ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 01 | January - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

INCIDENCE AND RISK FACTORS OF RETINOPATHY OF PREMATURITY: A HOSPITAL BASED STUDY IN ASSAM

Neonatology

Arindam Ganguly Department of Paediatrics, Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta, Assam, India.

ABSTRACT

Introduction: Retinopathy Of Prematurity (RoP) is a retinal disorder of low birth weight premature infants. It can be mild with no visual defects, or it may become aggressive with new vessel formation (neo-vascularisation) and progress to retinal detachment and blindness.
An increase in survival of very young preterm infants , due to the advances in neonatology, have subjected them to the risk of developing ROP.
Objective: To study the incidence of Retinopathy of Prematurity in preterm neonates and to identify the risk factors associated with the development of RoP.
Methods: It is a prospective observational study conducted at NICU Silchar Medical College & Hospital, Assam. All the babies fulfilling the inclusion criteria were examined using indirect ophthalmoscopy after full mydriasis.
Results: Out of the 68 neonates screened, 7 neonates developed RoP ; overall incidence of RoP in this study was 10.2%. Statistical analysis revealed that birth weight, gestational age, oxygen supplementation, RDS mechanical ventilation, sepsis, anaemia requiring blood transfusion and surfactant administration were found to be significantly associated with development of RoP ($p<0.05$).
Conclusion: RoP is one of the preventable causes of blindness in children. Thus timely retinal screening in high-risk preterm infants is important to prevent the development of RoP.

KEYWORDS

Retinopathy of prematurity, low birth weight, preterm, RDS.

INTRODUCTION

Retinopathy of Prematurity (ROP) is a vaso-proliferative disorder of the developing retina of low birth weight, preterm infants that potentially leads to blindness in a small but significant percentage of those infants. Premature infants have avascular or incompletely vascularized retina at birth and ROP evolves over 4-5 weeks after birth[1] Normal retinal vascularization happens centrifugally from optic disc to ora. Vascularization up to nasal ora is completed by 8 months (36 weeks) and temporal ora by 10 months (39–41 weeks)[2].

It was originally designated as retrolental fibroplasia by Terry[3] in 1942 who related it with premature birth. The term RoP was coined by Heath in 1951[4].

Premature retina exposed to high oxygen concentration, followed by abrupt withdrawal, easily undergoes uncontrolled vasculo-fibrotic proliferation and eventually results in retinaldetachment[5,6]. Complications of ROP include myopia, strabismus, anisometropia, amblyopia, glaucoma and cataract[7].

Multiple risk factors have been put forward as playing a role in the development of RoP like prematurity, low birth weight, sepsis, RDS, oxygen supplementation and so on[8,9].

In India due to the development of infrastructure, there has been a sharp increase in the survival of the preterm neonates which has resulted in an epidemic of RoP[10]. Early identification of risk factors and timely screening provides an opportunity for effective treatment.

OBJECTIVE OF THE STUDY

1. To determine the incidence of RoP in neonates of gestational age less than 34 completed weeks; weighing less than 2000 grams
2. To determine association of RoP with various risk factors

MATERIALS AND METHODS

It is a prospective observational study conducted amongst the neonates admitted in NICU of Silchar Medical College & Hospital over a period of one year.

Written and informed consent of the parents was taken at the time of enrollment for the study. Ethical clearance was obtained from the Institutional Ethics Committee.

Inclusion Criteria:
1. Babies born at gestational age ≤34 weeks
2. Babies with birth weight ≤2000 grams

Exclusion Criteria:
1. Babies born with gross congenital anomalies
2. Babies with chromosomal anomalies
3. Babies with congenital infections
4. Babies with congenital cataract, hazy cornea, abnormal anterior chamber
5. Babies, whose parents refused consent for the study

Babies were screened at 4 weeks post natal age. For babies weighing less than 1200 grams and period of gestation ≤ 30 weeks, screening was done at 2-3 weeks post natal age.

Procedure:
Babies were fed one hour before the examination to reduce the chances of aspiration. Pupil were dilated with Tropicamide (0.5%). One drop of tropicamide was instilled every 10-15 minutes 4 times starting 1 hour before the time of screening. It was followed by a single drop of Phenylephrine (2.5%).

After instilling a drop of topical anesthesia Proparacaine (0.5%) into the conjunctival sac, a wire speculum (Alfonso speculum) is inserted to keep the eye-lids apart. The screening is done by an experienced ophthalomologist using indirect ophthalmoscope and 20 D lens.

