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Pattern and risk factors of retinopathy of prematurity in tertiary care centre

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ABSTRACT

Introduction: Retinopathy of prematurity is one of the commonest cause of blindness in sick neonates exposed to excessive oxygen following NICU admissions. The present study was thus conducted to assess the pattern and risk factors associated with incidence of retinopathy of prematurity.

Materials and Methods: A retrospective record based study was conducted at tertiary care centre between 1st July 2017 to 30th May 2020 were screened for ROP. Baseline characteristics and risk factors for ROP were assessed. The zone and stage of ROP were categorized as per the International classification of ROP along with iris neovascularisation and plus disease as per the revised international classification of retinopathy of prematurity (ICROP) preplus disease criteria. Data was entered in excel sheet and analysed using SPSS software version 20.

Results: Majority of neonates belonged to gestational age of 28 to 31 weeks (58.8%) and 51.2% neonates had birthweight of 1.5 to 2 kg. Male preponderance was observed with male: female ratio of 1.75:1. Amongst the various risk factors, the occurrence of ROP was highly significantly associated with gestational age and birthweight ($p < 0.01$). Subgroup analysis revealed that aggressive posterior ROP (APROP) contributed significantly to Type I ROP in 11.1% (3) cases. And the observed difference in gestational age and birthweight between APROP and other cases of ROP were statistically highly significant ($p < 0.01$).

Conclusion: Early and timely screening of ROP for all high risk neonates especially low birth weight and neonates with small gestational age should be mandatory as these are the most significant risk factors associated with ROP in present study.

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1. Introduction

Retinopathy of prematurity is one of the commonest cause of blindness in sick neonates exposed to excessive oxygen following NICU admissions. Retinopathy of prematurity (ROP) also called retrolental fibroplasia is categorized as unique condition as it occurs only in premature infants with incompletely vascularized retinas characterized by retinal ischaemia leading to neovascularization.¹ Though

occurrence of ROP has been on rise in developed and developing countries, but the clinical profile of ROP is very different among them.^{2,3} Also significant variation in the incidence of ROP have been observed even in urban and rural centers of India.⁴ With the medical and technological advancement, survival of neonates associated with critical illness have increased, thus prevalence of ROP is expected to rise.

In 1942, retrolental fibroplasia was first described by Terry and the oxygen therapy was the only attributed cause associated with this pathology.⁵ However, with further

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advancements in research, ROP have been observed even without oxygen therapy and even after oxygen therapy. Also the fact that not all premature infants develop ROP indicate toward other possible risk factors.⁶ There are various risk factors associated with ROP but three factors have shown consistent and significant association with ROP. These include- low gestational age, low birth weight and prolonged exposure to supplementary oxygen following delivery.⁷ Other probable risk factors include mechanical ventilation, sepsis, intraventricular hemorrhage, surfactant therapy, anemia, frequent blood transfusions, and apnea.⁸ The present study was thus conducted to assess the pattern and risk factors associated with incidence of retinopathy of prematurity.

2. Objectives

1. To estimate the proportion of ROP at tertiary centre
2. To study the risk factors associated with ROP
3. To study the patterns of ROP

3. Materials and Methods

The present study was conducted as a retrospective record based study at tertiary care centre, Bhopal. Being a tertiary care centre, the services are utilized by population from inside as well as nearby Districts. Thus the study area act as a referral centre for various nearby districts. All the records of babies between 1st July 2017 to 30th May 2020 were screened for ROP. Baseline characteristics as obtained from the records were noted such as mother's name, sex, gestational age, birth weight. Risk factors analyzed in the study included gestational age, birth weight, oxygen supplementation, respiratory distress syndrome (RDS), neonatal hyperbilirubinemia (NNH), multiple pregnancy, congenital heart disease, neonatal sepsis (NNS), birth asphyxia, necrotizing enterocolitis (NEC), hypoglycemia, hypocalcemia, hypothermia and need for mechanical ventilation. The zone and stage of ROP were categorized as per the International classification of ROP⁹ along with iris neovascularisation and plus disease as per the revised international classification of retinopathy of prematurity (ICROP) preplus disease criteria.¹⁰

3.1. Statistical analysis

Data was entered in excel sheet and analysed using SPSS software version 20. Data was grouped and their frequency and percentage were calculated.

3.2. Observations

Retrospective analysis of eyes of 289 neonates was conducted for presence of retinopathy of prematurity. The mean gestational age of neonates was 32.2±7.2 weeks and mean birth weight was 1.47±0.8 kg. All neonates presented

late for screening with mean age at first screening 10.38 weeks (range 6–18 weeks).

Table 1: Distribution according to sociodemographic variables

Sociodemographic variables	Frequency	Percentage	
Gestationaage (weeks)	<28	28	9.7
	28-31	170	58.8
	32-34	74	25.6
	>34	17	5.9
Birth weight (kg)	<1	21	7.3
	1-1.49	97	33.6
	1.5-2	148	51.2
Gender	>2	23	7.95
	Male	184	63.7
	Female	105	36.3

Majority of neonates belonged to gestational age of 28 to 31 weeks (58.8%) and 51.2% neonates had birthweight of 1.5 to 2 kg. The present study documented 63.7% males and 36.3% females. Thus male preponderance was observed with male: female ratio of 1.75:1. (Table 1)

Out of 289 neonates, avascular retina was observed in 148 (51.2%) whereas ROP was observed in remaining 141 (48.8%). Of them, type I and type II ROP was observed in 27 (19.1%) and 114 (80.9%). Thus the proportions of ROP in present study was documented as 48.8%.

