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Original Research Paper

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FREQUENCY OF RETINOPATHY OF PREMATURITY IN LARGER PREMATURE BABIES WITH GESTATIONAL AGE BETWEEN 31-37 WEEKS OR WEIGHT MORE THAN 1501 GRAMS

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ABSTRACT **Background-** India is home to more than 25% of the world's blind children, making childhood blindness a significant public health issue. Retinal etiology accounts for more than 22% of childhood blindness in India, with "Retinopathy of Prematurity (ROP)" being the most frequent and avoidable of these causes. **Aim-** Our study aims to measure the frequency of ROP in larger premature babies with gestational age between 31-37 weeks or weights more than 1501 grams. **Material And Methods-** This study was a single-center, hospital-based cross-sectional study, screening premature neonates of N.C Medical College and Hospital, Israna, Panipat, born between May 2023 to October 2023. The data of 176 babies (352 eyes) was analyzed. The screening was done using an indirect ophthalmoscope by the same ophthalmologist and classification was done using international ROP classification. **Results-** The incidence of ROP in our study was found to be 18.75%. The average Gestational age among cases was 29.2 $\pm$ 2.8 weeks and the average Birth weight was 1962 $\pm$ 225.6 grams. We also found that all the parameters had a p-value of <0.001. **Conclusion-** We conclude that Babies with BW >1501 grams had 15.5% incidence of ROP and babies with GA of 31-37 weeks had 13.7% incidence of ROP. ROP screening and treatment, especially for babies with lower gestational age and weight will provide great gains in combating this disease, which is the most common cause of preventable blindness in infants.

KEYWORDS : Retinopathy of prematurity, infant, premature, diagnosis.

INTRODUCTION

India is home to more than 25% of the world's blind children, making childhood blindness a significant public health issue.[1] Retinal etiology accounts for more than 22% of childhood blindness in India, with "Retinopathy of Prematurity (ROP)" being the most frequent and avoidable of these causes.[2] According to the World Health Organization, India and other middle-income nations are currently experiencing the 'third epidemic' of this illness.[3]

ROP is a complex disorder that affects the development of retinal vasculature in preterm infants. It is more common in infants who get intensive neonatal care, especially if they receive prolonged oxygen therapy and other risk factors. It is thought to be caused by the blood vessels in the retina becoming disorganized, which can cause scarring and retinal detachment.

Peripheral retinal neovascularization is the primary pathogenic alteration associated with ROP and can be minor self-limiting, but in more severe cases it can cause blindness. Based on data gathered from community-based research, the incidence of visual impairment ranged from 2.05 per thousand to 13.6 per thousand. At the same time, the frequency of childhood blindness varied from 0.6 to 1.06 per thousand. [4-5]

In 2017 the National Task Force on ROP in India released ROP operating requirements. These recommendations state that larger children delivered between 34 and 36 weeks with high-risk features, as well as preterm newborns weighing fewer than 2000 g at birth, should also be tested for ROP. The initial screening should occur within the first four weeks of life for infants with birth weights under 1200 g or gestations under 28 weeks. These babies should be examined between two and three weeks of age. [6-7]

Currently recommended guidelines are based on a birth weight (BW) of less than 1,501 gm or a gestational age (GA) of 30 weeks or less. [1,8] The new Growth and Retinopathy of Prematurity (G-ROP) guidelines use six criteria, any one of which leads to an examination for ROP.[8] These criteria include a

1)BW of less than 1,051 g

2)GA of less than 28 weeks

3)Three measures of slow postnatal weight gain

4)The presence of hydrocephalus.

The postnatal weight gain measures capture weight gain (WG) between postnatal day 10 and 19 < 120 g; WG between postnatal day 20 and 29 < 180 g; or WG between postnatal day 30 and 39 < 170 g.

ROP is more common in high-income nations among children born extremely preterm (less than 28 weeks gestational age), although it is not restricted to these babies. The prevalence of ROP reduces with increasing gestational age at birth, however, there is a "third epidemic" of ROP occurring in low- and middle-income nations, where most newborns with severe ROP appear to be older than 29 weeks gestation [9]. These more developed newborns have a different phenotypic and illness trajectory from severely preterm babies, which presents unique challenges for screening and care.

