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Original Article

SCREENING FOR UNCORRECTED REFRACTIVE ERROR AMONG PRIMARY SCHOOL CHILDREN IN SOUTH-SOUTH NIGERIA

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Abstract

A study on screening for uncorrected refractive error in primary school children has not been done in Bayelsa State, South-South Nigeria. This study aims to screen for uncorrected refractive error among primary school children in Bayelsa State and use the data to plan for an effective school Eye Health Program. A cross sectional study on screening for uncorrected refractive error in school children was carried out in Yenagoa Local Government Area of Bayelsa State, South-South Nigeria in June 2009. A multistage sampling technique was used to select the study population (pupils aged between 5-15 years). Visual acuity for each eye was assessed by an optometrist and a community ophthalmic nurseoutside the classroom, at a distance of 6 meters. Unaided distant visual acuity of 6/12 or less which improved with pin hole,in a child not currently using corrective glasses, was considered an uncorrected refractive error. Funduscopy was done inside a poorly lit classroom. Data was analyzed with EPI INFO version 6 and scientific calculator. A total of 1,242 school children consisting of 658 females and 584 males were examined.About 97.7% of pupils had normal vision of 6/6 while 26 eyes (1%) had visual acuity of 6/12 or less. Of the 26 eyes with visual acuityof 6/12 or less, 22improved when presented with pin-hole. A total of 12 pupils had uncorrected refractive error, giving a population prevalence of 0.97%.The 8-10 yearage-range had the highest proportion (41.7%) of cases of uncorrected refractive error.

The prevalence of uncorrected refractive error in primary school children in Bayelsa State, South-South Nigeria was 0.97% and most eyes (97.7%) had normal vision.

Keywords: Uncorrected refractive error, Screening, School children.

Introduction

A refractive error is an optical defect of the eye that prevents light from being brought to a sharp focus by the cornea and lens onto the retina (Schwab, 1999).Refractive error is a major contributor to visual impairment which is a significant cause of morbidity in children worldwide (Gilbert and Foster, 2001).

The World Health Organisation estimates that worldwide, 12 million children aged between 5 to 15 years are visually impaired because of uncorrected refractive errors: conditions that could be easily diagnosed and corrected with glasses, contact lenses and refractive surgeries (WHO, 2009). Uncorrected refractive error is therefore a significant cause of blindness and the major cause of impaired vision (Dandonaet al, 1999).

Screening is defined as the presumptive identification of individual at risk in a population likely to be affected by asymptomatic or subclinical condition who can benefit by being further investigated (Wilson and Junger, 1986).

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A screening test is not intended to be a diagnostic test; it is only an initial examination. Those who are found to have positive test results are referred for further diagnostic work-up and treatment (Perks, 2007).

A study on vision screening for uncorrected refractive error among school children is yet to be carried out in Bayelsa State. In a study (Nkanga and Polin, 1997) on vision screening in primary school children in Enugu Nigeria, the prevalence of refractive error was 7.4%. A similar study on refractive error in pupils of Army children primary school in Lagos Nigeria found a prevalence of 7.3% (Faderin and Ajaiyeoba, 2001).

Chuka-Okosa in her study on refractive error among students in a rural community in South-East Nigeria observed a comparatively lower prevalence of 1.97% (Chuka-Okosa, 2005). Also, another study on blindness and visual impairment among school children in a rural community in South Western Nigeria, observed a low refractive error prevalence of 0.87% (Ajaiyeoba et al, 2006). The studies by Nkanga in Enugu and Faderin in Lagos, both in cosmopolitan cities, observed high prevalence of refractive error ((7.4% and 7.3% respectively). The variation in the prevalence of refractive error in these studies may be related to ethnic differences and in the studies in Lagos and Enugu, the high prevalence observed may be due to the large heterogeneous population. The differences in the prevalence of refractive error in these studies, may also in part, be related to the methodologies used in identifying pupils with refractive error.

A study in Uganda found the prevalence of refractive errors in primary school children to be 11.6% (Kawuma and Mayeku, 2002). The high prevalence in the study may be partly due to the relatively small study population of 623 pupils. The Kawuma study in Uganda contrasted with a similar study (Wedner et al, 2000) in rural Tanzania which showed a low prevalence of 1% for refractive error in school children aged 7-19 years. The lower prevalence in the Wedner study is likely to be due to the reason that only the proportion of pupils with a visual acuity of less than 6/12 were considered in the study.

