Original Article

Retinopathy of Prematurity Scenario In A Tertiary Eye Care Hospital

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Abstract

Purpose: To evaluate scenario of retinopathy of prematurity (ROP) in a tertiary eye care hospital. **Methodology:** This observational study was conducted at Department of vitreo retina in National Institute of Ophthalmology and Hospital (NIOH), Dhaka, from January 2023 to September 2023. Study population was taken among patients who had come for confirmation and treatment of ROP. The sampling method was purposive sampling. Inclusion criteria were preterm and low birth weight babies with confirmed ROP according to national guideline. Exclusion criteria was doubtful cases with peripheral avascular zone. Variables were age distribution, sex distribution, fetus count, gestational age, age during 1st examination in department of vitreo retina, birth weight, delivery place, oxygen intake, zone and stage of ROP and ROP treatment. A detailed history was taken. The clinical examination was performed and adequately recorded. A proforma was prepared to record the data on the particulars of the patients. Ethical principles were followed accordingly. **Results:** Maximum patients were male (62%). 25% babies were twins or triplets. Mean gestational age was 31.67 weeks. Mean birth weight was 1623 gm. Mean oxygen intake duration was 12.35 days. 81% babies had multiple complications. Maximum cases (30%) were APROP (Aggressive posterior retinopathy of prematurity) followed by zone II stage 3 with plus disease (22%) and zone II stage 2 with plus disease (20%). Maximum patient were treated by injection Bevacizumab and ROP laser (46%) followed by ROP laser (28%) and observation (14%). **Conclusion:** ROP is one of the emerging causes of childhood blindness. Preterm and low birth weight babies with prolonged oxygen therapy in neonatal intensive care unit were the major cases of ROP in a tertiary eye care hospital.

Key Words: Retinopathy of prematurity (ROP), Aggressive posterior retinopathy of prematurity (APROP), Neonatal intensive care unit (NICU), Infertility.

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Introduction

Retinopathy of prematurity (ROP) is a vascular disorder that mainly impacts the underdeveloped retina in premature infants, potentially resulting in significant vision impairment and blindness. In 1942, Terry coined the term "retrolental fibroplasia" to a disorder characterized by the presence of complicated retinal detachment in the eyes at the advanced stage of ROP[1]. The anomalies observed in ROP occur at the interface between the vascular and avascular retina. Retinopathy of prematurity (ROP) may appear between the 3rd to 4th chronological age (CA) weeks, namely from 31 to 33 weeks post-conception, irrespective of the gestational age (GA) at delivery (figure 1). Prematurity is defined by the World Health Organization (WHO) as an infant born at less than 37 weeks' gestation and severe if less than 28 weeks. Low birth weight (LBW) is defined as than 2,500 grams and extremely LBW as <1000g [2,3]. ROP is

one of the preventable contributor to childhood blindness. ROP poses a risk to all newborns who are born prematurely and have low birth weight. Retinopathy of prematurity (ROP) leads to permanent vision loss shortly after birth, typically within a few weeks. Due to the significant reliance on vision for early learning, infants with ROP who are blind are also susceptible to developmental delay, which can impact their motor, social, and emotional development[3].

