

Refractive errors among students of a postprimary institution in a rural community in South-Eastern Nigeria

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Summary

Objective: To determine the prevalence and types of refractive errors seen among students of Girls' Secondary School, Akegbe Ugwu in Nkanu West Local Government area of Enugu State, Nigeria.

Methods: A questionnaire documented the students' personal data, their chief complaints and past ocular history. This was followed by unaided visual acuity assessment then assessment with pinhole, anterior segment examination, funduscopy, non-cycloplegic objective and subjective refraction in those found to have an unaided visual acuity of less than 6/9 in either eye and improved vision with pinhole.

Results: A total of 355 students aged 12 -21 years was tested. Out of these, 9 (2.53%) had uncorrected vision worse than 6/9 in either or both eyes.

Uncorrected refractive error accounted for the reduced vision in 7 cases 5 of which were myopia.

Conclusion: There is a prevalence of refractive error of 1.97% among students of this rural girls' secondary school in South-Eastern Nigeria.

The low prevalence of myopia (1.4%) found agrees with the report that, though the most common refractive cause of visual impairment globally, it is relatively rarer in Africans.

Key words: Refractive error, Postprimary, Rural.

Résumé

Objectif: Déterminer la fréquence et des types d'erreurs de réfraction vues parmi les étudiantes d'école secondaire des filles, Akegbe Ugwu à l'administration communale de l'Ouest de Nkanu de l'Etat d'Enugu, Nigeria.

Méthode: Un questionnaire a documenté les données personnelles des étudiantes, y compris leur maladies les plus importantes, et l'histoire oculaire du passé. Suivi par une évaluation d'acuité visuelle sans assistance, ensuite, évaluation avec ouverture minuscule, examen du segment antérieur, fundoscopie, réfraction objective et subjective non-cycloplégique chez ceux, sujets atteintes d'acuité visuelle de moins de 6/9 dans les deux yeux et une vision améliorée avec ouverture minuscule.

Résultats: Un total de 355 étudiantes âgées entre 12 - 21 ans ont été étudiées. Parmi elles, 9 soit 2.53% avaient eu la vue malcorrigée plus mauvaise que 6/9 dans l'un ou l'autre ou bien les deux yeux. Erreur de la réfraction non corrigée constituait une baisse dans la vision chez 7 cas, dont 5 étaient myopie.

Conclusion: Il y a une fréquence de 1,97% d'erreur de la réfraction chez ces filles d'une école secondaire rurale au sud-est du Nigeria. La baisse dans la fréquence de la myopie (1,4%) notée est en accord avec le rapport qui souligne que ce phénomène est relativement rare en Afrique bien qu'il soit la cause de réfraction la plus courante d'affaiblissement visuel

a l'échelle planétaire.

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.¹

Globally, it is the most common cause of visual impairment in children.² There is evidence that the prevalence of errors varies with ethnicity.³ Compared to white Americans, Asian Americans have a higher prevalence of myopia, while Africans have a lower prevalence of myopia.³ Native Americans have a higher degree of astigmatism but not of myopia.³ Myopia has also been associated with scholastic success, reading ability, educational level of parents, and higher family income.³

Most existing information on prevalence of refractive errors among Nigerian children is from studies among urban primary school children^{4,7} and clinic-based studies^{8,10} in various parts of the country.

These reports have shown refractive error to be the most common ocular problem encountered amongst Nigerian children with the prevalence rates ranging from 7.3%⁵ to 8.9%⁶.

In a population-based study to determine the ocular health status of secondary school students in Kaduna, Northern Nigerian, Abiose et al¹¹ noted that refractive errors were the second most common ocular diseases encountered.

Ideh et al¹², following a vision screening of the students of an all-females' urban secondary school in Benin City, Western Nigeria, reported a prevalence of refractive errors of 3.9%.

This study was conducted in an all-females' secondary school in Akegbe Ugwu, a rural community in Enugu State, South Eastern Nigeria to determine the prevalence and types of refractive error.

Background information on Akegbe Ugwu village

Akegbe Ugwu is one of the nine villages that make up Nkanu West local government area of Enugu State in South-Eastern Nigeria.

It has a population of about 15,000¹³ and the people are predominantly farmers.

The village has five government-owned primary and 2 postprimary schools. Only one government-owned health centre serves the whole village, and it provides no form of eye care.

