

## Preterm Retinopathy of Prematurity and risk factors from a tertiary health care unit: A descriptive study

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### ABSTRACT

**Introduction:** Retinopathy Of Prematurity (ROP), is the major preventable blindness in infants. A study was conducted to find the risk factors of ROP in premature infants with gestational age (GA) < 36 weeks.

**Methods:** It was a descriptive study conducted in Kakatiya Medical College, Hanumakonda. Babies with major congenital, chromosomal anomalies were excluded. One hour before screening, a drop of Tropicamide was instilled for every 10 – 15 minutes for 4 times followed by a drop of Phenylephrine just before examination. ROP screening was carried out by a senior ophthalmologist in NICU. First, the anterior segment was examined. This was followed by sequential examination of all clock hours of the peripheral retina and findings were recorded. Association between variables was analysed by using Chi-Square test.  $P < 0.05$  was considered to be statistically significant.

**Results:** ROP was detected in 31.4%; statistically there was no significant difference between gender. Apnoea, hyperbilirubinemia, anaemia, respiratory distress were found to be the risk factors for ROP; statistically there was significant difference, respectively.

**Conclusion:** Preventing prematurity is the best way to reduce ROP. Proper coordination between obstetrician, neonatologist and ophthalmologist can help to reduce the incidence.

**KEYWORDS:** Neonates, Premature infants, Retinopathy

### INTRODUCTION

Retinopathy Of Prematurity (ROP), is the major cause of preventable blindness in infants.<sup>[1]</sup> Preterm, low birth weight (LBW), premature infants are more prone to this. As per the WHO Vision 2020 programme, early screening can reduce the incidence of ROP and referral for treatment.<sup>[2]</sup> The risk of ROP is 82% in infants with birth weight (BW) < 1000 grams; among this, 9.3% are at risk of blindness.<sup>[3]</sup>

Due to the limited knowledge as well as infrastructure, initially there was low incidence of ROP in developing countries such as India; but the scenario is improving due to development in the medical field. One of the recent reports from the Indian subcontinent in 2016, mentioned that the incidence of ROP was 23.4%.<sup>[4]</sup> Whereas, in 2020, Senjam SS et al. reported that the visual impairment due to ROP is growing continuously over the past many years.<sup>[5]</sup> LBW, prolonged oxygen treatment, severity of neonatal illnesses and so on are some of the causes of ROP; but the pathogenesis is multifactorial.<sup>[6, 7]</sup>

With these, a study was conducted to find the incidence of ROP in premature infants with gestational age (GA) < 36 weeks or BW < 2000 gm and also to find the risk factors associated with ROP as well as the clinical spectrum.

### METHODS

It was a descriptive observational study conducted in the department of Paediatrics, Kakatiya Medical College, Hanumakonda. Study was conducted from November 2019 to October 2021. Informed consent was taken after explaining the methods and procedures involved in the study

in vernacular language. Study protocol was approved by the Institutional Ethics Committee.

Babies with gestational age (GA) < 36 weeks and the BW < 2000 gms were included in this research. Children with major congenital malformations, chromosomal anomalies and full term babies were not considered. Neonates those were admitted in NICU were included and routine screening was carried as per the protocol. One hour before ROP, the babies were fed, so that vomiting and aspiration can be avoided if anything. Due to the short term effects on vitals in the premature babies, screening was kept as short as possible.

Pupils were dilated with 2.5% Phenylephrine and 0.5% Tropicamide. One hour before the scheduled time, a drop of Tropicamide was instilled for every 10 – 15 minutes for 4 times. This was followed by a drop of Phenylephrine just before examination. Phenylephrine is available at 10% concentration, diluted 4 times before use. Repeated installation of Phenylephrine was avoided.<sup>[8]</sup>

After topical anaesthesia, ROP screening was carried by senior ophthalmologists in NICU by using Retcam Shuttle (Clarity MSI, USA). A wire speculum was used to keep the eyelids apart. First, the anterior segment of the eye was examined to observe tunica vasculosa lentis, pupillary dilation, and lens/media clarity followed by the posterior pole to look for plus disease. This was followed by sequential examination of all clock hours of the peripheral retina. A scleral depressor was used to indent the eye externally to examine areas of interest, rotate and stabilize the eye and the findings were recorded.

#### Statistical analysis:

Data were analysed using SPSS software Inc, Chicago, version 22 and Microsoft Excel version 2007. Descriptive statistics such as mean and standard deviation (SD) for continuous variables, frequencies and percentages were calculated for categorical variables were determined. Association between Variables was analysed by using Chi-Square test.  $P < 0.05$  was considered to be statistically significant.

