Central Medical College Journal
Vol 8 No 2 July 2024
DOI:https://doi.org/10.3329/cemecj.v8i2.81619

Original Article

Screening of Premature Infants for Retinopathy of Prematurity in a Tertiary Eye Hospital

Azam AA[1], Islam MA[2], Hossain MN[3], Azad MAK[4], Sehar N[5], Ferdous T[6]

Abstract

Background: *Retinopathy of prematurity (ROP) is a proliferative retinopathy affecting premature infants of very low birth weight, who have been exposed to high ambient oxygen concentrations; and is a leading cause of childhood blindness. The population of infants at risk for retinopathy of prematurity (ROP) varies by world region; in countries with well-developed neonatal intensive care services, the highest risk infants are those born at less than 28 weeks gestational age (GA) and less than 1 kg at birth, while, in regions where many aspects of neonatal intensive and ophthalmological care are not routinely available, more mature infants up to 2000 g at birth and 37 weeks GA are also at risk for severe ROP. Aim of the study was to evaluate the profile of ROP in a tertiary level eye hospital in Bangladesh.* ***Method:*** *Descriptive study was conducted from 1st January 2023 to 31st December 2023. A total of 72 premature infants irrespective of gestational age, gender & body weight were examined in this hospital for evaluation of ROP. Prior to commencement of this study, the study protocol was approved by the ethical review committee. Written informed consent was ensured from every parents of each of the participants. All patients were examined by single senior pediatric ophthalmologist with indirect ophthalmoscope after dilatation of pupil. Data collection was done through a structured form with the variables of gestational age (GA), gender body weight (BW) and duration of oxygen inhalation (O_2) & neonatal intensive care unit (NICU). After collection of all the required data, analysis was done by Microsoft Excel.* ***Result:*** *Among 72 patients 42 were male and 30 were female. Six patients (8.3%) were found with gestational age less than 28 weeks. Gestational age 28 to 32 weeks was observed in 34 (47.2%) patients; and gestational age >38 weeks was found in only 4 (5.5%) patients. In this study mean gestational age of the patients was found 32.45 weeks. Body weight at birth <1.5 kg was found in 14 (19.4%) patients; 48 (66.7%) patients was in 1.5 to 2.0 kg weight group and >2 kg body weight was 10 (13.9%) patients. Out of 72 patients various grade of ROP was diagnosed in 32 (44.5%) babies; among them only 6 (8.3%) patients was selected as need treatment and rest 26 (36.1%) was advised for follow-up in different schedule.* ***Conclusion:*** *About half of the patients (44.5%) attending for ROP screening in this institute develops ROP. That is an alarming sing for the community and deserving attention to examine the premature babies in terms of gestational age, body weight and oxygen (O_2) use in NICU.*

Keywords: *Bangladesh, Gestational age, Infants, Retinopathy of prematurity.*

Introduction: Retinopathy of prematurity (ROP) is a major cause of preventable blindness in children all over the world.[1-3] Globally in 2010, an estimated 19 million children were visually impaired from retinopathy of prematurity (ROP)[4], having substantial effects on the individual, family, and society.[5] It has been estimated that more than 20,000 infants are blinded annually from retinopathy of prematurity

01. ***Dr. Amir Abdulla-Hel Azam,*** *Senior Consultant (Ophthalmology), Sheikh Fazilatunnessa Mujib Eye Hospital & Training Institute, Gopalganj.*
02. ***Dr. Mohammad Ariful Islam,*** *Assistant Professor (Ophthalmology), Chandpur Medical College, Chandpur.*
03. ***Dr. Md. Noman Hossain,*** *Assistant Professor (Medicine), Chandpur Medical College, Chandpur.*
04. ***Dr. Md. Abul Kalam Azad,*** *Associate Professor (Ophthalmology), Magura Medical College, Magura.*
05. ***Dr. Nazmun Sehar,*** *Junior Consultant (Gynae & Obst), 250 Beded General Hospital, Gopalganj.*
06. ***Dr. Tanzila Ferdous,*** *Dental Surgeon (Children Dentistry), Sir Salimullah Medical College Mitford Hospital Dhaka.*

Correspondence: ***Dr. Amir Abdulla-Hel Azam,*** *Email: dr.azamk8@gmail.com Mob: +8801712787238*

Received date: 15 September 2024
Accepted reviewed version date: 24 November 2024

(ROP), and an additional 12,300 have mild to moderate visual impairment worldwide.[6] In term infant's retinal vasculature are fully developed; so ROP cannot occur. During the course of gestation, development of retina & retinal blood vessels proceeds peripherally from the optic disc. In preterm infants, the development of the retina and its blood vessels is incomplete. The immaturity of the retina mainly depends on the degree of prematurity at birth that creating the possibility for abnormal development of retinal blood vessels. In the sequential nature of ROP progression the benefits of timely treatment in reducing the risk of visual loss is proven. The infants who are at risk should receive careful and timely retinal examinations to identify the ROP require treatment in time that should be effective. A binocular indirect ophthalmoscope is a major part of the retinal examinations that should be performed by a trained ophthalmologist who is experienced in the examination of preterm infants for ROP. The schedule of retinal examinations should be designed according to the gestational age of preterm infant's at birth and presence of subsequent disease severity. All pediatricians or other primary eye care providers who care for the preterm infant at-risk of ROP should aware of this schedule.

