IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 1 Ser.8 (January. 2021), PP 10-14
www.iosrjournals.org

Study of Incidence of Retinopathy of Prematurity (ROP) and Risk Factors Associated with Disease by Screening Premature Infants at Risk for ROP

Rohini Sharma, Rakesh Porwal , Sanjeev Nainiwal
Department of Ophthalmology Jawahar Lal Nehru Medical College & Hospital Ajmer-305001, Rajasthan (INDIA)
Address for Correspondence ***Rohini Sharma*** *MS*
5d-2 Duplex Colony In front of Veera Seva Sadan Bikaner , Rajasthan 334001

Abstract
Purpose: *The objective of this study was to investigate the incidence of ROP and risk factors associated with disease by screening premature babies at risk for ROP.*
Result: *In this study incidence of ROP was 18.33% and only factors found to have an independent association with occurrence of ROP were birth weight and gestational Age.*
Method: *Prospective, observational study conducted in JLN hospital Ajmer, Rajasthan form September 2016 to September 2017.*
Conclusion: *Appropriate screening and timely treatment are crucial to avoid ROP related blindness.*
Key Words: *Advances in ROP, Screening for retinopathy of prematurity, anti vasoactive endothelial growth factors, Laser photocoagulation*

Date of Submission: 01-01-2021 Date of Acceptance: 13-01-2021

I. Introduction

The immature retina of preterm neonates are liable to insults that disrupt neurovascular growth resulting in retinopathy of prematurity (ROP). Suppression of growth factors due to hyperoxia and loss of the maternal–fetal interaction result in an abrupt cessation of retinal vascularisation (phase 1). Subsequently, the increasingly metabolically active, yet poorly vascularised, retina becomes hypoxic and stimulates growth factor-induced vasoproliferation (phase 2), which may cause retinal detachment. Identification and control of factors that contribute to development of ROP is necessary to prevent progression to sight-threatening disease and to limit comorbidities with which the disease shares modifiable risk factors

Each year about 15 million babies are born prematurely [1]. ROP cases are increasing in India as a result of the improved neonatal care and better neonatal survival rate. Early identification of ROP by screening of at-risk premature infants performed by an experienced Ophthalmologist remains the most important policy in the management of ROP.

The latest ROP screening guidelines published by the American Academy of Pediatrics and the American Academy of Ophthalmology (AAO/AAP), advocate that every infant with gestational age (GA) of ≤ 30 weeks and/or ≤ 1500 g of birth weight (BW), or with unstable clinical course should be screened [2].

The ROP screening criteria of gestational age and birth weight are lower within the developed world.[3] In order to adjust and accept the variable quality of care in India, and in view of the increased risk of ST-ROP, the screening criteria have been kept broad.[4,5,6] All infants admitted to SNCUs/NICUs with the following criteria need examination by fundoscopy [7] All infants born at 34 weeks or less gestational age; [1] All infants weighing 2000 g or less at birth, [8] All infants born at more than 34 weeks gestational age with associated risk factors (cardiorespiratory support; prolonged oxygen requirement; respiratory distress syndrome; chronic lung disease; fetal hemorrhage; blood transfusion; sepsis; exchange transfusion; interventricular hemorrhage; apnea; poor post-natal weight gain), [2] Other preterm infants based on the discretion of the pediatrician or neonatologist.

The first step for ROP screening is identification of infants eligible for screening. This is facilitated by maintaining records in which infants are listed as per screening schedule based on eligibility criteria (gestational age, birth weight) at the time of admission and on recommendation of pediatricians while an inpatient. The first ROP screening should take place by 25-30 days of life. This is possible with a coordinated effort of all health care personnel involved in childcare. All eligible babies ought to additionally screened before discharge[9,10]

Screening should take place in the SNCU/NICU for inpatients. Outpatients can be examined in the eye department.

The findings and management decision must be clearly documented by the screener in the medical records at each screening episode, for example "no ROP in either eye, immature retinal vessels", or "right and left eye: Stage 2 in zone 2" as well as the date and name of the screener. If further screening is required, the date and place must also be clearly documented and communicated. This is particularly important before discharge or transfer to another unit.

II. Material and Method

The present clinical study was conducted in the Department of Ophthalmology, JLN Medical College & Hospital, Ajmer.

