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RESEARCH ARTICLE

A STUDY OF RISK OF RETINOPATHY OF PREMATURITY IN LOW BIRTH WEIGHT AND PREMATURE INFANTS WITH EXTENDED PROTOCOLS OF SCREENING.

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Keywords:-
Retinopathy, low birth weight, blindness, prematurity.

Abstract

Objective: To evaluate the prevalence and severity of retinopathy of prematurity and its relationship with low birth weight and prematurity with extended protocols of screening.

Methods : This is a hospital based observational study, examining all the newborn infants with birth weight ≤ 2000 grams and gestational age ≤ 35 weeks and / or neonates with > 2000 grams birth weight and > 35 weeks with rough neonatal period, brought to Govt. Regional Eye Hospital, Andhra Medical College, Visakhapatnam from January 2017 to December 2017.

Results: Three hundred forty two newborns were screened. Two hundred thirty seven newborns were normal and have no ROP. 38 were diagnosed to have stage 1 retinopathy of prematurity, 19 had stage 2 retinopathy of prematurity, 14 had stage 3 retinopathy of prematurity and 1 baby had stage 5 retinopathy of prematurity. The prevalence of retinopathy of prematurity was 21.05%, affecting 72 newborns. The *prevalence* of Retinopathy of prematurity progressing to threshold ROP was 1.17% affecting 4 newborns. ROP was confirmed in 5 babies with birth weight less than 1000 grams, 36 babies with birth weight less than 1500 grams, 24 babies with birth weight less than 2000 grams, 7 babies with birth weight more than 2000 grams.

Gestational Age and Low birth weight were significantly lower among the newborns diagnosed with Retinopathy of prematurity than those among without disease.

Conclusion: The development of retinopathy of prematurity was inversely proportional to weight and gestational age at birth. ROP can develop in newborns of more than 2000 grams and more than 34 weeks of gestation with rough perinatal course and screening for ROP has to be extended if neonatologist is of the opinion that babies have rough perinatal course.

Introduction:-

Retinopathy of prematurity (ROP) is a major cause of preventable blindness in children all over the world[1].Although the etiology of ROP is multifactorial, low birth weight and low gestational age are recognized to be the most important risk factors[2,3]. We aimed to evaluate the prevalence and severity of ROP and the relationship between low birth weight and low gestational age.

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Retinopathy of prematurity is a disorder of the developing retinal blood vessels in premature infants. The main pathology in ROP is the peripheral neovascularization[4] .The outcomes vary from minimal sequelae to bilateral irreversible blindness.

Retinopathy of prematurity, first identified by Terry in 1942, which was previously described as retrolental fibroplasia. As the pathogenesis became better understood later, the term Retinopathy of Prematurity was adopted. This was coined by Heath[2] in 1951.

The incidence of ROP is increasing in India because of improved neonatal survival rate. Out of 26 million annual live births in India, approximately 2 million are <2000 g in weight and are at risk of developing ROP[5]. In India the incidence of ROP is between 38 and 51.9% in low-birth-weight Infants[5,6].

Screening guidelines:-

American Academy of Pediatrics [7] .

1. Infants with birth weight of ≤1500g.
2. Gestational age of 30 weeks or less.
3. Infants with birth weight between 1500g and 2000g or gestational age of >30 weeks with unstable clinical course.

