



RESEARCH ARTICLE
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Retinopathy of prematurity: prevalence and severity at maternity and children hospital in Najaf province ,Iraq

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ABSTRACT

Background: preterm infants are vulnerable to retinopathy of prematurity, which consider as a leading cause of blindness in premature neonates. Low birth weight and small gestational age had been identified as significant risk factors for the development and progression for this disease .

Aim of the study: To assess the prevalence and severity of retinopathy of prematurity among preterm infants at neonatal intensive care unit in Al zahraa maternity and children teaching hospital at Najaf convince ,Iraq.

Patients and methods: This is a prospective study which enrolled 134 preterm infants who had been referred to ROP unit at al zahraa maternity and children teaching hospital in the period from November 2019 till September 2021.

Results: In this study 134 preterm neonate were screened ,of them 45(33.6%) having retinopathy of prematurity and 99(66.4%) were not affected. There were 6 (13.3%) cases of ROP at stage 1 ,28 (62.2%) at stage 2 ,8 (17.2%) at stage 3 and 3 (6.7%) at stage 5. Plus disease was detected in 5 (3.7%) of cases.Type 2 ROP were found in two third of ROP cases (66.6 %) and one third of ROP cases were (33.3%) were classified as sever (type 1 ROP or stage 5). The mean birth weight and gestational age of the screened infants were 1532.3+_507.7(500 to 3000)grams, 30.4+_2.5(26 to 42) weeks respectively.67 (56.7%) of the neonate were males and 58 (43.3%) were females.

Conclusion: Retinopathy of prematurity is relatively common disorder affecting premature neonate of Najaf province in Iraq. The mean gestational age and birth weight were less in infants who had ROP when compared to those without ROP.

Keywords: *prevalence, infants, premature, retinopathy of prematurity*

INTRODUCTION

Retinopathy of prematurity is a disorder that affects retinal vessels of preterm neonate with low birth weight. 1 It is considered as an important cause of blindness in infancy across both the developed and developing world. 2 In the United States, ROP is considered as a second cause of blindness among children. 3

Retinopathy of prematurity initially was described by Terry in 1942 as a retroretinal fibroplasia, as he noted a thick white fibrovascular plaque behind the lens in a group of preterm infants. Later, it was discovered that this finding represents complete tractional retinal detachment which is the end stage of retinopathy of prematurity. 4

The most important risk factors for the development of retinopathy of prematurity are small gestational age and low birth weight as well as supplemental oxygen in preterm neonate. 5

Respiratory distress, sepsis, intraventricular hemorrhage and blood transfusion associated with higher risk for ROP development. 6

The pathogenesis of ROP involves two phases. First phase, in which there is relative hyperoxia with subsequent decrease in vascular endothelial growth factor level. This phase extends from 22-30 weeks postmenstrual age. The second phase is characterized by relative hypoxia and increased level of vascular endothelial growth factor. The understanding of this correlation between oxygen and vascular endothelial growth factor helps the researchers to improve the strategy for management of ROP. 7,8

Retinopathy of prematurity is classified into five stages: stage one: there is a fine demarcation line between vascularized and avascular retina. stage two: elevated ridge. stage three: characterized by extra retinal fibrovascular tissue. stage four: there is subtotal retinal detachment. stage five: total retinal detachment. 9

plus disease reflects marked vascular engorgement and tortuosity noticed at the posterior pole vessels. This might be found at any stage and reflects the increased blood flow throughout the retina. 10

Retinopathy of prematurity may result in profound visual morbidity but early intervention with either laser photocoagulation, cryotherapy or anti-VEGF injections gives promising visual outcome to those affected infants. 11 Consequently, an effective screening program is mandatory for timely diagnosis and management of this disorder. 12

The aim of this study is to assess the incidence of ROP in a sample of Iraqi preterm and low birth weight infants. Additionally, we aimed in this research to participate in the current body of knowledge of ROP in Iraqi population and help in development of guidelines for neonate screening in our country.

MATERIAL AND METHODS

This is a prospective study performed at the ROP unit at AL Zahra teaching hospital, Najaf city in the period from November 2019 till September 2021.