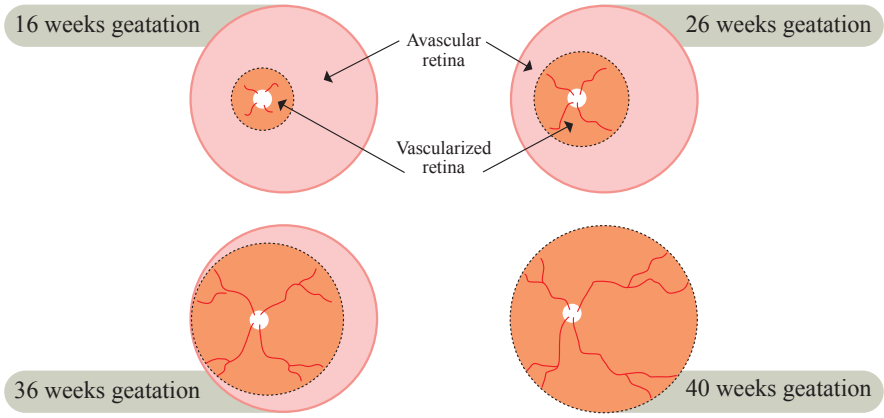


Figure : 1 : ROP development

Approximately 3.75 million babies are born in Bangladesh each year. Among them, about 424,100 babies are born prematurely (<37 weeks), with a preterm birth rate of 14.5%. About 45,000 babies are born with low-birth weight (<2,500 grams) and/or before 28 weeks of gestation. About 25,000 of these weigh 1,500 grams or less and are at high risk of ROP. Babies with a gestational age (GA) of <33 weeks who were examined between December 1998–July 2003 and found an incidence of 4.4% presenting at various stages. Another study assessed the presence of ROP and potential risk factors other than supplementary oxygen in premature infants with a gestational age of ≤34 weeks and or birth weight of ≤1,500g; ROP was detected in 40% of these infants[4-8].

Immaturity and the administration of high levels of oxygen therapy are significant contributing factors to the development of ROP. Multiple studies indicate that retinopathy of prematurity (ROP) is also influenced by various factors occurring before and after birth, as well as neonatal treatments including maternal hypertension, multiple births, male gender, respiratory distress syndrome (RDS), apnea, sepsis, intraventricular haemorrhage (IVH), blood transfusions, and genetic factors[9-11].

This study was conducted at the National Institute of Ophthalmology and Hospital (NIOH), Dhaka. This study aimed to evaluate scenario of retinopathy of prematurity in this hospital.

Methodology

This observational study was conducted at department of vitreo retina in National Institute of Ophthalmology and Hospital (NIOH), Dhaka, from January 2023 to September 2023. The study population was taken among patients who had come for confirmation and treatment of ROP in the Department of Vitreo retina. In NIOH, 1st ROP screening is performed in department of paediatric ophthalmology, then suspected ROP cases are referred to department of vitreo retina for confirmation and treatment. The sampling method was purposive sampling. Inclusion criteria were preterm and low birth weight babies with confirmed ROP according to national guideline. Exclusion criteria was doubtful cases with peripheral avascular zone only and no ROP.

ROP screening is conducted according to National Guideline (Figure 2 and 3)[3,12].

Criteria	Description
Criterion I	Babies with BW ≤2000g
Criterion 2	Babies born at a GA of ≤35 weeks
Criterion 3	Selected preterm (>35-<37 weeks) infants who are sick and have needed extensive cardiorespiratory support and prolonged oxygen therapy, or who had apnea of prematurity, anemia needing blood transfusion, thrombocytopenia or neonatal sepsis should also be screened if the attending pediatrician or neonatologist considers them to be at high risk.

Figure 2 : National Guideline of ROP screening

Timing	Indicators
20-day strategy	Babies with a GA of ≤30 weeks or a BW of ≤1500g
30-day strategy	Babies with a GA of ≤35 weeks or a BW of ≤2000g

Figure 3 : Timing of ROP screeing

Variables were sex distribution, fetus count, gestational age, age during 1st examination in department of vitreo retina, birth weight, delivery place, oxygen intake, zone and stage of ROP, ROP treatment, history of infertility treatment, mother's age.

A detailed history was taken. The clinical examination was performed and adequately recorded. Proper ocular examinations were done by torchlight and then under indirect ophthalmoscope. Some patients were examined under ret-cam for confirmation. Some patients were advised for B scan if needed. All collected data was recorded correctly. A proforma was prepared to record the data on the particulars of the patients. Ethical principles were followed accordingly.

Statistical analysis

The statistical analysis was conducted using SPSS (Statistical Package for Social Science) version 26 statistical software. The study's findings were presented by frequency and percentage in tables and graphs. Means and standard deviations for continuous variables and frequency distributions for categorical variables were used to describe the characteristics of the total sample. Associations of continuous data were assessed using paired sample t-test. Here, $p<0.05$ was considered significant, and all p-values were two-sided.

Results

A total number of 152 cases (eyes) of 80 patients were included in this study.

Sex Distribution :

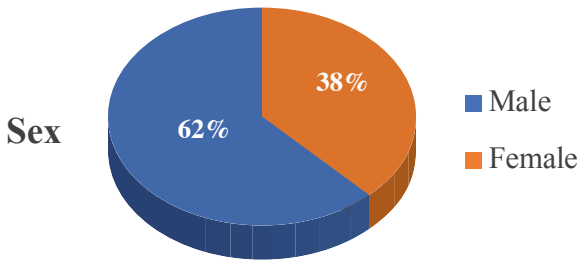


Figure : 4 : Sex distribution : Among the 80 patients, 50 (62%) were male, and 30 (28%) cases were female.

