

Incidence and risk factors study of retinopathy of prematurity in neonatal care unit.

Abstract :

Aim : To study the incidence of retinopathy of prematurity in neonatal care unit and to study the associated risk factors.

Materials and methods : A prospective analytical study was carried out at NICU of KIMS Hubli, Karnataka. Total 140 babies with gestational age at birth less than 34 weeks and birth weight less than 1750 gm were examined, associated prenatal, intranatal and postnatal history was noted down.

Results :

Incidence of ROP was found to be 27.14 %.Among 140 babies screened, ROP was found in 38 babies among which 20 were males and 18 were females.Stage 1 ROP was in 11 babies (7.85 %),stage 2 ROP in 24 babies (17.14%),stage 3 ROP in 2 babies (1.42%) and APROP was found in 1 baby(0.71%).Factors which were having association with ROP by univariate analysis are gestational age at birth ($p=0.005$), birth weight ($p=0.005$),respiratory distress syndrome ($p=0.017$),oxygen therapy ($p=0.020$),sepsis ($p=0.001$) and blood transfusion ($p=0.002$).Among them factors which were having independent association by multivariate analysis are birth weight ($p=0.007$,OR 12.581),sepsis($p=0.022$,OR 5.427),blood transfusion($p=0.009$,OR 23.054).

Conclusion :

Incidence of ROP among screened babies is significant.All high risk babies should be screened for ROP and all eligible babies should be advised

24 treatment.Risk factors which were having independent association with ROP are
25 birth weight,sepsis and blood transfusion.

26 **Introduction :**

27 Retinopathy of prematurity is a disorder of developing retinal vessels.It is
28 emerging as one of the leading cause of preventable blindness and accounts for
29 up to 10% of childhood blindness in developed countries.⁽¹⁾ Terry first described
30 the disease as retrolental fibroplasia in 1942.⁽²⁾ Incidence of ROP is increasing
31 since the time when it was first described because of improved neonatal care
32 which had increased the survival of low birth weight and premature infants.
33 Countries like India which is having highest number of preterm births have
34 ROP as a major cause of blindness.⁽³⁾ Visual outcomes of higher stages of ROP
35 are poor even after treatment. Therefore there is a need to detect ROP at its
36 earliest stage so that appropriate treatment can be given and there is need to
37 study the risk factors associated so that the disease can be prevented to
38 develop.Present study is carried out to determine the incidence of ROP in NICU
39 babies and to study associated risk factors.

40 **Aims and objectives :**

- 41 1.To study the incidence of ROP in high risk babies.
- 42 2.To study the associated risk factors .

43 **Materials and methods :**

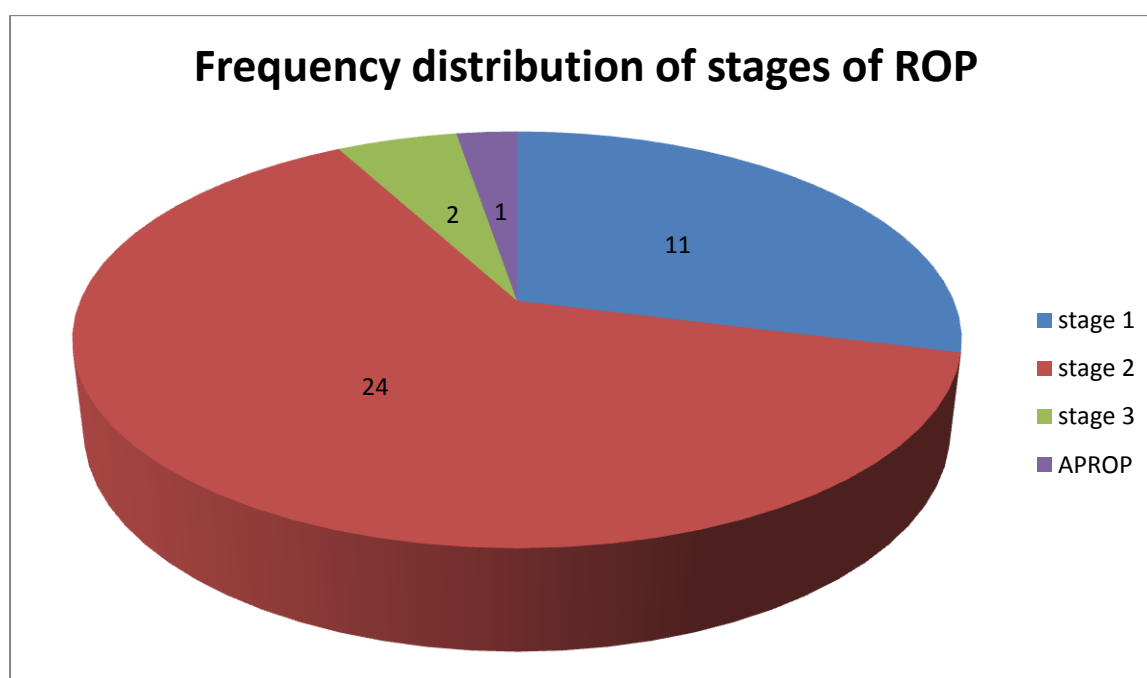
44 This study was conducted among 140 babies which were admitted in NICU of
45 KIMS Hubli. Babies which were having gestational age at birth less than 34
46 weeks and birth weight less than 1750 gm were included in the study. Babies
47 which were having congenital cataract and other congenital malformations were
48 excluded from this study.Appropriate history regarding prenatal,intranatal and
49 postnatal events were recorded for each baby. After examining the anterior