The precise gestational age of children is not often recorded in India; also, bigger babies weighing between 1500 and 2000 grams at delivery have been documented to have ROP. Ophthalmologists have reported many anecdotal cases of neonates weighing between 1500 and 2000 grams being diagnosed with ROP. [8] Data on ROP in these bigger infants, however, are few in the neonatal population. Despite substantial improvements in prenatal care over the past few decades, ROP remains a multidisciplinary issue for ophthalmologists and neonatologists. Rather than offering a thorough picture, our focus in this prospective review is on the screening of newborns weighing more than 1500 grams or

more than 31 weeks, both of which together are termed bigger preterm babies.

MATERIAL AND METHODS:

This study was a single-center, hospital-based cross-sectional study, screening premature neonates of N.C Medical College and Hospital, Israna, Panipat, born between May 2023 to October 2023, and was referred to the Ophthalmology outpatient clinic for screening for the prospective. The data of 176 babies (352 eyes) were analyzed.

A well-formulated and drafted informed consent was obtained from the parents of all infants. The gestational age and weight of the infants, stay in the neonatal intensive care unit, duration of oxygen therapy, and detailed ophthalmologic examination findings were recorded in the study.

All of the babies included in the study have taken non-invasive mechanical ventilation and the babies who were severely ill were excluded from the study. Babies smaller than 37 weeks of gestational age were examined for ROP. For sensitization of parents of babies who were leaving against medical advice examination was done at 4 + 2 days post-nataly and then a repeated examination was done at 4 weeks for screening of ROP. The babies who didn't underwent any pre-checkup were examined at 4 weeks.

ROP screening was performed after pupillary dilatation using 0.5% tropicamide + phenylephrine 2.5% w/v eyedrops. These drops are considered effective and safe for ROP screening. The screening was done by the same ophthalmologist who was experienced in this by using a Heine binocular indirect ophthalmoscope and 20 D lens combined with a scleral depressor after applying wire speculum and proparacaine eye drops as the topical anaesthetic.

The grading of the ROP status was made according to the international ROP classification. [6] For each infant, the status of ROP was recorded including the zone, stage, extent of the disease, and the presence or absence of plus disease in the study. The classification was as follows-

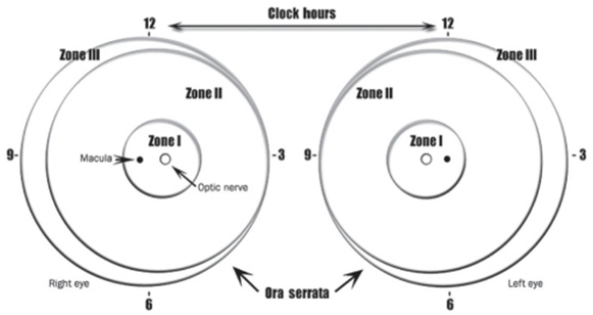


Figure1: Shows the distribution of zones according to international ROP classification.

Table 1: Shows Staging According To International ROP Classification.

STAGE	FEATURES
Stage 1	The demarcation line separates avascular from vascularized retina
Stage 2	Ridge arising in region of the demarcation line
Stage 3	Extraretinal fibrovascular proliferation/neovascularization
Stage 4	Partial retinal detachment
Stage 5	Total retinal detachment
Pre-plus disease	More vascular tortuosity than normal, but insufficient for diagnosis of plus disease
Plus disease	Vascular dilation and tortuosity of at least two quadrants of the eye

Subjects who were not diagnosed with ROP were followed up every two to three weeks until retinal vascular maturation was completed as the diagnosed cases were followed up every one to two weeks due to the severity of the disease.

IBM SPSS (Statistical Package for the Social Sciences) 22.0 package program was used to perform statistical analysis. The average, standard deviation, percentage, minimum, and maximum values of the data were calculated.

Categorical data were analyzed using the chi-square test. The data were analyzed using Spearman correlation analysis in the absence of a normal distribution. Categorical data were reported as frequencies and percentages, whereas continuous variables were expressed as mean standard deviation (SD). For intergroup comparisons of the continuous variables, the student's t-test was used.

