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Original Research Article

Proportion and severity of retinopathy of prematurity in preterm and among low birth weight babies in a tertiary care hospital in Tamil Nadu

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ABSTRACT

In India, the survival rates for preterm infants have increased, thereby risk of developing ROP has also increased. There are not enough reports on the prevalence of ROP in India. The aim of study is to determine the prevalence of retinopathy in preterm infants. Infants with birth weight, $\leq$ 2000 grams and gestational age $\leq$ 32 weeks and or 32-34 weeks with other risk factors of ROP were examined over a period of one year in a tertiary care hospital.

Results: 68 infants full filled the inclusion criteria. The prevalence of ROP in our study was 22.05%.40% percent of the infants had stage 1 ROP, stage 2 was found in53.33%, stage 3 in only 6.66% preterm babies. The mean gestational age for ROP group is 28.20 with SD of 1.74 whereas for non ROP group is 30.58weeks with SD of 2.1. There is a significant differences between the ROP group and non ROP group p =0.001.

The mean birth weight of ROP group is 1002 gram with SD of 0.24 and non ROP group is 1330 gram with SD of 0.41. There is a significant differences between the mean weight of ROP group and of non ROP group, P 0.007.

Infants with lower birth weight and lower gestational age at birth had a significant higher incidence of ROP. Therefore, in order to make ROP as an avoidable cause of blindness in children, more emphasis should be given on early screening and detection of ROP in premature babies.

1. Introduction

In the last few decades, the survival rates for most of the preterm infants have in creased, thereby early detection of infants at high risk for ROP is very important.

ROP is a vascular disease which is commonly seen in premature infants with incompletely vascularized retina. ROP was first described by Terry in 1942 as retrolental fibro plasia[1]. ROP has two phase[2]. In the first phase, which is acute in nature, vasculo -genesis is interrupted. Second phase is vasoproliferative in nature, resulting in formation of new vessels in response to angiogenic substances secreted by ischemic retina. Cogan from his experimental study has showed us that the last part of retina to mature is its vasculature[3]. 80% of premature infants acquire the mature retinal vasculature by the time they reach their due date. In contrast only 40% will have mature vasculature earlier in the development[4]. This immature vasculature of the premature infants is susceptible to cause ROP[5]. As the temporal retinal vasculature is the last to get mature, ROP is most commonly seen in the temporal periphery. ROP is a vasoproliferative disorder of the developing retina of premature infants. It may regress completely or leave sequel from mild myopia to total blindness. Regressed ROP changes include telangiectatic vessels, thin retina, lattice degeneration and pigmentary changes.

Main risk factors for ROP includes low birth weight, young gestational age and supplemental oxygen exposure[6]. Speed of ROP progression is said to influence the severity of ROP. Postnatal development has also evolved as a predictor

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of severe ROP. However our study has not included it.

2. Material and Methods

This study was done in SRM Medical College and hospital. Duration of this prospective study was twelve months. 76 infants were enrolled during the study period, out of which 8 babies did not complete the follow up. So, a total of 68 preterm babies were included in this study. It included all the preterm babies coming to ophthalmology outpatient department as well as those who were screened at neonatal intensive care unit.

2.1. Inclusion criteria

1. All infants whose birth weight was less than two thousand grams or whose gestational age at birth was less than or equal to thirty two weeks,
2. Infants with gestational age of 32 -34weeks with other risk factors like respiratory distress syndrome, apneic episodes were also included.

2.2. Exclusion criteria

Infants with major congenital anomalies, congenital infections were excluded from our study.

