Original Article

Socio-economic Factors Responsible for Delayed Presentation of ROP in a Tertiary Neonatal Care Unit in Bangladesh

Dr. Mizanur[1], Dr. Rashid[2], Dr. Afsana[3], Dr. Sumiya[4], Dr. Asma[5], Dr. Dipak Nag[6]

Abstract

Purpose: To evaluate the socio-economic factors responsible for delayed presentation of ROP in a tertiary neonatal care unit in Bangladesh. **Methods:** This observational study was conducted on fifty babies, who were presented delay at screening were purposively selected for the study at Dhaka Shishu Hospital, National Institute of Ophthalmology & Hospital. Study period was 12 months and data collection was done by face to face interview from legal guardians with pre designed questionnaire. Information regarding gestational age, birth weight, condition of health at birth,parents education level and economic condition were obtained by face to face interview from parents. They were also asked whether the baby was advised for screening or not. Screening was done by indirect ophthalmoscopy by using 20D condensing lens. **Results:** Among the 50 babies, prevalence of ROP was 66.0% (95% CI: 52.87-79.13). Mean gestational age was 29.10(±1.5) weeks and mean birth weight was 1250(±0.24) gm. After taking account of all possible confounders, we found that place of residence of the parents is associated (p=0.011) as well as adviced for screening is marginaly assocated (p= 0.05) with delayed presentation of ROP for screening. **Conclusion:** There are many risk factors for delayed presentation of ROP at screening. Among the factors palce of residence (rural) and advice for screening are found to be significant. Further study regarding this issue is necessary to explore all other factors and formulate plans to overcome them.

Keywords: ROP, Stages of ROP, risk factors of delayed screening.

Introduction

Retinopathy of prematurity (ROP) is the retinal disease occurs in infant most commonly preterm low birth weight babies. It is an important cause of preventable blindness in children[1].

1. Medical Officer (OSD) National Institute of Ophthalmology & Hospital, Dhaka
2. Junior Consultant, Ntional Institute of Ophthalmology & Hospital, Dhaka
3. Head of Nutrition & Health, Hellen Keller International, Dhaka.
4. Medical Officer (OSD) Sirajganj Sadar Upazilla, Sirajganj.
5. Medical Officer, National Institute of Ophthalmology & Hospital, Dhaka.
6. Professor, National Institute of Ophthalmology & Hospital, Dhaka.

Address of correspondence:
Dr. K.M.Mizanur Rahman
Email: mizan120@gmail.com
Phone: 01719166036

In the Royal Blind School of Edinburgh, it accounts for up to 10% of childhood blindness,[2] and it is believed to account for 6-8% of childhood blindness in developed countries1. Recent advances in the neonatal care in the last decade, have improved the survival rate for premature infants[3]. Consequently, the incidence of Retinopathy of Prematurity (ROP) has increased in parallel Retino. Early identification of retinal damage and institution of appropriate treatment prevent blindness and offer babies better overall development[4]. It is a major cause of childhood blindness in Indian sub continent.

The highest number of live births (37.1 million, 28%) and largest number of preterm births (4.95 million, 33%), are reported in the South Asia region; which predisposes an estimated 79,600 babies to have high risk of developing ROP annually[5]. The uncontrolled growth of Neonatal Intensive Care Units (NICU) with poor neonatal care/untrained personnel, and the fact that not all the neonatal care units have programmes for the detection and treatment of ROP, is leading to larger numbers of preterm babies developing

severe ROP[6-7]. Concentration of ophthalmologists in large cities, lack of ROP orientation in residency programs, poor financial support for equipment and salaries are important barriers in many developing countries[8-9]. There are others factors like social, financial and educational status of parents, physical condition of the baby that also contribute to fatal disease. In South Asia region primarily includes India, where despite well-established ROP screening protocols[10], the lack of awareness among all stakeholders and ineffective ROP screening programs commonly leads to advanced stage of ROP referral across tertiary eye care hospitals and they are coming lately with very fatal disease [11].

Bangladesh is a densely populated country with increase birth rate and high incidence of premature deliveries. Neonatal intensive care facilities are available but ophthalmological examination of preterm babies is not routinely done and many babies coming for screening with delay and this delay causing dangerous consequence leading to irreversible blindness. There are many factors responsible for this delay presentation. In Bangladesh, this study will be helpful to detect the factors responsible for delayed screening of ROP and take necessary measures to overcome these obstacles. Those initiatives can ensure early diagnosis timely management of ROP, for preventing blindness due to Retinopathy of Prematurity (ROP).

