International Journal of Health Sciences and Research
Vol.10; Issue: 8; August 2020
Website: www.ijhsr.org
Original Research Article *ISSN: 2249-9571*

Prevalence of Ocular Morbidity among Primary School Children in Calabar, Nigeria

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ABSTRACT

Purpose: To determine prevalence of ocular morbidity among school children in Calabar, identify and refer those with vision threatening conditions for appropriate treatment.
Methods: A cross sectional study was done among primary school children in 4 schools (2 government and 2 private) in the city of Calabar. Eye examination was done which included visual acuity testing, external eye and anterior segment examination using penlight and magnifying head loupe. Posterior segment examination was done with direct ophthalmoscope. Data obtained was analyzed using statistical package for social sciences.
Results: A total of 1,233 school children were examined. There were 564(45.7%) males and 669 (54.3%) females. Age range was 4 to 15 years with mean of 9.1± 2.5 (95% confidence interval [CI] = 8.95-9.23) Ocular morbidity was found in 176 children amounting to a prevalence of 14.3%. Allergic conjunctivitis 83 (6.7%) was the most common cause of ocular morbidity followed by refractive error 38 (3.1%), glaucoma suspect 23 (1.9%), ocular albinism 6 (0.5%), traumatic subconjunctival haemorrhage 5 (0.4%), congenital ptosis and external hordeolum 3 (0.2%) each. Visual impairment was seen in 8 (0.65%) children and monocular blindness was found in 4 pupils.
Conclusion: This study shows that a significant number of school children in Calabar have ocular morbidity. Early detection of ocular morbidity through regular systematic eye screening in schools and timely intervention to prevent or minimize the burden of eye diseases on school children is advocated.

Key words: ocular morbidity, prevalence, school children.

INTRODUCTION

Several studies have shown that ocular morbidity is a frequent cause of health problems among school children [1-5]. One study in Nigeria among 1,308 school children aged 5 to <16 years reveals that 17.1% had eye diseases[2]. In another similar study in India among 1,561 school children 31.6% were found to suffer from one ocular morbidity or another[3].

It is reported that 1.4 million of the entire 39 million blind persons worldwide are children and 70 – 90% of these children live in low resource developing countries of Asia and Africa[1,6]. In terms of blind person years, childhood blindness is said to be second only to adult cataracts as a leading cause of blindness, alarmingly constituting approximately 70 million blind person years worldwide[7].

Blindness and visual impairment are caused by some ocular morbidities and these can impact negatively on children in several ways. Notably on their education, development and quality of life and ultimately results in huge economic loss to a nation[7,8]. Some other ocular morbidities not commonly known to cause blindness and visual impairment such as ocular allergy can make a child have need to visit out-patients clinics frequently and this may have a negative impact on their academics.

Sufferers of ocular allergy also tend to experience quality of life reduction related to general health[8].

Early detection of ocular morbidity through appropriate eye screening and timely intervention can help reduce or mitigate the burden it may impose on children. Young children are often unable to express the visual challenge they might be experiencing. In addition to this, very often, visual impairment in them is detected only after decline in academic performance[1]. It is important to emphasize that studies show that 80% of the commonest causes of blindness in developing countries which include refractive errors, congenital cataract, trachoma and xerophthalmia are preventable or treatable [1]. Unfortunately school vision screening that will aid in early detection and treatment of ocular morbidities, thereby helping to prevent childhood blindness and visual impairment, is not routine practice. Many children never had the opportunity of eye examination either before or after school entry. Due to prevailing unfavourable socioeconomic and cultural factors of developing countries, often times, less than 10% of children who entered school have had previous eye examination(s)[4]. Thus, this study is aimed at evaluating the prevalence of ocular morbidity among school children in Calabar, and identifying and referring those with vision threatening conditions for proper treatment.

MATERIALS AND METHODS

This was a cross-sectional descriptive study involving primary schools selected from the two Local Government Areas that make up Calabar, the capital of Cross River State, Nigeria. Four primary schools (two public and two private) were simple randomly selected from a sampling frame comprising 205 primary schools in the two Local Government Areas that make up Calabar Metropolis. The number of pupils to be recruited per school was determined by proportional allocation. Also, in each school the number of pupils to be recruited was proportionally allocated among the various classes. Simple random sampling using a table of random numbers was used to finally recruit pupils from the various classes such that any child from the schools could have been recruited. Serial numbers of the children in class registers were used during the sampling. A few classes had relatively small numbers of pupils therefore all of them were recruited. For the classes that had large numbers of pupils, random numbers generated were used to exclude some pupils until a calculated sample size of 1,324 (including 10% allowance for attrition rates) was reached.