Statistical analysis also included the use of the Analysis of Variation (ANOVA) test for homogeneous data. In the study, logistic regression analysis was used to identify the important independent risk variables connected to the presence of ROP. Each potential risk factor's adjusted odds ratio (OR) and 95% confidence interval (CI) were computed. precise P values for various variables.

RESULTS:

Table 2: Distribution Of Cases-

Total cases	ROP cases	ROP %
176	33	18.75%

In our study, the total number of cases taken was 176, and out of these 33 cases had ROP. The incidence in our study was found to be 18.75%.

Table 3: Distribution Of ROP Cases According To Gender-

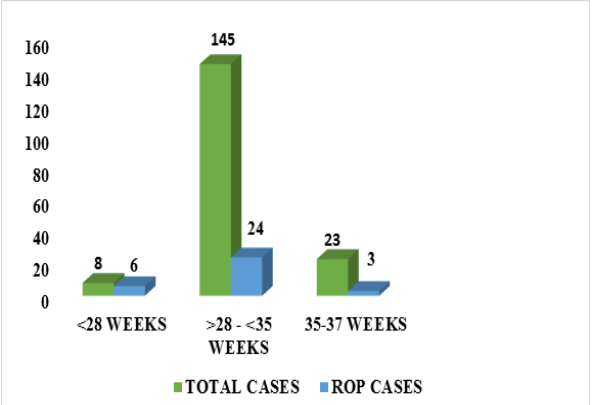
Gender	Frequency	Percentage
Male	18	54.54%
Females	15	45.45%

Out of the 33 ROP cases, we found that 18 were males and 15 were females. 54.54% were males and 45.45% females.

Table 4: Risk Factors Predisposing To ROP-

Parameter	Mean in our study
Stay in NICU	20.8 + 3.7 days
Oxygen duration	15 + 4.6 days
GA	29.2 + 2.8 weeks
BW	1962 + 225.6 g

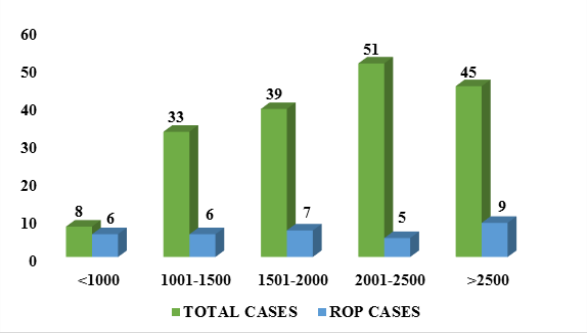
In our study, we found that among ROP cases the mean duration of neonatal intensive care unit (NICU) stay was 20.8 + 3.7 days. The mean duration for oxygen intake was found to be 15 + 4.6 days. The average GA among cases was 29.2 + 2.8 weeks and the average BW was 1962 + 225.6 grams. We also found that all the parameters had a p-value of <0.001.



Graph 1: Distribution of cases according to GA-

Graph 1 show the distribution of cases according to GA. We

found that 8 cases (4.54%) belong to GA of <28 weeks, 145 cases (82.4%) belong to GA of 29-35 weeks, and 23 cases (13.06%) belong to 35-37 weeks. Out of the 8 cases belonging to GA <28 weeks 6 were found to have ROP, and out of 145 cases belonging to GA of >28-<35 weeks 24 were found to have ROP. It was also seen that 3 cases belong to GA of 35-37 weeks (which is mostly neglected).



Graph 2: Distribution Of Cases According To BW-

Graph 2 shows the distribution of cases according to BW. We found that 8 cases (4.54%) belong to BW of <1000 g, 33 cases (18.75%) belong to BW of 1001-1500 g, 39 cases (22.15 %) belong to BW of 1501-2000 g, 51 cases (26.97 %) belong to BW of 2001-2500 g, and 45 cases (25.56 %) belong to BW of >2500 g. Out of the 8 cases with BW <1000 g 6 had ROP, in cases with BW of 1001-1500 g 6 had ROP, in cases with BW of 1501-2000 g 7 had ROP, in cases with BW of 2001-2500 g 5 had ROP and the ones with BW of >2500 g had 45 cases from which 9 had ROP.