Materials & method

This was an observational study conducted at the Department of vitreo –retina & Pediatric ophthalmology, in the National Institute of Ophthalmology and Hospital, Dhaka, Special Care Baby Unit (SCABU) and ICU of Dhaka Shishu Hospital from July 2016- June 2017). A total of 50 babies were included in the study by non probable purposive sampling. Babies with birth weight ≤1750gm and born at ≤35 week of gestational age and with other risk factors like need of cardio respiratory support, prolong oxygen therapy, apnea of prematurity, anemia needing blood transfusion and neonatal sepsis were included in this study. Neonates who had congenital anomalies, syndromic manifestations or suspected inborn errors of metabolism, media opacity were excluded form the study. Detail history had been taken form the parents and finally babies were taken in a screening table. The examination was carried out under topical anesthesia without any sedation, using indirect ophthalmoscope and 20 D condensing lens. Recording of the findings was done in the chart or card using standard notions. The information was recorded and the findings were drawn in a preformed screening sheet with exact location.The drawing with staging and grading were also constructed. In the interview, parents were asked about their age, address, maternal education level, occupation. They were also asked about the age of the baby, their gestational age, birth weight, physical condition at birth with place and mode of deliver. Parents were also asked whether they knew about ROP screening or they were advised for screening by the primary care giver of the baby. All interviewed questionnaire were checked for its completeness, accuracy and consistency to exclude missing or inconsistant data. Data were checked and cleaned before incorporating into statistical software (SPSS- version 26) and analyzed. Descriptive statistics were expressed as percent, mean & standard deviation. For categorical variables Chi-square test, Fisher exact test was done. In all tests of significance p below <0.05 was considered as significant.

Results

Table 1: Demographic Characteristics of the babies screened for ROP (n=50)

Criteria	Frequency (%)
Gender	
Male	22 (44.0%)
Female	28 (64.0%)
Gestational age (in weeks)	
24-27	3 (6.0%)
28-31	41 (82.0%)
32-35	6 (12.0%)
Mean±SD	29.10(±1.5)

Birth weight (in grams)

<1000	13 (26.0%)
1001-1500	29 (58.0%)
>1500	8 (16.0%)
Mean±SD	1.25(±0.24)

Maternal education status

Up to primary	2 (4.0%)
Secondary	22 (44.0%)
Higher secondary	18 (36.0%)
Graduate and above	8 (16.0%)

Monthly family income (Tk)

5000-10000	9 (18.0%)
10001-20000	18 (36.0%)
20001-30000	17 (34.0%)
>30000	6 (12.0%)

Place of residence

Rural	13 (26.0%)
Urban	37 (74.0%)

Majority babies (64.0%) were female. Mean gestational age was 29.10(±1.5) weeks and mean birth weight was 1250(±0.24) gm. Majority babies (74.0%) were from urban areas (table 1).

17 (34.0%)

33 (66.0%)