Amongst the various risk factors, the occurrence of ROP was highly significantly associated with gestational age and birthweight ($p<0.01$). (Table 2)

Subgroup analysis revealed that aggressive posterior ROP (APROP) contributed significantly to Type I ROP in 11.1% (3) cases. Also the mean gestational age of neonates with APROP was 30.1 weeks whereas mean birth weight was 1.2 kg. And the observed difference in gestational age and birthweight between APROP and other cases of ROP were statistically highly significant ($p<0.01$).

4. Discussion

The present study was conducted with aim to study the proportions of ROP through a retrospective analysis of records. The proportions of ROP in this study was 48.8%, which was comparatively higher as reported by Dwivedi A et al (30%).¹¹ The findings of present study were comparable with studies from various other parts of India which reported an incidence between 42.27-51.89%.^{12,13}

However, the 11.1% APROP was comparatively less as reported by Dwivedi A et al.¹¹ These findings were similar to study by Hungi B et al wherereported APROP cases were reported to be 13.2% in a rural neonatal intensive care unit.⁴ The mean gestational age of neonates with APROP was 30.1 weeks whereas mean birth weight was 1.2 kg. These findings were similar to study by Dwivedi A et al in which mean gestational age and birth weight of APROP babies were 30.9 weeks and 1359.9 gm respectively.¹ Sanghi et al

Table 2: Distribution according to risk factor

Risk factor		Total	TYPE I (n=27)	Type II (n=114)	No ROP (n=148)	P value
Gender	Male	184	16 (59.3)	76 (66.7)	92 (62.2)	0.66
	Female	105	11 (40.7)	38 (33.3)	56 (37.8)	
GA	<28	28	9 (33.3)	7 (6.1)	12 (8.1)	0.001
	28 -31	170	5 (18.5)	74 (64.9)	90 (60.8)	
	32– 34	74	7 (25.9)	29 (25.4)	38 (25.7)	
	>34	17	6 (22.2)	3 (2.6)	8 (5.4)	
Birth weight	<1	21	9 (33.3)	7 (6.1)	5 (3.4)	0.001
	1-1.49	97	9 (33.2)	33 (28.9)	55 (37.2)	
	1.5-2	148	6 (22.2)	68 (59.6)	74 (50)	
	>2	23	3 (11.1)	4 (3.5)	14 (9.4)	
Oxygen supplementation	Yes	72	9 (33.3)	29 (25.4)	34 (23)	0.51
	No	217	18 (66.7)	85 (74.6)	114 (77.0)	
RDS	Yes	59	2 (7.4)	28 (23.7)	29 (19.6)	0.13
	No	230	25 (92.6)	86 (76.3)	119 (80.4)	
Hyperbilirubinemia	Yes	74	7 (25.9)	29 (25.4)	38 (25.7)	0.99
	No	215	20 (74.1)	85 (74.6)	110 (74.3)	
Multiple pregnancy	Yes	70	4 (14.8)	27 (23.7)	39 (26.4)	0.43
	No	219	23 (85.2)	87 (76.3)	109 (73.6)	
CHD	Yes	61	3 (14.8)	29 (25.4)	29 (19.6)	0.21
	No	228	24 (85.2)	85 (74.6)	119 (80.4)	
Septicaemia	Yes	92	6 (22.2)	31 (27.2)	55 (37.2)	0.12
	No	197	21 (77.8)	83 (72.8)	93 (62.8)	
Asphaxia	Yes	71	4 (14.8)	32 (28.1)	35 (23.6)	0.33
	No	218	23 (85.2)	82 (71.9)	113 (76.4)	
NEC	Yes	64	4 (14.8)	26 (22.8)	34 (23)	0.63
	No	225	23 (85.2)	88 (77.2)	114 (77)	
Hypoglycemia	Yes	77	4 (14.8)	27 (23.7)	46 (31.1)	0.14
	No	212	23 (85.2)	87 (76.3)	102 (68.9)	
Hypocalcemia	Yes	81	5 (18.5)	32 (28.1)	44 (29.7)	0.49
	No	208	22 (81.5)	82 (71.9)	104 (70.3)	
Hypothermia	Yes	102	5 (18.5)	44 (33.6)	53 (35.8)	0.14
	No	187	22 (81.5)	70 (61.4)	95 (64.2)	
Mechanical ventilation	Yes	64	2 (7.4)	22 (19.3)	40 (27)	0.06
	No	225	25 (92.6)	92 (80.7)	108 (73)	

documented mean gestational age of 29.75 weeks and birth weight of 1259.66 gm.¹⁴

The major risk factors associated with occurrence of ROP in present study were birth weight and gestational age ($p < 0.01$). These findings were in concordance to a study by Dwivedi A et al.¹¹ Jothi S et al also observed significant association of ROP with gestational age and birthweight similar to present study. Mean birth weight of babies having ROP was 1.34 kg and mean gestational age was 31.56 weeks, which was lower than the babies without ROP. RDS and LBW were the risk factors for development of ROP in mature (>32 weeks) babies.¹⁵ Gawai D et al also documented similar findings i.e. highest percentage of retinopathy of prematurity was seen in infants with gestational age < 28 weeks and extremely low birth weight (< 1000 g) infants.¹⁶

The study has certain limitations, retrospective nature lack of the details regarding Oxygen supplementation i.e.,

dose and duration of O₂ therapy are major limitations.

5. Conclusion

Based upon the findings of present study, the proportions of ROP are higher among neonates in presence of various prenatal/postnatal risk factors especially low birth weight and neonates with small gestational age. Hence, early and timely screening of ROP for all high risk neonates should be mandatory among neonates and uniform screening protocol must be developed at national level which must be incorporated in National Programs all over India.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare no conflict of interest.

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