



## Original Research Article

## Study of prevalence of retinopathy of prematurity in tertiary care hospital

Kavin Shroff<sup>1</sup>, Khushnood Sheikh<sup>1,\*</sup>, Manisha Patel<sup>1</sup><sup>1</sup>Dept. of Ophthalmology, SMIMER Medical College, Surat, Gujarat, India

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## ABSTRACT

**Introduction:** Retinopathy of prematurity (ROP) is a disorder seen in preterm babies. ROP is a potentially preventable cause of irreversible total blindness in premature infants. Recent advancements in neonatal care have led to an increase in the survival of low birth weight infants, resulting in a rise of ROP incidence. Globally, ROP is estimated to affect more than 50,000 infants annually. In India, every year, 500 children are estimated to become blind from ROP. If left untreated it can be a third epidemic which can be prevented by appropriate screening.

**Objectives:** To find the prevalence of ROP To identify the risk factors for ROP.

**Materials and Methods:** Retrospective study analysis was done for 2.5 years at tertiary care hospital where after taking permission from institutional ethical committee 293 babies were enrolled in this study who were referred from paediatrician as per the standard guidelines of “Rashtriya Bal swasthya karyakram”. All babies were dilated with combination drops of Tropicamide 0.8%w/v and Phenylephrine hydrochloride 5%w/v. All the high risk term babies and preterm babies(<32 weeks) and <2 kg weight were examined 4 weeks postpartum and babies with <=28 weeks were examined at 2 weeks postpartum by Viteroretinal surgeon till the retina matures. Grading was done by following International classification of ROP. All babies retina were examined up to Ora Serrata, Collected data were analysed by Chi-square test.

**Results:** Among 293 babies Prevalence of ROP identified was 32%. 93 babies were very low birth weight (31.7%)(<1.0 kg BW), 35 babies were low birth weight (46%)(1 to 2.5 kg BW) as per the standard guidelines of World Health Organization for birth weight. ROP was found in 52 out of 93 very low birth weight babies(55%) and 40 out of 135 low birth weight babies(29%). P value was less than 0.0001 which was statistically significant. ROP was found in 80 Out of 157 pre term babies (50%). Logistic regression was performed to ascertain the effect of birth weight and gestational age.

**Conclusion:** ROP occurs mostly in extreme low birth weight and preterm infants. In middle-income-countries like India, high rates of premature birth, and increasing resuscitation of premature infants, often with suboptimal standards of care, have resulted in a third epidemic of ROP. It is essential to screen premature babies and babies with low birth weight. Awareness regarding ROP screening is a key factor for it's prevention.

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## 1. Introduction

Retinopathy of prematurity (ROP) is a disorder seen in preterm which was described by Terry in 1942.<sup>1</sup> So Retinopathy of Prematurity is also known as Terry's syndrome.

Terry coined term retrolental fibroplasia because of his impression that it was the pathology that involve embryonic hyaloid proliferation of retina. The term ROP was given by Heath in 1951.<sup>2</sup> His studies and research offered thorough details of the disease.

ROP is a potentially preventable cause of irreversible total blindness in premature infants. As the survival of preterm babies increased due to improved perinatal

\* Corresponding author.

E-mail address: [kmsheikh69@gmail.com](mailto:kmsheikh69@gmail.com) (K. Sheikh).

healthcare, ROP has been the favourite research project worldwide. The preterm with less than 2.0kg birth weight classified as low birth weight babies are at the greatest risk of developing ROP.

High ROP rates are associated with comorbidities of preterm birth<sup>3</sup> which has major social consequences like blindness especially in middle income countries and south-east Asia.<sup>4</sup> It has implications throughout life of the child and family.

ROP is a multifactorial disease<sup>5,6</sup> with associated risk factors like birth weight gestational age, oxygen supplementation, prolonged mechanical ventilation, anaemia, Intraventricular haemorrhage, necrotizing enterocolitis, sepsis.<sup>7</sup> These risk factors which leads to progression of ROP needs to be evaluated. The knowledge of these risk factors will help the ophthalmologists and paediatricians to perform enhanced clinical examination, screening and diagnosis of ROP.