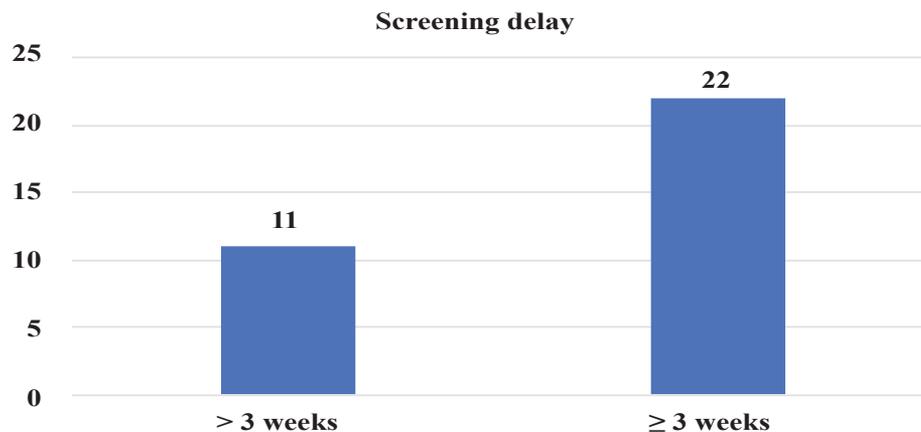■ Babies with ROP   ■ Babies without ROP
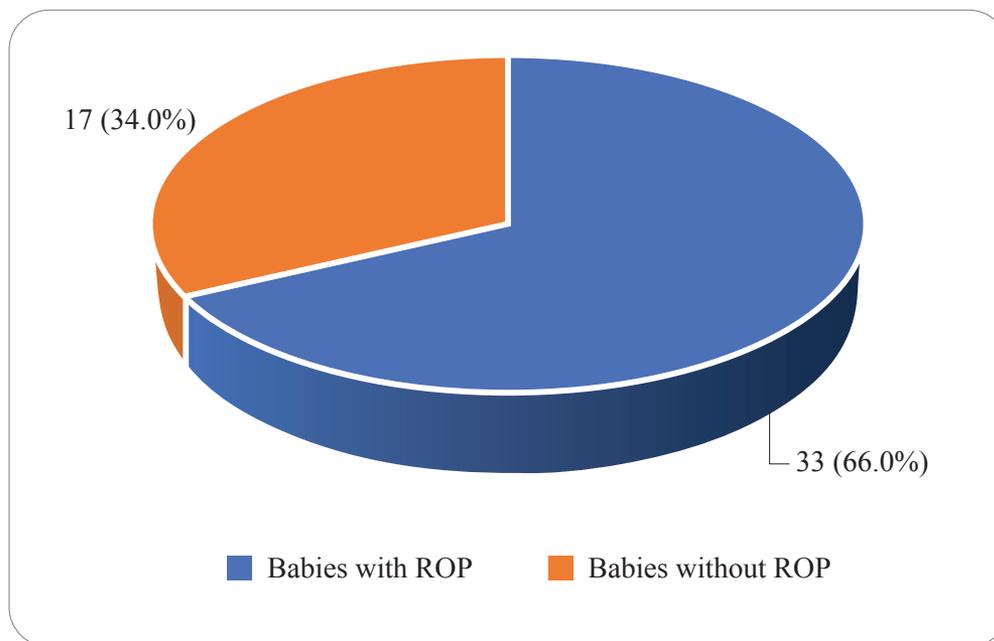
Figure 1: Distribution of babies with ROP

Out of the 50 neonates; 33 (66.0%) cases developed ROP (95% CI: 52.87-79.13) (figure 1)

Table 2: Distribution of ROP according to severity and type (n=33)

Criteria	Number (%)
Type of ROP	
Type 1	21(63.6%)
Type 2	9(27.3%)
AP ROP	3(9.1%)
Severity of ROP	
Stage I	7 (21.2%)
Stage II	9 (27.3%)
Stage III	9 (27.3%)
Stage IV	2 (6.1%)
Stage V	6 (18.2%)

Among the 33 babies with ROP, 63.2% had type 1 while 27.3% had type 2 ROP. According to severity of ROP, 27.3% babies were in stage II, another 27.3% babies were in stage III and 18.2% babies were in stage V (table 2).

Figure 2: Distribution of screening delay amomg babies with ROP
Out of the 33 neonates with ROP, 22 (66.7%) cases had ≥ 3 weeks screening delay (figure 2)

Place of residence of the parents is associated (p=0.011) as well as adviced for screening is marginaly assocated (p= 0.05) with delayed presentation of ROP for screening (table 3).

Discussion

Retinopathy of prematurity is a childhood blinding disease. It is an emerging problem in the developing world. But unfortunately, it is not been properly addressed due to lack of awareness among the different stakeholders like parents, paediatricians, neonatologist, gynaecologist. For these reasons many babies are not being screened in proper time. They are presenting with very advanced stage of the disease. There are also other factors for the delay presentation. However, no study had been done to evaluate the factors responsible behind this delay presentation.

This study was done in Dhaka Shishu Hospital and Retina and Paediatric ophthalmology department of National Institute of Ophthalmology and Hospital (NIOH). A screening programme for ROP is going on in Dhaka shishu hospital in collaboration of NIOH. In this study, there were 50 babies, all of them were presented with delay of different duration.

Table 3: Determination of socio-economic risk factors for delay presentation at ROP screening