Fetus Count :

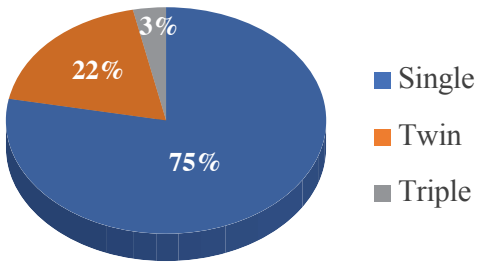
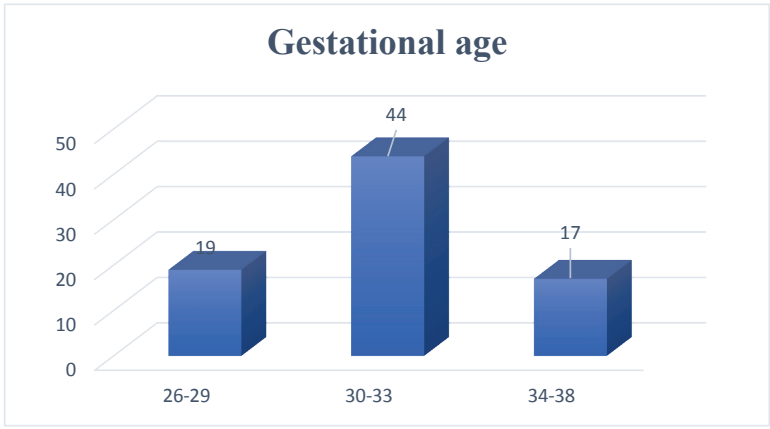


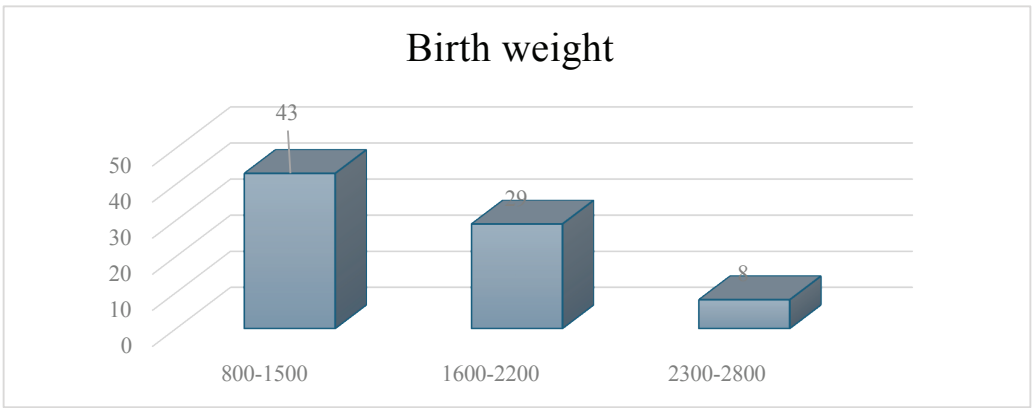
Figure : 5 : Fetus count : 60 (75%) babies were single , 18 (22%) were twin, 2 (3%) were triplet.

Gestational Age :



Mean age : 31.67 weeks
Figure : 6 : Gestational age : 44 (55%) were from 30-33 weeks group ,
19 (24%) were from 26-29 weeks group, 17 (21%) were from 34-38 weeks group.

Birth Weight :



Mean birth weight : 1623 gm
Figure : 7 : Birth weight : 43 (54%) were from 800-1500 gm group , 29 (36%)
were from 1600-2200 gm group, 8 (10%) were from 2300-2800 gm group.

Neonatal Hospital History :

Criteria	No
Hospital Born	97% (n=78)
Mean Oxygen intake duration in NICU (100% cases)	12.35±6.7 days
Neonatal multiple complications (Jundice / respiratory distress / blood transfusion)	81% (n = 65)

Table 1 : Neonatal hospital history. 97% babies were born in hospital, mean oxygen intake duration in neonatal intensive care unit was 12.35 days and 81% babies had multiple complications after birth like Jundice / respiratory distress / blood transfusion etc.

