Prevalence of Eye and Vision Abnormalities among a Sample of Children up to five years old who visit Primary Health Care Centers in Baghdad Alresafa

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Abstract

Background : Vision disorders are the fourth most common disability of children and the leading cause of handicapping conditions in childhood. Eye examination and vision assessment are vital for the detection of conditions that result in blindness, signify serious systemic diseases which may lead to problems with school performance, or at worst, threaten the child's life.

Objectives :
1. To identify the prevalence of vision and eye abnormalities in children up to five years old attending two of primary health care centers in Baghdad Al resafa.
2. To identify some risk factors associated with vision and eye abnormalities in this age group.

Subjects and methods: A descriptive cross-sectional study was conducted from November 2011 to March 2012 in two primary health care centers in Baghdad Al resafa. The sampling was a non-probability convenient sample of (407) children, and all the eligible, willing participants were subjected to a self -structured close ended questionnaire and were subjected to the following examinations by the researcher alone (inspection of all children's eyes and eyelids for any abnormalities, red reflex examination, corneal light reflex test, near fixation, ocular motility test, cover test, visual acuity test). Statistical Package for Social Sciences version 18 was used for data input and analysis.

Result: The prevalence of eye and vision abnormalities is 6.14% (95%CI 4.09% - 9.05%).The prevalence of strabismus 4.4 %, abnormal visual acuity1.5%, nystagmus 0.5%, congenital glaucoma 0.25%. In this study sample the majority of children with ocular abnormalities were from the second and fifth years of life (p=0.008). The sex was not significantly associated with ocular abnormalities (p=0.512). Prematurity was not significantly associated with eye problems (p>0.05). Low birth weight was significantly associated with eye problems (p=0.003). Family history of congenital glaucoma, eye deviation, wearing glasses during childhood, all were significantly associated with eye problems (p=0.001), but family history of nystagmus and cataract was not significant (p>0.05). Positive history of prenatal infection was not significantly associated with eye problems (p=0.273). Needed oxygen therapy on birth was significant (p=0.002). History of seizure, cerebral palsy, and syndromes all were not significant (p>0.05).

Conclusion: Strabismus and abnormal visual acuity are the most common abnormalities detected in this study. The detected eye and vision abnormalities were most commonly distributed in children at the fifth and second year of life.

Key words: Prevalence, eye and vision screening

Introduction

Childhood blindness is a priority eye problem in VISION 2020-The Right to Sight initiative. [1]

Vision disorders are the fourth most common disability of children and the leading cause of handicapping conditions in childhood. [2]

Eye examination and vision assessment are vital for the detection of conditions that result in blindness, signify serious systemic diseases that may lead to problems with school performance, or at worst, threaten the child's life. [3,4]

Vision problems occur in 5% to 10% of all pre-schoolers and include refractive error, strabismus, and amblyopia. [5]

United States Preventive Services Task Force recommends vision screening for all children at least once between the ages of 3 and 5 years, to detect the presence of amblyopia or its risk factors and concludes that the current evidence is insufficient to assess the balance of benefits and harms of vision screening for children < three years of age.[6]

Before adopting this screening in developing countries, workload of such screening should be critically reviewed to ensure its efficiency and sustainability. [7]

In Iraq a new screening program for early detection of eye and vision disorders in children from birth -five years old was started in 2010.*

Aims of the study:
1. To identify the prevalence of vision and eye abnormalities in children up to five years old attending two of primary health care centers in Baghdad Alresafa.
2. To identify some risk factors associated with vision and eye abnormalities in this age group.

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Subjects and Methods

1-Study Design :
A descriptive cross-sectional study to identify the prevalence of vision abnormalities in children up to five years old.

2-Time of the Study
This study was conducted from the first of November 2011 to the first of March 2012

3-Place of the Study
This study was conducted in two primary health care centers in Baghdad AL-Resafa; the selected centers are:
1- Sylakh specialized family Medicine primary health care center.