Variables	≤3 weeks delay	>3 weeks delay	P value
Gender			
Male	11 (45.8%)	11 (42.3%)	0.802[a]
Female	13 (54.2%)	15 (57.7%)	
Gestational age (in weeks)			
24-27	1 (33.3%)	2 (66.7%)	0.778[b]
28-31	20 (58.3%)	21 (65.4%)	
32-35	3 (50.0%)	3 (50.0%)	
Birth weight (in grams)			
<1000	5 (20.8%)	8 (30.8%)	0.231[b]
1001-1500	13 (54.2%)	16 (61.5%)	
>1500	6 (25.0%)	2 (7.7%)	
Maternal education status			
Up to primary	0 (0%)	2 (100.0%)	0.785[b]
Secondary	11 (50.0%)	11 (50.0%)	
Higher secondary	10 (55.0%)	8 (44.4%)	
Graduate and above	3 (37.5%)	3 (62.5%)	
Monthly family income			
5000-10000	4 (44.4%)	5 (55.6%)	0.912[b]
10001-20000	9 (50.0%)	9 (50.0%)	
20001-30000	9 (52.9%)	8 (47.1%)	
>30000	2 (33.3%)	4 (66.7%)	
Place of residence			
Urban	14 (70%)	6 (30%)	0.011[a]
Rural	10 (33.3%)	20 (66.7%)	
Advice for screening			
Adviced	10 (35.7%)	18 (64.3%)	0.051[a]
Not Advice	14 (68.6%)	8 (36.4%)	

a= Chi-square test, b= fisher exact test

Among the 50 babies M: F ratio was 0.78:1 and presence of ROP was 33 (66%).

The mean gestational age was 29.10(±1.5) weeks and mean birth weight is 1250(±0.24) gm of all babies, in other study the mean gestational age and mean birth weight are not much different. Like, Rajvardhan Azad et al. [12] reported that, the mean (SD) gestational age was 29.1 (2.3) weeks (25-36 weeks) and mean (SD) birth weight was 1323.1 gm, Yang[13] reported mean GA 31.6 weeks and mean birth weight 1594 gm, Sudha et al.[14] reported mean GA 31.4 weeks and Trinavarat et al.[15] found GA 31.8 weeks and BW 1416 gm. In another study reported by Adhikary et al.[16] mean GA 30.50 weeks and mean BW 1338.33 gm. There is not much difference in mean GA and mean birth weight in developing countries as these countries facing same economic and health related problems as developing nation. In recent years, there has been some advancement in neonatal care facilities in developing countries. Survival of preterm low birth weight babies increased for this

reason. These preterm low birth weight babies have high risk of exposure with different risk factors for ROP (e.g oxygen therapy, blood transfusion, anemia etc). Thus, the rate of retinopathy of prematurity is almost same among neonates with relatively same birth weight and same gestational age in different developing nations.

In this study total 66.0% neonates had some stage of ROP. Among them stage II and III were highest (27.3%) and stage V was (18.2%). Rekha et al[17] found in their study 46% had some stage of ROP, 21% had stage I, 14% had stage II, 8% had stage III, 1% had stage IV and 2% had stage V. In this study percentage of stage V ROP was found comparatively higher may be due delay at first presentation.

In this study place of residence of the neonates was found as a significant social risk factor for delay presentation (p 0.011). In Bangladesh, facilities for ROP screening and counseling are more centralized in urban areas specilay in Dhaka city. So rural people remain deprived of these facilities, which reflected in the result.

Though people's awareness, knowledge and practise depend more or less on educational status but in this study educational status was not found as a social factor for awareness of parents to bring the babies for ROP screening on time.ROP is a recent emerging disease. There is very little campaign and awareness programme done to educate people about the disease and its consequences. For this reason, a large group of people including educated class are not concern about the risk of ROP. So, they are not bringing their babies for screening in scheduled time, for these reasons, parents educational status was not found as a significant factor for delay presentation.

In the current study, among the selected 50 babies, 28 (56%) were advised for screening of ROP by initial caregiver (physician). There were also 22 (44%) babies who did not get proper advised and counseling for screening. Here advice for screening of ROP by primary caregiver was found as a potential risk factor (p= 0.05) for delay presentation. In Azad et al. [12] study 109 out 115 babies were never screened before. Similar findings have been reported in a study of 66 cases of stage 5 ROP in India in

which Sanghi, et al.[7] reported that 57 infants (86.4%) were not screened for ROP. Therefore, awareness of timely referral and proper counseling is very important to motivate parents to bring their babies for screening within recommended time limit.

As Bangladesh is a developing country, most of the parents belong to low-income class. However, here economic status was not identified as determinant of socio-economic factor for delay presentation. Poor people do not afford to arrange proper treatment for their sick low birth weight babies so survival of these babies is less. They also may not be able to bring their baby for screening due to need of money. On the other hand, people do not give proper information about their income and there was no proper document about the family income.

Delay at screening of ROP must be overcome to reduce the morbidity of ROP. So, first we must find out all the factors responsible for this delay. Then proper planning can be done to overcome these obstacles accordingly. Collaborative approach of all the stakeholders and Government policy makers is essential to combat the upcoming situation.