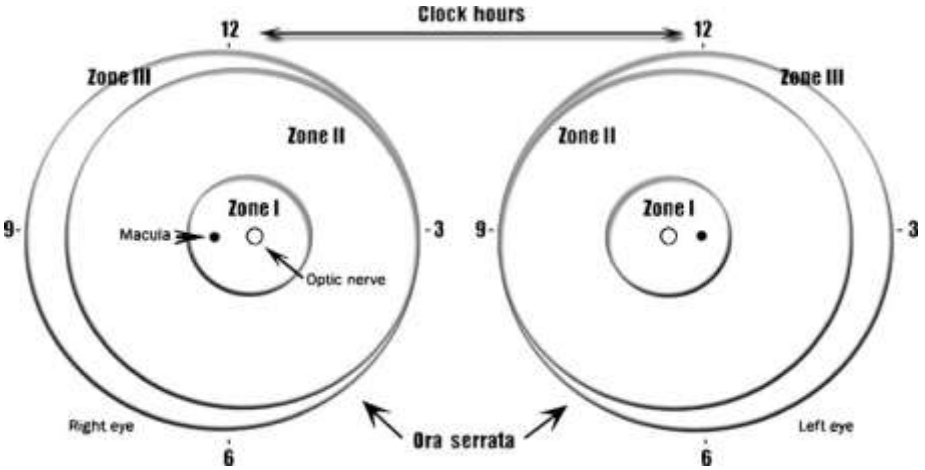
Indian scenario:-

1. Birth weight <1700g
2. Gestational age at birth <34–35 weeks
3. Exposed to oxygen >30 days
4. Infants born at <28 weeks and weighing <1200g are particularly at high risk of developing severe form of ROP
5. Presence of other factors such as respiratory distress syndrome, sepsis, multiple blood transfusions, multiple births (twins/triplets), apneic episodes, intraventricular hemorrhage increase risk of ROP. In these cases screening should be considered even for babies>37 weeks gestation or > 1700g birth weight.

Diagnosis:-

A screening program has to done for early detection and timely intervention for the prevention of visual loss due to ROP for high risk infants. For documentation for deterioration and regression ROP, classification of degrees of severity for therapeutic interventions, and consistent reporting in clinical trials the International Classification of ROP (ICROP) is used.

International classification of retinopathy of prematurity (ICROP) zones:-



Distance from optic nerve to macula

Classification of retinopathy of prematurity:-

1.Location	Zone Ⅰ Circle with optic nerve Centre and a radius twice the distance from optic nerve to macula

	Zone Ⅱ From edge of Zone Ⅰ to nasal ora-serrata and equator temporally Zone Ⅲ Lateral most crescent shaped area from zone Ⅱ to ora -serrata temporally
2.Severity	Stage 1 Presence of thin white line of demarcation separating the vascular and avascular retina. Stage 2 The line becomes prominent because of lifting of the Retina to form a ridge having height and width. Stage 3 Presence of extra retinal fibrovascular proliferation with abnormal blood vessels and fibrous tissue arising from the ridge extending into vitreous. Stage 4 Partial retinal detachment; not involving macula (4A) or Involving macula(4B). Stage 5 Complete retinal detachment
3.Plus disease	Presence of dilatation and tortuosity of posterior retinal vessels associated with vitreous haze, pupillary rigidity
4.Extent	Extent of involvement of the retina as expressed as clock hours (30 degrees sectors)
5.Pre-plus disease	Vascular abnormalities of the posterior pole that are insufficient for the diagnosis of plus disease but that Demonstrate more arterial tortuosity and more venous dilatation than normal

When and How Often to Screen:-
First screening examination should be carried out at 31 weeks of gestation or 4 week of age, whichever is later[7]. A good rule to remember is first screening at 1 month of postnatal age in babies born at >26 week of Gestational age, and 2 - 3 weeks of postnatal age in babies born at < 26 week of gestational age.

Methods:-

A hospital based observational study, was conducted at Govt. Regional Eye hospital from January 2017 to December 2017.

Inclusion criteria:-
1. Babies with birth weight < 2000 grams
2. Babies with gestational age <35 weeks
3. Babies with birth weight > 2000 grams and > 35 weeks with eventful neonatal course.

Informed consent of parents was taken after explaining in detail about methods and procedures involved in the study in their own language.

Preparation of the baby:-
Pupils are dilated with Phenylephrine 2.5% and Tropicamide 0.5%. One drop of Tropicamide is instilled every 10–15 min for 4 times starting 1 hour before the scheduled time for examination. Phenylephrine is available in 10% concentration; it should be diluted 4 times before use in neonates. Care was taken to wipe off any eye drops with sterile cotton that come out of eyes to cheeks and not to feed the baby immediately before examination as the child might vomit or aspirate. Repeated instillation of phenylephrine is avoided for the fear of hypertension.