#### RESULTS

Total, 102 babies were included in this research. ROP positivity was 32 (31.4%); in this 20 were male and 12 were female; statistically there was no significant difference ( $P = 0.087$ ). ROP was 17 (16.7%), 9 (8.8%), 6 (5.8%), respectively in 800 – 1200 gms, 1200 – 1600 grams and 1200 – 1600 grams BW categories; statistically there was significant difference. Table 1

Sixteen (50%) ROP positive neonates had history of apnoea; statistically there was significant association between apnoea history and the ROP. In this research, a total of 34 neonates had a history of hyperbilirubinemia, of these 19 were ROP positive; statistically there was significant difference. Total, 20 (19.6%) neonates had anaemia history.

In this, 11 (10.8%) were ROP positive; statistically there was significant difference Table 2. Out of 53 respiratory distress syndrome (RDS), 32 (61%) were ROP positive; statistically there was significant difference.

Birth Weight in gms	Retinopathy of Prematurity No. (%)		Total
	Positive	Negative	
800 – 1200	17 (16.7)	6 (5.8)	23 (22.5)
1200 – 1600	9 (8.8)	34 (33.3)	43 (42.1)
1600 – 2000	6 (5.8)	30 (29.4)	36 (35.3)
Total	32 (31.4)	70 (68.6)	102 (100)

$P < 0.001$ ; statistically significant

**Table 1: Correlation between birth weight and Retinopathy of Prematurity status among the study participants**

Anaemia	Retinopathy of Prematurity No. (%)		Total
	Positive	Negative	
Yes	11 (10.8)	9 (8.8)	20 (19.6)
No	21 (20.6)	61 (59.8)	82 (80.4)
Total	32 (31.4)	70 (68.6)	102 (100)

$P = 0.011$ ; statistically significant

**Table 2: Association between anaemia and Retinopathy of Prematurity status among the study participants**

#### DISCUSSION

Timely screening is the 2<sup>nd</sup> common measure to prevent ROP; early treatment prevents blindness. Hence, an utmost importance was given in the WHO VISION 2020 programme.<sup>[2]</sup> ROP is a significant problem in developing countries like India. But no authentic reports on large randomized multi-centric trials. The clinical spectrum and incidence of ROP is not similar in all units, there is an overall decrease in the incidence. So timely screening is very important aspect in the management of ROP.

In the present study, ROP was detected in 32 (31.4%) neonates. It was reported to be 22.3% by Chaudhari et al. in 2009, 23.4% by Verma et al. in 2016 and 19.3% by Deepthi et al.<sup>[4, 9, 10]</sup> In this study, there was an inversely proportional relationship between BW and RO Table 1. Similar findings were reported by Maheshwari et al.<sup>[11]</sup>

In this research, duration of oxygen administration was an independent risk factor for development of ROP ( $P=0.050$ );

nearly 50% of the babies on oxygen therapy developed ROP whereas it was reported to be 59.7% in Verma N et al. study.<sup>[4]</sup> Rekha et al. showed that antenatal steroid administration had protective effect against ROP in the neonates.<sup>[12]</sup> But it was not a significant risk factor in this study.

Clinical sepsis was identified to be the important risk factor of ROP. In this research, ROP was detected in 53.3% of neonates with sepsis. It was 52% in Gupta et al. study and 27% in Verma N et al. report.<sup>[4, 13]</sup> Sepsis increases the production of inflammatory mediators such as IL 6, IL 8, TNF- $\alpha$ , which causes vascular endothelial damage and leads to retinal hypoxia. This will release vascular endothelial growth factor (VEGF), causes ROP.<sup>[14]</sup> Half of the neonates in this study had a history of apnoea. It is clear in the literature that ROP is associated with apnoea and reported risk factor of ROP.<sup>[15-17]</sup>

As per various reports' bilirubin had antioxidant activity.<sup>[18, 19]</sup> Some researchers reported that bilirubin has a protective role against the development of ROP.<sup>[20]</sup> Whereas in this research, ROP was diagnosed in 19 out of 34 hyperbilirubinemia neonates. This might be due to long term oxygen therapy because all these neonates were on long term oxygen therapy. Charan R et al. also opined similarly.<sup>[21]</sup>

Englert et al. reported that neonates with severe anemia for long time developed mild ROP compared to less anaemic babies.<sup>[22]</sup> Whether blood transfusion and anaemia are the risk factors for the development of ROP is not clear.<sup>[23]</sup> In this research, >50% neonates with anaemia history developed ROP because the hypoxic avascular retina can stimulate the production of VEGF which results in uncontrolled retinal neovascularization ends up with ROP.<sup>[24]</sup> According to Kusuda et al., RDS is important risk factor for the development of ROP.<sup>[25]</sup> In this study, out of the 53 RDS neonates, ROP was detected in 32 (61%); statistically there was significant difference.

**Recommendations:** Large multi-centric studies for longer duration with large sample size is recommended which is helpful to establish the true incidence and to find the risk factors associated with ROP especially to high populated countries such as India.

**Conclusion:** Preventing prematurity is the best way followed by meticulous management of sick babies, which can help to reduce the incidence of ROP. Close collaboration among obstetricians, neonatologists, and ophthalmologists is crucial to minimize both the occurrence and impact of ROP. Indirect ophthalmoscopy is advised for all premature infants.

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