Since children do not usually complain of visual difficulties, early detection and prompt treatment of eye disease is important to prevent vision problems and eye morbidities which could affect their learning ability, personality and adjustment in school (Nwosu, 1999; Adegbehingbeet al, 2005)

Methods

This study was conducted on primary school children in Yenegoa Local Government Area (LGA) of Bayelsa State, South-South Nigeria. Children in primary basic 1 to 6 and aged 5 to 15 years were included in the study. The United Nations children fund [UNICEF] definition of childhood as a period of life before 16 years of age was used. Children in Special Schools for the blind were excluded from the study.

A multi-stage sampling technique was used to select pupils in the study population. Stage 1 sampling involved the selection of 3 clusters based on the three Educational Zones in the study area. The second stage involved stratification of schools into public and private, and in stage 3, five schools were selected (4 public and 1 private) based on the ratio of schools in the clusters and the population of pupils in the schools. The schools were randomly selected from a sampling frame of schools in each zone (public separated from private). All pupils in the selected schools were included in the study. The minimum sample size was 1,123.

Ocular examination included visual acuity (VA) assessment with Snellen's illiterate 'E' chart. Visual acuity was assessed outside the class room at a distance of 6 meters with and without pinhole. Unaided VA was determined separately for each eye and where it was ≤ 6/9, a pinhole was presented and the test repeated. Detailed adnexal and ocular examination was done using pen torch, head loupe and ophthalmic direct ophthalmoscope. Funduscopy was done inside a poorly lit part

of the classroom. Students with ocular disorders needing further investigation and treatment were referred to an easily accessible tertiary health facility within the Local Government Area, with a predesigned referral form. A pilot study was carried out three days to the study in a primary school not in the study sample.

Ethical clearance was obtained from the Ethics Committee of the University of Port Harcourt Teaching Hospital and written consent from the Bayelsa State Ministry of Education and the Yenegoa Local Government Basic Education Authority. Written consents were presented to the head teachers of the schools included in this study. The head teachers were in turn instructed to obtain verbal consent from parents for examination of their wards.

Personal data were recorded in a predesigned and pretested questionnaire and analysed using the Epidemiological information software - EPI INFO version 6 and scientific calculator.

Definition for the purpose of this study

Reduced vision is unaided distant visual acuity of 6/12 or less.

Uncorrected refractive error is unaided distant visual acuity of 6/12 or less which improves with pin hole in a child not currently using a corrective eye glass

Results

There were 1,295 pupils in the class registers of the selected primary schools. Forty two pupils (3.2%) were absent from school on the screening days, giving a coverage rate of 96.8%. Of the 1,253 pupils screened, 11 were excluded from the study as they were at least ≥16 years. The primary 5 class, with 228 (18.3%) pupils had the highest number of pupils per class. Of the 1,242 pupils in the study, 1,043 (84%) were from public schools and 199 (16%) from private schools, giving a public to private pupil ratio of 5:1.Those aged 8–13 years made up 77.8% of the study population (Table 1). A total of 1,242 school children consisting of 658 (53%) females and 584 (47%) males were examined (Table 1).

Table 1: Age and Sex Distribution

Age Range	Male	Female	Total	%
5– 7	122	121	233	18.76
8– 10	254	251	505	40.66
11–13	195	266	461	37.12
14-15	23	20	43	3.46
Total	584	658	1242	100%

About 97.7% of eyes had normal VA (VA of 6/6) while 56 eyes (2.3%) had VAs ≤ 6/9.Twenty six eyes (1%) had reduced vision (visual acuity of ≤6/12) and this included one pupil (0.05%) with visual acuity of Hand Motion (HM), the only case of monocular blindness recorded in the study (Table 2).

Table 2: Unaided visual acuity of 6/12 or less

EYES	6/12	6/18	6/24	HM	TOTAL
Right	9	5	1	0	**15**
Left	6	4	0	1	**11**
Total	**15**	**9**	**1**	**1**	**26**

***HM = Hand Motion**

Of the 26 eyes with VA of ≤6/12, 22improved when presented with pin-hole (Table 3). Seventeen (65.4%) of the 26 eyes presented with pin hole improved to visual acuity of 6/6 (Table 3). No child with unaided VA of ≤6/12 was using an eye glass at the time of this study.