2- AL-Mustansyria specialized family Medicine primary health care center.

4-Sampling Design
The sampling design was a non-probability convenient sample.

5-Sample size
The sample size was calculated as (407) on a prevalence of -5%-10% (as reported in the USA) [3].
Sample size determination used the formula:
$N=P*Q*Z2/R2$ $N=0.08*0.92*(1.96)2/(0.05)2=113$
N=Sample size, P=prevalence, Q=1-P, Z=1.96, R=0.05.

6-Criteria of enrolment:

6.1 Inclusion criteria
The study population who attended the selected PHC centers for any complaint was selected depending on the following criteria:-
1) Age under five years.
2) Children from both sexes were included.

6.2 Exclusion criteria
1) Age above five years old.
2) Subjects who did not respond to screening tests

Content of the questionnaire
After selection of the eligible participants (the parents), then clarification of the purpose behind the study, assuring high confidentiality, and having verbal consents were done. And all the eligible willing participants were subjected to a self -structured closed ended questionnaire consisting of :

• Age at the time of examination
• Gender
• Is there a family history of vision problems (e.g., cataracts, nystagmus, congenital glaucoma, eye crossing and/or needing glasses In Young age?
• Was your child exposed to any prenatal infections (e.g. rubella, toxoplasmosis, cytomegalovirus, hepatitis)?
• Child weight at birth?
• Gestational age at birth?
• Has your child had meningitis or encephalitis?
• Has your child experienced some form of head trauma?
• Does your child have a seizure disorder?
• Does your child have any difficulties with his or her hearing, Cerebral palsy, diagnosed with a syndrome e.g. Down syndrome?

Examination

All children were subjected to the following examinations by the researcher alone using the same equipment for all: [8]

1. Inspection:
Inspection of all children's eyes and eyelids for any abnormalities like eye deviation, limited eye movement, involuntary jerky movement, red eye, watery, cloudiness of eye, drooping eyelid or any other abnormality.

2. Red reflex examination:

The test was done for all children and was performed in a darkened room (to maximize pupil dilation). The direct ophthalmoscope is focused on each pupil individually approximately 12- 18 inches away from the eye, and then both eyes are viewed simultaneously. The red reflex seen in each eye individually should be bright reddish-yellow (or light gray in darkly pigmented, brown-eyed patients) and identical in both eyes. Dark spots in the red reflex, blunted dull red reflex, lack of a red reflex, or presence of a white reflex are all indications for referral. After assessing each eye separately, the eyes are viewed together with the child focusing on the ophthalmoscope light (Bruckner test) as before, any asymmetry in red reflex colour, brightness, or size is an indication for referral, because asymmetry may indicate an amblyogenic condition.

3. Corneal Light Reflex Test:

All children older than three months should be examined holding a penlight 12-13 inches away from the child's face directly in front of the eyes. The child needs to fixate either on the penlight or an object that may be held near the light. The examiner should observe the reflection of the penlight in the pupils of both eyes. The reflection should be centered or equally centered slightly toward the nose (nasal). If the reflection is symmetrical and centered in both eyes it is normal. If the reflection of the penlight does not appear to be in a centered position in the pupil of each eye it is considered abnormal. Sensitivity to light, rapid eye movement, and poor fixation observed during this test are also reasons for referral for further evaluation.

4. Near Fixation:

All children older than three months should be examined. A 1-inch object is to be placed from (8-18) inches away from the child's face and observe whether the child looks at the object. If the child does not look at the object, it can be picked up and shown to the child. If the child fixates on the object (looks with sustained gaze for 2-3 seconds) it's a normal finding but if the child cannot fixate on the object or maintain fixation it's considered an abnormal finding.

5. Ocular Motility Test:

Smooth tracking skills should be evident after 3 months of age.

Horizontal Tracking: Position the object or light about 12 inches from the child's eyes. Move the object to get the child's attention and let him or her look at it for 2-3 seconds. Slowly move the object in an arc of 180 degrees from one side to the other and back to the other side.