Ethical clearance for this study was obtained from the Health Research and Ethics Committee of the University of Calabar Teaching Hospital (UCTH). Permission to carry out the study in the primary schools was obtained from the Cross River State Ministry of Education and from the Head Teachers of selected schools. Written informed consent was obtained from parents/guardians of participating pupils. Only pupils who voluntarily agreed to participate and whose parents/guardian consented to their participation were included in the study.

Data collection

Data collection lasted three months between 25th March to 28thJune 2013. The data collection team included an Ophthalmic Assistant, an Ophthalmic Nurse and an Ophthalmologist. The Ophthalmic Assistant recorded the biodata, the Ophthalmic Nurse assessed and recorded the visual acuity of each participating pupil while the Ophthalmologist performed examinations of the ocular adnexia, anterior segment and posterior segment of the eyes of each pupil. Relevant history was obtained from the children as well as their teacher. Findings on each child were recorded on an examination proforma.

Examinations

Visual acuity (VA) assessment was done on the corridor with out-door sunlight using standard Snellen`s Chart from a distance of 6 meters. This include unaided and aided (with glasses, if available), pinhole and near vision acuity tests. Each eye was tested separately with the pupil using his/her palm to cover each eye one after the other. Children with VA < 6/9 underwent a pinhole test to determine if the decrease in vision was due to refractive error. A refractive error was diagnosed when a VA worse than 6/9 improved on pin hole test.

External eye and anterior segment examinations including eyelids, lacrimal apparatus, conjunctiva, cornea, anterior chamber, pupil, iris and lens was done using penlight and 3x binocular magnifying head loupes.

The posterior segment was examined using a direct ophthalmoscope. Undilated fundoscopy was performed on every child while dilated fundoscopy was done where necessary in cases of VA equal to or less than 6/18 which did not improve significantly with pinhole in the absence of an obvious identifiable factor. One drop of 1% tropicamide eyedrops instilled three times at intervals of five minutes was used for pupillary dilatation where indicated.

Children with minor eye problems were treated while those needing further ophthalmic evaluation and treatment were referred to UCTH for management. All eye examinations were done during school hours.

Data Analysis

Data obtained with the examination form was entered into Statistical Package for Social Sciences (SPSS) version 22 and analyzed with the same software. Descriptive statistics included frequencies, mean and standard deviations. 2x2 tables were used and categorical variables were compared by chi-square test. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 1,324 school children were recruited for the study but 1,233 (93.1%) were actually evaluated for ocular morbidity. Of the 91 (6.9%) pupils excluded from the study, 84 was due to their not been available on the day of visit and 7 due to over age.

There were 564 (45.7%) males and 669 (54.3%) females with male to female ratio of 1:1.2. Age range was 4 years to 15 years with a mean age of 9.1±2.5 (95% confidence interval [CI] = 8.95-9.23) . Majority 467 (37.9%) of the pupils fell into the 7 to 9 years age group (Table 1). Least common age group was the 13 to 15 years with only 129 (10.5%) of the study participants falling into this age group.

Table 1: Age group and sex distribution of participants and prevalence of ocular morbidities

Age group	Male		Female		Total		Prevalence
	Number of Participants (%)	Number with morbidity (%)	Number of Participants (%)	Number with morbidity (%)	Participants (%)	Morbidity (%)	
4 - 6	102 (8.3)	15 (8.5)	117 (9.5)	16 (9.1)	219 (17.7)	31 (17.6)	14.2
7 - 9	222 (8.0)	40 (22.7)	245 (19.9)	28 (15.9)	467 (37.9)	68 (38.6)	14.6
10 - 12	173 (14.0)	33 (18.6)	245 (19.9)	27 (15.3)	418 (33.9)	60 (34.1)	14.4
13 - 15	67 (5.4)	11 (6.3)	62 (5.0)	6 (3.4)	129 (10.5)	17 (9.6)	13.2
Total	**564 (45.7)**	**99 (56.3)**	**669 (54.3)**	**77 (43.7)**	**1,233 (100)**	**176 (100)**	

Presenting Visual Acuity (VA)

Table 2 shows the distribution of presenting visual acuities in the better and worse eyes of the 1,233 pupils that participated in this study. Majority 1,226 (99.4%) of the pupils had VA of 6/18 or better in their better eye while only 7 (0.6%) had VA of less than 6/18 (low vision). Similarly, most pupils, i.e. 1,222 (99.1%), had a visual acuity of 6/18 or better in their worse eye while only 11 (0.9%) had visual acuity of less than 6/18 (low vision). No child had a VA of less than 6/60 in the better eye. Eight pupils were visually impaired with presenting VA in the better eye being less than 6/12. Four children were monocularly blind with visual

acuities less than 3/60. Two were due to traumatic optic neuropathy and the other two had phthisis bulbi post ocular trauma.

