Original Research Article

A study of risk factors of retinopathy of prematurity in a tertiary care hospital

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Abstract

Introduction: Retinopathy of prematurity (ROP) is a vaso-proliferative disorder of the retina, which principally occurs in premature neonates during vascular development and maturation stage. ROP is multifactorial disorder. **Objectives:** The purpose of this study is to know the risk factors and their correlation with retinopathy of prematurity. **Methods:** All neonates born between 28-34 weeks of gestation admitted in NICU, who are under oxygen, were included in the study and screened for ROP. Babies with ocular disorder which interfere with fundus examination and babies who did not complete follow up till complete vascularization of retina were excluded from the study. **Results:** A total of 95 neonates were studied for ROP. In babies with gestational age between 30 – 32 weeks, 15.4%, 8.5% in the 32 – 35 weeks and none among those born between more than 35 weeks had ROP. About 12.5% of the patients with no PDA and 57.1% of the patients with PDA had retinopathy of prematurity. About 10.8% of the patients with no anemia and 33.3% with anemia had retinopathy of prematurity. This study had shown that 9.6% of the patients without blood transfusion and 36.4% with blood transfusion had retinopathy of prematurity. In this study 10% of the newborns with no thrombocytopenia and 32% with thrombocytopenia had retinopathy of prematurity.Retinopathy is an important complication of prematurity. **Conclusion:** 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.

Key words: Retinopathy of prematurity, Newborns, Risk factors.

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Introduction

Retinopathy of prematurity (ROP) is a vaso-proliferative disorder of the retina, which principally occurs in premature neonates during vascular development and maturation stage. It was first identified by Terry in 1942 and named it retrolental fibroplasias [1]. The incidence of ROP is closely correlated with the weight and the gestational age at birth. Despite current therapies, ROP continues to be a highly debilitating disease. Our advancing knowledge of the pathogenesis of ROP has encouraged investigations into new anti-vasculogenic therapies [2].

ROP is multifactorial disorder, having various risk factors including prematurity, low birth weight, oxygen therapy [3]. In many cases it may undergo spontaneous regression or may progress to blindness. If detected early and timely intervention is done, the blindness is preventable. In developed countries; its incidence continues to increase with the improvement in the survival of extremely premature infants [4,5]. The abnormal neovascular development in ROP is fragile and can leak or bleed, scarring and pulling the retina causing retinal detachment, which is the main cause of visual impairment and blindness in ROP[6].

There are approximately 50 million blinds in the world today out of them 30% are in Asia. Of this total blindness 4% (2 million) are children. India shares 20% of the world childhood blindness, important causes include congenital cataract, glaucoma and ocular injuries. ROP is one of the important causes of childhood blindness in India. It is estimated that out of 100 preterm infants, 20 to 40 develop ROP, out of

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which 3-7 can progress to blindness [7]. There has been a marked increase in incidence of ROP in India due to better survival rate of low birth weight and preterm babies availing modern neonatal facilities and care [8]. With improving outcomes of the "at-risk" preterm infants at several newborn care centers, ROP is likely to emerge as a major problem in India. The present study was conducted with an objective to determine risk factors of ROP in a tertiary care hospital.

Materials and Methods

Type of study: Present study was a cross sectional study which was undertaken in neonatal intensive care unit (NICU) of Basaveshwara Medical College Hospital and Research Centre, Chitradurga,

Inclusion criteria: All neonates born between 28-34 weeks of gestation admitted in NICU, who are under oxygen, were included in the study and screened for ROP.

Exclusion criteria: Babies with ocular disorder which interfere with fundus examination and babies who did not complete follow up till complete vascularisation of retina were excluded from the study.

Methodology: Screening of ROP involves indirect ophthalmoscopy using 20 D or 28/30 D lens by an experienced ophthalmologist. After instilling a topical anesthetic drop like Proparacaine, a wire speculum is inserted to keep the eye-lids apart. First the anterior segment of the eye is examined to look for tunica vasculosalentis, pupillary dilation, and lens / media clarity; followed by the posterior pole to look for plus disease; followed by sequential examination of all clock hours of the peripheral retina. A scleral depressor is often used to indent the eye externally to examine areas of interest, rotate and stabilize the eye. The findings were recorded in a predesigned Performa.

Baseline data was collected in a predesigned proforma for each baby regarding date of birth, sex, single or multiple pregnancies, intrauterine growth retardation, low gestational age, low birth weight, hypoglycemia, septicemia, hypoxia, severe respiratory illness, anemia and other antenatal insults. During the stay, heart rate, blood pressure, apnoea monitoring and oxygen saturation are done by continuous pulse oximetry. Clinical assessments and lab investigations for identifying the risk factors are carried out.

Statistical method: The data thus obtained was entered in Microsoft excel sheet and transferred and analyzed using Statistical Package for Social Services (SPSS vs 20). The categorical data was presented as frequencies and percentages and quantitative data was presented as measures and central tendency and dispersion.

