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Screening for Retinopathy of Prematurity in a Sample of Preterm Infants from Three Egyptian Governorates

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Abstract

Background: Incomplete vascularization of the retina in preterm neonates causes the sight-threatening condition known as retinopathy of prematurity (ROP), which is caused by pathological angiogenesis. Despite current therapy approaches, ROP represents a substantial cause of disability in children.

Aim of Study: To determine the demographics and epidemiology of retinopathy of prematurity for infants at risk in three selected Egyptian governorates: Gharbia, Kafr El-Shiekh and Al-Buhaira. Also, to study the possible factors that increase the chance of developing ROP and the requirements for intervention.

Patients and Methods: A prospective cohort study enrolled 300 preterm babies from 3 different governorates (Gharbia, Kafr El-Shiekh and Al-Buhaira) for ROP screening and identification of risk factors. Infants born under 1500g birth weight (BW) or at less than 32 weeks gestational age (GA) were included, as were infants with a GA of more than 32 weeks and/or a BW of more than 1500g who were clinically unstable. Demographic data and possible risk factors were collected.

Results: The mean BW and GA of the studied preterm babies were 1484.05±316.71 & 31.9±2.03 weeks, respectively. The study revealed an 80% overall incidence of ROP.

Severe ROP was detected in 22.9% of all ROP cases. Lower BW and GA, apnea, RBCs infusion and bronchopulmonary dysplasia were the most relevant risk factors.

Conclusion: ROP Screening is mandatory to decrease blindness and persistent visual impairments. Older and larger infants can develop ROP and sight threatening ROP complications if they have co-morbidities.

Key Words: *Retinopathy of prematurity – Screening – Incidence – Egypt – Apnea.*

Introduction

T.L. Terry first identified ROP as retrolental fibroplasia (RLF) in 1942 after noticing a dense, white fibrovascular plaque behind the lens in several preterm newborns. RLF rose to prominence as the first cause of infant blindness in affluent nations with well-organized and well-funded healthcare systems in the 1950s. Due to the fact that premature babies in developed nations were cared for in incubators with artificially high oxygen levels, it was hypothesised that oxygen toxicity was the disease's cause. With the restriction of oxygen for preterm infants in the 1960s, the prevalence of ROP decreased. Sadly, this also contributed to an increase in cerebral palsy and preterm newborn deaths **[1,2]**.

The Early Treatment for ROP Trial (ETROP) stated that 68% of newborns fewer than 1,251g were found to have any stage ROP. Severe ROP manifested in almost one third of newborns with ROP **[3]**.

Children's preventable blindness due to ROP is a big issue in both developing and industrialized nations. Since neonatal care has improved, the condition has become more common. Many nations have implemented their screening protocol in order to identify and treat preterm newborns with this blinding condition as early as possible. In Egypt, ROP screening for premature children is still in its infancy.

Patients and Methods

Our study was a prospective cohort study that involved 300 preterm infants from three selected Egyptian Governorates: Gharbia, Kafr El Sheikh, and Al-Buhaira (100 cases for each governorate) from May 2017 to May 2019. All infants with birth weights under 1500 g and gestational ages of 32 weeks or fewer were screened. Selected newborns with a birth weight between 1500 and 2000g or a gestational age of over 32 weeks were also included due to clinical instability exposing them to ROP risk as suggested by their attending physician or

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neonatologist. Eyes with media opacities interfering with fundus examination and documentation were excluded from our study.

Screening was carried out in 3 governorates: the Gharbia governorate NICU (55 incubators), the Kafr El Sheikh governorate NICU (55 incubators), and the Al Buhaira governorate NICU (26 incubators). Informed consents from parents were taken.

The first screening was done at 4 weeks postnatal, though it was delayed until 31 weeks postmenstrual in the youngest newborns. Maternal data, including age, perinatal history, and systemic diseases were collected. Respiratory problems, apnea, blood transfusion, and congenital cardiac disorders were among the cases that were noted.

To dilate the pupils, two drops of a cyclopentolate (0.1%) and phenylephrine (1%) solution were administered at ten-minute intervals sixty minutes before the examination. Before the screening exam, comfort care methods such as giving a 25% glucose solution and applying 0.5% proparacaine eye drops were taken into consideration.