- Patients included: Infants admitted in SNCU, JLN Medical College & Hospital, AJMER and attached Hospitals.
- Study Design: Prospective study
- Study duration: 12 months (September 2016 to September 2017)
- Sample size: All infants meeting the inclusion criteria were included in the present study.
- Method: All Infants were screened under supervision of a Pediatrician.
- Tropicamide 0.5% was used to dilate pupils. One drop of Tropicamide was instilled every 10-15 minutes for 4 times starting 1 hour before the scheduled time for examination. Screening of ROP involved indirect ophthalmoscopy using 20 D lens by experienced Ophthalmologist. After instilling Proparacaine, a topical anesthetic drop, a wire speculum was inserted to keep the eye-lids apart. First the anterior segment of the eye was examined to look for 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 using pediatric scleral indenter. Antibiotic eye drop was instilled in both eyes after examination.

International Classification of ROP (ICROP) was used for documentation of ROP.[7] ICROP describes vascularization of the retina and characterizes ROP in terms of zone (position) , stage (severity) and clock hours (extent) .

The examinations were kept as short as possible and precautions were taken to ensure that emergency situations can be dealt with promptly and effectively.

Discomfort to the baby was minimized by using topical proparacaine before examination and **swaddling** the baby. Proper sanitation & asepsis was maintained using gloves & mask during examination.

First screening examination was carried out at 31 weeks of gestation or 4 weeks of age, whichever was later.

Follow-up examinations were conducted until ROP resolution or retinal maturation was achieved and babies with treatable ROP were referred to higher centre for further management.

Inclusion criteria:

- Infants born with gestational age ≤32 weeks
- Infants born with the birth weight ≤2000 gm.
- Selected preterm infants with a gestational age of more than 32 weeks with sickness like need of cardiorespiratory support, prolonged oxygen therapy, apnea of prematurity, anemia needing blood transfusion and neonatal sepsis or believed by their attending pediatrician or neonatologist to be at high risk.

Exclusion criteria

Clinically unstable and critical newborns.

Infants whose parents didn't give consent for screening.

III. Results

Table 1: Incidence of ROP according to Gender.

Gender	Total Cases	Cases with ROP		Cases without ROP		Chi Square Value	p- Value	Odds ratio
		No. Of Cases	Percentage	No. Of Cases	Percentage			
Male	153	35	22.88	118	77.12	4.303	0.038	0.531
Female	147	20	13.61	127	86.39			
Total	300	245		55	18.33			

In this study, out of 300 infants 55(18.33%) infants developed ROP, of them 35/153 (22.88%) were males and 20/147 (13.61%) were females who developed ROP. The p Value for this proportion is 0.038 which is significant.

Table 2: Distribution of ROP Cases according to Maximum ICROP STAGE developed by the neonate

Stage of ROP	**Number of Cases**	**Percentage of ROP Cases**	**Outcome**
Stage 1	24	43.64	Followed up till regression
Stage 2	20	36.36	Followed up till regression
Stage 3	11	20	Referred to higher centre for Peripheral Retinal Ablation
Stage 4	0	0	-
Stage 5	0	0	-
Total	55		

In this study there were 24 cases of Stage 1 ROP (43.64%); 20 cases of Stage 2 ROP (36.36%); 11 cases of Stage 3 ROP (20%); 0 cases of both stage 4 and stage 5 ROP. All the 11 Stage 3 ROP were in Zone 1 were classified as severe or Type 1 ROP (as per ETROP study) and were referred to higher centre for Peripheral Retinal Ablation.

In present study neonates with ROP classified as Type 1 according to ETROP study were taken as severe and infants whose ROP was Type 2 according to ETROP Study or lesser were considered Non Severe ROP. Out of total 55 infants with ROP, 11 cases were of Severe ROP (20% of ROP Cases or 3.67% of total cases) whereas 44 cases were of Non Severe ROP (80% of ROP Cases or 14.67% of total cases).