## 2. Materials and Methods

It is a retrospective analysis. This analysis was done at tertiary care hospital in Ophthalmology department for duration of 2.5 years. All Patients were dilated with combination drops of Tropicamide 0.8%w/v and Phenylephrine hydrochloride 5%w/v. All the preterm babies (less than 34 weeks) and low birth weight babies of less than 2 kg weight<sup>8</sup> were examined after 4 weeks postpartum and babies with less than and equal to 28 weeks were examined at 2 weeks postpartum using 20 D lens with indirect ophthalmoscopy by Vitreoretinal Surgeon. Paediatric speculum was used to spread eyelids and Wire Vectis was used as a depressor. Patients were examined for retinal development till up to ora serrata and followed up till complete development of retina. Data were analysed by Chi-square test. ROP was classified by following International classification of ROP and screening guidelines of Government of India.<sup>9</sup>

### 2.1. International Classification of Rop (ICROP)<sup>9</sup>

Zone I: (inner zone): It is limited from optic disc to double the disc fovea distance diameter in all directions.

Zone II: From edge of zone 1 to nasal ora serrata tangential point.

Zone III: residual crescent which is anterior to zone-2

Extent: Clock hour numbers have been assigned for the extent of the disease.

The extent of the disease is further described as contiguous or non-contiguous ROP clock hours.<sup>9</sup>

Staging the disease (As defined by the International Classification of ROP)<sup>9</sup> ICROP Staging

Stage 1: Thin demarcation line that separates avascular retina to vascularized retina

Stage 2: Ridge that arises from demarcation line

Stage 3: Fibro vascular Proliferation from ridge to the vitreous

Stage 4: Retinal detachment which may be foveal or extra-foveal

Stage 5: Total retinal detachment

### 2.2. Inclusion criteria

Screening of the newborn was done as per the criteria of set by government of India.

1. All the premature babies which are less than or equal to 34 weeks.
2. All Low birth weight babies (less than 2 0 kg irrespective of gestational age.
3. Babies with GA 34-36 weeks and given oxygen therapy with other risk factors.<sup>10</sup>

### 2.3. Exclusion criteria

1. Neonate who dies before 4 weeks postpartum.
2. Infants with congenital anomalies.
3. Chromosomal abnormalities.
4. Congenital metabolic diseases.

## 3. Results

**Table 1:** Magnitude of ROP

ROP	Frequency(No. of Babies)	Percentage
NO	199	67.9%
YES	94	32.1%
Total	293	100.0%

Table 1 describe the magnitude of ROP. Out of 293 patients screened for ROP, 94 babies (32%) were found to have ROP of different zones and stages.

**Table 2:** Distribution of birth weight

Birth Weight	Frequency	Percent
Very low(<1 kg)*	93	31.7
Low (1 to 2.5 kg)	135	46.1
Normal (>2.5 kg)	65	22.2
Total	293	100.0

\*As per WHO classification for birth weights in paediatric age group

Table 2 shows birth weight distribution of our study. We found out that total 31.7% of 293 babies which accounts for 93 babies were very low birth weight. 46% of total babies were low birth weight which accounts for 135 babies. 22% babies were having normal birth weight which accounts for 65 babies.

Table 3 shows association between birth weight and ROP.

**Table 3:** Birth weight association with ROP

ROP	Birth Weight			Total
	Very low	Low	Normal	
No	41(20.6%)	95(47.7%)	63(31.7%)	199
Yes	52(55.3%)	40(42.6%)	2(2.1%)	94
	93	135	65	293

**Table 4:** Relation of ROP and gestational age

ROP	GA(Gestational Age)		Total
	PRE term(<34 weeks)	FULL term(>34 weeks)	
No	77(38.7%)	122(61.3%)	199
Yes	80(85.1%)	14(14.3%)	94
	157	136	293

**Table 5:** Comparison of Variables

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
GA(pre-term)	1.527	.514	8.815	1	0.003	4.605
BIRTH Weight			20.211	2	P<0.0001	
BW –Very low	2.003	.851	5.547	1	0.019	7.413
BW- Low	.741	.832	.793	1	0.373	2.098
Constant	-3.242	.739	19.267	1	P<0.0001	.039

\*logistic regression applied

We have observed that statistically significant P value (P less than 0.0001) was found out in low birth weight babies.

Babies having low birth weight have more chances of Retinopathy of Prematurity than normal birth weight babies. This result was statistically significant. (P value was less than 0.0001).

