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ESTABLISHMENT OF FIRST NEONATAL SCREENING PROGRAM FOR RETINOPATHY OF PREMATURITY AT SECONDARY NEONATAL CARE CENTRE IN HYDERABAD, PAKISTAN

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ABSTRACT
This retrospective study aims to describe the frequency and risk factors for retinopathy of prematurity (ROP) identified through the establishment of the first neonatal screening program for ROP at Aga Khan Maternal and Childcare Center, a secondary-level hospital in Hyderabad, Pakistan. Medical records of preterm infants admitted between January to December 2014 with a gestational age ≤34 weeks or birth weight ≤2000g were reviewed. A total of 158 infants who underwent retinal screening between 4-6 weeks of age using indirect ophthalmoscopy were included, of which ROP was detected in 27 infants (17%) across stages I-IV. Key risk factors observed for ROP included oxygen therapy, sepsis, anemia and low birth weight. This study provides valuable data on the burden of ROP at a secondary care center in Pakistan and emphasizes the importance of screening programs for early detection and management to prevent ROP-associated blindness, especially given advancing neonatal care in low resource settings.

Key Words: Preterm, Retinopathy of prematurity, Risk factors

INTRODUCTION:
Retinopathy of prematurity (ROP) is a leading cause of potentially avoidable childhood blindness worldwide (1). Retinopathy of prematurity (ROP) is a vision threatening disease associated with abnormal retinal vascular development at the boundary of vascularized and avascular peripheral retina of preterm babies (2). The severity of disease may vary from mild and resolve spontaneously to blindness. The major risk factor is prematurity. Other factors include low birth weight and very low birth weight, oxygen toxicity, sepsis, and relative hypoxia (3,4) With recent advances in neonatal care, incidence of ROP has increased in parallel and emerged as an important cause of blindness in children worldwide. Despite significant advances in neonatal care, the worldwide number of infants with ROP has been increasing as the survival rate of premature babies has increased (5). ROP affects the normal development of retinal vascularization, which, if not detected and treated quickly, can lead to dreadful complications such as: macular folds, retinal detachment and even blindness (6). However early screening and timely intervention can prevent the long-term risk of blindness in children. Unfortunately, in low socioeconomic countries and especially at secondary care level hospital with limited resource the incidence is high. Lack of knowledge regarding screening of retinopathy of

prematurity among general physician and pediatricians is also contributing factor for its high incidence. Aga khan maternal and childcare Centre Hyderabad is integrated with Aga University Hospital in 2010, before this there was no screening program for retinopathy of prematurity. In late 2013 we had started routine screening for ROP was started. This study will help us to identify the prevalence of ROP in our region, its risk factors and help to prevent long term blindness in children.

Objective

To describe the prevalence, characteristics, clinical staging, and risk factors of Retinopathy of prematurity.

Material & Method:

This retrospective study was done at Aga Khan Maternal and Child Care Centre Hyderabad, which is 85 bed secondary care level Hospital and integrated with Aga Khan University Hospital Karachi. Guidelines for the screening for retinopathy of prematurity were developed in 2013 in collaboration with Pediatric ophthalmologist. All babies born before 34 weeks of gestation were screened at ophthalmology clinic after discharge from neonatal unit between 4-6 weeks postnatal age.

Babies born before 34 weeks of gestation, admitted in Neonatal unit, and followed at ophthalmology clinic between 1st January to 31st December 2014 were included in study. The study protocol was approved by Ethical review committee of Aga Khan University.

Medical records of all Premature infants with birth weight <2kg & gestational age < 34 weeks were reviewed by trained medical officer. Data were entered in SPSS system using predesigned Performa, include Gestational age, birth weight identified risk factors like Oxygen therapy (humidified oxygen therapy 0r bubble CPAP), episodes of apnea neonatal sepsis, anemia, necrotizing enterocolitis, blood transfusion, exchange transfusion. Data were analyzed by using SPSS version 20. Frequency and percentage were computed for analysis of all variables. No inferential test was applicable for this descriptive study.

