A CLINICAL STUDY OF SCREENING AND GRADING OF RETINOPATHY OF PREMATURITY IN THE UNIVERSITY HOSPITAL OF SOUTH INDIA

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ABSTRACT

BACKGROUND
Retinopathy of prematurity is a leading cause of blindness among premature infants. This study was undertaken to develop an effective screening programme to access such premature infants especially for this disease and to study the characteristics and grading of this disease in them.

MATERIALS AND METHODS
This prospective study was conducted between January 2016 and August 2017 at SRM MCH & RC, a Suburban Tertiary Care Hospital at SRM University campus. A total of 80 neonates of birth weight less than 2000 gms and gestational age less than or equal to 37 weeks were screened and these neonates were followed up for the presence of Retinopathy of Prematurity. Risk factors in these infants were noted and if present morphological characteristics of this disease were recorded and graded. Eye examination was done using indirect ophthalmoscope and a +20 diopter lens after dilating with tropicamide 0.5% and phenylephrine 1.25% which was instilled thrice with 10 minutes duration, in both eyes.

RESULTS
Overall incidence of this disease was calculated in addition to the incidence of various categories of birth weight, gestational ages and stage specific incidence. P value was calculated to check the statistical correlation between various risk factors and the presence of this disease in the infants was screened. Out of the 80 neonates screened, 21 neonates had retinopathy of prematurity and the incidence of ROP was 26.3% for any stage. Out of the 21 infants who developed ROP, 7 infants were in stage 1(33.3%), 9(42.9%) were in stage 2, 5 (23.8%) were in stage 3 and none of the infants were positive for stage 4 retinopathy of prematurity. In this study, the incidence of ROP for birth weight 500-1000 gms was 29.4%, 1001-1500 gms was 36.6% and 1501-2000 gms was 4.5%. A statistically significant correlation was found to exist between low birth weight and ROP.

CONCLUSION
As inferred from previous studies, this study also showed that low birth weight and low gestational age make an important contribution to the overall incidence of ROP. RDS was found to be significantly associated with ROP. Apnoea and neonatal sepsis were not found to be significantly associated with ROP in our study.

KEYWORDS
Retinopathy of Prematurity (ROP), Premature Birth, Low Birth Weight, Gestational Age, Respiratory Distress Syndrome (RDS), Apnoea, Neonatal Sepsis, Effective Screening Program.

BACKGROUND
With the tremendous advancement of medical care there has been an increase in survival rate of premature infants. Retinopathy of prematurity which was previously known as retrolental fibroplasia is a leading cause of blindness among premature infants.

It is a disorder of retinal blood vessels due to abnormal response of premature infant's retinal vasculature to prematurity and therapy for its management.

This disorder may regress completely or leave behind a spectrum of sequel ranging from myopia to significant visual loss caused by retinal detachment and scarring of macula.

In India, approximately, 1 in 1000 children are blind and the incidence of Retinopathy of prematurity is reported 24% and 47%.[1]

In 2010, the annual incidence of blindness and visual impairment from ROP was estimated to be 32, 200 cases worldwide. India accounted for nearly 10% of all estimated worldwide visual impairment following ROP in 2010, with at least 5,000 developing severe disease and 2,900 children surviving with visual impairment related to ROP.[2]

Currently various guidelines are prevalent towards screening and grading of retinopathy of prematurity such as International classification of retinopathy of prematurity,[3] National neonatology forum guidelines,[4] American academy of Paediatrics guidelines[5] and ROP AIIMS Protocol 2014.[6]

Objectives

1. To identify neonates who are at a risk of developing ROP and screen for the same,
2. To study the risk factors which are associated with ROP and
3. To study the morphological characteristics and grading of ROP.

MATERIALS AND METHODS

This prospective study was conducted at SRM Medical College and Hospital from January 2016 to August 2017. An approval of the institute's ethical committee was obtained for the purpose.

A total of 80 preterm neonates were screened and followed up for presence of ROP upto 42 weeks of post gestation. According to the AIIMS protocol 2014, ROP screening was done for all neonates less than or equal to 32 weeks of gestational age, birth weight less than or equal to 1500 gms and selected preterm infants with birth weight less than or equal 1500 to 2000 gms or gestational age less than or equal 32 weeks with sickness like respiratory distress syndrome, apnoea of prematurity and neonatal sepsis were selected for screening. Eye examination was done using indirect ophthalmoscope and a +20 dioptre lens after dilating with tropicamide 0.5% and phenylephrine 1.25% which was instilled thrice with 10 minutes duration, in both eyes.

All data were analyzed using statistical software package SPSS version 21.0.

RESULTS

A total of 80 preterm neonates were screened and followed up for presence of ROP till 42 weeks. Of the 80 neonates screened, 49 were males and 31 were females (p=0.265). 15 among the males and 6 among the females developed ROP.

	ROP Present	ROP Absent
Male	15	34
Female	6	25
Table 1		

A total of 21 neonates out of 80 neonates developed ROP at various stages, and the incidence of ROP was found to be 26.3%.

Stage	No. of Neonates	Incidence
1	7	33.3%
2	9	42.9%
3	5	23.8%
4	0	0%
Table 2		

Of 6 infants who fell into gestational age group 28-30 weeks, 2 developed ROP. Of the 34 infants who fell into gestational age group 30-32 weeks, 8 developed ROP. Of the 24 infants who fell into gestational age group 32-34 weeks, 9 developed ROP. Of the 15 infants who fell into gestational age group 34-36 weeks, 2 developed ROP

(p=0.332). No statistically significant correlation was seen between gestational age and ROP.

