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Retinopathy of Prematurity: Its incidence, prevalence and risk factors in a teaching hospital in South India

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Abstract

Background: Retinopathy of prematurity (ROP) is an important cause of preventable blindness in the world. In India also as more and more premature babies are being saved the incidence is on the rise. Aim of this study is to know the incidence, prevalence and risk factors of ROP in preterm babies with birth weight < 1750 gms and /or gestational age < 35 weeks in a teaching hospital. **Subjects and Methods:** This study was conducted at Amala Institute of Medical Sciences from August 2016 to July 2018. All preterm babies < 1750 gms and/ or gestational age < 35 weeks and babies > 35 weeks and > 1750 gms with significant risk factors were screened for ROP. **Results:** Out of 202 babies, 180 babies fulfilled the criteria and completed the study. 12 babies did not meet the follow up criteria and 10 babies died before screening in the hospital. Out of 180 babies, 12 babies were found to have ROP with a prevalence rate of 6.7%.**Conclusion:** ROP is an important cause of preventable blindness in these vulnerable babies. Timely diagnosis and intervention will help to prevent the same.

Keywords: Retinopathy of prematurity, risk factors, South India.

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Introduction

Retinopathy of Prematurity (ROP) is a vasculo proliferative disorder of the developing retina of preterm low birth weight babies that can lead to significant visual handicap.[1] ROP was first reported by Terry in 1942.[2] ROP evolves over first few weeks after birth and hence it gives only a limited window for screening and appropriate intervention. The incidence of ROP in our country varies in different studies from 28% to as high as 54%.[3] Incidence in developed countries like USA is around 15 to 20 %.4 As more and more extreme premature babies are being saved by modern neonatal care starting from antenatal steroids to tertiary neonatal care, the incidence is likely to rise further. Robust screening for ROP, early detection and intervention programme is mandatory in every institution managing these babies.[12,13]

Subjects and Methods

This study was conducted at Amala Institute of Medical Sciences, Trichur. Total babies enrolled were 202.

Inclusion criteria: Preterm babies with gestational age < 35 weeks and or birth weight < 1750 gms. Babies between 1750 to 2000 gms or between 35 and 37 weeks with high risk factors like respiratory distress, sepsis, apnea, blood transfusion, prolonged oxygen therapy.

Exclusion criteria: Babies where consent for the study could not be obtained and babies who died before screening could be done.

Initial screening was done within in 4 weeks of life. In babies 28 weeks or less of gestation, initial screening done earlier within 3 weeks of life. Screening was performed by a trained specialist under strict aseptic precautions using indirect binocular ophthalmoscope with + 20 dioptre lens.

If no ROP was detected at initial examination, the infants were reevaluated every 2 weeks till vascularisation was complete. I f ROP was detected it was graded using the International Classification of ROP (ICROP) guidelines. Follow up was done based on severity and location as given in table 1 below.[15]

Results

202 babies were enrolled in the study out of which 180 fulfilled the criteria and completed the study. 10 babies died during the early neonatal period and 12 babies did not complete follow up criteria. [Table2]. Out of these 12 babies with ROP, 6 babies had Stage 1 and 6 babies had Stage 2. No babies had Stage 3 or 4 or Plus disease.

Table 1: Treatment of ROP

Early Treatment of Retinopathy of Prematurity (ETROP) Classification:

Type 1 ROP should be treated:
Zone I any stage of ROP with plus disease
Zone I Stage 3 ROP with or without plus disease
Zone II Stage 2 or 3 ROP with plus disease

Type 2 should be observed, and only undergo treatment if it progresses to type I or threshold disease:
Zone II Stage 1 or 2 ROP without plus disease
Zone II Stage 3 ROP without plus disease

Table 2: Incidence of Retinopathy of Prematurity

ROP	Number	Percentage
Present	12	6.7
Absent	168	93.3
Total	180	100

Out of 180 babies 95 were females and 85 were males. The birth weight of the babies ranged from 720 g to 2600 g with a mean birth weight of 1210 + 280 g. The birth weight of ROP babies ranged from 720 to 1350 g (mean 880+220g) while without ROP, birth weight ranged from 1200g to 2600 g (mean 1430+350g). In babies with birth weight below 1000 g the incidence was 100% while incidence in low birth weight babies (1000 – 1499 g) the incidence was 7.69% [Table 3]. In babies above 1500 g there was no ROP.