Infants who expired before 6 weeks of age, Infants who lost to follow up before enough eye examination were excluded from study.

All babies included in study were first screened by a trained ophthalmologist using indirect ophthalmoscopy and +20D lens, pupils were dilated using mydiatric eye drops phenylephrine 2.5% & cyclopentolate 0.5% instilled before eye examination with sclera depressor after applying lid speculum and topical anesthesia & detail examination had been done.

Depending upon the severity, retinopathy of prematurity was classified according to the international classification of ROP mentioned below,

- Stage l. Demarcation line separating the avascular retina anteriorly from vascular retina posteriorly with abnormal branching of small vessels immediately posterior to this.
- Stage ll. Retinal ridge: demarcation line increased in volume, but this proliferative tissue remains intraretinal
- Stage lll. Ridge with extra retinal fibro vascular proliferation.
- Stage lV. Partial retinal detachment
- Stage V. total retinal detachment
- Plus, disease. Aggressive ROP

Starting of early treatment was effective to reduce the chances of blindness, some babies with “plus disease” need immediate treatment.

Follow up examinations were recommended by ophthalmologist according to the international classification of ROP recommendations.

RESULTS:

One hundred and fifty-eight preterm babies were included in study and screened with weight ranging from 1000-2000 grams and gestational age < 34 weeks of gestation. Out of one hundred fifty-eight twenty-seven (17%) were diagnosed to have retinopathy of prematurity. Among these Nine (33%)

having stage I ROP, five (18.5%) having II ROP, six (22%) of them having ROP grade III, five (18.5%) of them having ROP grade IV and two (7%) having plus disease. Table II. These babies were divided into three groups. Group I included preterm babies less than 30 weeks of gestation (1000-1250 gms), Group II included preterm babies 31-32 weeks of gestation (1251-1500 gms), and Group III included 33-34 weeks Gestation (1501-2000 gms) of preterm babies. Group I am having 39 preterm out of these 10 (37%) developed ROP, Group II having 50 preterm out of these 09 (33.3%) developed ROP & Group III having 69 preterm out of these 08 (29.6%) developed ROP – Table I.
Along with prematurity, prolonged use of oxygen therapy, neonatal sepsis, anemia, necrotizing enterocolitis, apnea, and multiple births were also observed as secondary risk factors. Table III

Table I: Incidence of ROP according to Gestational age and birth weight

Group 1	**Gestational age**	**Birth weigh**	**Total No of infants**	**Total no of infants developed ROP (%)**
Group I	<30 weeks	1000-1250 grams	39	10 (37)
Group II	31-32 weeks	1252-1500 grams	50	9 (33)
Group III	33-34 weeks	1501-2000 grams	69	8 (29)

Table II: Clinical staging of Retinopathy of Prematurity.

Stage of Retinopathy of Prematurity	**No of Infants**	**Percentage**
Stage l	9	33
Stage ll	5	18
Stage lll	6	22
Stage lV	5	18
Plus, disease	2	7

Table III: The Risk Factors diagnosed with ROP:

Risk factors for ROP	Number (N)	Percentage (%)
Oxygen therapy (humidified oxygen)	27	100
Phototherapy	24	88
Blood transfusion	15	55
Bubble CPAP	12	44
RDS	12	44
Neonatal sepsis	10	37
Anemia	10	37
NEC	9	33
Apnea	5	18
Multiple births	2	7