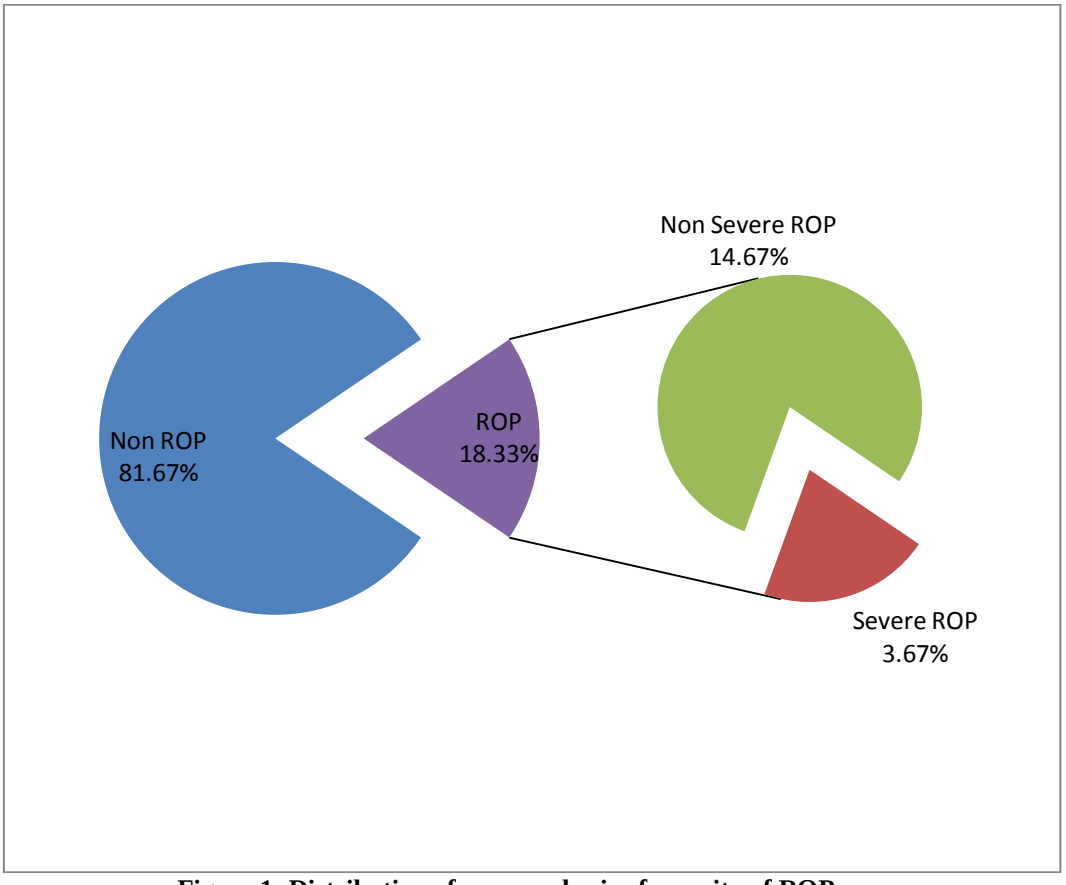

Figure 1: Distribution of cases on basis of severity of ROP

Table 3: Multivariate Logistic Regression for various risk factors associate with Occurrence of ROP

	Cases with ROP	Cases without ROP	Total	p-value for multiple logistic regression
Total	55	245	300	
Gender				
Male	35	118	153	0.1163
Female	20	127	147	
Birth Weight				
Birth Weight taken as a continuous variable				0.00001
Gestational Age				
Gestational Age calculated by Ballard Score as continuous variable				0.00001
Mode of Delivery				
Caesarean Section	10	24	34	0.0011
Vaginal Delivery	9	57	66	
Blood Transfusion				
PCV Given	28	11	21	0.0001
Not given	27	70	79	
Supplemental Oxygen (FiO2 > 21%)				
Duration of Supplemental Oxygen taken as continuous variable in days				0.00001
Ventilation				
Duration of Ventilation taken as continuous variable in days				0.00001
Phototherapy				
Given	5	9	14	0.12
Not Given	14	72	86	
Culture Proven Sepsis				
Present	8	15	23	0.89
Absent	11	66	77	
IVH				
IVH Present	3	2	5	0.6236
IVH absent	16	79	95	
Apnea				
Apnea Present	8	15	23	0.4280
Apnea Absent	11	66	77	
RDS				
RDS Present	14	29	43	0.8856
RDS Absent	5	62	67	

On Multiple Logistic Regression the only factors found to have an independent association with Occurrence of ROP were birth weight and gestational Age with a p value of <0.01 and <0.01 respectively, which are significant statistically.