Table 3: Incidence of Birth weight and ROP

Birth weight	ROP Present	ROP Absent	Total
<1000	8(100%)	0(0%)	8
1000-1499	4(7.7%)	48(92.3%)	52
≥1500	0(0%)	120(100%)	120
Total	12(6.7%)	168(93.3%)	180

Fisher's exact test p value = 0.001

The gestational age of ROP babies ranged from 26- 32 weeks (mean 27.4+1.72), while non ROP babies ranged from 27- 37(30.7+2.9) weeks. The incidence of ROP in babies < 28 weeks was 50% as compared to 7.69 % in the group 28-34 weeks. None of the babies above 35 weeks had ROP.

Table 4: Incidence of gestational age and ROP

Gestational age (weeks)	ROP Present	ROP Absent	Total
<28	4(50%)	4(50%)	8
28-34	8(7.69%)	96(92.3%)	104
35-37	0(0%)	68(100%)	68
Total	12(6.7%)	168(93. %)	180

Fisher's exact test p value = 0.001

In our study 8 babies (28.6%) of 28 babies who presented with shock and poor perfusion at birth developed ROP. 12 babies (30%) out of 40 babies with sepsis developed ROP. None of the 64 babies whose mothers had PIH developed ROP. Only 12 babies (7.5%) of 172 babies who received phototherapy had ROP. 12 babies (13.6%) out of 88 babies who developed apnea of prematurity had ROP. Incidence of ROP in babies with RDS was 12(30%) out of 40 babies, 8 babies who received blood transfusion out of 12 developed ROP. 12 babies (15,8%) out of 76 babies who received prolonged oxygen therapy had ROP. Only 8 babies (10%) of 80 whose mothers received antenatal steroids developed ROP4.

Table 5: Co relationship between risk factors and ROP

Risk factor	ROP Present	ROP Absent	Total	p value (fisher's exact test)
Shock	8(28.6%)	20(71.4%)	28	0.0001
Sepsis	12(30%)	28(70%)	40	
PIH	0(0%)	64(100%)	64	
Phototherapy	12(7.5%)	160(92.5%)	172	
Apnoea	12(13.6%)	76(86.4%)	88	
RDS	12(30%)	28(70%)	40	
Blood Transfusion	8(66.7%)	4(33.3%)	12	
Oxygen Therapy	12(15.8%)	64(84.2%)	76	
Antenatal Steroids	8(10%)	72(90%)	80	

Discussion

Retinopathy of prematurity (ROP) is a rapidly evolving disease of the retinal vessels due to abnormal vasoproliferation. It has become one of the main causes for preventable blindness in children.[5] Even in a developing country like India as more and more preterm babies are being saved by modern medical care, the incidence is on the rise. In our study, all preterm babies < 35 weeks and/ or weighing <1750 g and babies between 1750 g to 2000g and babies up to 37 weeks with high risk factors were screened for ROP by a single retinal specialist. In United Kingdom, babies less than 32 weeks and less than 1500 g are screened for ROP. In India larger and mature babies have been reported to have ROP and hence there are recommendations to screen babies up to 2000g and <37 weeks.[11-13]

Table 5: Classification of ROP

Location	Zone 1	Circle with optic disc as centre and a radius with twice the distance from optic disc to fovea
	Zone 2	Concentric circle from edge of zone 1 from oraserrata nasally and equator temporally.
	Zone 3	Lateral crescent from zone 2 to oraserrata temporally
Severity	Stage 1`	Presence of thin white demarcation separating vascular and avascular retina
	Stage 2	Additional depth and width to the above line to become a ridge
	Stage 3	Presence of extra retinal fibro vascular proliferation with abnormal vessels and fibrous tissue extending from ridge to vitreous and the ridge has a velvety appearance with a ragged border
	Stage 4	Partial retinal detachment beginning at the ridge where the retina got pulled anteriorly into the vitreous by the fibro vascular ridge not involving macula (4A) and involving macula (4B)
	Stage 5	Complete retinal detachment
Plus disease	disease is an indication of5activity and is characterized by the presence	

