Original Research Article

Assessment of the effect of supplemental oxygen on development of retinopathy of prematurity

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Abstract

Background: Retinopathy of prematurity is a vasoproliferative disorder that affects premature infants. The present study was conducted to assess the effect of supplemental oxygen on development of retinopathy of prematurity.**Materials & Methods:** 90 neonates of 0-28 day's old of both gender with possibilities of ROP were included and assessment of retinopathy was done.**Results:** There were 1 ROP +ve and 12 ROP-ve neonates seen within 24-72 hours of oxygen inhalation, 6 and 10 in 73-120, 22 and 2 in 121-170 and 36 and 1 >170 hours of oxygen inhalation respectively. There were 8 ROP+ve and 10 ROP-ve neonates seen with 85-89 Oxygen saturation, 25 and 12 with 90-94 Oxygen saturation and 32 and 3 with 95-99 Oxygen saturation respectively. The artial pressure of oxygen (PaO2) was 70-99 seen in 13 and 8, 100-150 seen in 40 and 14and >150 in 12 ROP +ve and 3 ROP-ve respectively. The difference was significant (P< 0.05).**Conclusion:** Retinopathy of prematurity was seen with oxygen supplementation.

Key words: Oxygen, Neonates,Retinopathy of prematurity.

Introduction

Retinopathy of prematurity is a vasoproliferative disorder that affects premature infants. Despite major advances in management, it continues to be a leading cause of childhood blindness throughout the world. The spectrum of ROP ranging from mild, transient changes in the retina with progression to severe progressive vasoproliferation, scarring, detachment of retina and blindness[1].In the early treatment for retinopathy of prematurity (ET-ROP) study in the United States, the incidence of any stage ROP was 68% among infants weighing < 1251 g.

Among infants with ROP, clinically-significant (prethreshold) ROP developed in 36.9%[2]. Most guidelines use birth weight (BW) and gestational age (GA), which are major risk factors, to identify infants in need of ROP screening. Current guidelines by the American Academy of Pediatrics, American Academy of Ophthalmology, and American Association for Pediatric Ophthalmology and Strabismus stipulate that all infants ≤30 weeks GA or ≤1500g BW should be screened for ROP, as well as selected larger infants based on clinical course[3].Oxygen was discovered more than 200 years ago and it has been administered to more infants in the world than any other neonatal treatment[4]. However, we still do not fully know how much is wise to give or how much infants actually need in relation to variations in illness and gestational and postnatal age. But we have known for many years that "too much oxygen" damages the retina. Many neonatal units have adopted new oxygen saturation policies to reduce the amount of supplemental oxygen given to premature infants[5]. The present study was conducted to assess the effect of supplemental oxygen on development of retinopathy of prematurity.

Materials & Methods

The present study comprised of 90 neonates of 0-28 day's old of both gender with possibilities of ROP. Parents were informed regarding the study and their written consent was obtained. Inclusion criteria was baby's birth weight ≤2500gm, <34weeks ofgestation, babies withsickness like need of cardiorespiratory support, prolong oxygen therapy,apnea of prematurity,anemia and neonatal sepsis. Exclusion Criteria were neonates who had congenital anomalies, Syndromic manifestations or suspected inborn errorsofmetabolism and neonates who had congenital eye problems like cataract, glaucoma or corneal opacities. Assessment of retinopathy was done. Results of the study was tabulated for statistical analysis. P value less than 0.05 was considered significant.

Results

Table 1:Distribution of neonates

Gender	ROP +ve	ROP-ve
Male	35	14
Female	30	11

Table 1: shows that ROP+ve were 35 males and 30 females and ROP-ve were 14 males and 11 females.

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Table 2:Distribution of duration of oxygen inhalation (hours)

Duration (Hours)	ROP +ve	ROP-ve	P value
24-72	1	12	0.01
73-120	6	10	
121-170	22	2	
>170	36	1	

Table 2, Fig 1 shows that there were 1 ROP +ve and 12 ROP-ve neonates seen within 24-72 hours of oxygen inhalation, 6 and 10 in 73-120, 22 and 2 in 121-170 and 36 and 1 >170 hours of oxygen inhalation respectively. The difference was significant (P< 0.05).

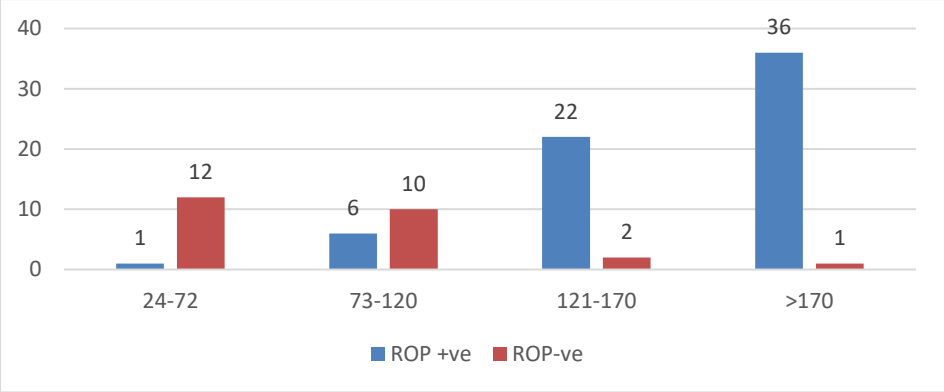

Fig 1:Distribution of duration of oxygen inhalation (hours)

Table 3: Oxygen saturation (SpO2) and association with ROP

Oxygen saturation (SpO2)	ROP +ve	ROP-ve	P value
85-89	8	10	0.01
90-94	25	12	
95- 99	32	3	

Table 3 shows that there were 8 ROP+ve and 10 ROP-ve neonates seen with 85-89 Oxygen saturation, 25 and 12 with 90-94 Oxygen saturation and 32 and 3 with 95-99 Oxygen saturation respectively. The difference was significant (P< 0.05).

