Retinopathy of prematurity: Incidence and risk factor

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Abstract

With the advent of new technologies in neonatal health care, the mortality rate of infants have gone down drastically and has resulted in spike of ROP and its severity.

Aim: To study risk factors for Retinopathy of prematurity and its incidence, in newborns at risk in SNCU of a tertiary care hospital in Bhopal.

Study Design: This was a retrospective observational, hospital-based study.

Materials and Methods: Infants with birth weight less than 1500gm and gestation age less than 34 weeks were screened after birth at 4 weeks for ROP or 31-33 weeks post conception age, whichever was later from February 2015 to June 2016. Infants with birth weight 1500gm to 2500 gm and gestation more than 34 weeks with additional risk factors were also screened.

Statistical Analysis: Statistical Package for the Social Sciences was used for analysing data. The ROP incidence was described in simple proportion. For group comparisons, the chi-square ($\chi 2$) test was. Probability (P) of less than 0.05 was considered significant.

Result: 178 eyes of 89 infants were included in this study.33.70% eyes had some stage of ROP. In infants weighing more than 2500gm or with a gestational age more than 35 weeks no signs of ROP was found. Small for gestation, Low birth weight, septicaemia, Oxygen therapy, Ventilator support, Respiratory Distress syndrome, Apnoea and asphyxia were significant factors for ROP development. However mode of delivery, type of pregnancy, Blood transfusion and gender were not found to be significant risk factors for ROP development.

Keywords: Low birth weight, Low gestational age, Risk factors, Retinopathy of prematurity (ROP).

Introduction

Retinopathy of prematurity or retrolental fibroplasia was first described by Terry during an epidemic in 1940s.[1] It is a proliferative disorder of immature vessel of at risk infants. It is an important cause of preventable blindness in children.[2] Recent advances in neonatal care in past few years have increased the survival rates for premature infants. Consequently, the incidence of ROP has increased in parallel.[3] Recent studies from India report an incidence ranging from 20% to 46%.[2,4,5]

ROP can manifest as a wide range of disorder from mild with no visual defects to severe with neovascularisation which can lead to retinal detachment and can cause blindness.

The American Academy of Paediatrics (AAP) guidelines state that the following newborns should be screened for the presence of ROP: Those having birth weight <1500 g, gestational age <=30 weeks and selected infants with a birth weight between 1500 and 2000g or gestational age of more than 30 weeks with risk factors. The scenario differs slightly in India.[6]

Materials and Methods

A retrospective, observational based clinical study was carried out in newborns admitted in neonatal unit of Hamidia hospital, Bhopal and falling in the inclusion criteria during the period from February 2015 to June 2016.

Inclusion Criteria:

All neonates with

1. Birth weight less than or equal to 1500g
2. Gestational age less than or equal to 34 weeks
3. Neonate with known risk factors for retinopathy of prematurity.

Exclusion Criteria

1. Infants with more than 34 weeks of gestational and birth weight more than 1500gms without risk factors.
2. Newborns having family history of exudative vitreoretinopathy, congenital hydrocephalus
3. Parents/ guardians not willing to enrol for study were excluded from the study.

Sample Size: 178 eyes of 89 infants were screened for ROP in this study.

Method of Examination: The initial examination was carried out at 4 weeks after birth or 31 to 33 weeks post conception age, whichever was later. Detailed history was recorded including the gender, gestational age, birth weight, type and mode of delivery. Significant post natal problems such as apnoeic spells, asphyxia, RDS, septicaemia and intraventricular haemorrhages were also noted in prestructured proforma. History regarding need for mechanical ventilation, oxygen support and blood transfusion was also asked.

Screening: Parents were explained about the procedure. Initial ocular examination was done without dilating pupil and anterior segment was examined for corneal opacities, non-dilating pupil, persistent tunica vasculosa lentis, and plus disease of the iris.

Two drops each of 2.5% phenylephrine and 0.5% Tropicamide are instilled at an interval of 15 minutes and a lid speculum was used to open the lids.

Funds examination was performed with an indirect ophthalmoscope and a 20D or 2.2 pan retinal Lens. Posterior pole is examined without depression for plus disease. Sclera depressor is then used to examine the temporal retina followed by nasal retina, to establish the proximity of the retinal vessel at the ora serrate.

After complete examination, speculum was removed gently and antibiotic eye drop was instilled.

Precaution: Examination should be carried out after washing hands with beta dine and rinsing with water. Neonatologist should be present while examination is carried out. There should not be over spilling of eye drop. After instilling eye drop, lacrimal punctum should be occluded so as to prevent systemic absorption of drug. Infant should not be fed immediately prior to examination as child may aspirate or vomit.