DISCUSSION

ROP continues to be an important cause of potentially preventable blindness worldwide. This study represents a descriptive study evaluating the incidence, risk factors and severity of ROP in Hyderabad. ROP is strongly associated with smaller more immature premature and clinically sick newborns. The main risk factors for development of ROP are extremely low birth weight and extreme prematurity so we can say that ROP is indirectly proportional to gestational age, if gestational age is low there is high chance for the development of ROP. In rural areas in Pakistan due to lack of awareness about this potentially blinding problem routine evaluation of preterm babies were not done. Increased survival of very premature infants following the introduction of neonatal intensive care in the early 1970s has

led to the resurgence of ROP. The aim of screening of premature babies for ROP is to detect all treatable cases with minimal expense of time and resources. The incidence of ROP in this study was 17% which was lower than previously reported studies in other areas like 19.2% in Egypt (7), 24% in India (8), and 29.2% in Singapore (9) & 32.4% in Pakistan (10). The aim of screening of premature babies of ROP is to detect all treatable cases with minimal expense of time & resources. The risk factors for ROP that have been mentioned included oxygen therapy, apnea, RDS, anemia, NEC, multiple births, phototherapy, and blood transfusion. We feel that the incidence of ROP in our study is significant & the risk factors are also like those mentioned in other studies. Appropriate screening of high-risk babies has been shown to be cost effective. We recommend that first assessment should be done as early as 3-4 weeks postnatal age or 34 to 35 weeks post conceptional age and stress the need to follow up till term gestation.

CONCLUSION:

Prevention of prematurity and control of risk factors are the main step to reduce the incidence and severity of ROP in the preterm low/ VLBW infants. The timely retinal screening of high-risk preterm infants is important to prevent the development of advanced ROP. Since ROP may produce serious sequelae up to complete blindness, all efforts must be made to prevent the development of advanced ROP through elimination of preterm births, changes in the neonatal care, and improvement in detection of threatening ROP markers.

REFERENCES

1. 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. Pediatr Res. 2013 Dec;74 Suppl 1(Suppl 1):35-49. doi: 10.1038/pr.2013.205. PMID: 24366462; PMCID: PMC3873709
2. BEDROSSIAN RH, CARMICHAEL P, RITTER J. Retinopathy of prematurity (retrolental fibroplasia) and oxygen. I. Clinical study. II. Further observations on the disease. Am J Ophthalmol. 1954 Jan;37(1):78-86.
3. Karna, P.; Muttineni, J.; Angell, L.; Karmaus, W. (2005). "Retinopathy of prematurity and risk factors: A prospective cohort study". *BMC Pediatrics*. 5 (1): 18. doi:10.1186/1471-2431-5-18. PMC 1175091. PMID 15985170.
4. Padmani Karna, Jyotsna M, Linda A. Retinopathy of prematurity and risk factors: a prospective cohort study. BMC Paediatrics 2005; 5:18
5. Hong EH, Shin YU, Cho H. Retinopathy of prematurity: a review of epidemiology and current treatment strategies. Clin Exp Pediatr. 2022 Mar;65(3):115-126. doi: 10.3345/cep.2021.00773. Epub 2021 Oct 12. PMID: 34645255; PMCID: PMC8898617.
6. Sen P, Wu WC, Chandra P, Vinekar A, Manchegowda PT, Bhende P. Retinopathy of prematurity treatment: Asian perspectives. *Eye*. 2020;34(4):632–642. doi: 10.1038/s41433-019-0643-4
7. Abdel HA, Mohamed GB, Othman MF. Retinopathy of Prematurity: A Study of Incidence and Risk Factors in NICU of Al-Minya University Hospital in Egypt. J Clin Neonatol. 2012 Apr;1(2):76-81. doi: 10.4103/2249-4847.96755. PMID: 24027695; PMCID: PMC3743140.
8. Murthy KR, Nagendra, Babu K, Bena kappa N, Niranjan, Murthy PR. Analysis of risk factors for the development of ROP in preterm infants at tertiary referral hospital in South India. Acta Medica
9. Shah VA, Yeo CL, Ling YL, Ho LY. Incidence, risk factors of retinopathy of prematurity among very low birth weight infants in Singapore. Ann Acad Med Singap. 2005 Mar;34(2):169-78. PMID: 15827664
10. Taqui AM, Syed R, Chaudhry TA, Ahmad K, Salat MS. Retinopathy of prematurity: frequency and risk factors in a tertiary care hospital in Karachi, Pakistan. J Pak Med Assoc. 2008 Apr;58(4):186-90. PMID: 18655427.