.05). Gestational age, sepsis, oxygen therapy, and frequency of blood transfusions remained significant variables after logistic regression analysis.

#### CONCLUSION

Authors found that oxygen supplementation found to be effective in preventing progression from stage 2 to stage 3 ROP in premature infants.

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