After employing a paediatric scleral depressor and eye speculum, a binocular indirect ophthalmoscope was used to perform indirect ophthalmoscopy (All Pupil II, Keeler Ophthalmic Instruments, UK) with a 28-diopter lens (Volk Double Aspheric, USA). RetCam II (Clarity Medical Systems, Pleasanton, Calif., USA) documentation was also used when available. Each infant's ROP status was isolated based on the International Classification of ROP, which takes into account the stage, zone, and extent of the disease as well as the presence or absence of additional diseases. The examination results were recorded in the infants' medical files at each visit, and parents were informed of the results and given a detailed explanation of their management, timing, and importance. ROP infants were re-examined at predetermined intervals based on severity and affected zone. The screening examination was done in the presence of a neonatologist with the use of oxygen saturation monitoring. When no longer risk for ROP existed, screening was terminated.

Statistical analysis:

The Statistical Package for Social Studies, or SPSS, version 19 was used to tabulate, organize, and statistically analyze the acquired data. It was developed by IBM in Chicago, Illinois, USA. The range, mean, and standard deviations for numerical values were computed.

For data with a normal distribution, the student's *t*-test was employed to compare the differences between two mean values. To compare baseline data with various follow-up periods, a paired (*t*) test was performed. When it was estimated that the data did not fit the normal distribution, the Wilcoxon signed ranks test or the Kruskal-Wallis Chi square were used to compare baseline and follow-up data. For categorical variables, the number and percentage were calculated, and chi square tests determined whether there were any differences between subcategories. When the chi square test was impractical, the Fisher and Monte Carlo exact tests were applied. The threshold for significance was set at 0.05.

Results

Demographic and maternal characteristics are shown in Table (1), which also reveals their relation to ROP development and its management. From the studied babies, 163 (54.3%) were males. Multiple births were 158 (52.7%). Thirty-nine babies (13%) were the result of assisted fertilization. Cesarean section delivery was found in 234 (78%).

The maternal age ranged from 18 to 40 years, with a mean age of 26.66±5.103. The (GA) average was 31.9±2.034 weeks, and the (BW) average was 1484.05±316.7137Kg. The postmenstrual age (PMA) at first examination was 36.67±2.65 weeks, with 52.3% of cases <37 weeks and 47.7% 37 weeks. The relation between birth weight, weight at baseline examination, gestational age, and postmenstrual age to retinopathy development is elaborated in Table (2).

At the time of the initial examination, 240 patients had ROP of any stage (an 80.0% incidence).Of those with ROP, 55 babies (22.9%) developed type 1 ROP.

Regarding the whole sample, we found 199 (66.3%) neonates with BW <1500g or GA <32 weeks, of which 171 (84.9%) had ROP. Forty-five (81.8%) patients with type 1 ROP belong to this subgroup. ROP was found to be present in 81.8% of extremely low birth weight babies, (11.1%) of them had type 1 ROP), whereas it was 85.5% (25.8% type 1 ROP) in very low birth weight new born. Moreover, ROP developed in 74.6% of low birth weight newborn (20.8% of whom had type 1 ROP), and 50% of normal birth weight infants. In 86 individuals weighing over 1500g and in 69 patients older than 32 weeks, retinopathy was found. In the group of patients who needed treatment, 41 instances had GAs longer than 30 weeks;

22 of these had BWs under 1500g and 19 cases had BWs greater than 1500g.

The incidence of ROP was 100% in extremely preterm infants (28 weeks), 92.5% in very preterm infants (28-32 weeks), 73.9% in late preterm infants (32-37 weeks), and 33.3% in term infants (37-42 weeks).

Among ROP cases, 39 (16.25%) showed stage 0 ROP, 144 (60.1%) stage 1 ROP, 37 (15.3%) stage 2 ROP, and 14 (5.8%) stage 3 ROP. Stage 5 ROP was found in one patient (0.4%). Five patients (2.1%) presented with APROP. One eye of one patient developed stage 4 a during follow-up.

Disease affecting zone I was seen in 46 (19.2%) babies, and zone III disease was found in 19 cases (7.9%). While 174 neonates (72.8%) had zone II disease, 28 were post-zone II, 93 were mid-zone II, and 53 were anterior zone II.

Table (1): Relation of demographic and maternal characteristics t o retinopathy development and its management.

