

Incidence And Risk Factors Of Retinopathy Of Prematurity: An Observational Study

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Abstract

Background: Retinopathy of prematurity is a condition where development of abnormal retinal vessels is secondary to an incomplete vascularization of retinal tissue due to hyperoxia, causing feedback inhibition of VEGF and destruction of endothelial cells. The risk factors of ROP should be identified to prevent disease development, and the knowledge of its etiology may help neonatologists and ophthalmologists perform careful screening and executive accurate diagnosis. In view of less literature on ROP in India, the current study was undertaken.

Methods: This is a hospital-based observational study done on Neonates born at our tertiary care center- ASRAM Medical College, Eluru, Andhra Pradesh. The study was done for 6 months. Preterm infants having birth weight ≤ 1500 g or gestational age ≤ 32 weeks or BW > 1500 g or GA between 32 to 37 weeks with either respiratory distress syndrome, or sepsis, blood transfusions, and intraventricular hemorrhage were included.

Results: ROP found in 21% infants. There is no significant difference in gender, mean gestational age between two groups. Among 21 infants with ROP, 11 had stage 1 ROP, 8 had stage 2 and 2 had stage 3 ROP. There is significant difference in mean birth weight in between two groups.

Conclusion: Impaired lung function (indicating the need for usage of surfactant) which may be, caused by pneumonia, bronchopulmonary dysplasia, or hyaline membrane disease, is an important risk factor for the development of ROP. ROP needs prompt therapeutic interventions to maintain high interest at this stage.

Keywords: Retinopathy of prematurity, Neonates, Birth weight, Incidence, Risk factors, Gestational age

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I. Introduction

Retinopathy of prematurity (ROP) is a condition where development of abnormal retinal vessels is secondary to an incomplete vascularization of retinal tissue due to hyperoxia, causing feedback inhibition of VEGF and destruction of endothelial cells. This mechanism indicates that VEGF plays an important role in endothelium development. Next to the closure of growing vessels, the retinal tissue becomes hypoxic and ischemic during development. This process will enhance VEGF significantly for neovascularization.¹⁻³ The disease has been significantly studied worldwide as there is an increase in survival rates in very low birth weight preterm newborns, which means those whose birth weight is less than or equal to 1500 g and these kinds of infants are at greater risk for developing ROP. These increased numbers may be due to improved perinatal care. High rates are leading to a remarkable setup in the appearance of other comorbidities that are related to preterm birth⁴, which have major social repercussions, such as blindness secondary to ROP. Nearly 10% of births are premature around the world.⁵

Blencowe et al.⁶ informed that due to the ROP, 32000 neonates worldwide are becoming blind or have developed severe visual impairment as per estimation. Of this, 10% are Latin American and Caribbean-born neonates. Depending upon the region, the risk factors of the ROP vary. These variations may be related to the discrepancy in neonatal care and the heterogeneity of the population. Many studies show the risk factors associated with this condition, some of which cause severe ROP⁷⁻¹¹ The risk factors of ROP should be identified to prevent disease development, and the knowledge of its etiology may help neonatologists and ophthalmologists perform careful screening and executive accurate diagnosis. In view of less literature on ROP in India, the current study was undertaken.

II. Objectives

1. To determine the incidence of ROP among Indian neonates at a tertiary care center.
2. To identify various risk factors associated with ROP development.

III. Materials And Methods

Type of study: it is an observational hospital based study.

Source of data: neonates born at our tertiary care center- asram medical college, eluru, andhra pradesh

Place of study: department of pediatrics at asram medical college, eluru, andhra pradesh

Duration of study: 6 months, january 2024 to june 2024

Sample size: the sample size is 100 and the sampling method is simple random sampling.

Eligibility:

Inclusion Criteria:

Preterm infants having birth weight $\leq 1500\text{g}$ or gestational age ≤ 32 weeks or $\text{BW} > 1500\text{g}$ or GA between 32 to 37 weeks and any of the following risk factors as follows: respiratory distress syndrome, multiple pregnancies, sepsis, blood transfusions, and intraventricular hemorrhage.

Exclusion Criteria:

Infants who were not attending the outpatient clinic for follow-up tests, infants who died without complete resolution of ROP

Infants with incomplete data on BW or GA, and

Infants who are suffering from congenital glaucoma or congenital cataracts.

Methodology:

Before the examination, a fundoscopy was performed under mydriasis. One drop of the 0.5% tropicamide eye drops combined with 1% phenylephrine eye drops was instilled three times in each eye, with a 15-minute gap.