ROP Status :

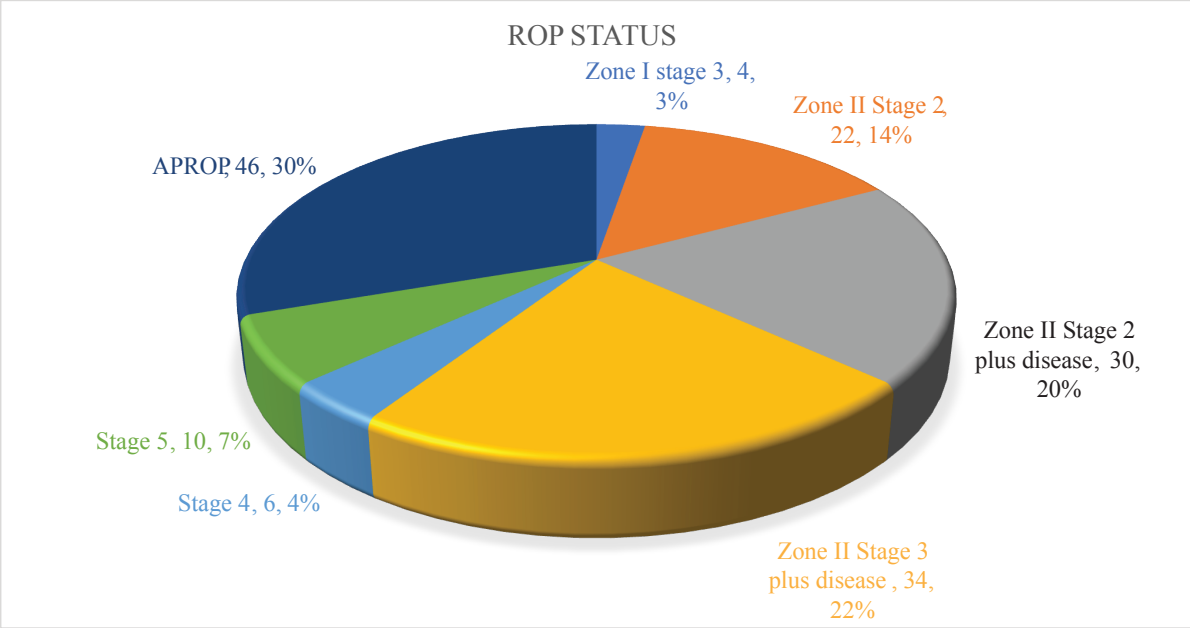


Figure 8 : 3% (n=4) eyes had zone I, stage 3 ROP, 14% (n=22) eyes zone II stage 2 ROP, 20% (n=30) had zone II stage 2 ROP with plus disease, 22% (n=34) had zone II stage 3 ROP, 4%(n=6) had stage 4 ROP, 7% (n=10) had stage 5 ROP, 30% (n=46) had APROP (Aggressive posterior retinopathy of prematurity)

Treatment of ROP

Treatment procedures	Number of cases
Injection Bevacizumab	04 (3%)
Injection Bevacizumab + ROP Laser	70 (46%)
ROP Laser	42 (28%)
Observation	22 (14%)
Surgery	14 (9%)

Table 2 : Treatment procedures : 4 (3%) eyes were advised bevacizumab injection , 70 (46%) were advised both injection bevacizumab and ROP laser , 42 (28%) were advised ROP laser , 14 (9%) were advised surgery , 22 (14%) were advised for Observation.

Discussion

Retinopathy of prematurity (ROP) is a condition that occurs in infants with low birth weight or underdeveloped retinas. Its main features include the development of abnormal blood vessels and reduced blood flow to the retina, which can result in ROP, retinal detachment, degeneration, and secondary glaucoma. ROP can also cause concurrent issues such as cataracts, amblyopia, and strabismus even blindness in children[13].