Statistic Analysis

Data were analyzed by the Statistical Package for the Social Sciences. Descriptive statistics included the mean and standard deviation for numerical variables, and the percentage of different categories for categorical variables. The incidence rate of ROP was described in simple proportion. Group comparisons were done by the chi-squared ($\chi 2$) test for categorical variables. A probability (P) of less than 0.05 was considered significant.

Result

Out of the total admissions at our SNCU during the period of study, 89 infant who fulfilled the inclusion criteria were screened for ROP. There were 49(55.05%) male and 40(44.95%) female.

The Mean B.W was 1518.539±397.2989 grams and the mean G.A was 31.39±2.009 wks.

Out of 178 eyes of 89 preterm infant screened, the incidence of any ROP (60 eyes) and severe ROP (33eyes) in this study was 33.70% and 18.5% respectively. Infants with severe ROP were referred for treatment by laser photocoagulation.

In infant with ROP the mean B.W was 1321±315.1093 gm (P<.00001) and mean gestational age was 30.2833±1.9406 wks (p<.00001); both being significantly less.

Table 1: Mean B.W and mean G.A of ROP+ and ROP- infant

	ROP+	ROP-	P value
Mean B.W	1321±315.1093 gm	1629.661±373.5506 gm	<.00001
Mean G.A	30.2833±1.9406 wks	31.9576±1.8041wks	<.00001

The incidence of ROP according to gestational age and birth weight is shown in table 2 and table 3 respectively.

The incidence of ROP was reported to be 72.27% in infants </=28 wks and 47.22% in infants between 29-30 wks. Further decrease in incidence of ROP was seen as gestational age of infants increased with increase in G.A and B.W the incidence of ROP decreased in this study.

Table 2: Incidence of ROP according to gestational age

G.A (wks)	Total Eyes N=178	ROP N=60	%
</=28	22	16	72.27%
29-30	36	17	47.22%
31-32	78	20	25.64%
33-34	32	7	21.87%
>/=35	10	0	0

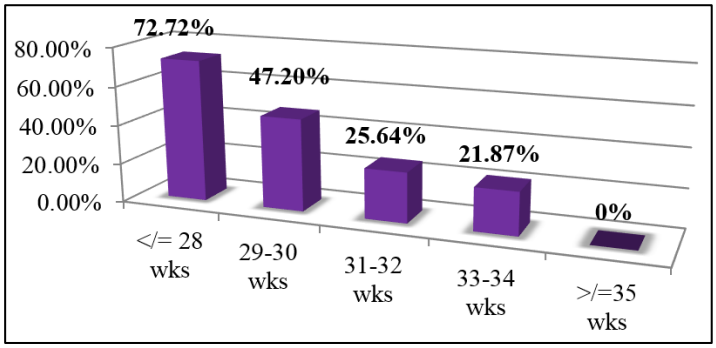

Fig. 1: Incidence of ROP according to gestational age

Table 3: Incidence of ROP according to birth weight

BW gm	N=178	ROP	%
</=1000	8	8	100%
1001-1499	90	38	42.2%
1500-2499	78	14	17.9%
>/=2500	2	0	0

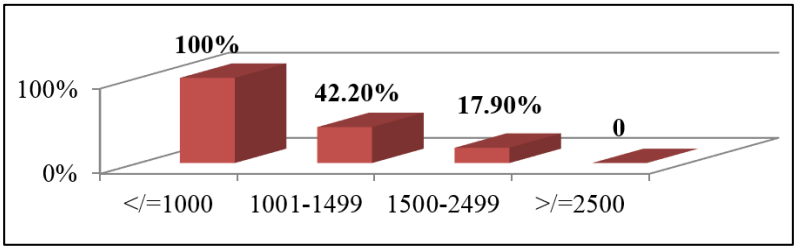

Fig. 2: Incidence of ROP according to birth weight

From table 3, low gestation age (.00752) and low birth weight (.000036) were significant risk factor ROP development. However no difference in ROP was seen in male and female infant in this study.

Table 3: Correlations of gestational age, sex and birth weight with incidence of ROP

Risk Factor	ROP+ (n=60)	%	ROP- (n=118)	%	P Value
G.A					
<32 weeks	53	38.97%	83	61.02%	.00752
>32 weeks	7	16.66%	35	83.33%	
B.W					
<1500 gm	46	46.93%	52	53,06%	.000036
>1500 gm	14	17.5%	66	82.5%	
GENDER					
MALE	32	53.3%	66	55.93%	.741
FEMALE	28	46.6%	52	44.06%	

Severe ROP was found in infant with gestation age less than 32 weeks.