2.3. Method of examination

First fundus examination was done between four and six weeks after birth[7,8]. First the anterior segment was examined. Pupillary reaction was noted. We used 0.5 % cyclopentolate and 1% phenylepherine drops for dilating the pupils. One drop in each eye three times, ten minutes apart starting an hour before screening was ins tilled. Lid speculum suitable for premature infants was applied. Fundus examination was performed using binocular indirect ophthalmoscope and a +20 D lens, at least every two weeks until the retina is fully mature (defined as retinal vessels seen up to nasal ora serrate in the context of ROP). In eye with zone 1 ROP weekly evaluation was needed. Staging of ROP was done using international committee for the classification of ROP[9,10]. All infants were screened weekly or biweekly, depending on their retinal examination findings. The examination or screening was done until vascularization had extended into zone three or regression of ROP was detected on at least two successive examination. Ethical committee clearance was taken for this study.

2.4. Statistical analysis

SSPS software version 16 was used for data analysis. Data were analyzed using t test, chi square test and analysis of variance.

3. Results

76 infants were screened for ROP during the study period of one year. Out of which 68 infants fulfilled the inclusion criteria and completed this study. Out of 68 babies screened 57 were male and 11 were female.12 male babies developed ROP and 3 female babies had ROP.

The prevalence of ROP in our study was 22.05% as shown in Table 1 . In our study out of 15 infants who developed ROP, six infants were in stage 1, eight infants were in stage 2 and one was in stage 3 ROP, as shown in Table 2 . None of the infants had stage 4.

The mean birth weight was 1.26 gram with SD of 0.40. We performed t test between birth weight and ROP. P value of 0.001 shows that there is an association between ROP and birth weight of infants. P value 0.001 shows that there is an association between ROP and gestational age of child with SE of 0.077 with CI (-0.0644,-0.337). The incidence of ROP in extremely low birth weight (less than 1000 grams) babies in our study was 47.36%. The incidence of ROP in low birth weight (1000-1500 gram) was 13.51%. In babies weighting more than 1500 gram to 2000 gram, incidence of ROP was 8.33% (Table 3). The mean birth weight of ROP group is 1002 gram with SD of 0.24 and non ROP group is 1330 gram with SD of 0.41. We performed Independent t test and found that, there is a significant differences between the mean birth weight of ROP group and mean birth weight of non ROP group. P value 0.007 with confidence interval of -0.54 and -0.09.

The mean gestational age was 30.0 weeks with SD of 2.27. We performed Chi square test between gestational age and ROP. The p value was 0.001 which is statistically significant. Out of 10 infants who fell into less than 28 weeks gestational age group, 8 infants developed ROP. Out of 53 infants who fell in gestational age groups 28-32 weeks, 7 infants developed ROP. Out of 5 infants who fell into gestational age 32-34 weeks, none of them developed ROP. (Table 4).

The mean gestational age for ROP group is 28.20weeks with SD of 1.74 whereas the mean gestational age for non ROP group is 30.58 weeks with SD of 2.13. Based on Levene's test for equality of variances, there is a significant differences between the ROP group and non ROP group, p value =0.001 with confidence interval -3.58 and -1.19. Out of 68 babies, 57 were given oxygen and 15 babies developed ROP. None of the babies for whom oxygen was not given, developed ROP. Oxygen supplementation was established as a major contributing factor for the development of ROP. There is an association between the use of oxygen and ROP, p value=0.049 (Table 5), chi square test was performed.

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Table 1: Prevalace of Rop (any stage)

Rop	Number	Percentage
PRESENT	15	22.05%
ABSENT	53	77.94%
TOTAL	68	100%

Table 2: Proportionof Rop

Stage	Rop	Percentage
1	6	40.00%
2	8	53.33%
3	1	6.66%
4	0	0

Table 3: Birth weight and ROP.

