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ORIGINAL ARTICLE

Study of Risk Factors in Retinopathy of Prematurity in A Tertiary Eye Care Center

Princy Choudhary, Ananta Raina, Hans Raj Sharma, Ashok K. Sharma, Palak Gupta

Abstract

Background: Retinopathy of prematurity (ROP) is a vascular disease of retina seen in premature infants which is associated with various risk factors. **Objective:** To find out the risk factors associated with ROP in tertiary eye care center. **Material and Methods:** The study was a hospital based, cross-sectional, observational study involving babies at risk of retinopathy of prematurity (ROP). A total of 400 infants were screened using indirect ophthalmoscope. At the time of screening the factors which were studied includes sex, gestational age, birth weight, respiratory distress syndrome, sepsis, blood transfusion, apnea, phototherapy and intraventricular hemorrhage. **Results:** Out of 400 neonates, 232 (58%) were males and 168 (42%) were females. ROP was seen in 70 (17.5%) of these 400 neonates. Of these 70 neonates, 42.8% developed stage-1 ROP, 45.7% developed stage- 2 ROP, 5.71% developed stage- 3 and 5.71% developed stage- 4. Gestation age ≤34 week ($p= 0.008$) and birth weight <2kg ($p<0.001$) were found to be significant risk factors for ROP development. Respiratory distress syndrome ($p=0.012$) and oxygen supplementation($p<0.001$) are also significant risk factors for the development of ROP. **Conclusion:** This study shows low birth weight, low gestation age, Oxygen supplementation and respiratory distress syndrome are associated with development of ROP. Such analysis of risk factors helps us to predict ROP in high-risk cases.

Keywords

Retinopathy of Prematurity, Risk factors, Oxygen supplementation

Introduction

Retinopathy of prematurity (ROP) is a vascular disease of retina which affects premature infants. It was first described by Terry in 1942 as retrolental fibroplasia as he considered it to be proliferation of embryonic hyaloid system. [1] In United States ROP accounts for 6-18% of childhood blindness. [2] The incidence of ROP in India is reported to be 32.3%. [3] The neonatology practice has improved over the years and more premature infants are now surviving. This can lead to an increase in the incidence of ROP. Established risk factors for ROP include prematurity, low birth weight and prolonged supplement oxygen. Oxygen supplementation causes pathologic growth of vessels in the developing retina and can permanently damage retina. Apnea is an independent risk

Department of Ophthalmology, Government Medical College, Jammu, Jammu and Kashmir, India

Correspondence to: Dr. Hans Raj Sharma, Associate Professor, Department of Ophthalmology, Government Medical College, Jammu

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factor for ROP. [4] Neonatal sepsis is also associated with an increased risk of developing ROP. [5] The aim of the present study is to identify the risk factors associated with the development of ROP at tertiary eye care center.

Material and Methods

This was a hospital based, cross- sectional, observational study involving babies at risk of retinopathy of prematurity (ROP) and was conducted in Upgraded Department of Ophthalmology, Government Medical College, Jammu after due approval from Institutional Ethics Committee.

Inclusion Criteria

1) All the premature infants which are less than or equal to 34 weeks.

2) All Low-birth-weight babies (less than 2kg) irrespective of gestational age.

3) Infants with gestational age between 34 to 36 weeks but with risk factors such as: cardio-respiratory support, prolonged oxygen therapy, respiratory distress syndrome, chronic lung disease, fetal hemorrhage, blood transfusion, neonatal sepsis, exchange transfusion, intraventricular hemorrhage, apneas and poor postnatal weight gain.

4) Infants with an unstable clinical course who are at high risk (as determined by the neonatologist or pediatrician).

Exclusion Criteria

1) Infants with congenital anomalies.

2) Chromosomal abnormalities.

3) Congenital metabolic diseases.

At the time of screening the factors which were studied includes sex, gestational age, birth weight, respiratory distress syndrome, sepsis, blood transfusion, apnea, phototherapy and intraventricular hemorrhage.

The examination was carried out at four weeks after birth. For babies delivered earlier than 28 weeks or birth weight less than 1200 gm, ROP screening was done 2-3 weeks after birth. Screening was performed using indirect binocular ophthalmoscope with +28 diopter lens after pupillary dilatation. Pupils were dilated with a combination of phenylephrine 2.5% and tropicamide 0.4%. This concentration was achieved by diluting the commercially available combination of phenylephrine 5% and tropicamide 0.8% with pharmaceutically available methyl cellulose drops in the ratio of 1:1. Topical anesthetic proparacaine 0.5% was applied in conjunctival sac before examination and examination was done using wire speculum. Scleral indenter was used when needed.