Table 4: Relationship b/w LOW G.A and severity of ROP

	Severe ROP (stage 3,4,5)		Mild ROP(1,2)		P value
	n=33	%	N=27	%	
<32 week	33	100%	20	74.07%	.0018
>32 week	0	0	7	25.92%	

On analysing various risk factors for development of ROP oxygen supplementation (.0013), ventilator support (.0029), septicaemia (.024), respiratory distress syndrome (.014), apnoea (.0018), asphyxia (.031) were found to be significant risk factor for ROP development.

However there was no significant difference of ROP in single and multiple pregnancies (.45). Blood transfusion (.313), type of delivery (.075) and hyperbilirubinaemia (.170) were also not significant risk factor for ROP development in this study

Table 5: Correlation of various risk factors with ROP

Risk Factor	ROP+	%	ROP-	%	P value
Pregnancy					
Single	54	90%	110	93.2%	.450567
Multiple	6	10%	8	6.7%	
Type of Delivery					
Vaginal	50	83.33%	84	71.18%	.075
Caesarean	10	16.66%	34	28.81%	
Oxygen Supplementation					
Present	37	61.66%	43	36.44%	.0013

Absent	23	38.33%	75	63.55%	
Septicaemia					
Present	24	40%	28	23.72%	.024
Absent	36	60%	90	76.27%	
Ventilator support					
Present	24	40%	22	18.64%	.00209
Absent	36	60%	96	81.35%	
Respiratory Distress Syndrome					
Present	26	43.33%	30	25.42%	.014
Absent	34	56.66%	88	74.57%	
Hyperbilirubinaemia					
Present	22	36.66%	56	47.45%	.170
Absent	38	63.33%	62	52.54%	
Apnea					
Present	12	20%	6	5.08%	.0081
Absent	48	80%	112	94.91%	
Blood Transfusion					
Present	19	31.66%	29	24.57%	.313
Absent	41	68.33%	89	75.42%	
Asphyxia					
Present	16	26.66%	16	13.56%	.031
Absent	44	73.33%	102	86.44%	

Discussion

Various studies show ROP incidence to vary from 20% to 46%.[4,5,7]

ROP incidence in this study was 33.70%, which was higher than the study done by Gebeşçe A et al (20.1%)[10]

Gopal L et al[8] (38%) and Mostafa Feghhi et al[9] (32%) in their study found incidence similar to this study.

There was a significant difference in mean gestation age and mean birth weight of ROP infant in this study (p<.05). No difference was found by Shohat M et al[13] in his study.

Severity of ROP and its incidence was related to low gestational age in our study similar to reported by Chaudhari et al.[15]

Low birth weight in our study was a significant risk factor for ROP development (p<.05). Chaudhari S et al[15] and Sneha R[17] found similar relationship in studies done on Indian population. However Murthy et al[18] and Hakeem K H et al[11] found that L.B.W had no influence ROP.

Inverse relationship of incidence of ROP and BW was seen in our study, which was in similar to a study by Qing Liu et al.[16]

In this current study type of pregnancy (single/multiple) and mode of delivery were not found to be risk factor (p>.05). However Yau GS et al[19] in his study found that infants born from twin pregnancy and vaginal delivery were at risk for ROP development.

Gender of infant was not a significant risk factor for ROP in this study, in contrast to Chaudharis et al[10] who in their study found ROP was more common in male infant.

Use of oxygen and mechanical ventilation in post natal period were significant risk factor for ROP in the current study. Shah et al[12] and Chaudhari et al[15] also reported similar result.

Hakeem K H et al[11] in their study found insignificant relationship between ROP and RDS. However in the present study a significant correlation was revealed between them, which was in line with results of Yau GS et al.[19]

Septicaemia was found to be a statistically significant (p<.05) risk factor for ROP development in the present study and this agreed with studies of Shah et al.[12]

In our study, we found blood transfusion (p>.05) to be a non significant risk factor for ROP development, which was in agreement with, Cut Badriah et al.[20]

In present study apnoea and Asphyxia were found to be a statistically significant (p<.05) risk factor for ROP development. Chaudhari S et al[15] found that apnoea was a significant risk factor for ROP. Shah et al[12] in his study concluded asphyxia as a significant risk factor.

Conclusion

ROP is a multifactorial disease and is a preventable cause of childhood blindness. In this study Small for gestation, Low birth weight, septicaemia, Oxygen therapy, Ventilator support, Respiratory Distress syndrome, Apnoea and asphyxia were significant factors for ROP development. However mode of delivery, type of pregnancy, blood transfusion and

gender were not found to be significant risk factors for ROP development. Hence timely screening of high risk preterm infants is important to prevent the development of advanced ROP and to prevent serious squeal leading to complete blindness.

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