Stastitical Analysis:
Data was analyzed using SPSS software version 22. The student 't' test was used to determine whether there was a statistical difference in weight, gestational age, duration of oxygen supplementation at examination between babies who had ROP and those babies who did nothave ROP. In the entire test, the “p” value of less than 0.05 was accepted as indicating statistical significance.

RESULTS

In the present study, 68 neonates were screened who fulfilled the inclusion criteria. Out of the total 68 neonates, 7 had developed Retinopathy of Prematurity. Hence incidence of RoP is 10.2% in the present study.

Table 1. Analysis Of Risk Factors And Development Of Rop

PARAMETER		RoP PRESENT	RoP ABSENT	p value
Birth weight (grams)	Mean	1135	1716	0.027 (significant)
	Standard Deviation	132	282.4	
Gestational Age (weeks)	Mean	30.4	31.5	0.000 (significant)
	Standard Deviation	1.4	1.43	
Oxygen Supplementation (days)	Mean	6.25	3.7	0.047 (significant)
	Standard Deviation	0.95	1.28	
CPAP	Required	5	18	0.0263 (significant)
	Non Required	2	43	

Mechanical Ventilation	Required	6	11	0.000 (significant)
	Not Required	1	50	
Apnoea	Present	5	14	0.006 (significant)
	Absent	2	47	
RDS	Present	5	16	0.0142 (significant)
	Absent	2	45	
Surfactant Administration	Done	4	24	0.364 (not significant)
	Not Done	3	37	
Sepsis	Present	5	19	0.034 (significant)
	Absent	2	42	
Anaemia requiring blood transfusion	Yes	6	11	0.000 (significant)
	No	1	50	
Phototherapy	Given	3	32	0.630 (not significant)
	Not Given	4	29	
Multiple Gestation	Yes	4	13	0.038 (significant)
	No	3	48	

DISCUSSION

The overall incidence of RoP in the present study is 10.2%. The incidence of RoP in various Indian studies is mentioned below.

Table 2: Incidence Of RoP In Indian Studies

Author/Year	Incidence of RoP
Maheshwari R11/1996	20%
Gupta VP12/2004	21.7%
Chaudhari S13/2009	22.3%
Kumar N14/2017	16%
Ali MA15/2018	16.39%
Present Study	10.2%

Following risk factors were discussed with other studies on RoP:

Birth Weight And Gestation:

Table 3

Author / Year	Parameter		Non-RoP		RoP		p value
			n	%	n	%	
Shivaprasad B[16]/2014	Birth weight (g)	<1000	5	5.7	5	38.5	0.001
		1001-1500	42	48.3	6	46.2	
		1501-1750	40	46.0	2	15.4	
	Gestational age (weeks)	24-28	1	1.1	4	30.8	0.000
		28-33	47	54	8	61.5	
		33-35	39	44.8	1	7.7	
Vijayalaxmi Gagandeep[17]/2016	Birth weight (gram)	<1000	1	33.3	2	66.6	0.002
		1000-1500	119	79.8	30	20	
		>1500	41	97.6	1	2	
	Gestational Age (weeks)	≤32	100	78.1	28	21.8	0.01
		>32	61	92.4	5	7.5	
Present Study	Birth Weight (grams)	≤1000	1	33.3	2	66.6	0.000
		1000-1500	11	68.7	5	31.2	
		1500-2000	49	100	0		
	Gestational Age (weeks)	28-30	10	76.9	3	23	0.03
		30-32	26	89.6	3	10.3	
		32-34	25	96.1	1	3.8	

Duration Of Oxygen Supplementation

Table 3

Author/Year	Mean duration of Oxygen supplementation (days)		p-value
	RoP	Non RoP	
Shah VA[18]/2005	55.8±75.6	10.4±22.1	0.0001
Freitas AM[19]/2018	27	6	<0.001
Ali MA[15]/2018	7.74±2.725	1.50±2.062	<0.001
Present Study	6.25±0.95	3.7±1.28	0.047

CPAP

Table 4

Author/ Year	CPAP				p-value
	RoP Present		RoP Absent		
	n	%	n	%	
Shivaprasad B16/2014	3	23.1	15	17.2	0.000
Ali MA15/2018	13	65	21	20.59	<0.001
Present Study	5	71	18	29	0.000

Mechanical Ventilation

Table 5

Author/Year	Mechanical Ventilation				p-value
	RoP Present		RoP Absent		
	n	%	n	%	
Chaudhari S[13]/2009	51	41.7	30	24.8	0.031
Chen M[20]/2011	48		20		0.0106
Present Study	6	85.7	11	18	0.000