An informed consent was taken from the parents of all the participant neonates. The study had been conducted according to the Declaration of Helsinki.

A total of 134 infants were screened in this study. The inclusion criteria involve:

neonate born at 32 weeks gestational age or less, less than 1500 gram birth weight.

Starting the first examination at 4-8 weeks gestational age and then each 1-2 week interval depending on clinical findings till complete vascularization of retina were recorded.

At every ocular examination ,pupil was dilated using cyclopentolate hydrochloride drop (0.5%) twice times for each eye thirty minute prior to the examination. Topical tetracaine hydrochloride(0.5%) drop were instilled to provide ocular surface anaesthesia.

To keep the eyelids apart ,we used infant eyelid speculum then examination with wide field digital imaging (retcam) was done .

During each visit ,clinical findings were recorded on specific medical sheet. Schematic representation of stage and zone given attention to vessels feature (dilation and tortusity) to detect presence or absence of plus disease.

Time and decision of interference was in accordance with result of early treatment for retinopathy of prematurity(ETROP) trail which divided ROP into type 1 and type 2 ROP .If infant was diagnosed as type 1 retinopathy of prematurity , he will be sent for intravitreal injections of anti VEGF.

STATISTICAL ANALYSIS

Data were analyzed using statistical package for social science (SPSS) version 16 and Microsoft Office Excel 2007. Quantitative variables were

expressed as mean, standard deviation and range, whereas, qualitative variables were expressed as number and percentage. Comparison of mean values was done using independent samples student t-test. Association between qualitative variables was done using Chi-square test. The level of significance was considered at $p \leq 0.05$ and the level of high significance was considered at $p \leq 0.01$.

RESULTS

This study involved 134 infants with preterm birth or low birth weights, including 76 males (56.7%) and 58 (43.3%) females. (Table 1)

The gestational age of recruited infants varied from 26 to 42 weeks with a mean of 30.4 ± 2.5 weeks. Only 13 (9.7%) had gestational age less than 28 weeks, 30 (22.4%) were aged 28-29.9 weeks, 52 (38.8%) aged 30-31.9 weeks and 39 (29.1%) aged 32 weeks or more. (Table 1)

Regarding birth weight of the study sample varied from 500 to 3000 grams with a mean weight of 1532.3 ± 507.7 grams. 16 infants (12%) weighed less than 1000 grams, 42 (31.3%) their weights were between 1000 to 1499 grams, 60 infants (45.1%) weighed between 1500 to 2000 grams and remaining 16 (12%) weighed more than 2000 g. (table 1)

TABLE 1. Characteristics of sampled babies

variable	N =134	percent
Gender		
.male	76	56.7%
.female	58	43.3%
Gestational age at birth		
Less than 28 week		
28-29.9 week	13	9.7%
30-31.9 week	30	22.4%
More than 32 week	52	38.8%
	39	29.1%
Birth weight		
Less than 1000 g	16	12.0%
1000-1499 g	42	31.3%
1500-2000g	60	45.1%
More than 2000g	16	12.0%
ROP		
Yes	45	33.6%
no	89	66.4%
Plus disease		
Yes	5	3.7%
no	129	96.3%

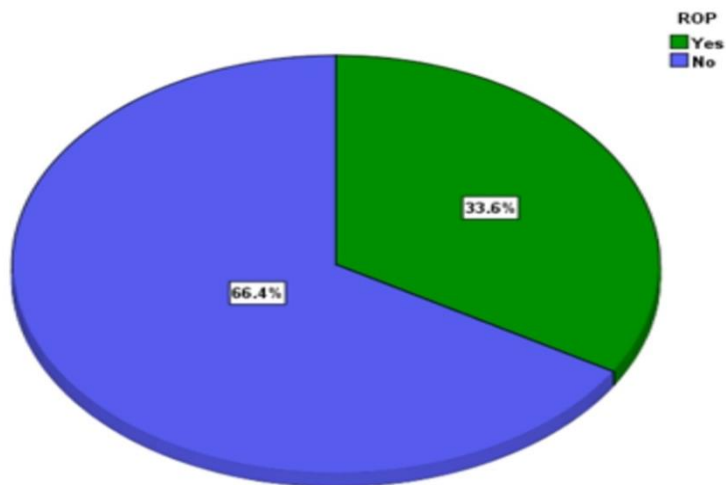


FIGURE 1. Distribution of babies according to ROP

Retinopathy of prematurity was found in 45 infants (33.6%) (Table 1, figure 2). Involvement of both eyes was detected in all infants with ROP except two cases . From the total 134 cases of ROP, five(3.7%) of them only were having Plus disease.