Chi square test was used as test of significance for the categorical variables. A logistic regression analysis was conducted to study the association of various risk factors with occurrence of retinopathy of prematurity. A p value of less than 0.05 was considered as statistically significant.

Results

A total of 95 neonates were studied for ROP. Among these babies, neonates born before 30 weeks, 46.7% had retinopathy of prematurity. In babies with gestational age between 30 – 32 weeks, 15.4%, 8.5% in the 32 – 35 weeks and none among those born between more than 35 weeks had ROP. There was a statistically significant difference in the retinopathy of prematurity and gestational age. About 27.9% of the newborns with birth weight of less than 1.5 kgs and 5.8% of those who had birth weight of 1.5 – 2.5 kgs had retinopathy of prematurity. There was a statistically significant difference in the birth weight and retinopathy of prematurity.

About 12.5% of the patients with no PDA and 57.1% of the patients with PDA had retinopathy of prematurity. The difference in occurrence of retinopathy of prematurity between the patients with or without PDA was statistically significant. About 10.8% of the patients with no anemia and 33.3% with anemia had retinopathy of prematurity in this study which was statistically significant. This study had shown that, 9.6% of the patients without blood transfusion and 36.4% with blood transfusion had retinopathy of prematurity which was statistically significant. In this study 10% of the newborns with no thrombocytopenia and 32% with thrombocytopenia had retinopathy of prematurity.

A logistic regression model was used in order to study the association of various risk factors in occurrence of retinopathy of prematurity. The risk factors which had a significance level of less than 0.2 were included in the model. The logistic regression analysis had shown that, gestational age of less than 30 weeks, birth weight, FiO_2, anemia and thrombocytopenia are commonly observed but not significant association with occurrence of retinopathy of prematurity (Table-1).

Table-1: The association of various risk factors of retinopathy of prematurity.

Variables in the Equation						
	B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
Gestational age			2.595	3	.458	
Gestational age (< 30 weeks)	.732	16089.006	.000	1	1.000	2.080
Gestational age (30 – 32 weeks)	-2.133	16089.006	.000	1	1.000	.119
Gestational age (< 30 weeks)	-.509	16089.006	.000	1	1.000	.601
Birth weight	.962	1.086	.785	1	.376	2.618
Patent ductus arteriosus	-1.089	40650.056	.000	1	1.000	.337
Anemia	44.039	40650.061	.000	1	.999	1336275449079044 7000.000
Blood transfusion	-44.262	40650.061	.000	1	.999	.000
Thrombocytopenia	.497	1.691	.086	1	.769	1.644
Constant	19.508	32658.761	.000	1	1.000	296691619.703

Discussion

Retinopathyof prematurity(ROP) is acommon disease ofpreterm neonates with variable degree of involvement ranging from mild, transient changes in the retina with regression to severe progressive vaso - proliferation, scarring, detachment of retina and Blindness.The pathophysiology of this disease is still not fully understood. Over the past 50 years, some studies have been performed in order to identify possible factors associated to the development of ROP. It is known that the retinal vasculature begins to develop from the optic disc to the periphery around the 16**th** week of gestation, with vascularization of the nasal region occurring around 32-36 weeks and the temporal region at 40-42 weeks [9].

Thus, the degree of prematurity of the newborn determines the stage of retinal vasculature maturation and the affected zone [10]. Most cases of ROP resolve spontaneously without sequelae between 32 and 42 week of gestation [10, 11]. Currently, laser photo coagulation of the avascular retina is the treatment of choice, and various studies show that its functional and structural results are superior to cryotherapy [12]. Vitrectomy is another therapeutic option available for the advanced stages of ROP, associated with retinal detachment.In a study by Abdel et al, the gestational age was less than 32 weeks in 33.3% of the ROP cases and 9.4 of the cases without ROP[13].

A study by Yang et al had shown that mean gestational age of infants with no ROP was 30.3 weeks, 28.1 weeks in ROP without surgery and 26.9 weeks in ROP with surgery [13]. Present study had shown that, 46.7% of the newborns born within 30 weeks of gestation had retinopathy of prematurity. Study by Abdel et al, the birth weight was less than 1 kg in 6% of the cases of ROP and 0.7% of the cases without ROP and between 1 kg to 1.5 kg in 48.5% of the cases with ROP and 51.1% of the cases without ROP[13]. Yang et al have observe that the mean birth weight was 1251 gms in infants without ROP, 1014 gms in ROP without surgery and 954 gms in ROP with surgery [14]. Present study showed 27.9% of the newborns with birth weight of less than 1.5 kgs and 5.8% of those who had birth weight of 1.5 – 2.5 kgs had retinopathy of prematurity. In a study by Abdel et al, the PDA was present in 3% of the cases without ROP and 1.4% of cases without ROP[13]. Yang et al have observed that, 37.8% of the patients with no ROP, 33.8% with ROP but without surgery and 28.4% with ROP with surgery had patent ductus arteriosus[14].