The retinal examination was performed at the bedside using a 20-diopter lens, a pediatric scleral depressor, a newborn eyelid speculum, and a binocular indirect ophthalmoscope.

This examination was performed by one of the authors, an ophthalmologist with competent training in diagnosing and managing pediatric retinal diseases and an experienced person.

The classification of infants is based on the most advanced stage of ROP observed during the follow-up assessment, considering eyes with more advanced disease, which depends on the International Classification of Retinopathy of Prematurity.¹²

The Initial examination was performed between 4 and 6 weeks of chronological age, and the next examinations were scheduled as per ROP guidelines at intervals determined by findings seen in each examination.¹³

Data collection was stopped when retinal vascularization was completed, when reaching the extreme temporal periphery, or when ROP showed complete regression after the treatment. After that, the infants were scheduled for regular follow-up assessment with the pediatric ophthalmologist at 6 months of age. The infants discharged from the NICU are scheduled for outpatient follow-up if re-examination was mentioned above.

Parameters Assessed:

Gender,

Birth weight

Need for oxygen therapy

GA;

APGAR scores at 1 and 5 min;

Number of blood transfusions;

Use of surfactants;

Occurrence of sepsis

Maternal use of antenatal corticosteroids

Ethical aspects: Informed consent was obtained from parent of every participant in the study.

Statistical analysis: Percentages, frequencies were calculated. Normally distributed quantitative data is expressed as standard deviation and mean. Asymmetrically distributed variables were represented as minimum, median, and maximum values. Categorical variables, such as percentages and counts, were reported. First, comparisons are made between infants with and without ROP. If we use the Student test, the quantitative data was analyzed for

normally distributed variables, and asymmetrically distributed variables were tested using the U test. The categorical data was assessed using the Chi-square test.

IV. Results

During the study period, 142 infants met the inclusion criteria. Among these, 42 newborns were excluded, as 30 failed to attend follow-up visits, and 12 had incomplete data(including deaths). Overall 100 infants were included.

Incidence of ROP:

ROP found in 21% infants. All parameters were compared between infants with and without ROP to know the risk factors of ROP.

Rop Presence	Frequency	Percent
Yes	21	21
No	79	79
Total	100	100.00%

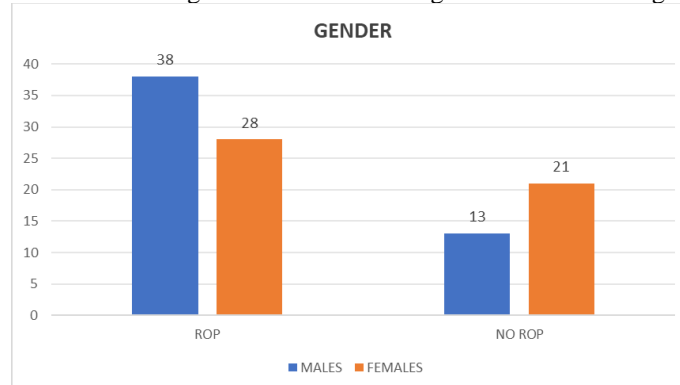
Table 1: Incidence Of Retinopathy Of Prematurity

Gestational age: The mean gestational age was 29.4±1.4 weeks. There is no significant difference in mean gestational age between two groups.

GROUP	MEAN GA	P VALUE
ROP	28.8± 1.3	0.81
NO ROP	30.0± 1.12	

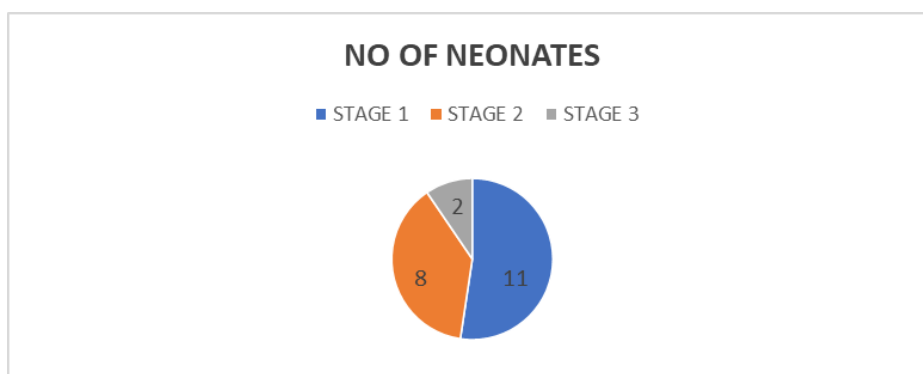
Table 2: Mean gestational age in two groups

Gender: 51% were males. There is no significant difference in gender between two groups.