Weight	ROP Present	ROP Absent	Total
Less than 1000 g	9(47.36%)	10(52.63%)	19
1001-1500 g	5(13.51%)	32(86.48%)	37
1500-2000 g	1(8.3%)	11(91.66%)	12
Total	15	53	68

Table 4: Gestational age and Rop

Gestational age	Rop present	Rop absent	Total
<28 weeks	8(80%)	2(20%)	10
28-32 weeks	7(13.20%)	46(86.79%)	53
32 -34 weeks	0	5(100%)	5

Table 5: Oxygen and ROP

Oxygen	Rop present	Rop absent	Total
Given	15(26.31%)	42(73.68%)	57
Not given	0	11(100%)	11
Total	15	53	68

4. Discussion

ROP is a vasoproliferative disorder of the developin g retina of premature infants. It may regress completely or leave sequel from mild myopia to total blindness. In the Cryo therapy for Retinopathy of prematurity (CRYO-ROP) trail, the incidence was reported to be 66% in infants with birth weight less than 1251 grams.[11–13] The prevalence of ROP in western studies varies from22% to 65.8%.[14–18] The incidence of ROP in various Indian studies varies from 17.5% to 46%.[19–21] In our study, the prevalence of ROP was 22.05%. Among the Indian studies, Fortes Filho et al reported an incidence of 17.5%,[20], in Dogra et al study the incidence o f ROP was 47.27%[19], and Gopal et al study, the incidence of ROP was 38%.[21] The prevalence of ROP (any stage), in our study was comparable to other studies in India. The prevalence of severe ROP (stage 3 and stage 4) was very less in our study as compared to other Indian studies. The limitation of our study is small sample size which may account for the low prevalence of severe ROP in our study. In our study, 22.2% of infants developed ROP. Out of which 33% of infants had stage1 ROP, 43% of infants had stage2 ROP and 18.3 % had stage 3 ROP. None of the infants had plus disease or stage 4 ROP. Among the Indian studies, Dogra et al reported an incidence of 16.97% in stage1, 17.58% in stage 2, 11.52% in stage 3 and 1.21% in stage 4 ROP.[19] They even reported plus disease in 10.3% of infants.

The prevalence of ROP, in our study, in extreme low birth weight babies weighing less than 1000 gram at birth was 47.36% %. In our study, the prevalence of ROP, in very l ow birth weight babies (1000-1500 gram) was 13.51% and 8.30% in low birth weight babies (1500-2000gram) had ROP. In a study by Gopal et al, among infants with birth weight less than 1001 gram the incidence was 46% which is very comparable to our study.[21] In Dogra et al 90% of infants in extremely low birth weight babies developed ROP whereas 25.92% of babies, weighing between 1501 and 1700 grams in their study, developed ROP.

In our study, the prevalence of ROP was 80% in less than 28 weeks of gestation, 13.2 % in 28-32 weeks of

gestation, none of the infants between 32 -34 weeks had ROP. In our study, lower gestational age was found to be a significant risk factor for the development of ROP(p=0.001). The mean gestational age of ROP babies was 28.20 with SD of 1.74 and that of non ROP babies was 30.58 weeks with SD of 2.13. Dogra et al had reported a mean gestational age of 32.47+-0.2 weeks in their study in ROP babies. Oxygen as a risk factor for ROP in different studies has been accepted.[22–24] Out of 68 babies, 57 infants were given oxygen and 15 babies (26.31%) developed ROP. None of the babies for whom oxygen was not given, developed ROP. In a study done by Gopal et al 51.5% of infants developed ROP.[21] In their study, two infants developed ROP even in the absence of oxygen administration. Our study, clearly shows that babies who developed ROP had significant lower birth weight and gestational age (p value less than 0.005), thereby highlighting the need of routine screening of preterm infants, especially of low birth and gestational age.