Apnoea

Table 6

Author/Year	Apnoea				p value
	RoP Present		RoP Absent		
	n	%	n	%	
Chaudhari S[13]/2009	47	38.4	13	10.7	0.000
Shivaprasad B[16]/2014	6	46.2	7	8	<0.01
Ali MA[15]/2018	13	65.2	7	6.8	<0.01
Present Study	5	71	14	23	<0.01

RDS

Table 7

Author/Year	RDS				p value
	RoP Present		RoP Absent		
	n	%	n	%	
Parekh A[21]/2016	11	25	24	22	0.03
Present Study	5	71	16	26.2	0.000

Surfactant Administration

Table 8

Author/Year	Surfactant Administration				p value
	RoP Present		RoP Absent		
	n	%	n	%	
Vander Merwe SK[22]/2013	7	50	110	33.5	0.203
Ali MA[15]/2018	5	25	19	18.6	0.512
Present study	4	57.4	24	39.3	0.364

Sepsis

Table 9

Author/Year	Sepsis				p value
	RoP Present		RoP Absent		
	n	%	n	%	
Shivaprasad B[16]/2014	6	46.2	8	9.2	<0.001
Kapoor R[23]/2014	13	35.1	24	64.9	0.0001
Freitas AM[19]/2018	165	83.5	285	71.6	0.001
Ali MA[15]/2018	7	35	12	11.76	0.009
Present Study	5	71.4	19	31.1	<0.001

Anaemia Requiring Blood Transfusion

Table 10

Author/Year	Anaemia requiring blood transfusion				p value
	RoP Present		RoP Absent		
	n	%	n	%	
Chaudhuri S[13]/2009	29	23.6	60	14.2	0.125
Ali MA[15]/2018	5	25	6	5.88	0.032
Present Study	6	85.7	11	18	<0.001

Phototherapy

Table 11

Author/Year	Phototherapy				p value
	RoP Present		RoP Absent		
	n	%	n	%	
Sneha R[24]/2014	22	61.1	24	44.4	0.137
Ali MA[15]/2018	5	25	19	18.6	0.876
Present Study	3	42.8	32	52.4	0.512

Multiple Gestation

Table 12

Author/Year	Multiple Gestation				p value
	RoP Present		RoP Absent		
	n	%	n	%	
Kapoor R[23]/2014	24	63.16	10	4.17	0.001
Present Study	4	57.1	13	21.3	<0.001

The present study was discussed with various other studies as mentioned in the above tables. In this study, low birth weight, prematurity, prolonged oxygen supplementation, requirement of CPAP , mechanical ventilation, sepsis, apnoea, anaemia requiring blood transfusion, RDS and multiple gestation was found to be

significantly associated with the development of RoP. The present study correlates well with the similar other studies.

In this study, surfactant administration and phototherapy were not found to be significant risk factors for the development of RoP.

LIMITATIONS:

The limitations of the study are the small sample size and the failure to follow up the neonates who had RoP at the time of screening.

CONCLUSION

RoP is currently one of the leading causes of preventable blindness in children especially in the developing countries. A universal eye screening program with wide coverage is essential for early detection of the disease. Along with the regular screening, each neonatal unit should have a policy on oxygen administration. Blended oxygen should be used in delivery rooms and neonatal units to guide oxygen therapy. All babies who receive oxygen should be monitored closely to target oxygen saturation of 90-95% and a good working knowledge must be imparted to all the medical and para medical staff about the disease.