Vertical Tracking: Position the object about 12 inches in front of the child's nose. Move the object to get the child's attention and let him or her look at it for 2-3 seconds. Slowly move the object up to several inches above the child's head and then down to several inches below his or her chin. If the tracking is described as jerky or segmented it is abnormal. If both eyes maintain their gaze on the oncoming object at least 4-6 inches from the nose it is normal.

6. Cover Test:

Start by 6 months age.

The target object (small toy) may need to be manipulated or changed to maintain a young child's attention. Position the child sitting in caregiver's lap or independently in a chair. The room should be quiet to reduce unnecessary distraction. The examiner sits across from the child and aligns his or her eyes with the child's eyes. Hold the target object about 12 inches away directly in front of the child. Get the child to fixate on the object for 2-3seconds. This can be checked by moving the object back and forth and watching the child's eyes follow.

The child's right eye should be covered with the occluder, watching the left eye for any movement, the cover should be left for 2-3 seconds then quickly move the occluder across the bridge of the nose to cover the left eye, watching the right eye for any movement, waiting 2-3 seconds after the cover is moved to permit fixation of the now uncovered eye, moving the cover from the left eye back to the right eye, across the bridge of the nose, watching the left eye for any movement then we allow 2-3 seconds for fixation. Repeat procedure several times to be assured of observations. If there is no redress movement in either eye; the child will pass this screening indicator. If there is redress movement in either eye, the child will fail this indicator and should be referred for further evaluation.

7. Visual Acuity (V.A) Test:

All children from 36 months old were examined, using Snellen picture chart. The examiner shows the child the pictures on the chart up close and asks the child to give a name for each picture. The child looks at the chart which is placed 20 feet (6 meters) from the child. The child or his or her parent occluding one eye and the child should be able to identify at least 3 pictures from 5 at each line to pass that line. If the child has a V.A of 20 /40or 6 /12 his or her V.A is considered normal at that eye, one eye should be evaluated at a time. [8]

Data analysis:-

SPSS v.18 (Statistical Package for Social Sciences version 18) was used for data input and analysis. Continuous variables were presented as mean with its standard deviation (SD) and discrete variables presented as numbers and percentages. Chi square test for goodness of fit was used to test the significance of observed distribution. Those who did not undergo a specific examination or test were not included in related analysis. Chi square test for independence and Fisher exact test were used as appropriate to test the significance of association between observed findings. P value used for all tests was asymptotic and two sided. Findings with a P value less than 0.05 were considered significant.

Results

The total number of children who were involved in this study is 407; the minimum age was 2 weeks and the maximum age 59 months; the mean of ages was 16.6 months; standard deviation is 15.1.

The personal characteristics for the study sample according to presence or absence of eye problems: There is a significant association between age and having eye problems with the majority of eye problem cases aged more than one year (p<0.001), (Table 1).

Table 1: Personal characteristics for the study sample according to presence or absence of eye problem

	positive eye problem N=25	100%	negative eye problem N=382	100%	P value
Year of Life					
First	3	12.0	180	47.1	
Second	10	40.0	124	32.5	
Third	1	4.0	35	9.2	<0.001
Fourth	0	0.0	21	5.5	
Fifth	11	44.0	22	5.8	
Sex					
Male	12	48.0	143	37.4	0.512
Female	13	52.0	239	62.6	
GA< 37 Week	6	24.0	54	14.1	0.178
Birth Weight < 2.5 kg	5	20.0	12	3.1	<0.001

There was no significant association between sex and having eye problem (P=0.512). Prematurity was not significantly associated with eye problems in the study sample (p=0.178). Low birth weight was significantly associated with eye problems in the study sample (p<0.001), (Table 1).