Method

The author made preliminary visits to the school two weeks before the day of vision testing.

This was to explain to the principal the purpose, content and benefits of the study.

All the students in the school register at the time of the

study were admitted into the study and in order of their classes, were examined.

Two volunteers administered a questionnaire with three sections to each student by face-to-face interview.

Data collected from section A were: name, age, class, school and autonomous community.

Questions asked under ocular history (section B) were:

- Do you have any ocular complaints? If yes, what are they?
- Have you ever had trauma in your eye(s)?
- Have you ever worn glasses?
- Do you still wear glasses?

This study was carried out over 3 consecutive days in June, 2003. Two volunteers tested the unaided distant visual acuity on each eye of each student separately, using the Snellen's chart with multiple optotypes at 6 meters. One subject who was already wearing glasses was examined without and with her glasses.

Subjects whose visual acuity was less than 6/9 in any eye were rechecked by the ophthalmologist (CMC) and if vision still <6/9 in either eye, had the unaided vision test repeated using a pinhole, then subjected to ophthalmologic review by the same ophthalmologist. This review included detailed history, pentorch examination of the anterior segment through a head loupe and funduscopy through undilated pupils.

Those whose unaided distant visual acuity improved with pinhole were further subjected to non-cycloplegic objective and subjective refraction with the streak retinoscope, by the ophthalmologist and 2 optometrists.

The distant visual acuity (unaided, aided, with pinhole and after correction) and power of corrective lenses were recorded in section C of the questionnaire.

Definition for the purpose of this study

Refractive error (ametropia) is unaided distant visual acuity worse than 6/9 which improves with pinhole.

Unilateral ametropia was included for the purpose of needs assessment.

Data analysis

All data collected was manually analysed using the scientific calculator.

Results

A total of 449 students were in the school register at the time of the study.

Table 1 Age distribution of the students

Age	Number	Frequency %
12 - 15 years	50	14.08
≥ 16 years	305	85.92
Total	355	100

Table 2 Age distribution of students with refractive error

Age	Type of refractive error			Total Frequency %
	Myopia	Astigmatism	Total	
12 - 15 years	1	2	3	42.86
≥ 16 years	4	0	4	57.14
Total	5	2	7	100

A total of 355 students were examined (participation rate of 79%); 50(14.08%) were aged 12 - 15 years and 305 (85.90%) 16 years or older (Table 1).

Ninety-four (21%) students were absent from school at the time of study and thus were not examined.

Eight (2.26%) students had reduced vision (<6/9) in both eyes, and one in one eye only.

Of these 9 (2.53%) students with reduced vision 7(1.97%) had poor vision due to refractive error.

Myopia was the most common type of refractive error seen, accounting for 55.6% of the reduced vision found and occurring in 1.4% of the student population. The frequency of the different types of refractive errors is shown in table 2.

The age distribution of the students with refractive error is shown in table 2.

57.14% of the students with refractive error were aged 16 years and above.

6% and 2% of the children aged 15 years or less had refractive error and myopia respectively.

Only 1.2% of the young adults (those aged ≥ 16 years) had refractive errors, and myopia was the only refractive error found in them.

Discussion

Poor vision can have detrimental effects on a child's capacity to learn. With a habitual poor performance he could now lose interest in schooling and eventually drop out. Therefore, vision screening to identify and treat cases of poor vision among school children continues to be justified.

In the outline of the main activities to be carried out within the launched Global initiative for the elimination of avoidable blindness (Vision 2020: The right to sight), refractive errors have been listed, along with cataract, onchocerciasis and childhood blindness among eye problems whose prevention and cure should provide enormous savings and facilitate societal development.¹⁴

However, there is incomplete scientific knowledge concerning the distribution of refractive errors in different populations and the variation of prevalence with age, gender and race.¹⁵

This was a cross-sectional study aimed at testing the distant visual acuity of all the students in the rural girls' secondary school with a total number of 449 registered students, of which we were able to test 355 (participation rate of 79%).

The prevalence of reduced distant visual acuity was found to be 2.53%.

This value is significantly lower than that found among the females of an urban secondary school in Benin City, Western Nigeria (25.6%).¹⁶

The data in this study was biased as the author only examined the students attending the girls' secondary school in the community. However, it is known that not all school-age children are in school. In addition, 21% of the registered students in this school were not tested.