segment and pupillary reactions, pupil were dilated using Tropicamide(0.8%) and phenylephrine(5%) eye drops, instilled 3-4 times in both eyes 10 mins apart. After full dilatation of pupil both eyes fundus examination was done with indirect ophthalmoscope with 20 D lens and also with Retcam shuttle. Sterile Alfonso speculum was used for retracting the eyelids and paracaine (0.5%) eye drops were used for decreasing the pain and discomfort during the examination. Sterile scleral depressor was used to examine the periphery of retina. Findings were noted down describing the stage, zone of ROP and clock hours involved.

Results :

Total 140 eligible babies were screened which were born in the period between December 2015 to December 2016. The gestational age at birth ranges from 25 weeks to 34 weeks and birth weight ranges from 870 gm to 1750 gm. ROP was detected in 38 babies among them 20 were males and 18 were females. Stage 1 ROP was in 11 babies (7.85%) , among them 6 were in zone 2 and 5 were in zone 3. Stage 2 ROP was in 24 babies (17.14%), among them one was in zone 1, 21 were in zone 2 and 2 were in zone 3. Stage 3 ROP was found to be in 2 babies (1.42%) both were in zone 2. APROP was found in one baby which was in zone 2. 93 babies (65.71%) were having temporal avascular retina, but no stage ROP was present. Rest 9 babies (6.42%) fundus was found to be almost fully vascularised.

76 Pie chart showing frequency distribution of stages of ROP



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79 Baby with APROP was adviced laser photocoagulation as early as possible.
 80 Stage 1 and stage 2 ROP cases were adviced follow up visit after 2 weeks.
 81 Stage 3 ROP cases was adviced follow up visit after 1 week. 93 babies which
 82 were having temporal avascular retina were adviced follow up visit after 3
 83 weeks. 9 babies (6.42%) were having almost fully vascularised retina,no any
 84 follow up visit was adviced.

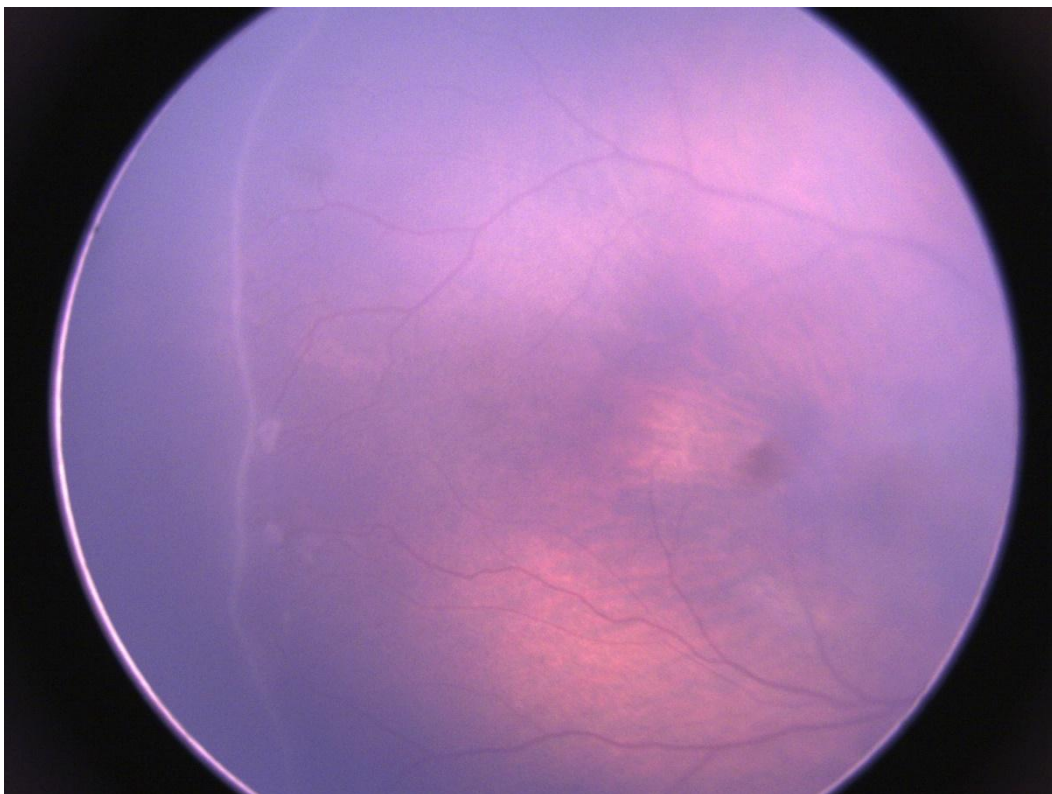
85 Stage 4 ROP,stage 5 ROP was not found in any of the baby screened in this
 86 study. All diagnosed ROP cases were symmetrical (same stage was present in
 87 both eyes).