Variables	Infants without retinopathy		Infants with retinopathy		*p*	Infants with follow-up		Infants with intervention		*p*
	n	%	n	%		n	%	n	%	
Age of mother:										
<20	2	25	8	75	0.9	2	33.3	4	66.7	0.14
20-24	21	19.1	89	80.9		66	75	22	25	
25-29	22	21.4	81	78.6		65	80.2	16	19.8	
30-34	8	16	42	84		34	80.1	8	19	
35-40	7	24.1	22	75.9		17	77.3	5	22.7	
Residence:										
Al Buhaira	22	22	78	78	0.035*	65	83.3	13	16.7	0.28
Gharbia	26	26	74	74		52	71.2	21	28.8	
Kafr El Sheikh	12	12	88	88		67	76.1	21	23.9	
Maternal diseases:										
No	39	19.1	165	80.9	0.65	126	76.8	38	23.2	0.98
Yes	21	21.9	75	78.1		58	77.3	17	22.7	
Assisted fertilization:										
No	52	19.9	209	80.1	0.98	166	79.8	42	20.2	0.015*
Yes	8	20.5	31	79.5		18	58.1	13	41.9	
Ante-natal steroid:										
No	31	19.1	131	80.9	0.56	99	76.2	31	23.8	0.66
Yes	29	20	109	80		85	78	24	22	
Mode of delivery:										
Normal vaginal	14	21.2	52	78.8	0.84	41	78.8	11	21.2	0.78
Cesarean section	46	19.7	188	80.3		143	76.5	44	23.5	
Gender of baby:										
Males	27	16.6	136	83.4	0.14	108	80	27	20	0.24
Females	33	24.1	104	75.9		76	73.1	28	26.9	
Maternal parity:										
Single	34	23.9	108	76.1	0.23	90	84.1	17	15.9	0.066
Twins	19	15.6	103	84.4		74	71.8	29	28.2	
Triplets	7	19.5	29	80.5		20	69	9	31	

*Significant.

Fifty-five patients (22.9%), which represents 18.3% of the total number, developed type 1 ROP and required treatment. Off label use of anti-VEGF intravitreal injection (IVI) was performed. We found non statistical difference in GA and BW between type 1 and type 2 ROP (p=0.722 for GA and p=0.121 for BW), but PMA at first examination between the two groups was significant (p=0.025).

Although the overall incidence of ROP among studied neonates was 80% (22.9% Type 1), it differed between the three governorates. While it was 78% in Al Buhaira (16.7% type 1) and 74% in Gharbia (28.4% type 1), it reached 88% in Kafr El Sheikh (23.9% type 1).

Except for apnea (p=0.001), neonatal co-morbid disorders were not found to be strongly related to ROP development. The correlation between neonatal co-morbid diseases and ROP care was shown to be insignificant, with the exception of broncho-pulmonary dysplasia, which was strongly linked to a greater requirement for ROP intervention (p=0.016). The details are shown in Table (3).

Neither the development of ROP nor the need for intervention was significantly affected by the different treatment modalities applied for neonatal co-morbid conditions, as shown in Table (4), except for RBC infusion, which was significantly related to an increased need for treatment of ROP.

Table (2): Relation of birth weight, weight at baseline examination, gestational age, and post-menstrual age to retinopathy development.

	Infants without retinopathy	Infants with retinopathy	*p*
Birth weight:			
Range	900-2750	800-2800	0.023*
Mean ± SD	1566.39± 357.26	1463.03± 302.75	
Weight at baseline examination:			
Range	1100-4500	916-8000	0.001*
Mean ± SD	2241.39± 644.33	1850.92± 636.34	
Gestational age:			
Range	30-38	26-37	0.001*
Mean ± SD	33.08±1.86	31.60±1.97	
Postmenstrual age:			
Range	33-47	31-52	0.001*
Mean ± SD	37.95±2.49	36.34±2.59	

*Significant.

Table (3): Relation of neonatal co-morbid conditions to retinopathy development and its management.