It is possible that the prevalence of reduced distant visual acuity is higher in the children who are of school age but do not attend school and the registered students who were not tested, as their inability to read the blackboard may

have led to academic failure and withdrawal from school.

Also, the difference in estimates in both studies may be accounted for by differences in sample size and case definitions.

Alakija's cohort¹⁶ was about two and a half times more than that in this study and his case-definition of poor distant vision included visual acuity of 6/9. But this study excluded all those with a distant visual acuity of $\geq 6/9$.

This study demonstrated that refractive error accounted for 77.78% of the reduced distant vision in the school, confirming that it is the major cause of visual morbidity amongst children.²

The prevalence of refractive error was found to be 1.97% in this study.

This finding is lower than that found among students of an urban girls' secondary school in Benin City Western Nigeria (3.9%).¹² Even though the cohorts in both studies were similar in sex (all females); institution (secondary school) and age range (12 - 21 years in this study; 11 - 21 years in Benin City), the ethnicity, case-definitions and degree of urbanization of the schools were different and these could significantly influence the prevalence of refractive error found.

Benin City is an urban environment and it is possible that because of more enlightenment and better socio-economic status children in an urban environment enrol in schools and start near-work from an earlier age.

Myopia is thought to be linked to literacy and increased near-work in childhood.² In Singapore where children begin their education at the age of three myopia has reached epidemic proportions.² The prevalence of refractive errors in the children in this study (12 - 15 year olds) was 6%.

Maul et al¹⁷ and Zhao et al¹⁸ reported prevalence of 15.8% and 12.8% among 5 - 15 year-old children in La Florida, Chile and Shunyi District, China respectively. However, the results are not comparable by case-definitions, sampling methodology and procedures.

Importantly also, while we studied only the children in the school at the time of the study Maul et al¹⁷ and Zhao et al¹⁸ studied school-aged children in the communities.

Myopia was the most common type of refractive error encountered in this study and present in 1.4% of the school population.

Wedner et al¹⁹ found a higher prevalence of same refractive error in 5.6% of the secondary students studied in Mwanza city, Tanzania.

In this series, myopia was found in 2% of the children (12-15 years). Pokharel et al²⁰ reported a prevalence of 2.9% among the 5 - 15year-olds studied in Mechi zone, Nepal. Various reports from Africa have shown prevalences of myopia amongst children to be 2% (Monrovia, Liberia)²¹; 1.4% (Dar Es Salaam, Tanzania)²¹ and 2.9% (Lagos, Nigeria).

The 1971 - 1972 survey in the U. S. A. estimated a 25% prevalence of myopia for persons aged 12 - 54 years.³

In those aged above 15 years in this study the prevalence of myopia was found to be 1.3%. Even though these various studies mentioned are not comparable by case-definitions; sampling methodology, age range of study popula-

tion and procedures, the trends in this study agree with the findings that Myopia is relatively rarer in Africans.³

In the natural trend of ocular growth, the following 8 years after the age 6 when the average eye grows only an additional 1mm (compared to 5mm from birth to age 6), the prevalence of myopia increases more than sevenfold, to 15% by the age of 15years in the general population (compared to the prevalence of only 2% by the age 6 years).²²

Juvenile-onset myopia³ defined as myopia with an onset between 7 and 16 years of age, is due primarily to growth in globe axial length. Intensive near-work and family history are some of the reported risk factors.³

The largest increase in the prevalence of myopia in girls is at age 9 - 10years, while in boys it occurs at age 11 - 12.3

Myopic progression usually stops in the middle teen years, at about age 15 for girls and at about age 16 for boys.³

Refractive error stabilises in about 75% of teens. In those who do not experience stabilization, progression continues into the 20s or 30s.

Adult-onset myopia³ begins at about 20 years of age.

Extensive near-work is a risk factor for the development of myopia at this age.³

In this study, myopia was observed in students aged 12 - 15 years old and those ≥ 16 years old. However, not being a longitudinal study the myopia could not be classified.

Sources of systematic (non-sampling) error in this study include:

1. Coverage of only school-going children;
2. Significant non-participant rate of 21%.

Conclusion

There is a prevalence of refractive error of 1.97% among students of this rural secondary school in South Eastern Nigeria and; despite its limitations this study confirms that myopia is relatively rarer in Africans.

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