Table 3: Improvement of 6/12 or less visual acuity with pin hole

EYES	6/6	6/9	6/12	6/18	NI	TOTAL
Right	9	2	1	1	2	**15**
Left	8	1	0	0	2	**11**
Total	**17**	**4**	**3**	**1**	**1**	**26**

***NI = No Improvement**

A total of 12 pupils had uncorrected refractive error, giving a population prevalence of 0.97%. Refractive error involved both eyes in 10 pupils and one eye in 2 pupils. The 8-10 average-range had the highest proportion (41.7%) of cases of uncorrected refractive error. Uncorrected refractive error affected both sexes equally (Table 4).

Table 4: Age/ Sex distribution of uncorrected refractive error

AGE	SEX		TOTAL	FREQUENCY
	M	F		
5 – 7	1	2	3	**25**
8 – 10	2	3	5	**41.7**
11 – 13	2	1	3	**25**
14 – 15	1	0	1	**8.3**
TOTAL	**6**	**6**	**12**	**100**

Discussion

Visual impairment due to uncorrected refractive error is a significant cause of morbidity in children worldwide (Ager, 1998). The visual experience of a child plays a significant role in his/her psychological, physical and intellectual development (AAO, 2003). Uncorrected refractive error is a common cause of abnormal visual experience that leads to amblyopia (Weakley, 2001). Children with uncorrected refractive error need to be treated early as delay in treatment can lead to amblyopia.

The prevalence of uncorrected refractive error in this study was 0.97%. A study on uncorrected refractive error in school children aged 12 – 20 years in Fiji observed a prevalence of 0.9% (Anthea et al, 2011). Though the prevalence in the Anthea study is close to that in this study, there were however differences in methodology in both studies. In the Anthea study, uncorrected refractive error was considered as unaided distant visual acuity of less than 6/12 that improved with pin hole to 6/12 or better. This may in part account for the lower prevalence in the Anthea study.

A comparatively high prevalence of uncorrected refractive error was observed among urban and rural school children aged 5-15 years in Maharashtra, India (Padhye et al, 2011). The study observed that the prevalence of uncorrected refractive error was higher in urban (5.46%) than in rural (2.63%) school children. The high prevalence of uncorrected refractive error in the study by Padhyein India may be related to ethnic and racial factors. Antheaalso observed in his study, that Indian students were nearly 6 times more likely to have refractive error than Fijians.

In this study 97.7% of eyes had normal vision while those with visual acuity of 6/9 or better were 98.9%. A similarly study on eye health status in school children aged 5-15years in South-Eastern Nigeria, observed that 96.5% of students had visual acuity of 6/9 or better (Ugochukwu, 2002).

The prevalence of pupils with uncorrected visual acuity of 6/12 or less (reduced vision) in this study was 1%. In this study the prevalence of uncorrected VA of 6/12 or less (1%), reduced to 0.19% following pin hole examination.

The refractive error study in children (RESC) carried out in Durban South Africa, involving children 5-15 years of age, found a prevalence of uncorrected visual acuity ((VA of 6/12 or less) of 1.4%, decreasing to 0.32% with correction (Naidoo et al, 2003). A similar study (RESC) in Nepal[22] had a prevalence of 2.9% of uncorrected visual acuity of 6/12 or less (Pokharel et al, 2000). In the study (RESC) in China, Zhao[23] found a high prevalence of uncorrected visual acuity of 6/12 or less, in at least one eye to be 12.8% and this decreased to 1.8% after correcting for refractive error (Zhao et al, 2000).

Ethnic, racial and environmental factors may play a role in the observed differences in prevalence of uncorrected refractive error the various regions (McCarthy, 2006). It has been observed that refractive error has assumed

epidemic proportions in Asia (McCarthy, 2006).

The World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB), both separately and in their joint initiative, VISION 2020: The Right to Sight, have worked very hard to put uncorrected refractive error on the blindness prevention agenda and to develop strategies for the elimination of this most simple avoidable cause of vision loss (Brien, 2007). Without appropriate optical correction, millions of children are losing educational opportunities (WHO, 2006).Early detection of a vision problem can have educational, behavioural and certainly, quality of life benefits (AAO, 2003)

Conclusion

The prevalence of uncorrected refractive error in primary school children in Bayelsa State, South-South Nigeria was 0.97% and most eyes (97.7%) had normal vision. Vision screening should routinely be done at school entry, midway through school and at completion of primary school, for early detection and treatment of eye diseases. The School Eye Health Screening Program should be strengthened to provide among other things, spectacles for students to correct refractive errors, after proper ophthalmological assessment.

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