In our study 55% of very low birth weight babies, were having ROP which accounts for 52 out of 93 babies. 29% of low birth weight babies were having ROP (40 out of 135). Only 0.03% of normal birth weight babies were having ROP (2 out of 65).

Among 94 ROP babies 52 were very low birth weight (55%), 40 were low birth weight (42%) and 2 were normal birth weight (2%).

Table 4 shows association between GA and ROP. ROP was found in 80 Out of 157 pre term babies (50%). Only 14 babies out of 136 full term babies had ROP. Out of 94 ROP babies, 80(85%) were pre term babies. 14 out of 94 ROP babies were full term. These findings were statistically significant (P less than 0.0001).

A logistic regression was performed to ascertain the effect of birth weight and gestational age on the likelihood that patients (born babies) have ROP. The logistic model was statistically significant, the model explained 28.6% (Nagelkerke  $R^2$ ) of the variance in ROP and correctly classified 72% of cases. Pre term babies are 4.605 times more likely to exhibit ROP than full term. Normal weight babies are associated with reduced likelihood of exhibiting ROP, whereas very low weight and low weight babies have 7.411 and 2.098 time respectively more chance to develop ROP in as compared to normal weight babies.

### 3.1. Statistical analysis

Descriptive Analysis was used to represent data as percentage, whereas chi-square test was applied to know the association between ROP & GA and ROP & BW at 95% level of Significance. Logistic Regression was applied to examine and describe the relation between a binary response variable (ROP – yes Vs no) and set of predictor variables (i.e. GA and BW)

## 4. Discussion

ROP is a pathological process that occurs in immature retina if left undetected can lead to tractional retinal detachment and thereby results in total blindness with increasing burden of blindness as well as economic burden too. To prevent these consequences it is high time requirement to screen the preterm and high risk babies at appropriate time and treat them as and when require till they reach to irreversible stage. In an order to achieve this goal screening guidelines were made and followed, records were kept to assess the prevalence outcome and associated risk factors.

In this study 94 out of 293 babies had ROP of any stage. This study prevalence was 32%. In contrast, the study which was done by Abdel H. A. A. Hakeem<sup>11</sup> in England had 19% ROP prevalence. The study done by

Dr. K. Rajendran in Tamil Nadu had prevalence of 19%. Prevalence of Both the studies were lower than our study. The study done by Dr. Anamika Dwivedi<sup>8</sup> in Madhya Pradesh had similar Prevalence of ROP which is 30%. Study done by Mukta Sharma<sup>10</sup> mentioned 30% of prevalence in

developing countries which is similar to our study.

The Study done by Lad EMin the United States<sup>12</sup> had 0.17% ROP. We can conclude from all these study results that Prevalence of ROP is much higher in developing countries than developed countries.

The study done by Shah VA<sup>13</sup> in Singapore had 29.2% ROP prevalence as compared to our study which has 32%. In the study done by Gupta VP<sup>14</sup> in New Delhi ROP was found in 33.3% which is similar to our study. CRYO-ROP<sup>15</sup> study, reported ROP of any stage in 65.8% which is quite higher than our study.

The retrospective study done by Vinekar et al.<sup>16</sup> 138 patients with BWs more than 1250 gm referred for ROP examination, reported 45% of ROP.

The study done by Charan et al.<sup>17</sup> reported in 1995 an overall incidence of 47% ROP in their babies with BWs of 1.7 kg or less. The study done by Dhaliwal et al.<sup>18</sup> Out of 1413 infants with birth weight less than 1500 g and/or GA of

26-31 weeks, infants with a birth weight below the tenth percentile for GA were more likely to develop any stage of retinopathy of prematurity.

All these studies shows birth weight and pre term are the most important risk factors for developing ROP which result is similar to result.

## 5. Conclusion

Retinopathy of Prematurity most commonly seen in low birth weight babies.

High rate of premature birth and increasing advancement of healthcare without proper standards resulted in third epidemic. There is urgent need of screening guidelines of ROP for developing countries like India.

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## 8. Conflict of Interest

None.

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## Author biography

**Kavin Shroff** Resident Doctor

**Khushnood Sheikh** Associate Professor

**Manisha Patel** Professor and Head

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