Variables	Infants without retinopathy		Infants with retinopathy		*p*	Infants with follow-up		Infants with intervention		*p*
	n	%	n	%		n	%	n	%	
Respiratory distress:										
No	3	60	2	40	0.06	2	100	0	0	1.0
Yes	57	19.3	238	80.7		182	76.8	55	23.2	
Broncho -pulmonary dysplasia										
No	60	20.5	232	79.5	0.37	181	78.4	50	21.6	0.016*
Yes	0	0	8	100		3	37.5	5	62.5	
Apnea:										
No	56	23.9	178	76.1	0.001*	139	78.5	38	21.5	0.43
Yes	4	6.1	62	93.9		45	72.6	17	27.4	
Hypotension:										
No	60	20.1	239	79.9	1.0	184	77.3	54	22.7	0.23
Yes	0	0	1	100		0	0	1	100	
Congenital heart disease:										
No	48	19.1	203	80.9	0.43	159	78.7	43	21.3	0.21
Yes	12	24.5	37	75.5		25	69.6	12	30.4	
Yes	13	14.8	75	85.2						
Neonatal Jaundice:										
No	13	17.8	60	82.2	0.54	45	75	15	25	0.621
Yes	47	20.7	180	79.3		139	77.7	40	22.3	
Hypoglycemia:										
No	59	20.3	231	79.7	0.98	178	77.4	52	22.6	0.43
Yes	1	10	9	90		6	66.7	3	33.3	
Neonatal Sepsis:										
No	20	22.7	68	77.3	0.5	50	73.5	18	26.5	0.52
Yes	40	18.9	172	81.1		134	78.4	37	21.6	

*Significant.

Table (4): Relation of neonatal co-morbid interventions to retinopathy development and its management.

Variables	Infants without retinopathy		Infants with retinopathy		*p*	Infants with follow-up		Infants with intervention		*p*
	n	%	n	%		n	%	n	%	
Surfactant:										
No	59	20.1	235	79.9	1.0	180	76.9	54	23.1	1.0
Yes	1	16.7	5	83.3		4	80	1	20	
Oxygen therapy:										
Mechanical ventilator	28	18.5	123	81.5	0.3	95	77.2	28	22.8	0.98
CPAP	14	17.1	68	82.9		51	76.1	16	23.9	
Nasal cannula	18	26.9	49	73.1		38	77.6	11	22.4	
RBCs infusion:										
No	38	21.7	137	78.3	0.48	99	72.3	38	27.7	0.03*
Yes	22	17.6	103	82.4		85	83.3	17	16.7	
Platelets infusion:										
No	46	21.5	168	78.5	0.43	128	76.6	39	23.4	0.93
Yes	14	16.3	72	83.7		56	77.8	16	22.2	
Plasma infusion:										
No	49	20.7	188	79.3	0.52	143	76.5	44	22	0.78
Yes	11	17.5	52	82.5		41	78.8	11	21.2	
Total parental nutrition:										
No	15	20.3	59	79.7	0.99	46	78	13	22	0.9
Yes	45	19.9	181	80.1		138	76.7	42	23.3	

*Significant.

Discussion

The current study found an 80% prevalence of ROP. Previous studies found that the disease's prevalence varied. Lower incidence was reported in developed countries, ranging from 15.6 to 47.5% **[4-7]**. However, other studies revealed a high incidence, ranging from 66.0 to 71% **[8-10]**. These variations among different studies might be because of different GA, BW, the survival rate of neonates, and the level of perinatal care. It also varied among different races, geographical areas, and countries. Socioeconomic status and resource disparities may affect patient screening methods and care protocols, which in turn affect patient outcomes and reported incidences **[11]**.

According to previous reports, the prevalence of ROP in Middle Eastern nations ranged from 23.31% to 56% **[12]**. An incidence of 33.7% and 36.5%, respectively, was observed in two investigations from Alexandria and Al Minia, Egypt **[13, 14]**. Another study from Zagazig and Mansoura found an incidence of 28.1% and 59%, respectively **[11,15]**.

Ali et al., in Cairo, Egypt, reported a 69.4% incidence of ROP **[16]**. The higher incidence in the current study in comparison to that study may be attributed to differences in inclusion criteria, as the former study included all infants younger than 37 weeks and/or weighing under 2500gm.

Indeed, the higher incidence in our work in relation to previous reports in Egypt could be due to the fact that we work in referral centers for screening in each governorate. Changes in geographical areas of screening and variable sample sizes in other studies are possible reasons as well. Another explanation could be the high percentage of infants <32 weeks GA in this study (66.3%) when compared to previous Egyptian studies such as Abdel HA et al., (14.0%) **[17]**.