Examination procedure:-
Screening of ROP involves indirect ophthalmoscopy using 20 D lens by the experienced author. After instilling a topical anesthetic drop like Proparacaine, a wire speculum is inserted to keep the eyelids apart. First the anterior segment of the eye is examined to look for tunica vasculosa lentis, pupillary dilation, and lens/media clarity; followed by the posterior pole to look for plus disease; followed by sequential examination of all clock hours of the peripheral retina. A scleral depressor is often used to indent the eye externally to examine areas of interest, rotate and stabilize the eye.

The results showed an overall significant benefit for the early treatment of eyes with high-risk prethreshold disease. Based on results of ETROP, two new terminologies have been suggested:

Type 1 ROP:-
Zone I, any stage ROP with plus disease
Zone I, stage 3 ROP with or without plus disease
Zone Ⅱ, stage 2 or 3 ROP with plus disease

Type 2 ROP:-
Zone I, stage 1 or 2 ROP without plus disease
Zone II, stage 3 ROP without plus disease.

Peripheral retinal ablation should be carried out for all cases with type 1 ROP and continued serial examinations are advised for type 2 ROP.

Results:-

One year hospital based observational study to know correlation between gestational age and birth weight with retinopathy of prematurity at Government Regional Eye Hospital, Andhra Medical College, Visakhapatnam, from January 2017 to December 2017.

Data distribution of the occurrence of retinopathy of prematurity to that of the babies screened in table 1.

Table 1:- Distribution of Incidence of ROP in the patients studied

Incidence of ROP	No of babies	%
Present	72	21.05
Absent	270	78.95
Total	342	100

Table 2:- Distribution of Gestational age and Incidence of ROP

Gestational age (weeks)	No babies with ROP (n = 72)	
	NO	%
24 weeks	1	1.38
26 weeks	2	2.77
28 weeks	24	33.33
29 weeks	3	4.16
30 weeks	4	5.55
31 weeks	2	2.77
32 weeks	21	29.16
33 weeks	3	4.16
34 weeks	4	5.55
35 weeks	3	4.16
36 weeks	3	4.16
38 weeks	2	2.77

Table 3:- Sex distribution in babies with ROP

SEX	Babies with ROP	%
Male	37	51.39
Female	35	48.61
Total	72	100

Table 3:- Gestational age VS severity of ROP (n=72)

ROP	**GESTATIONAL AGE (weeks)**						
	<27	27-28	29 - 30	31-32	33-34	35-36	>36
Stage Ⅰ	1	9	3	11	5	3	5
Stage Ⅱ		10	2	4	2		

Stage Ⅲ	2	3	2	8		1	
Stage Ⅳ							
Stage Ⅴ		1 1					

Table 4:- Birth weight VS severity of ROP (n=72)

ROP	BIRTH WEIGHT (grams)			
	500-1000	**1001-1500**	**1501-2000**	**>2000**
Stage Ⅰ	2	18	13	5
Stage Ⅱ	3	11	4	1
Stage Ⅲ		7	6	1
Stage Ⅳ				
Stage Ⅴ			1	

Rush disease in one baby and vitreous hemorrhage in 3 babies**.**

ROP does not always develop or progress in both the eyes of the patient simultaneously, here in our study, 72 babies who developed retinopathy of prematurity, out of 144 eyes,141 eyes had the disease of various stages illustrated in table 5 in correlational to gestational age. 5(3.5%) eyes of babies < 28 weeks gestational age(GA),16(11.35%)eyes of babies of 28-29 weeks of GA, 25(17.73%)eyes of babies of 32-33 weeks of GA, 12(8.51%) babies of 34-35 weeks of GA, 9(6.38%) babies >36weeks of GA had stage Ⅰ ROP.

12(8.51%)eyes of babies of 28-29 weeks of GA, 11(7.80%) eyes of babies of 30-31 weeks of GA, 9(6.38%)eyes of babies of 32-33 weeks of GA ,2(1.41%) babies of 34-35 weeks of GA had stage Ⅱ ROP.

2(1.41%) babies of <28 weeks of GA, 8(5.67%) babies of 28-29 weeks of GA, 6(4.2%) babies of 30-31 weeks of GA, 14(9.92%) babies of 32-33 weeks of GA, 2(1.41%) babies of 34-35 weeks of GA had stage ⅢROP. 2(1.41%) babies of 28-29 GA had stage Ⅴ.