DISCUSSION:

ROP presents certain challenges for ophthalmologists since its diagnosis and treatment need extensive clinical knowledge. [11-15] With parents becoming more aware of ROP, early detection of critical phases is more important, and treatment is started right away when it is necessary. [16-19] In the treatment of ROP, the location and stage of the disease in the retina is the most important factor in determining the treatment option. [20-24]

Our study showed that babies with a gestational age above 33 weeks and a gestational weight of more than 1500 grams are at significant risk of developing ROP. The frequency of ROP varies according to the development levels of the countries and the features of the neonatal intensive care units. The incidence of ROP in our patients according to their gestational weights and gestational age as reflected in the results of the study showed that advanced ROP requiring treatment may develop in infants with higher gestational age and weight.

In our study, the mean birth weight was found to be 1962 + 225.6 g which is on the higher side. However, in previous studies, the mean birth weight was found to be on the lower side as seen in a study by Dhawan *et al,* where the mean weight was 1260.90 + 215.52 g. [25] This shows that ROP may develop in children with higher birth weights.

Oxygen supplementation is one such factor that needs more discussion as in NICU setups oxygen is widely used without inhibitions and thus adds to the preterm insult and several studies done in the past, proving the same needs to be discussed in this study. Oxygen concentration, duration, and prolonged mechanical ventilation are among the most frequently identified risk factors for severe and treatment-requiring ROP. The amount of supplemental oxygen administration has a crucial role in reducing the incidence of ROP. In a study done by Kanav *et al,* it was seen that when oxygen supplementation was done judiciously in 17 babies only 3 developed ROP with a p-value of 0.01. So, the supplementation should be carried out judiciously. [26] In our study the mean duration of judicious oxygen supplementation was found to be 15 + 4.6 days.

A randomized controlled trial on ROP published in 1956 based on the preclinical work of Ashton and Patz found that exposure to >50% of oxygen increased the incidence of ROP compared with a curtailed oxygen exposure group. [27,28] In 1992, Flynn and colleagues found that for every 12 hours with a transcutaneous oxygen pressure (tcPO2) of 80 mm Hg, the risk of severe ROP is nearly doubled. In addition to high oxygen itself, fluctuations in oxygen saturation are an independent risk factor for severe ROP. Despite several large randomized controlled studies comparing different target ranges for oxygen saturation, the ideal range remains controversial.

In our study, the number of babies who develop ROP with advanced stage and requiring treatment is only 7, and 4 of these babies required laser photocoagulation and were referred to higher centers and 3 were taken for intravitreal anti-VEGF treatment. All of these infants were at 28-31 weeks of gestational age and 1000-1200 grams of gestational weight. Justifying the cause and effect of this study we were able to demonstrate important findings to confirm that ROP may be seen in babies over 35 weeks of gestation, making ROP screening important in infants who have higher gestational age and weight accompanying systemic disease.

CONCLUSION:

We conclude that Babies with BW >1501 grams had 15.5% incidence of ROP and babies with GA of 31-37 weeks had 13.7% incidence of ROP. ROP screening and treatment, especially for babies with lower gestational age and weight will provide great gains in combating this disease, which is the most common cause of preventable blindness in infants. In addition, it is also recommended to make the oxygen therapy as little as needed.

Limitation Of Study:

Due to the Lack of an advanced neonatal intensive care unit several perinatal risk factors in adverse deliveries which may lead to infliction with ROP could not be evaluated and it was impossible to compare the study on these parameters, which is the major limitation of our study. Also, the babies that required laser photocoagulation and intravitreal anti-VEGF treatment were referred to higher centers as no treatment method was available in our setup.

Ethics Approval And Consent To Participate:

Informed consent was taken from the parents of each patient before the study. The approval of the Institutional Ethics Committee of NC Medical College and Hospital, Israna Panipat was obtained.

Conflict Of Interest:

This study was not funded. By ethical obligations as researchers, the hospital as host to research & all authors declare that they have no conflict of interest concerning this research.

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