History findings of the study sample according to presence or absence of eye problems was as follows: The number of children with eye problems was 25 and the number of children with no eye problems was 382. Family history of glaucoma, eye deviation, wearing glasses during childhood, all were significantly associated with eye problems in the study sample (p<0.05) for each, but family history of nystagmus was not significant (p=0.06). There was no family history of cataract. Positive history of prenatal infection was not significantly associated with eye problems in the study sample (p=0.57). Needed oxygen therapy on birth was significant (p=0.002). History of seizure, cerebral palsy, and syndromes all were not significant (p>0.05). There were no cases of hearing difficulty, history of meningitis, encephalitis or head trauma, (Table 2 - next page).

Inspection finding for study sample. The total number of inspection abnormalities was 24 (5.9%), 3 (0.9%) children had watery eye, 1 child (0.2%) had cloudy eye, 18 (4.4%) had eye deviation, 2 (0.5%) children had nystagmus; no child had red eye, irritated eye or drooping of eyelids, (Table 3 - next page).

Examination findings of study sample was 24 (5.8) children having abnormal finding by inspection. 8 (2%) children had abnormal red reflex, 17 (4.1%) had abnormal corneal reflex, 4(1%) children had abnormal fixation test. 5 (1.2 %) children had abnormal fixation and flow (horizontal). 4 children (1%) had abnormal fixation and flow (vertical). 17 (4.1%) had abnormal cover test. 6 (1.4%) had abnormal visual acuity, (Table 4).

The distribution of study sample according to eye status was: 382 (39.9%) had normal eyes.15 (3.7%) had comitant strabismus, 4(1%) had abnormal visual acuity, 2 (0.5%) abnormal visual acuity and comitant strabismus. 2 (0.5%) had nystagmus and 1 (0.2%) have incomitant strabismus. 1 (0.2%) had congenital glaucoma, (Table 5).

The distribution of eye problems in children with eye abnormalities, were comitant strabismus (60%), abnormal (VA.) (16%), comitant strabismus+ abnormal (VA) is (8%), nystagmus (8%), incomitant strabismus (4%) and congenital glaucoma (4%), (Figure 1 - page 10).

Table 2: History findings for the study sample according to presence or absence of eye problems

	N =25	100%	N=382	100%	P value
Family history					
Positive for eye problems	9	36.0	11	2.9	<0.001
of Cataract	0	0.0	0	0.0	-
of Nystagmus	1	4.0	0	0.0	0.061
of Glaucoma	3	12.0	0	0.9	<0.001
of eye deviation	2	4.0	3	0.8%	0.032
Wearing Glasses during childhood	3	12.0	10	2.6	0.039
Positive History of Prenatal Infection	1	4.0	4	0.1	0.273
History of Needed Oxygen Therapy on Birth	4	16.0	2	0.5	0.002
History of Meningitis or Encephalitis	0	0.0	0	0.0	-
History of Head Trauma	0	0.0	0	0.0	-
History of Seizure	1	4.0	0	0.0	0.061
History of Hearing Difficulty	0	0.0	0	0.0	-
History of Cerebral Palsy	1	4.0	0	0.0	0.061
History of Syndromes	1	0.0	1	0.3	0.119

Table 3: Inspection findings for study sample

	N = 407	100.0%
Red Eye	0	0.0
Irritated Eye	0	0.0
Watery Eye	3	0.9
Cloudy Eye	1	0.2
Eye Deviation	18	4.4
Nystagmus	2	0.5
Drooping of Eyelids	0	0.0
Total No. of abnormalities	24	5.9

The prevalence of eye and vision abnormalities in the study sample were:
The prevalence of all eye abnormalities was 6.14% (95%CI 4.09% - 9.0.5%), the prevalence of strabismus was 4.42 %, abnormal visual acuity 1.5%, nystagmus 0.5% and congenital glaucoma 0.25% (Table 6).

The distribution of children with eye problems according to the age (year of life) at examination shows that maximum distribution is in the fifth (44%) and second (40%) year of life, no children with eye problems were found in the study sample in the fourth year of life, (Figure 2 - page 11).