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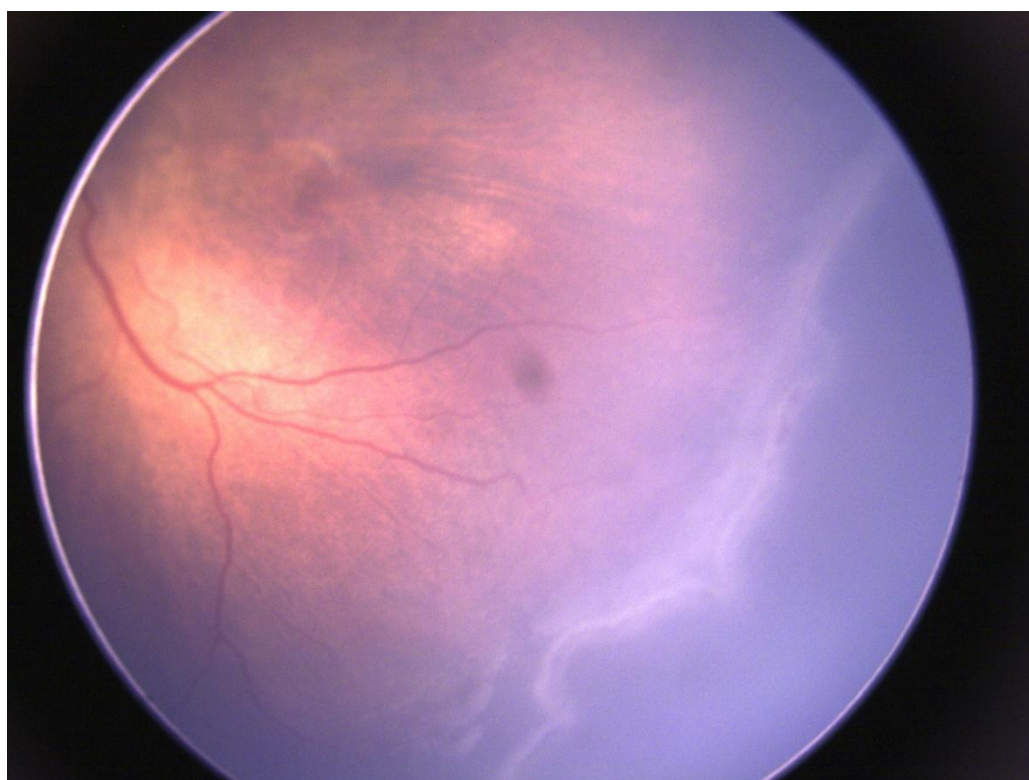
Stage 1 ROP

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Stage 2 ROP

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Stage 3 ROP

Risk factors :

Most common risk factor apart from prematurity and low birth weight in this study was respiratory distress syndrome which was present in 50% of all diagnosed ROP babies. Second most common risk factor was oxygen therapy which was present in 44.73% of all ROP babies. Frequency of all risk factors in ROP babies is given in following table-

Risk factor	Frequency in diagnosed ROP babies
Respiratory distress syndrome	19 (50.00%)
Oxygen therapy	17 (44.73%)
Multiple gestation	11 (28.94%)