Present study showed 57.1% of the newborns with PDA had retinopathy of prematurity which was statistically significant. Present study showed10.8% of the patients with no anemia and 33.3% with anemia had retinopathy of prematurity in this study which was statistically significant. Similar studies done by Rekha S et al[15], Chaudhari et al[16] also found anemia as independent risk factors for developing ROP. In a study by Abdel et al, the history of blood transfusion was present once in 9.1% of the ROP cases and more than once in 27.3% of the cases [13]. In a study by Shetty et al, the blood transfusion was present in 2 cases of ROP and absent in 10 cases of ROP [17].

Present study had shown that, 9.6% of the patients without blood transfusion and 36.4% with blood transfusion had retinopathy of prematurity.In the present study 10% of newborns with no thrombo-cytopenia and 32% with thrombocytopenia had retinopathy of prematurity. In a study by Shetty et al, thrombocytopenia was present 4 cases of ROP and absent in 8 cases [17].

Conclusion

Retinopathy is an important complication of prematurity. 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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References

1. Terry TL. Extreme Prematurity and Fibroblastic Overgrowth of Persistent Vascular Sheath Behind Each Crystalline Lens: I. Preliminary report. Am J Ophthalmol. 2018 Aug; 192:xxviii.doi: 10.1016/j.ajo. 2018. 05.024. DOI:10. 1016/j. ajo.2018.05.024

2. Coats DK, Miller AM, Hussein MA, et al. Involution of retinopathy of prematurity after laser treatment: factors associated with development of retinal detachment. Am J Ophthalmol. 2005 Aug;140 (2): 214-22. DOI:10. 1016/j.ajo.2004.12.106

3. Lucey JF, Dangman B. A reexamination of the role of oxygen in retrolental fibroplasia. Pediatrics. 1984 Jan; 73 (1):82-96.

4. Phelps DL. Retinopathy of prematurity: an estimate of vision loss in the United States--1979. Pediatrics. 1981 Jun;67(6):924-5.

5. Gibson DL, Sheps SB, Uh SH, Retinopathy of prematurity-induced blindness: birth weight-specific survival and the new epidemic. Pediatrics. 1990 Sep;86 (3): 405-12.

6. Azad R, Chandra P. Retinopathy of prematurity. J Indian Med Assoc. 2005 Jul;103(7):370-2.

7. Lucey JF, Dangman B. A reexamination of the role of oxygen in retrolental fibroplasia. Pediatrics. 1984 Jan; 73 (1):82-96.

8. Maheshwari R, Kumar H, Paul VK, Incidence and risk factors of retinopathy of prematurity in a tertiary care newborn unit in New Delhi. Natl Med J India. 1996 Sep-Oct;9(5):211-4.

9. Paysse EA. Retinopathy of Prematurity. In: Garcia-Prats JA, Saunders RA, Armsby C (Eds.). UpTo Date. Available at: http://www.uptodate. com/ contents/ retinopathy -of-prematurity, updated on: July 27, 2015, last access: July 2015.

10. Hellström A, Smith LE, Dammann O. Retinopathy of prematurity. DOI:10.1016/S0140-6736(13)60178-6

11. Chawla D, Agarwal R, Deorari A, et al. Retinopathy of prematurity. Indian J Pediatr. 2012 Apr;79(4):501-9. doi: 10.1007/s12098-010-0279-7. Epub 2010 Oct 27.

12. Shalev B, Farr AK, Repka MX. Randomized comparison of diode laser photocoagulation versus cryotherapy for threshold retinopathy of prematurity: seven-year outcome. Am J Ophthalmol. 2001 Jul; 132 (1) : 76-80.

13. Hakeem AH[1], Mohamed GB, Othman MF. Retinopathy of prematurity: a study of prevalence and risk factors. Middle East Afr J Ophthalmol. 2012 Jul-Sep; 19(3):289-94. doi: 10.4103/0974-9233.97927.

14. Yang C, Lien R, Yang P, Chu S, Hsu J, Fu R, Chiang M, Analysis of incidence and risk factors of retinopathy of prematurity among very low birth weight infants in north Taiwan, Pediatrics and Neonatology (2011) 52, 321e326.

15. Rekha S, Battu RR. Retinopathy of prematurity: incidence and risk factors. Indian Pediatr. 1996 Dec;33 (12) : 999-1003.

16. Chaudhari S, Patwardhan V, Vaidya U, et al. Retinopathy of prematurity in a tertiary care center--incidence, risk factors and outcome. Indian Pediatr. 2009 Mar;46(3):219-24. Epub 2009 Jan 1.

17. Shetty SP, Sheety J, Amin H, Shenoy RD, The incidence, risk factors and outcome of retinopathy of prematurity at a tertiary care centre in South India, IOSR – JDMS, 2015:14:6:77- 83.

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