IV. Conclusion

Retinopathy of prematurity (ROP) has become more common in developing countries with an improvement in survival of very premature infants. Though antecedently rare, it is likely to emerge as a significant problem in India because of improving outcome of 'at-risk' preterm infants. It is a potentially blinding illness which can be treated successfully if recognised on time. In a prospective study we estimated the incidence of ROP among at-risk infants in SNCU of Pediatrics Department of JLN Medical College Ajmer between September 2016 to September 2017. Infants with birth-weights ≤ 2000 grams and Gestational Age ≤ 32 weeks and infants with gestational age of more than 32 weeks with sickness like need of cardio-respiratory support, prolonged oxygen therapy, need for phototherapy, apnea of prematurity, anemia, blood transfusion and neonatal sepsis were included in this study. These infants were subjected to periodic ophthalmological evaluation for detection of ROP until full retinal vascularization occurred. 300 eligible infants completed the full protocol during the period of study. The incidence of ROP was 18.33% in the cohort and that of Type 1 ROP (as per ETROP Study) was 3.67%. 24 infants developed Stage 1 ROP(43.64%) 20 developed Stage 2 ROP(36.36%) and 11 infants developed Stage 3 ROP(20%) in which 3 infants developed Stage 3 ROP with plus disease(5.45%), The risk factors found to be associated with occurrence of ROP on univariate analysis were gestational age (p=0.0001), birth-weight (p<0.001), Oxygen therapy (p<0.00001), mechanical ventilation(p<0.00001), packed cell transfusion (p<0.001), apnea (p<0.05) and respiratory distress syndrome(p <0.0001). Birth Weight < 1500 grams (p<0.01) and Gestational Age < 28 weeks (p<0.001) were found to be a risk factor for ROP. Mean birth weight associated with ROP was 1236.73 grams compared to 1449.39 grams for those without ROP. The duration of Oxygen Therapy (8.98 days in infants with ROP compared to 3.07 days in infants without ROP) and Mechanical Ventilation (3.02 days in neonates with ROP compared to 0.59 days in neonates without ROP) were also significantly higher in neonates with ROP. The factors which were not found to be associated with ROP were male gender, culture proven sepsis. On multivariate analysis, factors

independently found to be associated with ROP were low birth weight and low gestational age. ROP is even possible in high risk infants who have not received any Oxygen. 11 infants in this study developed Severe ROP for which they were referred to higher centre for Peripheral Retinal Ablation. Rest 44 infants who developed ROP did not require intervention and were followed till ROP regression or vascularisation of peripheral retina.

The study provided data for incidence of ROP in Rajasthan which is not readily available. Efficacy of the Screening program running in the NICU and SNCU in Department of Pediatrics, JLN Hospital, Ajmer was assessed successfully. Out of the 300 infants screened 11 infants developed ROP requiring intervention and were referred to Higher Centre.

Bibliography

[1]. Cambell K. Intensive Oxygen therapy as a possible cause of Retrolental Fibroplasia. Med J Aust 2:48;1951
[2]. Dominico R, Davis K, Davis O. Documenting the NICU design dilemma: Comparative patient progress in open-ward and single family room units. J Perinatol. 2011;31:281–8.
[3]. American Academy of Pediatrics. Screening examination of premature infants for retinopathy of prematurity. Pediatrics. 2001;108:809–11.
[4]. Preterm Factsheet WHO Reviewed November 2016 http://www.who.int/mediacentre/factsheets/fs363/en/
[5]. Fielder AR, Shaw DF, Robinson J, Ng YK. Natural history of retinopathy of prematurity: A prospective study. Eye. 1992;6:233–42.
[6]. Kumar H, Shapiro MJ. A practical Approach to Retinopathy of Prematurity Screening and Management. In: Kumar H, Shapiro MJ, Azad RV, editors. ROP screening examination guidelines and methodology. New Delhi: Malhotra Enterprises; 2001. pp. 45–47.
[7]. Terry TL. Extreme prematurity and fibroblastic overgrowth of persistent vascular sheath behind each crystalline lens. Am J Ophthalmol. 1942;25:203–4.
[8]. Coats DK, Aaron MM, Mohamed AH. Involution of retinopathy of prematurity after laser treatment: Factors associated with development of retinal detachment. Am J Ophthalmol. 2005;140:214–22.
[9]. Wright K, Anderson ME, Walker E, Lorch V. Should fewer premature infants be screened for retinopathy of prematurity in the managed care era? Pediatrics. 1998;102:31–4.
[10]. Palmer EA. Results of US randomized clinical trial of cryotherapy for ROP (CRYO-ROP) Doc Ophthalmol. 1990;74:245–51.

Rohini Sharma MS, et. al. "Study of Incidence of Retinopathy of Prematurity (ROP) and Risk Factors Associated with Disease by Screening Premature Infants at Risk for ROP." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(01), 2021, pp. 10-14.