	Sepsis	08 (21.05%)
	Asphyxia	06 (15.78%)
	Neonatal jaundice	05 (13.15%)
:	Blood transfusion	05 (13.15%)
	IUGR	03 (7.89%)
	LSCS	04(10.52%)

On analysing the data by univariate analysis it was found that factors which are having significant association with are gestational age at birth ($p=0.005$), weight in grams ($p=0.005$), Respiratory distress syndrome ($p=0.017$), oxygen therapy ($p=0.020$), sepsis ($p=0.001$) and blood transfusion ($p=0.002$)

Statistical analysis table:

ROP		Present	Absent	Total	Chi square test
Gender	Male	21 (55.26)	56 (54.9)	77 (55)	$p = 0.970$
	Female	17 (44.74)	46 (45.1)	63 (45)	
ROP		Present	Absent	Total	Fisher exact test
GA (weeks) Groups	25-27 wks	4 (10.53)	1 (0.98)	5 (3.57)	$p= 0.005$ (Significant)
	28-30 wks	19 (50)	37 (36.27)	56 (40)	
	31-34 wks	15 (39.47)	64 (62.75)	79 (56.43)	
ROP		Present	Absent	Total	Fisher exact test
Wt (gms) Groups	<1000 gms	3 (7.89)	1 (0.98)	4 (2.86)	$P<0.005$ (Significant)
	1000-1399 gms	17 (44.74)	19 (18.63)	36 (25.71)	
	1400 & above	18 (47.37)	82 (80.39)	100 (71.43)	
ROP		Present	Absent	Total	Chi square test
RDS	Present	19 (50)	29 (28.43)	48 (34.29)	$p = 0.017$ (Significant)
	Absent	19 (50)	73 (71.57)	92 (65.71)	

ROP		Present	Absent	Total	Chi square test
Oxygen	Present	17 (44.74)	25 (24.51)	42 (30)	p = 0.020 (Significant)
	Absent	21 (55.26)	77 (75.49)	98 (70)	
ROP		Present	Absent	Total	Chi square test
Twin	Present	11 (28.95)	21 (20.59)	32 (22.86)	p = 0.295
	Absent	27 (71.05)	81 (79.41)	108 (77.14)	
ROP		Present	Absent	Total	Chi square test
Sepsis	Present	8 (21.05)	4 (3.92)	12 (8.57)	p = 0.001 (Significant)
	Absent	30 (78.95)	98 (96.08)	128 (91.43)	
ROP		Present	Absent	Total	Chi square test
Asphyxia	Present	6 (15.79)	10 (9.8)	16 (11.43)	p = 0.322
	Absent	32 (84.21)	92 (90.2)	124 (88.57)	
ROP		Present	Absent	Total	Chi square test
Jaundice	Present	5 (13.16)	10 (9.8)	15 (10.71)	p = 0.568
	Absent	33 (86.84)	92 (90.2)	125 (89.29)	
ROP		Present	Absent	Total	Chi square test
Blood transfusion	Present	5 (13.16)	1 (0.98)	6 (4.29)	p = 0.002 (Significant)
	Absent	33 (86.84)	101 (99.02)	134 (95.71)	
ROP		Present	Absent	Total	Chi square test
IUGR	Present	3 (7.89)	10 (9.8)	13 (9.29)	p = 0.729
	Absent	35 (92.11)	92 (90.2)	127 (90.71)	
ROP		Present	Absent	Total	Chi square test
LSCS	Present	4 (10.53)	15 (14.71)	19 (13.57)	p = 0.521
	Absent	34 (89.47)	87 (85.29)	121 (86.43)	

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117 On analyzing the data by logistic regression multivariate analysis, factors which
 118 are having independent association with ROP are birth weight (p=0.007, OR
 119 12.581), sepsis (p=0.022, OR 5.427), blood transfusion (p=0.009, OR 23.054).

120 **Logistic regression analysis table:**

		Adjusted OR	95% C.I. for EXP(B)		P value	Unadjusted OR
			Lower	Upper		
GA	25-27 weeks	4.502	0.316	64.124	0.267	17.06
	28-30	1.386	0.514	3.74	0.519	2.19
	31-34	(Ref)				
Birth Wt	<1000	12.581	0.865	182.898	0.064	13.67
	1000-1399	3.977	1.464	10.805	0.007 (Significant)	4.07
	1400-1750	(Ref)				-
RDS		0.818	0.147	4.552	0.819	2.51
Oxygen		3.202	0.603	17.009	0.172	2.49

Sepsis	5.427	1.281	22.987	0.022 (Significant)	6.53
Blood transfusion	23.054	2.191	242.598	0.009 (Significant)	15.30

121

122 **Discussion:**

123 Incidence of ROP is increasing nowadays because of improved neonatal care
 124 which increases the number of live premature and low birth weight babies.
 125 Incidence in present study is found to be 27.14 %. It varies in different
 126 studies,the reason might be due to differences in gestational age, birth weight,
 127 quality of infant survival and health care activities and other related factors such
 128 as ethnicity and race, limited sample size, loss to follow up.