Table 4: Examination findings for study sample

	N = 407	100.0%
Inspection		
Normal	383	94.1
Abnormal	24	5.8
Red Reflex		
Normal	399	98.0
Abnormal Red Reflex	8	2.0
Corneal Reflex		
Symmetrical	256	62.9
Not Symmetrical	17	4.1
Not done *	134	32.1
Fixation test		
Normal	346	85.0
Not normal	4	1.0
Not done *	57	14.0
Fixation and Flow Horizontal)		
Smooth	345	84.8
Not Smooth/segmented	5	1.2
Not done *	57	14.0
Fixation and Flow (Vertical)		
Smooth	346	85.0
Not Smooth/segmented	4	1.0
Not done *	57	14.0
Cover Test		
Normal	256	62.9
Abnormal Cover Test	17	4.1
Not done *	134	3212
Visual Acuity		
Normal	46	11.3
Abnormal Visual Acuity	6	1.4
Not done *	355	87.2

* children not included in the test because of their age

Table 5: Distribution of study sample according to eye status.

Diagnosis	N=407	100.0%	P value
Normal Eyes	382	93.9	
Comitant Strabismus	15	3.7	
Abnormal Visual Acuity	4	1.0	
Abnormal Visual Acuity & Comitant Strabismus	2	0.5	0.000
Nystagmus	2	0.5	
Incomitant Strabismus	1	0.2	
Congernital Glaucoma	1	0.2	

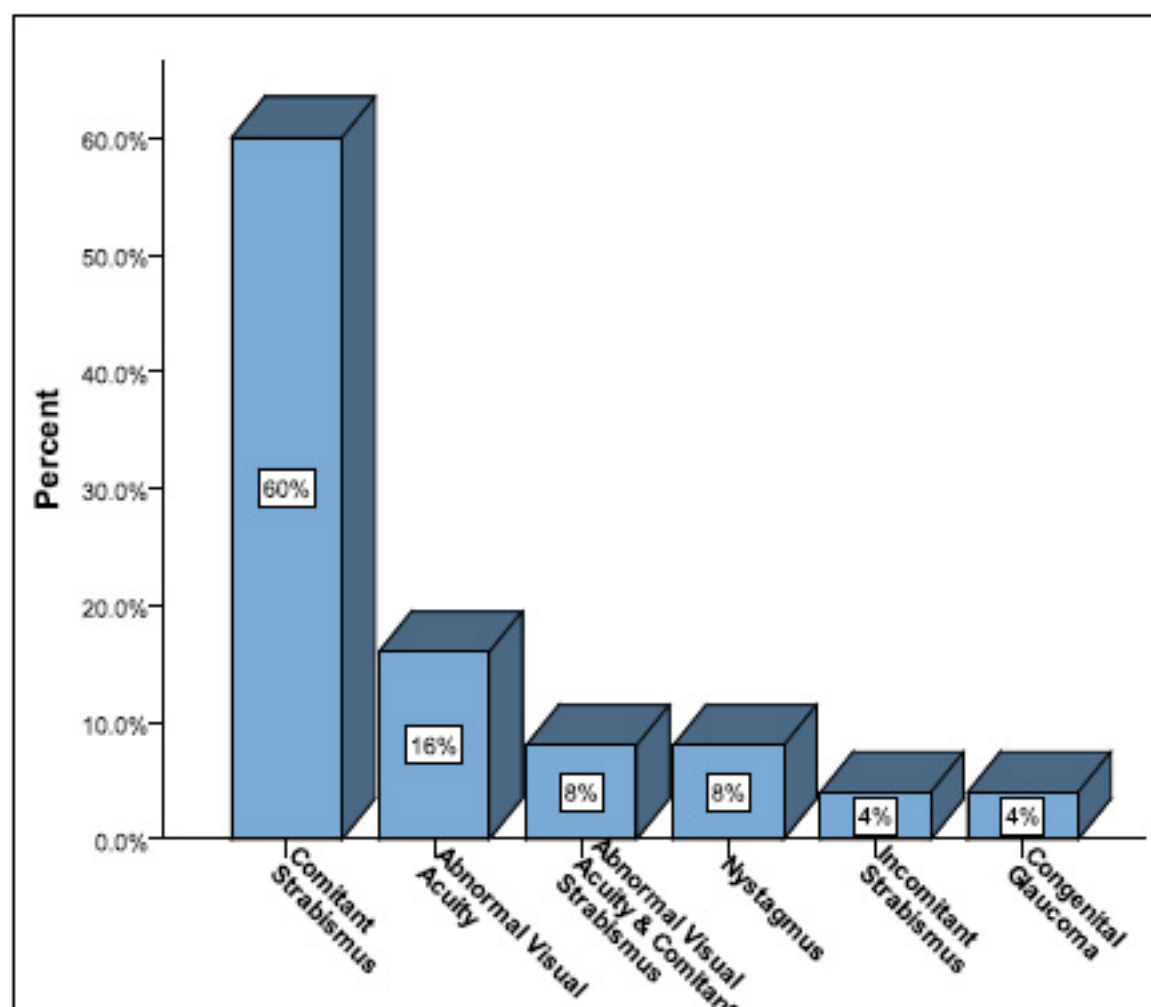**Figure 1: The distribution of eye problems in children with eye abnormalities**