Funding: *No funding sources*

Conflict of interest: *None declared*

REFERENCES

1. Austeng D, Kallen KB, Ewald UW, Jakobsson PG, Holmström GE. Incidence of retinopathy of prematurity in infants born before 27 weeks' gestation in Sweden. Arch Ophthalmol 2009;127(10):1315-9.
2. Pejawar R, Vinekar A, Bilagi A. National Neonatology Foundation's Evidence-based Clinical Practise Guidelines (2010), Retinopathy of Prematurity, NNF India, New Delhi2010:253–62.
3. Terry TL. Extreme prematurity and fibroblastic overgrowth of persistent vascular sheath behind each crystalline lens. I. Preliminary report. Am J Ophthalmol. 1942;25:203–4
4. Heath P. Pathology of retinopathy of prematurity, RLF. Am J Ophthalmol. 1951;34:1249–68.
5. Stephen J Ryan. Retina. 4th edition 2006
6. Charan R, Dogra M R, Gupta A, Narang A. The incidence of retinopathy of prematurity in a neonatal care unit. Indian J Ophthalmol 1995;43:123-6
7. Jalali S, Anand R, Kumar H, Dogra MR, Azad R, Gopal L. Programme planning and screening strategy in Retinopathy of prematurity. Indian J Ophthalmol 2003; 51:89- 99
8. R Karkhaneh, S Z Mousavi, M Riazi-Esfahani, S AEbrahimzadeh, R Roohipoor, M Kadivar, L Ghalichi, S F Mohammadi, M R Mansouri. Incidence and risk factors of retinopathy of prematurity in a tertiary eye hospital in Tehran. Br J Ophthalmol 2008;92:1446-1449
9. Krishna A Rao, JayashreePurkayastha, ManaliHazarika, Raghuvamsi Chaitra, K MithunAdith. Analysis of prenatal and postnatal risk factors of retinopathy of prematurity in a tertiary care hospital in South India. Indian J Ophthalmol 2007; 55: 329-330.
10. Campbell K. Intensive oxygen therapy as a possible cause of retrolental fibroplasia; a clinical approach. Med J Austral. 1951;2(2):48-50.
11. Maheshwari R, Kumar H, Paul VK, Singh M, Deorari AK, Tiwari HK. Incidence and risk factors of retinopathy of prematurity in a tertiary care newborn unit in New Delhi. Natl Med J India 1996;9:211-4
12. Gupta VP, Dhaliwal U, Sharma R, Gupta P, Rohatgi J. Retinopathy of prematurity—risk factors. The Indian Journal of Pediatrics. 2004 Oct 1;71(10):887-92.
13. Chaudhari S, Patwardhan V, Vaidya U, Kadam S, Kamat A. Retinopathy of prematurity in a tertiary care center--incidence, risk factors and outcome. Indian pediatrics. 2009 Mar 1;46(3).
14. Kumar N, Kaushik SL, Grover N, Sharma RL. Retinopathy of prematurity: incidence and risk factors: a hospital based study from Shimla, Himachal Pradesh, India. International Journal of Research in Medical Sciences. 2016 Dec 19;5(1):56-61.
15. Ali MA, Begum R, Rahman F. Retinopathy of prematurity: Incidence and risk factor: A Hospital Based study. IOSR Journal of Dental and Medical Sciences (IOSR- JDMS), vol 18, no. 7, 2019,pp 05-12.
16. Shivaprasad B , Usha. H. N, Kishore Baindur .Study on Incidence and Risk Factors of Retinopathy of Prematurity.Sch. J. App. Med. Sci., 2014; 2(6A):1962-1966
17. Vijayalaxmi gagandeep, Arun P. Incidence and risk factors for retinopathy ofprematurity in a teritiary care neonatal unit. TJPRC: International Journal of General Pediatrics and Medicine (TJPRC: IJGPM) 2016 Dec, Vol. 1, Issue 1, 45-50.
18. Shah VA, Yeo CL, Ling YL, Ho LY. Incidence, risk factors of retinopathy of prematurity among very low birth weight infants in Singapore. Ann Acad Med Singapore. 2005 Mar 1;34(2):169-78
19. Freitas AM, Mörschbächer R, Thorell MR, Rhoden EL. Incidence and risk factors for retinopathy of prematurity: a retrospective cohort study. International journal of retina and vitreous. 2018 Dec;4(1):20.
20. Chen M, Çitil A, McCabe F, Leicht KM, Fiascone J, Dammann CE, Dammann O. Infection, oxygen, and immaturity: interacting risk factors for retinopathy of prematurity. Neonatology. 2011;99(2):125-32.
21. Parekh, Anjali et al. Retinopathy of prematurity : a study of incidence and risk factors. IJPP v. 3, n.4.p. 1320-1325, dec. 2016.
22. Van der Merwe SK, Freeman N, Bekker A, Harvey J, Smith J. Prevalence of and risk factors for retinopathy of prematurity in a cohort of preterm infants treated exclusively with non-invasive ventilation in the first week after birth. South African Medical Journal. 2013;103(2):96-100.
23. Kapoor R, Talwar R, Sachdeva S, Paul P, Yadav R, Sachdeva S. Retinopathy of prematurity in babies weighing <1800 g; with special reference to babies weighing between 1501 and 1800 g: An experience from a tertiary care hospital in Delhi. Int J Medicine and Public Health 2014; 4(4): 359-63
24. Sneha R, Shankar P. A clinical study on incidence of retinopathy of prematurity changes in preterm infants and associated risk factors in a tertiary centre. Journal of Evolution of Medical and Dental Sciences. 2014 Mar 10;3(10):2603-8.