Statistical Analysis

Data was collected and entered in Excel spread sheet. Risk factors were analyzed using Chi-square test and a Yates corrected 2 tailed p value of <0.05 was considered as significant.

Results

This study included 400 neonates which fulfilled the inclusion criteria. Out of 400 neonates, 232 (58%) were males and 168 (42%) were females. ROP was seen in 70 (17.5%) of these 400 neonates. Of these 70 neonates, 42.8% developed stage-1 ROP, 45.7% developed stage-2 ROP, 5.71% developed stage- 3 and 5.71% developed stage- 4 (*Table 1*).

Gestation age ≤ 34 week ($p=0.008$) and birth weight <2kg ($p<0.001$) were found to be significant risk factors for ROP development.

Respiratory distress syndrome ($p=0.012$) and oxygen supplementation ($p<0.001$) are also significant risk factors for the development of ROP (*Table 2*). In this study sex, sepsis, intraventricular hemorrhage, blood transfusion, phototherapy and apnea were not found as significant risk factors for development of ROP (*Table 2*).

Table 1. Distribution of Various Stages of ROP

Stage of ROP	No. of New-born with ROP
Stage 1	30
Stage 2	32
Stage 3	4
Stage 4	4

Table 2. Relationship Between ROP and Risk Factors

Parameter	Cases with ROP (n=70)	Cases without ROP (n=330)	p-value (2 tailed, Yates corrected)
Sex: Male (n=232) Female (n=168)	 36 34	 196 134	0.27
Gestation age ≤34 week	64	252	0.008*
Birth weight <2Kg	66	230	<0.001*
Respiratory distress syndrome	30	50	0.012*
Sepsis	30	126	0.552
Intraventricular hemorrhage	4	8	0.25
Oxygen supplementation	62	124	<0.001*
Blood transfusion	7	22	0.46
Apnea	8	26	0.46
Phototherapy	35	176	0.70
*p<0.05 is significant; ROP: Retinopathy of Prematurity			

Discussion

ROP remains an important cause of preventable childhood blindness worldwide which occurs in immature retina. In this study, low birth weight (p<0.001) was found to be a risk factor for the development of ROP. This was in concordance with studies done by Shah *et al*., [6] Filho *et al*. [7] and Flores-Santos *et al*. [8] Low gestation age (p=0.008) was also found to be a significant risk factor for ROP. This was also seen in studies done by Shah *et al.* [6] and Filho *et al*. [7] who also found low gestation age to be a significant risk factor for the development of ROP.

In our study, oxygen therapy (p<0.001) was also associated with development of ROP. Murthy *et al*. [9] and Weinberger *et al*. [10] also reported oxygen to be a risk factor for ROP development. Respiratory distress syndrome (RDS) (p=0.012) was also found to be significant for the development of ROP in our study. This was also shown by Taqui *et al*. [11] However, study by Ahmedhussain *et al.* [12] did not find RDS to be a significant factor for the development of ROP.

In our study sepsis (p=0.552) was not found to be a significant factor for the development of ROP. This was in agreement with studies by Chaudhari *et al.* [13] where sepsis was not found to be a significant risk factor. But studies by Shah et al. [6] and Vinekar *et al.* [14] have shown sepsis to be a significant factor for the development of ROP.

In our study apnea (p=0.46) was not found to be of significance for ROP development. However, Chen *et al*. [4] considered it to be an independent risk factor for ROP development. Blood transfusion (p=0.46) was not found significant for the development of ROP in this study. This contrasted with the study by Chawla *et al*. [15] where blood transfusion was found as a risk factor

for ROP development.

In our study there was no significance between sex of new-born and development of ROP. However, study by Darlow *et al.* [16] found male sex a significant risk factor. Phototherapy (p=0.70) and intraventricular hemorrhage (p=0.25) were insignificant for the development of ROP in the present study. Chaudhari *et al*. [13] also reported phototherapy to be insignificant for ROP development. Shah *et al.* [6] found intraventricular hemorrhage to be of significance for the development of ROP. Taqui *et al.* [11] did not report significant relationship between intraventricular hemorrhage and ROP.