Table 6: Shows the prevalence of eye and vision abnormalities in the study sample

Diagnosis	Prevalence	95%CI
Strabismus	4.42 %	2.32-6.40
Abnormal Visual acuity	1.50%	0.62-3.38
Nystagmus	0.50 %	0.09-1.97
Congenital gluacoma	0.25 %	0.01-1.59
Total	6.14%	4.09 - 9.0.5

Discussion

In this study, the prevalence of eye and vision abnormalities among children up to five years old is 6.14% (95% CI is 4.09% - 9.05%) and this goes with prevalence of American Academy of Pediatrics where prevalence of vision abnormalities is 5% to 10%. [5]

The prevalence of strabismus is 4.4% which is close to Rajiv Khandekar et al's study in Oman and Bardisi et al in Saudi Arabia where the prevalence of strabismus was 2.9% and 6% respectively. [7, 9] This is also similar to other studies in the USA where the prevalence was 4%.[10, 11]

The prevalence of abnormal visual acuity is 1.5%, which is close to the Al-Rowaily study in Saudi Arabia which was 4.5%. [12]

The prevalence of nystagmus is 0.5%. This is similar to Shirzadeh et al's study in Iran 0.5 % [13] and close to Rajiv Khandekar et al's study in Oman which was 1.2%. [7]

The prevalence of congenital glaucoma is 0.2%, while in Zeidan et al's study in Sudan it was 2.5 %, [14] and according to the American Academy of Ophthalmology it was 0.01% in the USA. [15] This may be due to different samples size among these studies.

Figure 2: Distribution of children with eye problem according to the age (year of life) at examination