Our study included 11 cases with extremely low birth weight (ELBW) (BW <1000g), nine of whom developed ROP (81.8%), and only one infant developed type 1 ROP (11.1% of ROP cases). This incidence is close enough to that reported by Celebi et al., **[18]**, who reported a 75.5% incidence among ELBW; however, severe ROP requiring laser treatment was 38.7%, which is higher than our study. Ali et al. noted a 100% ROP incidence among ELBW babies, which is higher than our finding **[16]**. Yau et al., **[19]** found an incidence of 53.4% of ELBW, which is lower than that reported in the current study; however, type 1 ROP was 14.5%, which is comparable to our findings. This low overall incidence may be due to ethnic variations. Among new born with very low birth weight (VL-

BW) (BW 1000 <1500g) 85.5% had ROP (25.8% type 1 ROP). This incidence was higher than that revealed by Hwang et al., (34.1%) [20], however they reported a total incidence of 33.7% for type 1 ROP which is comparable to ours. Ali et al., found ROP to be present in 66.7% of all VLBW infants [16] which is less than its incidence in the current study.

One hundred and forty two infants with low birth weight were isolated in our study. 106 cases developed ROP (74.6%) and 22 had type 1 ROP (20.8%). This incidence of ROP among LBW was close to that reported by Ali et al., [16] while that detected by Bassiouny et al., [11] was lower.

ROP that requires treatment:

In our study, Severe ROP measured 22.9% of total ROP cases (18.3% of the total sample size), which is comparable to Abdel Hadi and Hamdy (28.6%) [21], Albialy and Rass (27.7%) [15], Onyango et al., (20.9%) [22] and Abdel HA et al., (18.2%) [17]. Bedda et al., [13] reported an incidence of 35.6%, which is higher than our incidence. This could be related to the lower overall incidence of ROP and smaller sample size in their study. Ali et al., found ROP requiring treatment to be 14.7% of all ROP cases [16]. Their lower incidence could be explained by different postnatal care and sample size.

Taking PMA at time of intervention (37.29± 2.0) as a proxy for first presentation of severe ROP, it is similar to that reported by Acevedo-Castellón et al., [23] (37w2d±5d). Quinn et al., [24] reported lower values (36w3d). This lower PMA may be due to the lower GA and BW of the studied infant than our records (28±3 weeks and 1100±363g, respectively).

Stages and zones of ROP:

In the current study, among ROP patients, 60.0% had stage 1 ROP, 15.4% had stage 2 ROP and 16.25% showed stage 0. The high percentage of stage 1 might signify an earlier ROP documentation by early screening, which can also explain the increased ROP incidence in our observation. Comparable findings were noted by Ali et al., [16] and Abdel HA et al., [17] who reported 50.7% and 54.5% stage 1 ROP, respectively.

The majority of cases (72.8%) were of zone 2 disease. The results confirm with Khorshidifar et al., [25] who reported 58% zone 2 disease. In contrast, Bassiouny et al., [11] and Waheeb and Alshehri [26] reported zone 3 as the most common zone of ROP (67.9% and 64.5%, respectively).

Risk factors for ROP:

Birth weight and gestational age:

The average gestational age for infants in the currentt study was 31.9±2.0 weeks, which is comparable to Abdel Hadi and Hamdy [21] (31.02± 2.13), Bassiouny et al., [11] (31.50±2.3) and Bedda et al., [13] (31.09±1.76). However, several other reports had lower gestational age. For example, Isaza et al., [27] screened 423 infants from different regions in Canada and showed an average gestational age of 27.5 weeks. Waheeb and Alshehri [26] reported also on infants with an average gestational age of 26.7 weeks. A higher infant's mortality rate among younger infants in our country could be the reason. Meanwhile, other studies reported higher gestational age [17,25,28].

The mean BW was 1484.05±316.7g which is similar to previous reports by Abdel HA et al., [17] (1510±245g), Bassiouny et al., [11] (1514±391 g) and Kumar et al., [29] (1335±351g), while Bedda et al., screened babies with lower mean birth weight (1222.62±236.66g) [13].

In the present article, babies with ROP were smaller and lighter than other unaffected ones, which was of statistical significance (p=0.001 for GA and p=0.023 for BW). Again, this was in agreement with other studies [4,11,15,17,30-32].

However, we found non statistical difference in BW and GA between type 1 and type 2 ROP (p =0.121 for BW and p=0.722 for GA), but PMA at first examination between the two groups was significant (p=0.025). These findings confirm with results of Abdel HA et al., [17] who did not find strong relationship between severity and gestational age. On the other hand several other studies, [11,16,21,28] found that severity was well correlated to the lower gestational age.