Method:

A descriptive study was done at the department of Paediatric Ophthalmology in Sheikh Fazilatunnessa Mujib Eye Hospital & Training Institute (SFMEHTI), Gopalganj, Bangladesh; from 1st January 2023 to 31st December 2023. All premature infants irrespective of gestational age, chronologic (postnatal) age, gender, body weight and experience of NICU & O_2 after birth who were presented to this hospital were examined for evaluation of ROP. Prior to commencement of this study, the study protocol was approved by the institutional review board (IRB), of SFMEHTI. Written informed consent was ensured from every parents of each of the participants. All patients were examined by single senior pediatric ophthalmologist. Retinal screening examinations was performed after pupillary dilation by using binocular indirect ophthalmoscopy with a lid speculum and scleral depression (as needed) to detect ROP. Use of dilating drops was sufficient to allow adequate pupillary dilatation for examination of the fundi, but care was taken in using multiple drops if the pupil fails to dilate. Because poor pupillary dilation can occur in advanced ROP, and administering multiple doses of dilating drops can adversely affect the cardiorespiratory and gastrointestinal status of the infant.[7] Separate sterile instruments or instruments cleaned in accord with the anti-infective protocol for metal instruments for each NICU patients was used to examine each infant to avoid possible cross-contamination by infectious agents. Effort was to minimize the discomfort of child and systemic effect of retinal examination. Single fundus examination was sufficient when retina was fully vascularized in both eyes. Recording, diagram and classification of the retinal findings at the time of examination was done according to the International Classification of Retinopathy of Prematurity Revisited (ICROP).[8] Data was collected through a structured form with the variables of gestational age, chronologic (postnatal) age, gender, body weight, duration of oxygen (O_2) inhalation and NICU experience. According to gestational age patients were grouped into four; less than 28 weeks, 28 to 32 weeks, 33 to 38 weeks and >38 weeks. Body weight at birth was categorized into three <1.5 kg, 1.5 to 2.0 kg, and >2 kg. After collection of all the required data, analysis was done by Microsoft Excel.

Results:

A total of 72 premature infants irrespective of gestational age, gender & body weight were examined who are attending in this hospital for evaluation of ROP. Among 72 patients 42 were male and 30 were female. In this study six patients (8.33%) was found with gestational age less than 28 weeks. Gestational age 28 to 38 weeks was observed in 63 (87.5%) patients; and gestational age >38 weeks was found in only 3 (4.17%) patients. In this study mean gestational age of the patients was found 32.4 weeks. Chronologic (postnatal) age (CA) of first time examination was found 1 to 14 weeks. Most of the patients 63 (87.5%) was attended within first 8 weeks and only 3 (4.17%) was examined first time after 3 months. Body weight at birth <1.5 kg was found in 14 (19.4%) patients; 48 (66.7%) patients was in 1.5 to 2.0 kg weight group and >2 kg body weight was 10 (13.9%) patients. Out of 72 patients 69 (95.8%) patients was the NICU experience & only 4 patients (4.2%) was no NICU experience. The duration in NICU up to 1 week was 50 (69.45%) patients, up to 2 weeks was 11 (15.27%) and 5 (6.95%) patients was more than 2 weeks. Among the 5 (6.95%) patients

Received date: 15 September 2024
Accepted reviewed version date: 24 November 2024

who has the NICU experience for long duration (>2 weeks); One patient was the 30 days NICU exposure with the body weight of 1.5 kg and 1 patient was rest in NICU for 25 days with the body weight of 1.6 kg. More than ninety percent 65 (90.27%) patients has the experience of Oxygen (O_2) consumption of various duration and amplitude. Out of 72 patients various grade of ROP was diagnosed in 32 (44.5%) babies; among them only 6 (8.3%) patients was selected as need treatment and rest 26 (36.1%) was advised for follow-up in different schedule.

Table 1: First eye examination according to gestational age at birth.

Gestational age at birth	No. of patients
Less than 28 weeks	6
28 – 32 weeks	34
>32 – 38 weeks	29
>38 weeks	3

Table 1 showing most of the patients were in 28 – 32 weeks age group (47.2%).

Table 2: Timing of first eye examination according to chronologic age.