Year of life at examination

Legend:
- First
- Second
- Third
- Fourth
- Fifth
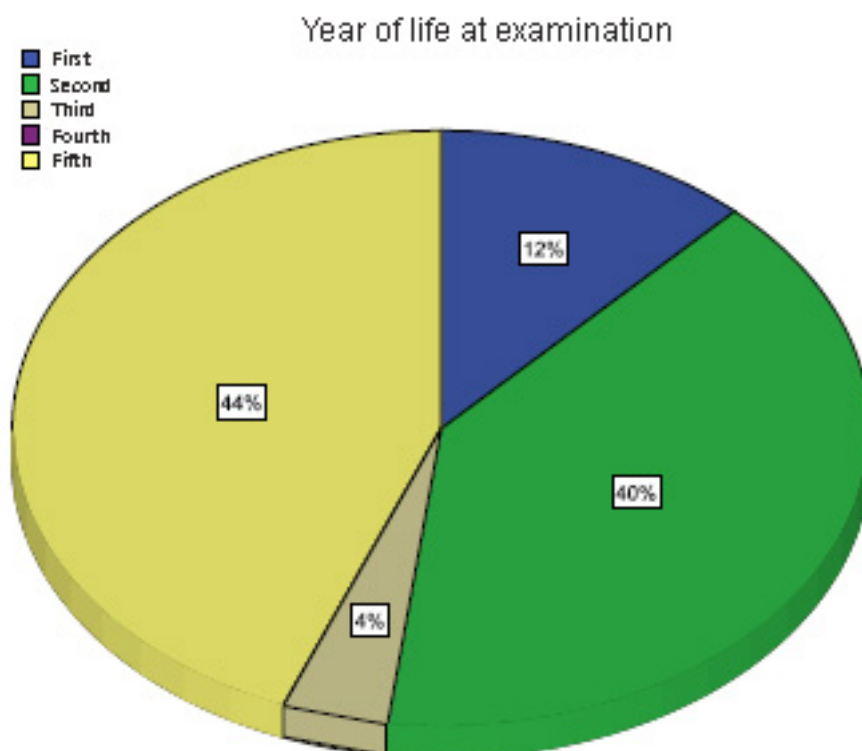
The distribution of children with ocular abnormalities in regard to year of life was significant in that the majority were from the second and fifth years of life while in Rajiv Khandekar et al's study the distribution of children with ocular abnormalities was significant in the second and fourth years of age. [7] This may be due to the larger number of children attending primary health care centers during the fifth year of life according to the immunization program, and older children respond better than those who are younger age for assessment of V.A. by Snellen chart.

There is no significant association between sex and having eye problem and this goes with Al-the Rowaily study in Saudi Arabia. [12]

This study shows that low birth weight was significantly associated with eye problems and this goes with Rajiv Khandekar et al's study in Oman and Saw et al's study in the USA. [7,16]

Prematurity was not significantly associated with eye problems and this goes with Rajiv Khandekar et al's study, [7] while in the Dowdeswell et al study in USA, prematurity was associated with eye and vision defect. This discrepancy occurs because most premature children in this study were born after the 32nd week of gestation while in the Dowdeswell et al study, all children were born before the 32nd week of gestation. [17]

Needed oxygen therapy is significantly associated with eye problems in this study and this goes with the Saw et al study and other studies in the USA. [13, 8, 18]

Family history was significantly associated with eye problems in this study. This goes with publications of the American Academy of Ophthalmology and different studies in the USA. [8,16, 18 ,19]

Positive history of prenatal infection was not significantly associated with eye problems in this study. This is because the majority of eye problems which were found like strabismus and abnormal visual acuity, are not associated with prenatal infection.

History of seizure, cerebral palsy, and syndromes are not significantly associated with eye and vision problems in this study, while in Peter Black et al's study in England and Haugen et al's study in Norway there was significant association. [20, 21] This may be due to smaller sample size in this study.

Conclusions

Vision and eye screening conducted in a small sample of children up to five years old in this study enabled us to detect children with eye problems for the first time in spite of having well established and accessible eye care services of primary and secondary levels within the reach of this community.

Strabismus and abnormal visual acuity are the most common abnormalities detected in this study.
The detected eye and vision abnormalities are most commonly distributed in children at the fifth and second year of life.

Recommendations

1- Vision screening is recommended, but validity of such screening should be established before recommending eye screening on a larger scale.

2- Amblyopia is an avoidable vision defect. In this study, risk factors for amblyopia like abnormal visual acuity and strabismus were identified and further studies to identify the prevalence and the effect of early detection and management of this abnormality is recommended.

3- Efforts should be encouraged to increase awareness about the importance of early vision assessment and eye examination firstly among doctors, especially family physicians, general practitioners and pediatricians who are in close contact with children during this critical period of visual development; secondly among medical staff and finally among parents via lectures, meetings and media.

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