Table 2: Distribution of visual acuities for better and worse eyes of study participants

Visual acuity	Better eye Number (%)	Worse eye Number (%)
6/5 – 6/6	1,199 (97.2)	1,186 (96.2)
< 6/6 – 6/9	15 (1.2)	14 (1.1)
< 6/9 – 6/12	7 (0.6)	15 (1.2)
< 6/12 – 6/18	5 (0.4)	7 (0.6)
< 6/12 – 6/24	3 (0.2)	1 (0.1)
< 6/24 – 6/36	3 (0.2)	5 (0.4)
< 6/36 – 6/60	1 (0.1)	1 (0.1)
< 6/60 – 3/60	-	-
< 3/60	-	4 (0.3)
Total	**1,233(100)**	**1,233 (100)**

Prevalence and pattern of ocular morbidity

Ocular morbidity was found in 176 out of the 1,233 pupils evaluated in this study giving a prevalence of 14.3%. Allergic conjunctivitis 83 (6.7%) constituted the major cause of ocular morbidity followed by uncorrected refractive error 38(3.1%), glaucoma suspect 23 (1.9%), ocular albinism 6 (0.5%), traumatic subconjunctival haemorrhage 5 (0.4%), congenital ptosis and external hordeolum 3 (0.2%) each. Other causes of ocular morbidity included traumatic optic neuropathy, phthisis bulbi, chalazion and conjunctival melanosis, each of which were encountered 2 times. One child each was found to have ocular myasthenia gravis, retinitis pigmentosa, nasolacrimal duct obstruction, cataract, strabismus, pterygium and cornea opacity (Table 3). Similar prevalence of ocular morbidity among public or government (14.4%) and private schools (14.2%) was observed (P= 0.436). Overall, there was significant male preponderance for prevalence of ocular morbidity in this study. Among males it was 17.6% as against 11.5% in females study participants (p = 0.021).

Table 3: Pattern and prevalence of ocular morbidities and their sex distribution

Type of ocular morbidity	Overall number (%)	Male (%)	Female (%)	Prevalence
Allergic conjunctivitis	83	49	34	6.73
Refractive error	38	23	15	3.10
Glaucoma suspect	23	13	10	1.90
Ocular albinism	6	3	3	0.50
Traumatic conjunctival hemorrhage	5	2	3	0.41
Congenital ptosis	3	3	-	0.2 4
External hordeolum	3	-	3	0.2 4
Traumatic optic neuropathy	2	2	-	0.16
Phthisis bulbi	2	1	1	0.16
Chalazion	2	1	1	0.16
Conjunctival melanosis	2	-	2	0.16
Ocular myasthenia gravis	1	-	1	0.08
Retinitis pigmentosa	1	-	1	0.08
Cataract	1	1	-	0.08
Others	4	2	2	0.32
Total	**176**	**100**	**76**	**14.29**

Others: Nasolacrimal duct obstruction, pterygium. Strabismus and cornea opacity (one each)

DISCUSSION

In this study, the overall prevalence of ocular morbidity was 14.3%. This is comparable to the prevalence reported in similar studies conducted in Southwestern Nigeria by Ajaiyeoba et al15.5% and Alabi et al 17.1% but lower than that reported in the South Eastern part of the country by Okoye et al 6.1% and in the North by Kehinde et al 8.4%[2,5,8,9]. Some other studies in Nigeria reported higher prevalence compared with present study. Abah et al reported a prevalence of 22.6% while Ekpenyong et al reported 32.1% in the Northern and Southern Nigeria respectively[10,11]. In comparison with international studies on the prevalence of ocular morbidity among school children, the prevalence in the present study was found similar to a study done in Tanzania which demonstrated a prevalence of 16.2%[12]. However, the prevalence is higher than the 4.92% reported by Sharma et al in India and lower than another study in India which showed a prevalence of 31.6%.[3, 13]. A study in Egypt and another in Ghana that reported

prevalence of 28.2% and 47.1% respectively are also comparatively much higher than that obtained in the present study[14,15].These observed differences in prevalence locally and internationally may be due to ethnic, racial, socioeconomic and environmental variations in addition to different methodologies used.