5. Conclusion

ROP is one of the most common cause of visual loss in children and can lead to lifelong vision impairment and blindness. We can see that there is an increase in the incidence of ROP because of improved survival rate s of premature infants in India. Therefore, in order to make ROP as an avoidable cause of blindness in children, more and more emphasis should be given on early screening and detection of ROP in premature babies.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Terry TL. Extreme prematurity and fibroplastic over growth of persistent vascular sheath behind each crystalline lens 1 Preliminary report. *Am J Ophthalmol*. 1942;25:203–204.
2. Pathology of the retinopathy of prematurity: Retrolental fibroplasia. *Am J Ophthalmol*. 1951;34:1249–1268.
3. Cogan DG; Development and senescene of human retinal vasculature. *Trans Ophthomol Soc UK*. 1963;83:465–489.
4. Palmer EA, Flynn JT, Hardy RJ, Phelps DL, Phillips CL, Schaffer DB. Incidence and early course of retinopathy of prematurity. *Ophthalmol*. 1991;98(11):1628–1668.
5. Sira B. Nissenkorn I, Kremer I:Retinopathy of prematurity. *Survey Ophthomol*. 1988;33(1):1–16.
6. K C. Intensive oxygen therapy as a possible cause of retrolental fibroplasia; a clinical approach. *Med J Austral*. 1951;2(2):48–50.
7. American Academy of Peadiatrics and the American college of Obstretician and Gynaecology. *Evaston,Illinios*. 1983;p. 216–216. Guidelines for perinatal care.
8. Palmer. Optimal timing of examination for acute retrolental fibroplasia. *Ophthalmol*. 1981;88:662–666.
9. Committee for the Classification of Retinopathy of Prematurity: An international classification of retinopathy of prematurity. *Arch Ophthalmol*. 1984;102:1130–1134.
10. Committee for the Classification of Retinopathy of Prematurity: An international classification of retinopathy of prematurity II. The classification of retinal detachment. *Arch Ophthalmol*. 1984;10:906–912.
11. Cryotherapy for Retinopathy of Prematurity Cooperative Group: Multicentre trial of cryotherapy for retinopathy of prematurity - Preliminary results. *Arch Ophthalmol*. 1988;106:471–479.
12. Cryotherapy for Retinopathy of Prematurity Cooperative Group: Multicentre trial of cryotherapy for retinopathy of prematurity - Three months outcome. *Arch Ophthalmol*. 1990;12:195–204.
13. Cryotherapy for Retinopathy of Prematurity Cooperative Group: Multicentre trial of cryotherapy for retinopathy of prematurity - One year outcome - Structure and function. *Arch Ophthalmol*. 1990;108:1408–1416.
14. Palmer EA, Flynn JT, Hardy RJ. Incidence and early course of retinopathy of prematurity. *Ophthalmology*. 1991;98:1628–1640.
15. Fielder AR, Shaw DE, Robinson. Natural history of retinopathy of prematurity: A prospective study. *Eye*. 1992;6:233–242.
16. Acheson JF, Schulenburg WE. Surveillance for retinopathy in practice: Experience from one neonatal intensive care unit. *Eye*. 1991;5:80–85.
17. Holmstrom G, Azazi M, J. Epidemiology of ROP in Stockholm area of Sweden. *Acta Ophthalmol*. 1993;210:44–47.
18. Darlow BA. Incidence of retinopathy of prematurity in New Zealand. *Arch Dis Childhood*. 1988;63:1083–1086.
19. Charan R, Dogra MR, Gupta A, Narang A. The incidence of retinopathy of prematurity in a neonatal care unit. *Indian J Ophthalmol*. 1995;43:123–126.
20. Filho JB, Eckert GU, Procianoy L, Barros CK, Procianoy RS. Incidence and risk factors for retinopathy of prematurity in very low and in extremely low birth weight infants in a unit-based approach in southern Brazil. *Eye*. 2009;23(1):25–30.
21. Gopal L, Sharma T, Ramachandran S, Shanmugasundaram R, AV. Retinopathy of prematurity. A study. *Indian J Ophthalmol*. 1995;43:50–61.
22. Kinsey, Ve, Jacobus JT, Hemphill F. Retrolental fibroplasia: a cooperative study of retrolental fibroplasia and the use of oxygen. *Arch Ophthalmol*. 1956;56:481–543.
23. Eichenbaum JW, Mamelok AE, Mittl RN, Orellana J. Medical Publishers Inc ; 1990,.
24. Patz A, Hoeck LE, Cruz EDL. Studies on the effect of high oxygen administration in retrolental fibroplasia. 1. Nursery observations. *Am J Ophthalmol*. 1952;35:1248–53.

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