The Incidence of Retinopathy of Prematurity at Al Zahraa Teaching Hospital at Al Najaf

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Abstract

Background: Retinopathy of prematurity (ROP) is regarded as one of the preventable causes of blindness in children. Recent advances in neonatal care have improved survival rates for premature infants. Thus ROP is believed to account for 6-18% of childhood blindness in developed countries. Early identification of retinal damage and the use of appropriate treatment prevent blindness and offer child better overall development.

Objective: To estimate the incidence of retinopathy of prematurity at Al Zahraa teaching hospital at Al Najaf Al Ashraf.

Patients and Methods: A prospective longitudinal study was conducted from 1st of April till 1st of August 2018 on a 100 preterm neonates who were admitted to the neonatal intensive care unit with gestational age less than 36 weeks. All of cases were examined by using RetCam.

Results: This study showed that the incidence of ROP was 9%. There was a highly significant relation between neonatal body weight and the occurrence of retinopathy of prematurity as the incidence in very low birth weight was 36.4% compared with 1.3% in neonate having birth weight > 1500 gm and p-value equal to 0.0001. In addition there was a highly significant relation between the gestational age with the occurrence of retinopathy of prematurity as the incidence in neonates delivered with gestational age < 30 weeks was 38.9% compared with 2.4% in neonates delivered with gestational age > 30 weeks and p-value equal to 0.0001.

Conclusion: The incidence of ROP was found to be 9%. This can be due to the early screening and detection of the disease. Parent's and medical staff education at the disease and the severity of the disease can increase their awareness to the importance of screening and follow up of the preterm neonate.

Keywords: Retinopathy, Prematurity, Childhood blindness

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Introduction

Retinopathy of prematurity affects low birth weight premature infants. Early exposure to high oxygen concentration has been regarded as a key risk but recently its significance is controversy [1].The survival rate of premature infants has been increased with the improvement in the technologies used in the neonatal intensive care units (NICU) and the improvement of healthcare services in recent years [2]. ROP is a complex disease process represented by a lack of complete or normal retinal vascularization in premature infants and it has a typical progression pattern, but in some cases the earlier disease stages may regress spontaneously at any time. Partial absence of retinal vessels in the immature retina can result in retinal ischemia which leads to the release of growth factor that promotes vascular growth. Instead of the normal vascular growth process, the growth pattern becomes disturbed and the vessels proliferate into the vitreal cavity at the border of vascular and avascular retina. In advanced cases vitreous hemorrhage and tractional retinal detachment can occur. The end stage of untreated ROP is the development of a white, dense, fibrovascular plaque behind the lens and complete tractional retinal detachment [3]. Thus appropriate screening to avoid ROP induced blindness must be applied utilizing certain criteria to reduce the number of neonates for screening as the screening procedure might result in pain in addition to its medical cost [4].

International committee for classification of ROP (ICROP) describes the disease depending on three parameters: The zone in the retina where ROP is found, the severity (stage) of ROP and the status of retinal vessels whether these are dilated and/or tortuous (pre-plus or plus disease) [3].

Collectively these parameters determined whether the patients had mild retinopathy of prematurity, pre-threshold retinopathy of prematurity or threshold retinopathy of prematurity. Thus the classification of ROP in each eye, at each screening session is important. The main feature of retinopathy of prematurity is the presence of avascular retina, thus three zones of ROP are centered on the optic disc: zone “1” involve a small circle of retina around the optic disc, zone “2” is a ring shaped section surrounding zone “1” and zone “3” is a crescent shaped area of temporal retina. In addition severity of the disease depends on retinal blood vessels maturity and growth [5]. Stage 1 characterized by a white line of demarcation in between the normally vascularized retina and the avascular peripheral retina. Stage 2 characterized by a ridge separating the vascular retina from the avascular peripheral one. Stage 3 characterized by growth and proliferation of the blood vessels in the ridge. Stage 4 characterized by subtotal retinal detachment. Stage 5 shows total retinal detachment. Dilatation and tortuosity of the retinal arterioles and venules near the optic disc indicate the presence of plus disease while the less pronounced changes indicate pre-plus disease [6]. The current study aim to estimate the incidence of ROP at Al Zahraa teaching hospital in Al Najaf.