Graph 1: Gender Of Infants

Stages of ROP: Among 21 infants with ROP, 11 had stage 1 ROP, 8 had stage 2 and 2 had stage 3 ROP.



Graph 2: Stages of ROP

Birth weight: There is significant difference in mean birth weight in between two groups. It was less among infants with ROP.

Group	Mean Bw	P Value
Rop	1.3± 1.14	0.001
No Rop	2.9± 1.31	

Table 3: Mean Birth Weight Among Groups

APGAR scores at 1 and 5 min: There is significant difference in mean APGAR scores at 1 and 5 min in between two groups. They were less among infants with ROP.

Group	Mean Apgar At 1 Min	Mean Apgar At 5 Min	P Value
Rop	5.7± 2.1	6.8± 3.5	0.0001
No Rop	8.2± 3.65	9.1± 1.4	0.0001

Table 4: Apgar Scores At 1 And 5 Min

Other risk factors include:

Using surfactant, maternal usage of corticosteroids, more duration of oxygen therapy, more number of blood transfusions were found to be other risk factors of ROP.

PARAMETERS	NO ROP(n=79)	ROP(n=21)	P value
Use of surfactants(%)	12.65%	66.67%	0.001
Maternal use of corticosteroids(%)	16.4%	57.14%	0.001
Mean duration on oxygen therapy(days)	1.7 days	3.8 days	0.001
No of blood transfusions needed(mean)	1	3.2	0.001

Table 5: Other parameters in both groups

V. Discussion

As per the current study findings, the incidence of ROP was 21% and the risk factors for ROP includes - low birth weight, low APGAR scores, more need for maternal corticosteroids, usage of surfactants. Also there is significant difference in mean duration of oxygen therapy, need for blood transfusions.

Using surfactant, maternal usage of corticosteroids, more duration of oxygen therapy, more number of blood transfusions were found to be other risk factors of ROP.

Freitas et al evaluated 602 newborns and the incidence of ROP was found to be 33.9%. Mean gestational age was 30.7 weeks. The incidence of of type 1 prethreshold ROP was 5.0%. Logistic regression analysis showed low birth weight, pulmonary diseases, intraventricular hemorrhage and low gestational age as main risk factors of ROP development. These findings are similar to the present study.¹⁴ Though the risk factors are same, the incidence was comparatively less in the present study.

Most of the ROP studies screen infants who are born at less than 32 weeks of gestation or with less than 1500g of BW.

The investigation of Fortes Filho et al. says that the frequency of ROP at any stage and type 1 threshold ROP is 29.6 and 7%, respectively.⁴

In 2010, The Vermont Oxford Network database estimated the incidence of 33.2% of ROP in neonates having BW less than 1500 g,¹⁵ and the data was collected from more than 1000 NICUs.

Goncalves et al. did an investigation and found that the occurrence of ROP at any stage and threshold ROP were 44.5 and 1.8%, respectively.¹⁶

Variations in the incidence of ROP may show the differences in mortality rates, informing the need to investigate further the risk factors for developing ROP and the characteristics of neonatal care in each institution. In the United States, numerous published case series show that infants having ROP in low and middle-income countries have higher average BW and GA than infants with ROP.¹⁷

According to the study reports, high-income countries have incidences of about 60% for babies with less than 1500g in nurseries¹⁸ whereas, in middle-income countries, the situation varied depending on birth conditions and rate of survival of premature infants and also due to the reason that the ROP seen in older and bigger babies

than in high-income countries because of different standards of neonatal care. Many studies seek better ROP screening routes by considering postnatal weight gain from mathematical models to identify risk in preterm infants.¹⁹ One study indicated that there is a possible method to decrease the number of unwanted examinations by using methods with good specificity and sensitivity.²⁰

VI. Conclusion

The occurrence of ROP in our study is near to worldwide results. Our study investigated risk factors related to ROP, supporting the significance of low GA, and BW. Impaired lung function (indicating the need for usage of surfactant) which may be, caused by pneumonia, bronchopulmonary dysplasia, or hyaline membrane disease, is an important risk factor for the development of ROP. ROP needs prompt therapeutic interventions to maintain high interest at this stage.

Conflicts of interest: Nil

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