Conclusion
There were many babies presented delay at screening for ROP. Proper and timely screening may prevent the progression of ROP by early interventions. Many risk factors are responsible for this delay. Rural inhabitance and lack of proper advice or counseling are significant among them. Lack of timely screening increasing the burden of this disease. There is also limitation of the facilities for screening in different regional and rural level. Lack of awareness among neonatologists, obstetricians and ophthalmologists about ROP causing improper counseling and referral, leading to serious consequences.

Conflict of interest: Nothing to declare

References

1. Coats DK, Aaron MM, Mohamed AH. Involution of retinopathy of pre maturity after laser treatment: Factors associated with development of retinal detachment. Am J Ophthalmol.2005;140:214-22.

2. Fleck BW, Dangata Y. Causes of visual handicap in the Royal Blind School, Edinburgh, 1991–2. The British Journal of Ophthalmology. 1994 May;78(5):421.

3. Dominico R, Davis K, Davis O. Documenting the NICU design dilemma: Comparative patient progress in open-ward and single family room units. J Perinatol.2011;31:281-8.

4. Ranaroff AA, Martin RJ, editors. Neonatal perinatal medicine.7th ed. Louis: Mosby;2002,pp.676-745.

5. Gilbert C. Retinopathy of prematurity: a global perspective of the epidemics, population of babies at risk and implications for control. Early human development. 2008 Feb 29;84(2):77-82.

6. Blencowe H, Lawn JE, Vazquez T, Fielder A, Gilbert C. Preterm-associated visual impairment and estimates of retinopathy of prematurity at regional and global levels for 2010. Pediatric research. 2013 Dec 1;74(S1):35-49.

7. Sanghi G, Dogra MR, Katoch D, Gupta A. Demographic profile of infants with stage 5 retinopathy of prematurity in North India: implications for screening. Ophthalmic epidemiology. 2011 Apr 1;18(2):72-4.

8. Zepeda-Romero LC, Meza-Anguiano A, Barrera-de León JC, Angulo-Castellanos E, Ramirez-Ortiz MA, Gutiérrez-Padilla JA, Gilbert CE. Case series of infants presenting with end stage retinopathy of prematurity to two tertiary eye care facilities in mexico: underlying reasons for late presentation. Maternal and child health journal. 2015 Jun 1;19(6):1417-25.

9. Zepeda-Romero LC, Gilbert C. Limitations in ROP programs in 32 neonatal intensive care units in five states in Mexico. BioMed research international. 2015 Jun 17;2015.

10. Section on Ophthalmology, American Academy of Pediatrics; American Academy of Ophthalmology;American Association for Pediatric Ophthalmology and Strabismus. Screening examination of premature infants for retinopathy of prematurity. Pediatrics. 2006;117:572-6.

11. Vinekar A, Dogra MR, Sangtam T, Narang A, Gupta A. Retinopathy of prematurity in Asian Indian babies weighing greater than 1250 grams at birth: ten year data from a tertiary care center in a developing country. Indian J Ophthalmol. 2007;55:331-6.

12. Rajvardhan Azad, Parijat Chandra, Anil Ganguli & Vivek Kumar, Lack of Screening Underlies Most Stage-5 Retinopathy of Prematurity. Indian Pediatrics.2016 November 15;53: 104-05.

13. Yang CS, Chen SJ, Lee FL, Hsu WM, Liu JH, Retinopathy of Prematurity: screening, incidence and risk factors analysis. Chin Med J (Taipei) 2001; 64: 706-2.

14. Sudha C, Vidyadhar P, Umesh V, Sandeep K, Aarti K. Retinopathy of Prematurity in a Tertiary Care Centre-Incidence, Risk Factors and Outcome. Indian Pediatr 2009;46:2l9-23.

15. Trinavarat A, Atchaneeyasakul LO, Udompunturak S. Applicability of American and British criteria for screening of the retinopathy of prematurity in Thailand. Japanese journal of ophthalmology. 2004 Jan 25;48(1):50-3.

16. Adhikari S, Badhu BP, Bhatta NK, Rajbhandari RS, Kalakheti BK. Retinopathy of Prematurity A Tertiary Care Hospital in Eastern Nepal. Journal of the Nepal Medical Association. 2008; 47(169): 24-7.

17. Rekha W, Battu RR. Retinopathy of prematurity: incidence and risk factors. Indian pediatrics. 1996 Dec;33:999-1004