129 Strong risk factors for development of ROP are low gestational age at birth,low
 130 birth weight.Other risk factors are oxygen therapy,respiratory distress
 131 syndrome,twin delivery,sepsis,anaemia,blood transfusion.^(4,5,7,8)

132 The risk factors which we found significant by univariate analysis are low
 133 gestational age at birth (p=0.005), birth weight (p=0.005),respiratory distress
 134 syndrome (p=0.017),oxygen therapy (p=0.020),sepsis (p=0.001) and blood
 135 transfusion (p=0.002).

136 As birth weight decreases ,incidence and severity of ROP increases as found in
 137 different studies.Even after logistic regression multivariate analysis birth weight
 138 remained a significant risk factor for ROP in our study.(p=0.007,OR 3.977)

139 Sepsis is frequently accompanied by hypotension which impair the tissue
 140 perfusion and release of angiogenic growth factors. In our study sepsis is found
 141 to be an independent risk factor for ROP(p=0.022,adjusted OR 5.429)

142 Premature and low birth weight babies are often accompanied by anaemia
 143 which increases the need for transfusion of packed cell volume. Adult RBCs are
 144 rich in 2,3 DPG and adult Hb binds less firmly to oxygen, thus releasing excess

145 oxygen to the retinal tissue. Blood transfusion is an independent risk factor for
146 ROP in our study ($p=0.009$, OR 23.054).

147 According to Murthy et al oxygen therapy in the form of mechanical
148 ventilation and CPAP were not the independent risk factor for development of
149 ROP.⁽⁶⁾ In our study we found that it is a significant risk factor on univariate
150 analysis but it is not an independent risk factor on multivariate analysis.
151 ($p=0.172$, adjusted OR 3.202).

152 We also found there is no any statistical association between occurrence of
153 ROP and sex of the baby ($p=1.014$), twin delivery ($p=0.295$), asphyxia
154 ($p=0.322$), jaundice ($p=0.568$), IUGR ($p=0.729$) and LSCS ($p=0.521$).

155 Stage 2 in zone 2 was the commonest pattern of ROP in our study and all
156 diagnosed ROP babies were having same stage of ROP in both eyes i.e the
157 disease was symmetrical.

158

159 **Conclusion :**

160 Incidence of ROP in present study is significant. Treating established ROP is
161 more difficult than screening early stages of ROP. It is a potentially blinding
162 disease which can be prevented to develop by elimination of risk factors. It can
163 be prevented to go for higher stages if it is detected at earliest stage by regular
164 screening and follow up of high risk babies. In this manner vision of high risk
165 babies can be saved.

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167 **References:**

- 168 1. Goggin M, O'Keefe M. Childhood blindness in the Republic of Ireland; a national survey. Br
169 J Ophthalmol 1991;75:425-49.)

2. Terry TL. Fibroblastic Overgrowth of Persistent Tunica Vasculosa Lentis in Infants Born Prematurely: II. Report of Cases-Clinical Aspects. *Trans Am Ophthalmol Soc.* 1942;40:262–284.)
3. Born Too Soon;The Global action report on preterm Birth;Geneva: World Health Organization; 2012.
4. Maheshwari R, Kumar H, Paul VK, Singh M, Deorari AK, Tiwari HK. Incidence and risk factors of retinopathy of prematurity in a tertiary care newborn unit in New Delhi. *Natl Med J India* 1996;9:211-4.
5. Chaudhari S, Patwardhan V, Vaidya U, Kadam S, Kamat A. Retinopathy of prematurity in a tertiary care center--incidence, risk factors and outcome. *Indian Pediatr* 2009;46:219-24.
6. Murthy KR, Nagendra, Babu K, Benakappa N, Niranjana, Murthy PR. Analysis of risk factors for the development of ROP in preterm infants at a tertiary referral hospital in South India. *Acta Medical Litunica* 2006;13:147-51.
7. Aggarwal R, Deorari AK, Azad RV, et al. Changing profile of retinopathy of prematurity. *J Trop Pediatr* 2002;48:239-42.
8. Rekha S, Battu RR. Retinopathy of prematurity: incidence and risk factors. *Indian Pediatr* 1996;33:999-1003.