Allergic conjunctivitis was found to be the most common cause of ocular morbidity in this study with prevalence of 6.7%. Although, allergic conjunctivitis commonly does not cause blindness, it is a leading cause of absenteeism from school among children and has been demonstrated to be associated with a reduction in the quality of life[5]. The prevalence of allergic conjunctivitis in this study is comparable to that found in other studies in Nigeria by Abah et al in Kaduna 7.3%, Ajaiyeoba et al in Ilesa, Osun state 7.4% and Ayanniyi in Ilorin 6.7%[5,14,16]. It is also similar to that found by El-Mosely et al 6.3% in Cairo, Egypt[14] but higher than the prevalence of 3.2% obtained by Vidya and Kiran in Mangalore, India[1] and 2.9% by Okoye et al [8] in South Eastern Nigeria. The study by Ben et al in Ghana demonstrated a higher prevalence of 17.3%[8]. The differences in prevalence in these studies may be due to seasonal variations and or differences in the environment where the study was done.

Refractive error was seen in 3.1% of the children in the index study. This is higher than that observed in studies in Northern Nigeria (1.7%) and South Eastern Nigeria (0.7%) and lower than that obtained in studies in Southwestern (6.9%) and Southern (11.5%) Nigeria[8,9,11,16]. Some studies done in other countries also show a variable prevalence for refractive errors. A good example is studies done in India. One study conducted in the Himalayan State of India reports a prevalence of refractive errors among school children to be 2.8% which is comparable to the index study. Yet another study conducted in Shimla, Himachal, North India reported a much higher prevalence of 22%[3,13]. A study in Egypt reported a prevalence of 7.1% and another in Ghana obtained 26.3% [14,15]. Again, these variations in reported prevalence of refractive errors may be attributable to differences in genetic, geographical and environmental factors as well as varied diagnostic criteria in different studies.

In this study, there were four children who were unilaterally blind. Of the four children, two had blindness due to traumatic optic neuropathy while the other two had unilateral blindness from phthisis bulbi post ocular trauma. It is noteworthy that the index study also found five children with subconjunctival haemorrhage due to ocular trauma. These findings underscores the need for supervision of children during play at home or at school in order to avoid dangerous play that can lead to avoidable injury to their eyes.

Eight children were found to be visually impaired in their better eyes with Visual acuities ranging from ≤ 6/12 to 3/60 giving a prevalence of 0.6%. This is comparable to findings in other studies by Nkanga et al (0.7%), Okoye et al (0.5%) both in Nigeria[8,17] and Singh et al (0.49%) in India[18]. However, this is lower than that reported by Ajaiyeoba et al (1.26%) and Alabi et al (6.7%) both in Southwestern Nigeria[2,5]. These differing results may be due to differences in study areas, age grouping and definitions of visual impairment. For instance, in the study by Alabi et al, visual impairment which was defined as visual acuity of 6/9 to 3/60 would tend to produce higher prevalence of visual impairment when compared with present study.

Twenty-three (1.9%) of the children in this study were found to be glaucoma suspects. This prevalence is relatively higher than the 0.8% obtained by Ayanniyi etal in a study conducted in Southwestern Nigeria and lower than the 3.7% reported by Abah et al in Northern Nigeria but comparable to 2.5% reported by Ekpenyong et al in a study done in Southern Nigeria where the present study was done[10,11,19].

In this study, ocular albinism was found in six (0.5%) of the children. This is higher than the 0.1% reported by Ekpenyong et al[11]. Several other studies locally and internationally did not report ocular albinism in their studies for comparison with this study.

CONCLUSION

This study shows that a significant number of school children in Calabar have ocular morbidity. The commonest ocular morbidity was allergic conjunctivitis followed by refractive error and glaucoma suspect. Worthy of note is that all the children unilaterally blind in this study were from trauma related causes. Prevention, early detection and timely management of these diseases would help reduce ocular morbidity in school children and mitigate its negative impact on their education. We therefore recommend increased awareness and appropriate sensitization programs, as well as school and public health education on prevention of ocular morbidities and blindness in children. There should be regular eye screening as part of school health program with the view to identifying treatable eye diseases at early stages so that timely intervention or treatment can be instituted. School teachers could be trained to recognize common eye problems in children and make referrals to appropriate eye care facilities.

Limitations of the study

This study only involved children who are in school and were available during visit to their school. Children absent from school at the time of visit, those unable to attend school due to economic reasons and children in special schools were not covered by this study. It may be assumed that if all these categories of children were included in the screening exercise, it would have given a better picture of the true status of eye diseases among school age children.

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How to cite this article: Okonkwo SN, Nkanga ED. Prevalence of ocular morbidity among primary school children in Calabar, Nigeria. Int J Health Sci Res. 2020; 10(8):208-214.

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