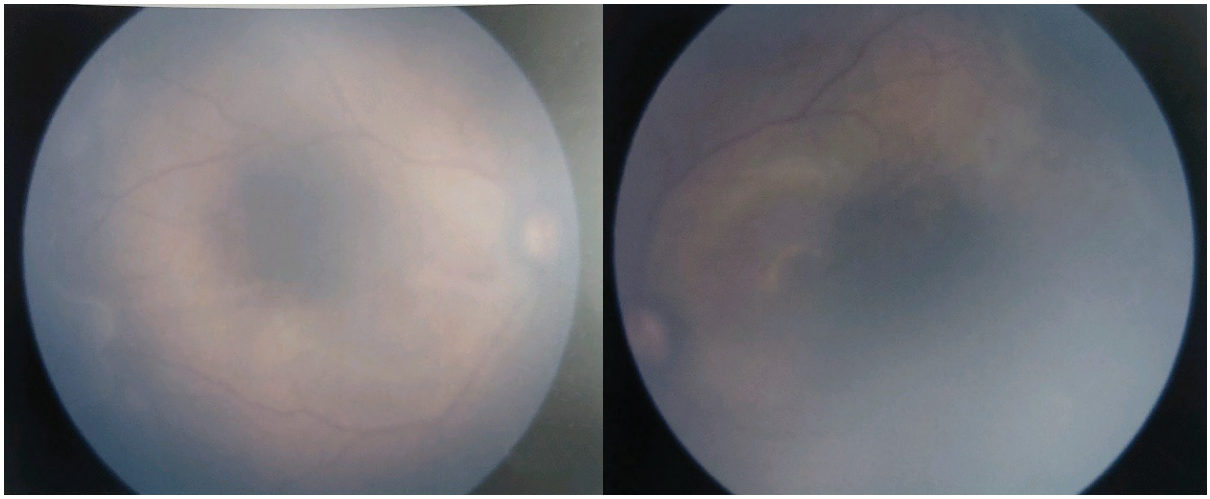


Figure 9 : Zone II Stage 3 ROP

In this study, maximum patients were male (62%). Many studies coincides with this study. Choi[14] et al, Rahman[15] et al, Gebesce[16] et al, Leng[17] et al stated male patients were more than female. Many previous studies indicated that male patients were more in number than female. Social stigma and prejudice were responsible for more appearance of male baby in retina OPD.

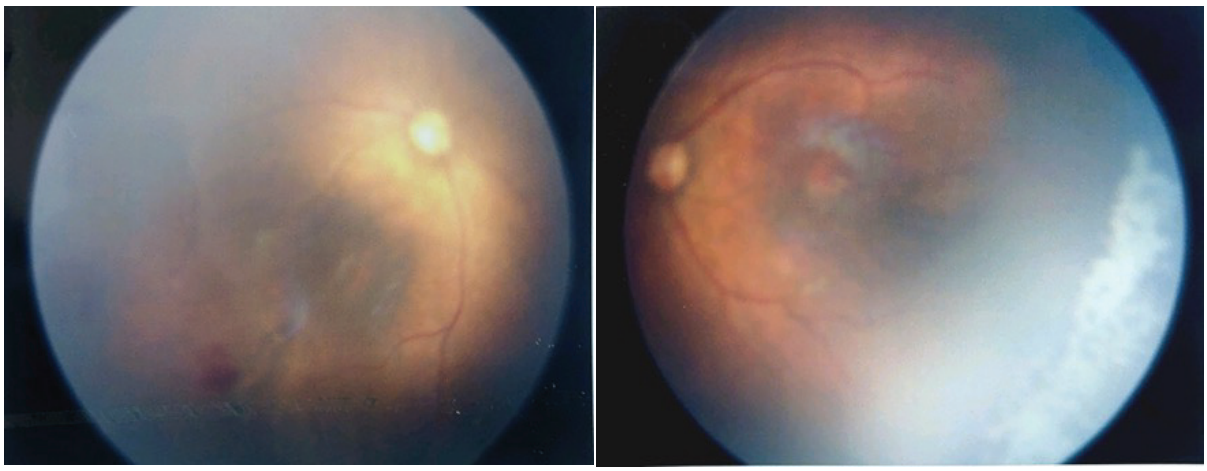


Figure 10 : APROP

Here, 25% babies were not single, twins or triplets. Khorshidifar[18] et al study showed 36% cases were from twins or triplets. In Dabir[19] et al study, 18% babies were twins or triplets. It also related with infertility treatment. Infertility treatment was one of major causes of multiple pregnancies and it also lead to low birth weight and preterm birth[20].