Characteristics of babies with ROP:

Being male or female in this study showed no significant association with occurrence of ROP (P > 0.05, table 2).

Gestational age < 32 week is significantly association (93.3%) with having ROP. (P < 0.05, table 2)

Mean of gestational age was significantly lower in babies with ROP (29±1.5 wk) compared to those not having ROP (31.1±2.5 wk) (P<0.05, table 3)

Birth weight ≤2000 g is significantly (95.6%) associated with ROP (P < 0.05, table 2)

Mean of birth weight was significantly lower in babies with ROP (1234±454.1 g) compared to those not having ROP (1664.2±492.6 g) (P<0.05, table 3)

TABLE 2. Distribution of the sampled babies according to presence of ROP and other studied characteristics

variable	ROP				P value
	YES		NO		
	N.	%	N,	%	
Gender					
Male	23	51.1%	53	59.6%	0.352
female	22	49.9%	36	40.4%	
Gestational age at birth					<0.001
Less than 28 week	7	15.6%	6	6.7%	
28-29.9 week	19	42.2%	11	12.4%	
30-31.9 week	16	35.6%	36	40.4%	
More than 32 week	3	6.7%	36	40.4%	
Birth weight					<0.001
Less than 1000 g	11	24.4%	5	5.7%	
1000-1499 g	20	44.4%	22	23.9%	
1500-2000g	12	26.7%	48	54.5%	
More than 2000g	2	4.4%	14	15.9%	

TABLE 3. mean values for sampled babies age, birth weight according to the presence or absence of ROP

variable	ROP					
	no			Yes		
	N	Mean	SD	N	mean	SD
Gestational age at birth (week)	45	29	1.5	89	31.1	2.5
Birth weight (g)	45		1234.4	88		1664.2
		454.1			492.6	

TABLE 4. Distribution of the sampled babies according to presence of Plus disease and other studied characteristics

variable	Plus disease				P value
	YES		NO		
	N.	%	N,	%	
Gender					
Male	2	40%	74	57.4%	0.442
female	3	60%	55	42.6%	
Gestational age at birth					0.111
Less than 28 week	1	20%	12	9.3%	
28-29.9 week	3	60%	27	20.9%	
30-31.9 week	0	0%	52	40.3%	
More than 32 week	1	20%	38	29.5%	
Birth weight					0.382
Less than 1000 g	1	20%	15	11.7%	
1000-1499 g	3	60%	39	29.7%	
1500-2000g	1	20%	59	46.1%	
More than 2000g	0	0%	16	12.5%	

Plus disease did not show any significant association in this study with any of gender, gestational age, birth weight (P>0.05, table 4).

TABLE 5. Distribution of ROP babies according to the severity

variable	ROP				P value
	Cases required intervention		Cases need follow up		
	N.	%	N,	%	
Gestational age at birth					<0.002
Less than 28 week	7	46.6%	1	3.33%	
28-29.9 week	2	4.44%	16	53.33%	
30-31.9 week	5	33.3%	11	36.66%	
More than 32 week	1	6.66%	2	6.66%	
Birth weight					0.088
Less than 1000 g	7	46.66%	4	13.33%	
1000-1499 g	5	33.33%	15	50.0%	
1500-2000g	3	20.0%	9	30.0%	
More than 2000g	0	0%	2	6.66%	

With respect to the pathological findings , the dominant stage was stage two which was found in one fifth (20.9%) out of all studied infants and about two-thirds (62.2%) infants with retinopathy of prematurity (Figure 3).

In patients with ROP ,the mostly affected zone of retina was zone two (48.9%),later was zone three (31.1%) and the least affected zone was zone one (20.0%).