	Is an indication of activity and is characterised by dilatation and tortuosity of retinal vessels at posterior pole of eye. Also associated with pupillary rigidity and vitreous haze

Incidence of ROP in studies done in India varied from 18 % to 46 %.[7-10] In our study the incidence of ROP was 6.7 % only. This is comparatively low as compared to many studies. In a study from KMCH, Tamilnadu,[9] The incidence was 19.2 %. In our study we had taken weight criteria of 1750 g and 35 weeks as compared to 1500 g and 32 week in their study. Another study from Central India by Bodhrajdhavan et al,[6] from a rural tertiary care hospital reported an incidence of 22% (11 out of 50 babies). Incidence in India is likely to increase as more and more preterm babies are being saved by modern neonatal care. In UK also the incidence is increasing. In their study by Painter et al,[16] Incidence and treatment of ROP in England between 1990 and 2011, there is an increase from 12.8% per 1000 LBW to 125.5 per 1000 LBW in 2011.[16-18]
Incidence of ROP in India is quoted between 38 to 51.9 % in LBW babies. Out of 30 million annual live births, approximately 9 % of newborn are < 2000 g.[19] In our study all babies below 1000 g (8 out of 8 babies) had evidence of ROP. All these babies had Stage 1 and stage 2 ROP and were treated appropriately. None of these babies needed laser therapy. 4 (7%) out of 52 babies between 1000g and 1499 g had ROP. No babies above 1500g had ROP. In a study by R Nikhil and others, from Tamilnadu, reported incidence of 48% <1000 g (12 out of 25 babies), 9.98% in 1000-1500 g (3 out of 43) and none above 1500 g. In other studies from various parts of India.[6,8-10] also reported similar pattern with regard to both gestational age and birth weight. This is reassuring though the present guidelines recommends screening of all babies below 2000g.[11-14] With regard to risk factors and ROP, out of 28 babies who presented with shock and poor perfusion 8(28.6%) developed ROP.[12] (30%) babies out of 40 babies who had RDS developed RDS. Indirectly all 12 babies who developed ROP had RDS. This is because RDS is seen in more premature babies.

Incidence of ROP in cases where antenatal steroids were given to mothers was less 8 (10%) out of 80. This reinforces the role of antenatal steroids in anticipated preterm labour. In our state this practice is regularly followed by obstetricians and that might be one of the reasons for reduced incidence of ROP in our study. 8 (66.7%) out of 12 babies who received blood transfusion developed ROP. None of the 64 babies born to mothers who had PIH developed ROP.[19] This may be attributed to closely monitoring and early diagnosis in mother due to regular antenatal care. The link between oxygen therapy and ROP is well established.[1,20,21] Use of oxygen should be judiciously used right from resuscitation and use of oxygen blenders is strongly recommended in neonatal units. In our study 12 babies (15.8%) out of 76 babies who received prolonged oxygen therapy developed ROP. In other words none of the babies who did not receive oxygen developed ROP. Thus oxygen therapy, RDS and blood transfusion are the most important risk factors for ROP. NEOPROM collaborative study which is a met analysis of 5 trials concluded that higher oxygen saturation (91-95%) was associated with more ROP where as lower saturation (88-89%) was associated with more deaths and NEC.[23-25]

Conclusion

This study was conducted to identify the incidence and association of risk factors associated with this condition. As ROP is a rapidly evolving disease the window for diagnosis is very important. In our study also the prevalence of ROP with decreasing gestational age and birth weight was seen. This is a well documented fact. There was also increased association with babies who received prolonged oxygen therapy, had shock, RDS and those who received blood transfusion. As the number of preterm babies surviving in our country is increasing we should have a robust screening programme for ROP as ROP is one of the leading causes of preventable blindness in the world.

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