Conclusion

In conclusion this study shows low birth weight, low gestation age, oxygen supplementation and respiratory distress syndrome to be the risk factors associated with development of ROP. Such analysis of risk factors helps us to predict ROP in high-risk cases and to formulate screening guidelines.

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Conflicts of Interest
There are no conflicts of interest.

References

1. Terry TL. Extreme prematurity and fibroblastic overgrowth of persistent vascular sheath behind each crystalline lens: I. Preliminary report. Am J Ophthalmol 1942;25:203-4.
2. Coats DK, Miller AM, Hussein MA, McCreery KM, Holz E, Paysse EA. Involution of retinopathy of prematurity after laser treatment: factors associated with development of retinal detachment. Am J Ophthalmol 2005;140(2):214-22.
3. Tekchandani U, Katoch D, Dogra MR. Five-year demographic profile of retinopathy of prematurity at a tertiary care institute in North India. Indian J Ophthalmol 2021;69(8):2127-31.
4. Chen Y, Li XX, Yin H, Gilbert C, Liang JH, Jiang YR, et al. Risk factors for retinopathy of prematurity in six neonatal intensive care units in Beijing, China. Br J Ophthalmol 2008;92(3):326-30.
5. Chiang MF, Arons RR, Flynn JT, Starren JB. Incidence of retinopathy of prematurity from 1996 to 2000: analysis of a comprehensive New York state patient database. Ophthalmology 2004;111(7):1317-25.
6. Shah VA, Yeo CL, Ling YL, Ho LY. Incidence, risk factors of retinopathy of prematurity among very low birth weight infants in Singapore. Ann Acad Med Singap 2005;34(2):169-78.
7. Filho JB, Barros CK, Lermann VL, Eckert GU, da Costa MC, Procianoy RS. Prevention of blindness due to retinopathy of prematurity at Hospital de Clínicas de Porto Alegre, Brazil: incidence, risk factors, laser treatment and outcomes from 2002 to 2006. Acta Medica Lituanica 2006;13(3):130-6.
8. Flores-Santos R, Hernández-Cabrera MA, Henández-Herrera RJ, Sepúlveda-Cañamar F. Screening for retinopathy of prematurity: results of a 7-year study of underweight newborns. Arch Med Res 2007;38(4):440-3.
9. Murthy KR, Nagendra, Babu K, Benakappa N, Niranjan, Murthy PR. Analysis of risk factors for the development of retinopathy of prematurity in preterm infants at a tertiary referral hospital in South India. Acta Medica Lituanica 2006;13(3):147-51.
10. Weinberger B, Laskin DL, Heck DE, Laskin JD. Oxygen toxicity in premature infants. Toxicol Appl Pharmacol 2002;181(1):60-7.
11. Taqui AM, Syed R, Chaudhry TA, Ahmad K, Salat MS. Retinopathy of prematurity: frequency and risk factors in a tertiary care hospital in Karachi, Pakistan. J Pak Med Assoc 2008;58(4):186-90.
12. Ahmedhussain HK, Khayyat WW, Aldhahwani BM, Aljuwaybiri AO, Badeeb NO, Khan MA, et al. Retinopathy of prematurity: incidence and perinatal risk factors in a tertiary hospital in Saudi Arabia. J Clin Neonatol 2021;10(1):31-6
13. Chaudhari S, Patwardhan V, Vaidya U, Kadam S, Kamat A. Retinopathy of prematurity in a tertiary care center - incidence, risk factors and outcome. Indian Pediatr 2009:46(3):219-24.
14. Vinekar A, Dogra MR, Sangtam T, Narang A, Gupta A. Retinopathy of prematurity in Asian Indian babies weighing greater than 1250 grams at birth: ten-year data from a tertiary care center in a developing country. Indian J Ophthalmol 2007;55(5):331-6.
15. Chawla D, Agarwal R, Deorari AK, Paul VK. Retinopathy of prematurity. Indian J Pediatr 2008;75(1):73-6.
16. Darlow BA, Hutchinson JL, Henderson-Smart DJ, Donoghue DA, Simpson JM, Evans NJ, et al. Prenatal risk factors for severe retinopathy of prematurity among very preterm infants of the Australian and New Zealand Neonatal Network. Pediatrics 2005;115(4):990-6.