Chronologic (postnatal) Age	No. of patients
1 week	4
2 weeks	2
3 weeks	6
4 weeks	21
5 weeks	6
6 weeks	17
7 weeks	4
8 weeks	3
9 weeks	2
10 weeks	2
12 weeks	2
14 weeks	3

Table 2 showing most of the patients 21 (29.17%) were examined at 4 weeks after birth.

Table 3: Body weight at birth.

Body weight at birth	No. of patients
Less than 1 kg	2
1 – 1.5 kg	23
1.6 – 2.0 kg	37
>2.0 kg	10

Table 3 showing most of the patients were in 1.6 – 2.0 kg weight group 37 (51.39%).

Table 4: Experience of NICU among the patients.

Days in NICU	No. of patients
0 day	4
1 day	9
2 days	7
3 days	4
4 days	8
5 days	4
6 days	8
7 days	7
8 days	3
9 days	3
10 days	2
11 -15 days	5
16 -20 days	3
>20 days	2

Table 4 showing most of the patients 50 (69.45%) were in NICU 1-7 days.

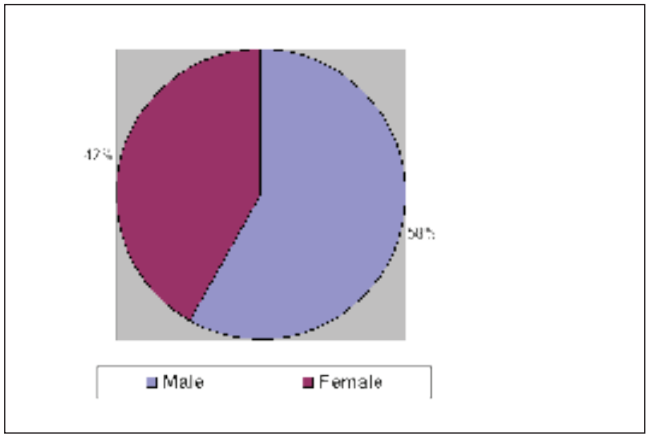

Figure 1: Pie chart shows male patients were more (58%).

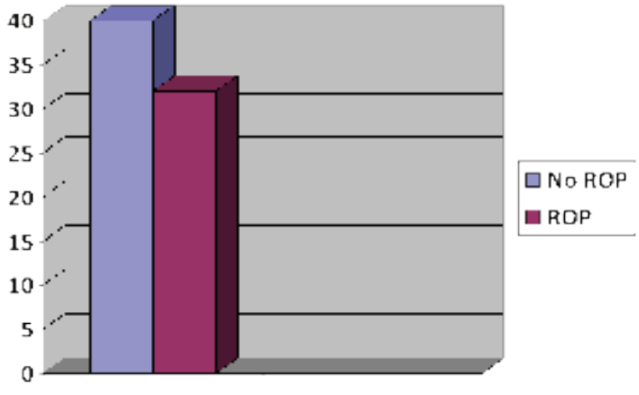

Figure 2: Bar diagram showing ROP was found in about half of the patients.

Received date: 15 September 2024
Accepted reviewed version date: 24 November 2024

Discussion:

Mean gestational age of the patients was found 32.4 weeks in this study; among them 63 (87.5%) was observed in 28 to 38 weeks, 6 (8.33%) was found with <28 weeks and only 3 (4.17%) was in >38 weeks. Early screenings have advocated by some practitioners on the basis of speculation that treatable aggressive posterior retinopathy of prematurity (AP-ROP). That could be occurring before 31 weeks' postmenstrual age. Because there is no significant body of evidence to support either practice, each practitioner and NICU will have to rely on clinical judgment as to the initiation of screening in preterm infants of 22 and 23 weeks' gestational age.[7] First time examination for ROP screening was observed 1 to 8 weeks in 63 (87.5%) patients and only 3 (4.17%) was examined after 3 months of birth. Academy of Ophthalmology recommend beginning screening at 4 to 6 weeks' CA or 31 to 33 weeks' postmenstrual age (PMA), that is, the age of the fetus or newborn calculated from the date of the onset of the mother's last menstrual period.[9] The onset of serious ROP correlates better with postmenstrual age (gestational age at birth plus chronologic age) than with postnatal age. That is why the initiation of acute-phase ROP screening should be based on the infant's postmenstrual age.[10] An infant is at birth; more the preterm, longer the time to develop serious ROP. In developing a screening schedule this knowledge has been used previously.[11,12] Multicenter Trial of Cryotherapy for Retinopathy of Prematurity provided a schedule for detecting treatable ROP with high confidence in infants with gestational ages (GA) of 24 to 30 weeks.[13] At birth <1.5 kg body weight (BW) was found in 14 (19.4%) patients; 48 (66.7%) patients was in 1.5 to 2.0 kg weight group and >2 kg body weight was 10 (13.9%) patients. Out of 72 patients various grade of ROP was diagnosed in 32 (44.5%) babies; among them only 6 (8.3%) patients was selected as need treatment and rest 26 (36.1%) was advised for follow-up in different schedule. In Kumar et al.[14] study total 704 neonates were screened, of whom 84 (11.9%) infants developed any ROP and 33 (4.7%) develops severe ROP. Where the mean birth weight of infants with severe ROP was 1113 ±438 g and age of gestation was 29 ± 3 wks.