Table 5:- **Gestational age VS severity of ROP (N = 141 eyes)**

STAGE	GESTATIONAL AGE (weeks)					
	< 28	28-29	30-31	32-33	34-35	>36
Stage Ⅰ	5	16	6	25	12	9
Stage Ⅱ	2	12	11	9	2	
Stage Ⅲ		8	6	14	2	
Stage Ⅳ						
Stage Ⅴ		2				

Discussion:-

In the present study, the incidence of various stages of retinopathy of prematurity is 21.05%. Retinopathy of prematurity is a bilateral vasoproliferative retinopathy affecting preterm or low birth weight babies which sometimes progresses to cause visual impairment or blindness. It is an avoidable cause of childhood blindness and its control is given priority in WHO's VISION 2020 programme[8]. Its secondary prevention, i.e. its early treatment to prevent blindness, requires a qualified ophthalmologists to screen babies at risk soon after birth.

Our study concluded that retinopathy of prematurity is an important complication of prematurity. Meticulous fundus examination with indirect ophthalmoscopy in all preterm babies with gestational age < 35 weeks and birth weight < 2000 grams and babies whose gestational age >35 weeks and birth weight > 2000 grams with rough neonatal period must undergo noninvasive method for early detection of ROP and its progression. The observed association of low GA or BW with ROP is in agreement with the most of the other studies [9,10].

31(43%) babies of more than 1500 grams weight and 7 (9.72%) babies of more than 2000 grams developed ROP in our study, which emphasizes the need for extended screening protocols. In our center we include all babies of less than 35 weeks gestation and less than 2000 grams and all the babies regardless of birth weight and gestational age with rough perinatal course referred from neonatologists for ROP screening.

There is need for the obstetricians, neonatologist and ophthalmologist to work in close cooperation to prevent blindness due to Retinopathy of prematurity (ROP).

Conclusion:-

1. The present study highlights the magnitude of the problem due to retinopathy of prematurity.
2. Low gestational age and low birth weight are the important risks factors of the disease.
3. Any neonate of gestational age >35 and birth weight >2000 grams with an eventful neonatal or perinatal course has to be screened for retinopathy of prematurity.
4. Early diagnosis and timely referral for treatment will help us to prevent blindness due to retinopathy of prematurity.

Conflicts Of Interest:- No financial interest

References:-

1. Terry TL. Extreme prematurity and fibroblastic overgrowth of persistent vascular sheath behind each crystalline lens. I. Preliminary report. Am J Ophthalmol. 1942;25:203–4.
2. Heath P. Pathology of retinopathy of prematurity, RLF. Am J Ophthalmol. 1951;34:1249–68.
3. Palmer E, Flynn J, Hardy R, Phelps DL, Phillips CL, Schaffer DB, *et al*. Incidence and early course of retinopathy of prematurity. The Cryotherapy for Retinopathy of Prematurity Coperative Group. Ophthalmology. 1991;98:1628-40.
4. Charan R, Dogra MR, Gupta A, Narang A. The incidence of retinopathy of prematurity in a neonatal care unit. Indian J Ophthalmol. 1995;43:123-6.
5. Pejawar R, Vinekar A, Bilagi A. National Neonatology Foundation's Evidence-based Clinical Practise Guidelines (2010), Retinopathy of Prematurity, NNF India, New Delhi 2010:253–62.
6. Jalali S, Anand R, Kumar H, Dogra MR, Azad R, Gopal L.Programme planning and screening strategy in retinopathy of prematurity. Indian J Ophthalmol. 2003;51(1):89–99.
7. Screening examination of premature infants for retinopathy of prematurity. Pediatrics. 2006;117:572–576.
8. Gilbert C, Foster A. Childhood blindness in the context of vision 2020: the right to sight. WHO Bulletin. 2001;79:227-32.
9. Kumar P, Sankar MJ, Deorari A, Azad R, Chandra P, Agarwal R, et al. Risk factors for severe retinopathy of prematurity in preterm low birth weight neonates. Indian J Pediatr.78:812-6.
10. *Raj DK et al. Int J Contemp Pediatr. 2017 May;4(3):1008-1011* http://www.ijpediatrics.com.