Patients and Methods

A prospective longitudinal study was conducted from 1st of April to the 1st of August 2018 on one hundred preterm neonates who were delivered for less than 36 weeks gestation and admitted to the intensive care unit of Al Zahraa teaching hospital in Al Najaf city. All patient's parents gave their informed consent before their inclusion in the study, recording of the premature infants and taking their parents verbal agreement and approval from the ethical local committee at Al-Kufa faculty of medicine and Al Zahraa teaching hospital.

The preterm neonates examined with Retinal Camera (RetCam) after using dilatation with 0.5% propacane phenylphrene, 2.5% tropicamide and 0.5% lid speculum). The RetCam is a real time wide angle digital imaging system for viewing pediatric eyes manufactured by Massie Research Laboratories, USA, 2004. The RetCam images provide a large, 130˚, field of view in a single picture instantly, giving a good field of view. Thus the RetCam enables efficient assessment and monitoring and nearly the entire retina is examined with only five images [7].

All examinations performed by the same ophthalmologist and as the occurrence of ROP is related to neonatal age, the infants who were born before 26 weeks of gestation were examined at postnatal age of 6 weeks, the infants who were born at 27 to 28 weeks were examined at the age of the 5th postnatal week, the infants born at the 29 to 30 weeks were examined at the age of the 4th postnatal week and those who were born after the 30 weeks of gestation were examined at the age of the 3rd postnatal week [8]. Then all neonates were followed up every two weeks until the disease is completely excluded. If the neonates developed retinopathy of prematurity, further examinations carried out based on the early treatment for ROP study protocol.

Statistical analysis

The collected data from a longitudinal study design was analyzed by using version 20 of SPSS software and descriptive statistics were obtained, the data were analyzed by using Chi-square test to evaluate the relation between the occurrence of ROP and the neonatal birth weight, gestational age and gender in the collected sample. A P-value < 0.05 was regarded statistically significant.

Ethical considerations: The research was done after approval of the study protocol by the ethical committee of Al- Kufa medical faculty and Al-Zahraa teaching hospital and it would not expose patients to further risk.

Results

The total number of preterm neonates, who were examined, was one hundred, among them there were nine neonates affected with ROP. The incidence of ROP was estimated to be 9%. The examined patients show the following disease stages: Four patients had stage two, zone two and no plus disease, three patients had stage two, zone three and no plus disease, two patients had stage five and were referred to a special center for further management.

All preterm neonates had high oxygen concentration delivered by CPAP during the first seventy two hours and they were changed to warm humidified oxygen after three days. No one of them was discharged before six days duration. Neonate's weight was ranging from 800 gram to 2100 gram.

Table (1): Shows incidence rate of ROP in neonates having different birth weights

Birth weight	Cases		Total	P-value
	ROP	NROP		
BW > 1500 g	1 (1.3%)	77 (98%)	78 (100%)	0.0001
BW < 1500 g	8 (36.4)	14 (63.6)	22(100%)	
Total	9 (9%)	91 (91%)	100 (100%)	

* ROP = Retinopathy of prematurity
* NROP = No retinopathy of prematurity
* BW = Birth weight

There is a highly significant relation between neonatal body weight and development of ROP as its incidence in very low birth weight reached 36.4% compared with 1.3% in neonates having birth weight > 1500 g as p-value equal to 0.0001. In addition the relative risk is 1.55 and this indicates that the incidence rate of occurrence of the disease in low birth weight neonates < 1500g is one and a half times greater than those with birth weight > 1500 g.