From the studied risk factors in the current report, apnea was the most significant risk factor with ROP development (p<0.05). This finding confirms to the observations of Alizadeh et al., [33] and Araz-Ersan B et al., [34]. Assisted fertilization, bronchopulmonary dysplasia and RBCs infusion were strongly correlated to ROP severity (p<0.05). Similar results were obtained from multiple studies [35-38]. Nevertheless, two previous reports suggested that in-vitro fertilization improvements could have diminished the potential risk for ROP severity [39,40]. Again, another report did not reveal strong correlation between restrictive and liberal transfusion groups regarding secondary outcomes such as brain insult and severe ROP [41].

Maternal age, maternal diseases, use of antinatal steroids, gender, delivery mode and multiple births were of non-significant relationship to ROP development in our study. This is consistent with other studies **[17,34,42-44]**.

In 86 individuals with a higher than 1500g BW and in 69 cases with a GA >32 weeks, retinopathy due to prematurity was found. Of the patients who needed treatment, 41 cases had GAs >30 weeks, exceeding the screening recommendations of the American academy of pediatrics (AAP) based on GA. 22 cases of these had BWs under 1500g, making them eligible for screening, but 19 cases had BWs greater than 1500g, making them ineligible for screening based on both age and weight.

In the current study, 10 cases who suffered severe curable ROP had GA >32 weeks, exceeding the screening recommendations of UK based on GA; meanwhile, 6 of them would have been screened according to their low BW. Twelve patients with BW >1500g, exceeding both the UK and AAP screening recommendations for BW, developed severe curable ROP, of them, 4 cases had GA greater than 32 weeks. So, we would miss 4 cases if we followed UK guidelines based on BW and GA alone.

Conclusion:

Low birth weight and gestational age are indicators of ROP development. The development of ROP and sight-threatening ROP can still occur in older low birth weight newborns as well as larger preterm infants. Local screening guidelines are recommended. Apnea, assisted fertilization, broncho-pulmonary dysplasia are related risk factors.

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فحص اعتلال الشبكية الخداجى فى عينة من الخدج من ثلاث محافظات مصرية

\الخلفية : يتسبب انتشار الأوعية الدموية غير المكتمل لشبكية العين عند الوالدان المبتسرين فى حدوث حالة تهدد البصر تعرف باسم الاعتلال الشبكى الخداجى الذى يسببه تكون الأوعية المرضى وعلى الرغم من تطور أساليب العلاج الحالية لا يزال سبباً رئيسياً للإعاقة عند الأطفال.

هدف \العمل : دراسة التركيبة السكانية والوبائية لاعتلال الشبكية الخداجى للرضع المعرضين للخطر فى ثلاث محافظات مصرية مختارة الغربية وكفر الشيخ والبحيرة. أيضاً، لدراسة العوامل المحتملة التى تزيد من فرصة تطوير اعتلال الشبكية الخداجى ومتطلبات التدخل.

\المرضى و\الأساليب : دراسة جماعية مستقبلية سجلت طفل خدج من محافظات مختلفة (الغربية و كفر الشيخ والبحيرة). تم تضمين الرضع المولودين تحت ١٥٠٠ جم أو فى عمر الحمل أقل من ٣٢ أسبوعاً، وكذلك الأطفال الذين لديهم عمر حمل لأكثر من ٣٢ أسبوعاً و/أو وزن أطفال يزيد عن جم وكان مسارهم السريرى غير مستقر. تم جمع البيانات الديموغرافية وعوامل الخطر المحتملة.

\النتائج : متوسطى عمر الحمل والوزن للخدج المدروسة كان 31.9±2.03 أسبوعاً و1484.05±16.71 جم على التوالى. كشفت الدراسة عن نسبة ٨٠٪ من حالات اعتلال الشبكية الخداجى. تم العثور على اعتلال الشبكية الخداجى الذى يتطلب العلاج فى ٢٢.٩٪ من جميع حالات اعتلال الشبكية الخداجى. كان انخفاض العمر والوزن، توقف التنفس، ضخ كرات الدم الحمراء وخلل التنسج القصبى الرئوى من أكثر عوامل الخطر ذات الصلة.

\الاستنتاج : إن تحرى الخدج من أجل اعتلال الشبكية الخداجى الزامى لتقليل العمى وضعف البصر المزمن. يمكن للأطفال الأكبر سناً والأكبر وزناً أن يصابوا باعتلال الشبكية الخداجى ومضاعفات اعتلال الشبكية الخداجى التى تهدد البصر إذا كانوا مصابين بأمراض أخرى.