Limitations:

1.Full dilatation of pupil was difficult in all the cases.
2.Evaluations of extreme periphery of the fundus still a challenging job.
3.Actual duration & amount of high flow Oxygen consumption by the patients was very hard to know.

Author's Contributions:

All the authors were contributed in various parts of the publication from concept and design, acquisition of data, analysis & interpretation of data and drafting of the manuscript.

Declaration of Conflicts:

The authors declare that, there is no conflict of interest regarding the publication of this article.

Conclusion:

The initial eye examination should be done by 31 weeks' postmenstrual age or 4 weeks' chronologic age, whichever is later. The usefulness of ROP screening depends on the accuracy of diagnosis of the retinal status.

Recommendation:

Wide-angle fundus camera for ROP screening has some advantage over binocular indirect ophthalmoscope.

Acknowledgement:

This study has been supported by the department of Paediatric Ophthalmology, Sheikh Fazilatunnessa Mujib Eye Hospital & Training Institute, Gopalganj. The authors wish to thank all the stuffs and employees of this department for their continuous support.

References:

1. Munoz B, West SK. Blindness and visual impairment in the Americans and the Caribbean. Br J Ophthalmol 2002;86:498–504.

2. Miada JM, Mathers K, Alley CL. Pediatric ophthalmology in the developing world. Curr Opin Ophthalmol 2008;19:403–8.

Received date: 15 September 2024
Accepted reviewed version date: 24 November 2024

3. Gilbert C, Fielder A, Gordillo L, Quinn G, Semiglia R, Visintin P et al. International NO-ROP Group. Characteristics of infants with severe retinopathy of prematurity in countries with low, moderate, and high levels of development: implications for screening programs. Pediatrics 2005;115:e518–e525.

4. Pascolini D and Mariotti SP. Global estimates of visual impairment: 2010. Br J Ophthalmol 2012;96:614-8.

5. Hoyt CS, Jan JE. How to help the visually disabled child and family. In Chap 59: Hoyt CS, Taylor D, editor. Pediatric Ophthalmology and Strabismus, 4th edition. Edinburgh, UK: Elsevier Saunders; 2013.

6. Blencowe H, Lawn JE, Vazquez T, Fielder A and Gilbert C. Preterm-associated visual impairment and estimates of retinopathy of prematurity at regional and global levels for 2010. Pediatric research 2013 Dec;74(1):35-49.

7. Fierson WM, Chiang MF, Good W, Phelps D, Reynolds J, Robbins SL et al. Screening examination of premature infants for retinopathy of prematurity. Pediatrics 2018 Dec;1:142(6).

8. International Committee for the Classification of Retinopathy of Prematurity. The international classification of retinopathy of prematurity revisited. Arch Ophthalmol 2005;123(7):991-9.

9. Joint Statement of the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology and Strabismus, and the American Academy of Ophthalmology: screening examination of premature infants for retinopathy of prematurity. Pediatrics 2001;108809-11.

10. Palmer EA, Flynn JT, Hardy RJ et al. The Cryotherapy for Retinopathy of Prematurity Cooperative Group. Incidence and early course of retinopathy of prematurity. Ophthalmology 1991;98(11):1628–40.

11. LIGHT-ROP Cooperative Group. The design of the multicenter study of light reduction in retinopathy of prematurity (LIGHT-ROP). J Pediatr Ophthalmol Strabismus 1999; 36(5): 257–63.

12. Hutchinson AK, Saunders RA, O'Neil JW, Lovering A, Wilson ME. Timing of initial screening examinations for retinopathy of prematurity. Arch Ophthalmol 1998;116(5): 608–12.

13. Reynolds JD, Hardy RJ, Kennedy KA, Spencer R, van Heuven WA, Fielder AR. Light Reduction in Retinopathy of Prematurity (LIGHT-ROP) Cooperative Group. Lack of efficacy of light reduction in preventing retinopathy of prematurity. N Engl J Med 1998;338(22):1572–6.

14. Kumar P, Sankar MJ, Deorari A, Azad R, Chandra P, Agarwal R, Paul V. Risk factors for severe retinopathy of prematurity in preterm low birth weight neonates. The Indian Journal of Pediatrics 2011 Jul;78:812-6.

Received date: 15 September 2024
Accepted reviewed version date: 24 November 2024