Table (2): Shows the incidence rate of ROP in neonates having different gestational ages

Gestational age	Cases		Total	P-value
	ROP	NROP		
GA > 30 WK	2 (2.4%)	80 (97.6%)	82 (100%)	0.0001
GA < 30 WK	7 (38.9%)	11 (61.1%)	18(100%)	
Total	9 (9%)	91 (91%)	100 (100%)	

*GA= Gestational age

This table shows that there is a highly significant relation between gestational age and development of ROP as P-value equal to 0.0001. In addition the relative risk is 1.59 and this indicates that the incidence rate of occurrence of the disease in neonates delivered with gestational age < 30 weeks is one and a half times greater than those with gestational age > 30 weeks.

Table (3): Shows the incidence rate of ROP in neonates having different gender

Sex	Cases		Total	P-value
	ROP	NROP		
Male	4 (8.5%)	43 (91.5%)	47 (100%)	0.872
Female	5 (9.4%)	48 (90.6%)	53 (100%)	
Total	9 (9%)	91 (91%)	100 (100%)	

There is insignificant relation between gender of neonates and development of ROP. In addition the relative risk is 1.0 and this indicates that there is no association between the occurrence of ROP and the gender of neonates.

Discussion

Control of blindness among children is one of the priorities of the World Health Organization's (WHO) VISION 2020 - the Right to Sight Program. This is a global initiative, which was launched by WHO in 1999 to eliminate avoidable blindness worldwide by the year 2020 [10]. As the survival rate of the extremely premature infants continuously increases as a result of the great advancements in the neonatal care. Thus, those neonates are at a high risk of developing more severe retinopathy of prematurity and they usually need early screening and detection of the disease [10&11].

In this study, the incidence of ROP at Al-Najaf city in the south of Iraq was found to be 9% and there were highly significant relationships between gestational age and neonatal birth weight and the development of ROP as the P-values equal to 0.0001. In another word the incidence of occurrence of ROP in neonates delivered with gestational age < 30 weeks was higher than the incidence in those with gestational age > 30 weeks as the relative risk equal to 1.59 and the incidence of occurrence of ROP in neonates with birth weight < 1500 g was higher than the incidence in those with birth weight > 1500 g as the relative risk equal to 1.55. All of them were submitted to high oxygen concentration delivered by CPAP for 3 days, then mask oxygen and stay for more than six days in the NICU. In contrast there was insignificant effect of gender on the development of the disease as the P-value value was 0.872.

These results run in parallel with the results mentioned by Deborah et al.[8] (2015) that stated the incidence of occurrence of ROP increases with the reduction in the gestational age and birth weight since infants with a birth weight less than 1250g and 1000g will develop some degree of retinopathy of prematurity in 65% and 80% respectively. In addition Li et al. [12] (2016) found that the incidence of ROP was 11 % since the researcher took the same risk factors but with bodyweight less than 2000 g and gestational age less than 34 week. Sola et al. [13] (2007) stated that the incidence in the United States was 7.35% and he took the duration of staying at the neonatal intensive care unit as a risk factor for retinopathy of prematurity.

Other studies like Şahin et al. [14] (2014) found that the incidence of ROP was 66.0% and the researcher studied the same risk factors but in infants born before the 28th weeks of gestation. Similarly Isaza and Arora [15] (2012) reported that the incidence of development of retinopathy of prematurity was about 85%. Teed and Saunders [10] (2009) mentioned that the incidence of retinopathy of prematurity was 64.7%. Tasman [16] (2004) found that the incidence of retinopathy of prematurity was71% among premature neonates. Abrishami et al. [17] (2013) stated that the incidence of retinopathy of prematurity was 26.2%. Gilbert [9] (2005) reported that more mature infants were tending to develop severe

retinopathy of prematurity in developing countries in comparison to the developed countries.

This difference between the results in our study and those in other studies might be due to the time interval in which we carried out the research which last for four months while in the other studies the researchers spend about four years to study the same risk factors. In addition to the high mortality rate among the premature neonates who were targeted in the NICU.

Conclusions

The incidence of ROP is found to be 9%. This can be due to the early screening and detection of the disease. Parent's education at the disease and the severity of the disease can increase their awareness to the importance of screening and follow up of the preterm neonate.

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