Gestational Age	ROP Present	ROP Absent
28-30 weeks	2	4
30-32 weeks	8	26
32-34 weeks	9	15
34-36 weeks	2	14
Table 3		

With respect to birth weight the incidence of ROP was as follows: 5 (29.3%) of neonates weighing less than 1000 gms, 15(36.6%) of neonates weighing between 1001-1500 gms, 1(4.5%) neonate weighing between 1501-2000 gms (p=0.021). Incidence was found to be higher with less birth weight. A statistically significant correlation was found between birth weight and ROP.

Birth Weight (gms)	ROP Present	ROP Absent
500-1000	5 (29.3%)	12 (70.6%)
1001-1500	15 (36.6%)	26 (63.4%)
1501-2000	1 (4.5%)	21 (95.5%)
Table 4		

Out of 21 infants who developed apnoea attack, 7 developed ROP and a total of 59 infants who had no apnoea 14 developed ROP (p=0.390). No statistical correlation was seen.

	ROP Present	ROP Absent
Apnoea Present	7	14
Apnoea Absent	14	45
Table 5		

Out of the 50 infants who had septicemia 11 developed ROP, while out of the 30 infants who did not have septicemia 10 developed ROP (p=0.265). No statistical correlation was seen.

	ROP Present	ROP Absent
Septicaemia present	11	39
Septicaemia absent	10	20
Table 6		

Out of the 62 infants who had developed RDS, 20 developed ROP. While out of the 18 infants withouts RDS, 1 developed ROP (p=0.023). Significant correlation was seen to exist.

	ROP Present	ROP Absent
Respiratory distress syndrome present	20	42
Respiratory distress syndrome absent	1	17
Table 7		

DISCUSSION

A total of 80 neonates weighing less than or equal to 2000 gms at birth with gestational age less than or equal to 37 weeks were screened from January 2016 to August 2017. Of these 80 infants, 49 were male and 31 were females. 15 among the males (61.3%) and 6 among the females (38.3%) developed Retinopathy of prematurity. It revealed insignificant relationship between sex and occurrence of ROP. The incidence of ROP was independent of whether the infant was male or female. A similar observation was also seen in the study by Palmer et al,[7] in which the incidence among males was 66.4% and among females 65.3% and it was in contrast to study done by Darwal et al[8] and Aggarwal et al.[9] where male gender was a significant risk factor.

Out of the 80 neonates screened, 21 neonates had Retinopathy of prematurity and the incidence of ROP was 26.3% for any stage. Out of the 21 infants who developed ROP, 7 infants were in stage 1 (33.3%), 9 (42.9%) were in stage 2, 5 (23.8%) were in stage 3 and none of the infants were positive for stage 4 Retinopathy of prematurity.

In the study done by Palmer et al, the overall incidence of ROP was found to be 65.8%. Of these 25.2% has stage 1 of ROP, 21.7% had stage 2 of ROP and 18.3% has stage 3 of ROP.

Out of the 6 infants who fell into gestational age group of 28-30 weeks, 2 infants developed ROP (33.3%). Of the 34 infants who fell into gestational age group of 30-32 weeks, 8 infants developed ROP (23.5%). Of the 24 infants who fell into gestational age group 32-34 weeks, 9 infants developed ROP (37.5%). Of the 16 infants who fell into 34-36 weeks of gestational age group, 2 infants developed ROP (11.3%).

In the study done by Palmer et al, the incidence of ROP among neonates of 28-31 weeks of gestational age was 55.3% and among infants of 32-34 weeks of gestational age was 22.9%.

The incidence of ROP was independent of whether the infant was of lower gestational age or higher gestational age. In this study, no statistically significant correlation was made between gestational age and retinopathy of prematurity.

In this study the incidence of ROP for birth weight 500-1000 gms was 29.4%, 1001-1500 gms was 36.6% and 1501-2000 gms was 4.5%. A statistically significant correlation was found to exist between low birth weight and ROP. This was in agreement in a study done by Ashwini Jegannath Wavare et al[10] and Ajuva AA et al.[11]

In the Palmer et al study, the incidence of ROP was 90% in infants with birth weight <750 gms, 78% among infants with weighing between 750-999 gms and 47% among infants weighing 1000-1250 gms.

Out of the 21 neonates with Retinopathy of prematurity, 20 developed RDS. A statistically significant correlation was made was found between RDS and ROP. Taqui et al[12] and Ashwini Jegannath Wavare et al[10] also had a significant association between respiratory distress syndrome. This was in contrast to study done by Singh et al. Our study found that sepsis was not significantly associated with the development of ROP. This was in agreement with the study done Chaudhari et.al.[13] This was in contrast to study done by with Shah et al.[14] and Vinekar et al.[15,16] This study showed an insignificant relationship between apnoea and occurrence of ROP in contrast to Aggarwal et al.,[5] Prasad et al.[6]

Limitations of the Study

A thorough satisfactory assessment of all the individual causative risk factor for retinopathy of prematurity is beyond the scope of this study, as only few parameters were assessed.

As this is an observational study to assess the risk factor of retinopathy of prematurity in a neonatal intensive care unit of a multi-speciality hospital; treatment protocols fall within the scope of a much larger study in a higher center.

CONCLUSION

As inferred from previous studies, this study also showed that low birth weight and low gestational age make an important contribution to the overall incidence of ROP. RDS (p=0.023) was found to be significant in this study.

Technological advances in neonatal care have enabled salvaging extremely small and low birth weight babies. Due to this there is an increased risk of development of ROP among the susceptible preterm babies. An effective screening programme helps to identify the neonates who have a potential risk to reach threshold ROP or who have already reached threshold ROP. Early diagnosis and prompt treatment of threshold disease with laser or intravitreal injection of anti-vascular endothelial growth factor promotes a better visual outcome and prevents irreversible blindness in children.

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