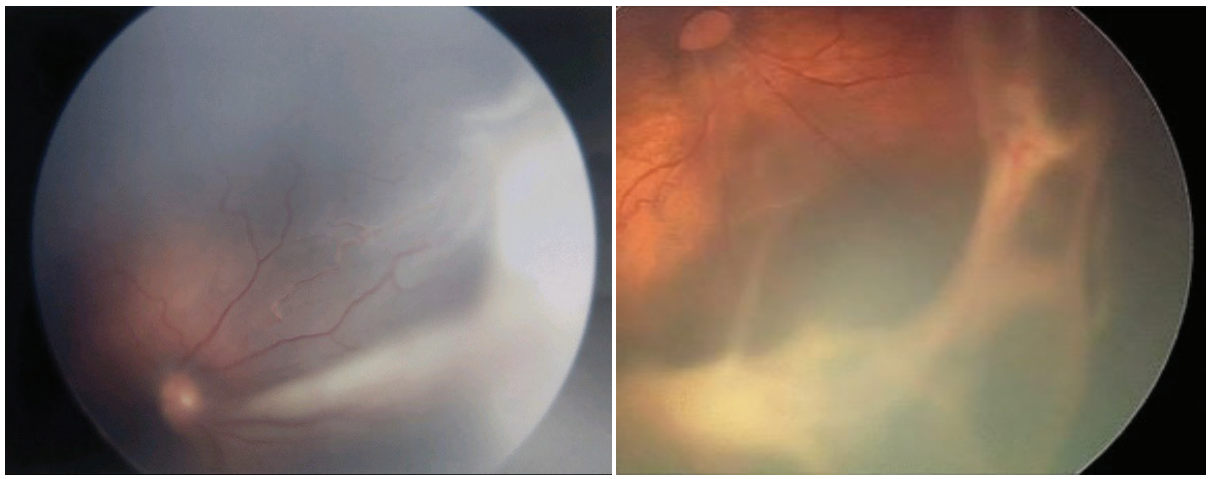


Figure 11 : ROP stage 4 (2 separate patients)

In this study, Mean age was 31.67 weeks. Maximum patients (55%) were from 30-33 weeks group, followed by 26-29 weeks group (24%), 34-38 weeks group(21%). Mean age was around 30 weeks in many studies. Choi[14] et al (29 weeks), Rahman[15] et al (30 weeks), Khorshidifar[18] et al (32 weeks) had similar results. Wu[21] et al stated that 68% cases had 32 weeks or less gestational age.

In this study, Mean birth weight was 1623 gm. Maximum patients were from 800-1500 gm group(54%), 36% were from 1600-2200 gm group, 10% were from 2300-2800 gm group. In Choi[14] et al study, mean birth weight was 1232 gm. It was 1680 gm in Rahman[15] et al study and 1274 gm in Khorshidifar[18] et al study. Leng[17] et al study stated that 53% cases were from less than 1500 gm group. In Khorshidifar[18] et al study, 62% cases had less than 1500 gm gestational weight. Both preterm birth and low birth weight are precursor for NICU (Neonatal intensive care unit) stay and Oxygen intake[20].

Mean oxygen intake duration was 12.35 days and 81% babies had multiple complications after birth like Jundice / respiratory distress / blood transfusion etc. Multiple studies had described that mean oxygen intake around 10-20 days were related to appearance of ROP[13,14,16,17]. Long term NICU oxygen therapy leads to retinal hyperoxia. Multiple neonatal complications prolonged NICU stay in ROP cases[16,17,18]. Neonatal sepsis, jaundice, blood transfusion, respiratory distress needs prolonged NICU supervision. Like a two aged sword Oxygen therapy promotes ROP appearance.

Maximum cases (30%) were APROP (Aggressive posterior retinopathy of prematurity) followed by zone II stage 3 (22%) and zone II stage 2 with plus disease (20%). Multiple studies in Bangladesh and abroad had established such outcomes. Rahman[15] et al study showed similar results where maximum patients had APROP. Nahar[22] et al also had similar results where APROP group had the majority. APROP is a curable condition if diagnosed and treated early.

Here maximum patient were treated by injection Bevacizumab and ROP laser (46%) followed by ROP laser (28%) and observation (14%). Nahar[22] et al study showed maximum patients were treated by injection and laser. In Rahman[15] et al study maximum cases 59% were treated by injection and laser followed by ROP laser 24%. Leng[17] et al study had more observation (55%).

Limitations

This study was conducted in a single center in a short period, 9 months.

Conclusion

National Institute of Ophthalmology and Hospital, Dhaka is a tertiary eye care center providing ROP screening and treatment support in a affordable way. This scenario provides a brief picture of ROP status in National ROP situations.

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- Department of vitreo retina, National Institute of Ophthalmology and Hospital, Dhaka

Conflict of interest

None

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