Table 4:Partial pressure of oxygen (PaO2) and association with ROP

PaO2 (mm Hg)	ROP +ve	ROP-ve	P value
70-99	13	8	0.01
100-150	40	14	
>150	12	3	

Table 4, Fig 2 shows that partial pressure of oxygen (PaO2) was 70-99 seen in 13 and 8, 100-150 seen in 40 and 14and >150 in 12 ROP +ve and 3 ROP-ve respectively. The difference was significant (P< 0.05).

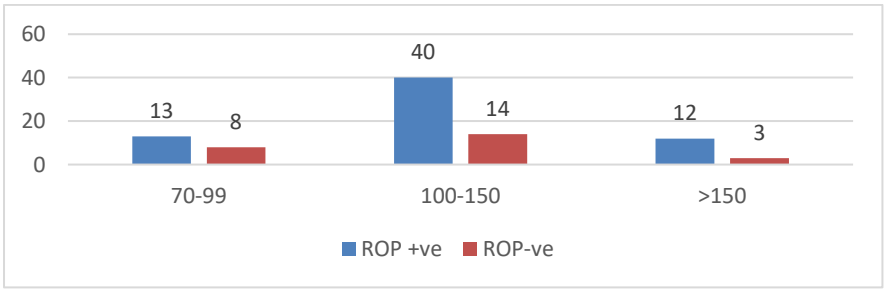

Fig 2:Partial pressure of oxygen (PaO2) and association with ROP

Discussion

Since ROP was first described over 75 years ago, there have been thousands of papers published on the disease. It's estimated that the number of blind children in the world is approximately 1.5 million[6].Among those cases, Retinopathy of Prematurity (ROP) is one of the most important preventable causes. Nearly 50,000 infants

each year become blind from ROP worldwide. Severe ROP is a serious vasoproliferative disorder that can affect extremely premature infants. ROP, also known as retrolental fibroplasia, was first recognized as a disease in 1942 by Dr. Theodore L. Terry[7]. Given the enormous impact of lifetime vision impairment or blindness caused by ROP on the quality of life of affected infants, many studies have been performed in order to find out the relationship between ROP and certain risk factors[8].The present study was conducted to assess the effect of supplemental oxygen on development of retinopathy of prematurity.In present study, ROP+ve were 35 males and 30 females and ROP-ve were 14 males and 11 females. There were 1 ROP +ve and 12 ROP-ve neonates seen within 24-72 hours of oxygen inhalation, 6 and 10 in 73-120, 22 and 2 in 121-170 and 36 and 1 >170 hours of oxygen inhalation respectively. Das et al[9] evaluated the effect of supplemental Oxygen on development of retinopathy of prematurity. In total 120 0-28 day's old neonates of both sexes possibilities of ROP were finalized as the study population. Thirty (36.59%) neonates got oxygen up to 72 hours did not developed ROP. Only one 1(2.63%) ROP (+ve) neonates received oxygen for 73 to 120 hours. Those who received oxygen for duration of 170-218 hours and >218 hours developed ROP, RR was 2.01 [1.17-3.48] and 4.67 [2.71-8.03] respectively and ($p<0.05$). On the other hand, five neonates (13.16%) of ROP (+ve) got percentage of oxygen in inhaled air (41-60) % and this concentration was found statistically significant risk for ROP, RR 3.48 [2.61-4.64] but there was no risk associated with FiO2 (24-32) % or 33-40% in inhaled air. SpO2 (95-99) % was present in 29 (76.32%) of ROP (+ve) neonates and 19 (23.17%) in ROP (-ve) neonates.We observed that there were 8 ROP+ve and 10 ROP-ve neonates seen with 85-89 Oxygen saturation, 25 and 12 with 90-94 Oxygen saturation and 32 and 3 with 95-99 Oxygen saturation respectively. The partial pressure of oxygen (PaO2) was 70-99 seen in 13 and 8, 100-150 seen in 40 and 14and >150 in 12 ROP +ve and 3 ROP-ve respectively. Haurpurg at el[10] found that infant exposed to high PCO2, low PH and high PaO2 appear to be at increased risk of more severe ROP. In the current study PaO2 was measured intermittently as per advised by consultant neonatologist. It was found that 15 (39.47%) neonates of ROP (+ve) found to have PaO2 >150 mm of Hg and the RR 2.90. The high PaO2 of this group may be due to blood sample were taken while the neonates on oxygen therapy. When duration of oxygen therapy was compared in the ROP (+ve) and ROP (-ve) group, this difference was significant ($P< 0.05$). The mean duration of supplemental oxygen in the ROP (+ve) neonates 299 hours and in ROP (-ve) neonates it was 128 hours. Multiple logistic regression analysis using SPSS identified, duration of oxygen as an independent factors which could significantly predict development of ROP (P=0001).Teioh et al[11] found that the duration of exposure to oxygen therapy increase, the risk of development of ROP, in their study the mean duration of oxygen therapy among 36 infants with ROP was 9.4 days. In India, Rekha et al[12]reported that duration of oxygen therapy and anemia were independent factors predicting the development of ROP.

Conclusion

Authors found that retinopathy of prematurity was seen with oxygen supplementation.

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