Regarding the severity of ROP in the studied sample , two third of the infants with ROP(66.6%) were classified as mild to moderate and need just follow up without any interventions while the remaining one third (33.3%)of ROP cases need intervention either in form of medical (intravitreal injections) of bevacizumab or in form of surgical intervention(as in table 5) .

Gestational age in required treatment group were significantly lower than follow up group (p value(> 0.05) While birth weight in were not significantly lower in the severe ROP group (p value <0.05)

DISCUSSION

Sever ROP consider as debilitating disorder which if left without treatment may end up with irreversible loss of vision with subsequent decrease in quality of life for the patient and remarkable economic considerations on the persons and the community.¹³

Blindness rate caused by ROP is below 10% in the developed countries but it increase up to 40% in developing countries .^{14,15}

This study involve 134 infants .There were 45(33.6%) infants suffered from ROP while 98(66.4%) of them not affected.

The demographic data of the study sample show that ROP group was 23 male (51.1%) and 22 female (48.9%) while the other group , there was 53 male (59.6%) and 36 female (40.4%).There was no significant statistical difference between the two group .

There is a wide variation in the incidence of ROP among different studies with lower incidence had been reported in more developed countries.^{16,17}

This variable incidence and severity of retinopathy of prematurity related mainly to difference in gestational age, birth weight and the provided perinatal care.^{17,18,19}

In this study the incidence of ROP was 33.6% in the screened infants which was comparable to similar studies that were conducted in different countries. Ekinic et al found the incidence of ROP was 32.4% at tertiary center in Turkey.²⁰ Waheeb et al found at tertiary center in Saudi Arabia ROP incidence at a rate of 33.7%.²¹ A screening study from Iran by Karkhaneh et al reported the incidence of ROP in 34.5% of infants who referred to Farabi Eye hospital while seven years northern Iran study show incidence of ROP at 45%.²² Samliarily, in India ,the incidence of ROP affected by the area of study and range from 20% to 47.3%.^{23,24}

This wide variability in the incidence of ROP can be explained by racial, geographical diversity as well as difference in selection criteria among those studies.

In this study the mean gestational age was 29+_1 week and this was markedly less in comparison to non ROP group. These results were comparable to that of Afraid et al who found mean gestational age of infants with ROP 29.4+_2 week while Zenaida et al found mean gestational age of ROP infant was 27.2+_2 week .^{25,26}

We found incidence of ROP in infants with gestational age greater than 32 week was 6.7%.This consider less rate in comparison to Ekinic et al where the incidence of ROP was 13.1% at 32 week gestational age.²¹

This finding reflect the risk of ROP incidence at higher gestational age with the subsequent need to widen current screening criteria to include premature infant with gestational age equal or less than 34 week.

In the presented study ,infants with ROP had mean birth weight of 1234+-454 grams and this consider less than non ROP group with statistically significant differences. This finding was consistent with other studies .25-30

Among neonate with weight of birth exceeding 1500 grams the rate of ROP incidence was 26%.This result was consistent with Bassiouny et al where he found the incidence rate of ROP in this group of neonate at 20%.29

In this study ,we found 13.3% of the affected infants were in stage 1 ROP 62.2% had stage 2 ROP and 17.2%had stage 3.

This result were comparable to that of Rasoulinejad et al where must of cases were in stage 2(63.07%)while those in stage 1 and stage 3 were only 16.99% and 19.9 % respectively.29-33

11.9% of the studied population had severe form of ROP that need treatment and referred for antiVEGF injections or vitreoretinal intervention. This result was consistent with that of Ekinici et al with sever ROP incidence of 8.8%.20, 34,35

Limitations of this study :the relatively small sample size, short duration of study and loss of follow up due to death of very low birth weight infants which had an effect on the final result.

In summary , the relatively high rate of ROP incidence in this sample of Iraqi infants necessitate the need to improve screening for ROP in the country. The screening guidelines from the developed countries need some modification in our region since we have found many infants with higher gestational age and birth weight affected with ROP . Prevention of preterm delivery through the better maternal care ,improvement of NICU care and monitoring of preterm infants during hospital admission consider the best way for reduction of ROP incidence.

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