

# Pattern of Ocular Abnormalities Among Students Attending Schools for the Hearing Impaired in Ibadan, South-West Nigeria

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## Abstract

**Objective:** To describe the pattern of ocular abnormalities among students attending schools for the hearing impaired in Ibadan, Oyo State, Nigeria. **Materials and Methods:** This was a descriptive cross-sectional study conducted from February to March 2016 among hearing-impaired students who were older than 10 years. Students were selected from four schools using systematic random sampling. The students' sociodemographic characteristics, visual complaints, ocular, and family history were recorded using an interviewer-administered semistructured questionnaire. Ocular examination and refraction was conducted on each student. Data were analyzed using IBM-SPSS Statistics for Windows 22 (IBM Corp., Armonk, NY, USA) with the test of association performed using the chi-square test and level of statistical significance set at  $P$ -value  $<0.05$ . **Results:** A total of 335 students participated in the study. Mean age was  $17 \pm 2.9$  years (range 11–39 years). The prevalence of ocular abnormalities among the participants was 56.1%. These included allergic conjunctivitis 8 (2.4%), retinitis pigmentosa 3 (0.9%), phthisis bulbi 3 (0.9%), cataract 2 (0.6%), and Wardenburg syndrome 2 (0.6%). Seventy-five (22.4%) respondents were with coexisting ocular abnormalities. **Conclusion:** The prevalence of ocular abnormalities was found to be high among the hearing impaired, with refractive error being the most common. It is necessary for the eye care providers and other stakeholders to provide eye health education as well as affordable and accessible eye care services for hearing-impaired students so as to improve their overall quality of life.

**Keywords:** children, hearing impaired, ocular abnormalities, students, visual impairment

## INTRODUCTION

Childhood blindness and visual impairment in developing countries remain a significant public health problem with an estimated 1.4 million blind children below the age of 15 years.<sup>[1,2]</sup> However, this scourge continues to be a concern for eye care professionals, International Non-Governmental Development Organizations, and other eye care workers. While emphasis has been placed on how to address childhood blindness and visual impairment in the general population, little is being done to address them among special needs groups such as the deaf and hearing impaired<sup>[3]</sup> despite the fact that their educational attainment, interpersonal communication, psychosocial well-being, and economic independence are all affected.<sup>[4-7]</sup>

The relationship between deafness and ocular problems is well established with varying nature and prevalence

globally.<sup>[8-11]</sup> However, the increased prevalence of deafness in West Africa has been associated with preventable diseases such as measles, rubella, and meningitis.<sup>[12]</sup> The collective consequence of visual and hearing impairment has been found to be greater on their functional independence than that of a single sensory impairment alone.<sup>[13]</sup>

Communication disorders have been acknowledged as a major public health issue because of their effect on early childhood development as well as restriction of vocational attainment.<sup>[14]</sup> Therefore, these suggest that interventions

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to improve sensory function may improve functional independence.

Data on the prevalence, magnitude, and causes of blindness and severe visual impairment in hearing-impaired persons are needed for planning and evaluating preventive and curative services for such people, and for planning special education and low vision services.<sup>[15]</sup>

## MATERIALS AND METHODS

This was a descriptive cross-sectional study conducted among schools established to cater for the needs of the hearing-impaired citizens of Oyo State, South West Nigeria between February and March 2016. There are six registered secondary schools for the hearing-impaired individuals in Oyo State. A four-stage sampling technique was used to recruit only secondary school students into the study. After adjusting for the nonresponse rate of 10%, a minimum sample size of 335 students was calculated. Four schools were selected from the list of schools by simple random sampling technique. Proportional allocation was used to select the number of students needed from each of the selected schools. Thereafter, students investigated were selected from the class register using systematic random sampling with probability proportion to size.

Ethical approval was obtained from the Ethical Committee of the Oyo State Ministry of Health. Permission was also obtained from the State Ministry of Education and the principals of the various schools included in the study. In addition, written informed consent was obtained from the parents or guardian of each student. Consent was also obtained from each student before enrolment into the study. The study was conducted in line with the declaration of Helsinki for studies on human participants. All students who agreed to participate and had parental/guardian consent were considered eligible to participate in the study.

Visual acuity assessment was performed at a place with good daylight illumination, between the hours of 10 a.m. and 2 p.m. using the standard illiterate Snellen's chart at 6 m. Information on the sociodemographic data of the students including the history of previous ocular diseases were collected from all participants. Thereafter ocular examination was performed with a pen torch and direct ophthalmoscope while objective refraction was performed for respondents with a visual acuity of 6/18 or worse using an autorefractor. Subjective refraction was also performed.

Refractive error included myopia (spherical error of  $-0.50D$  or worse<sup>[16,17]</sup>), hypermetropia (spherical error greater than  $+0.50D$  or worse<sup>[16,17]</sup>), and astigmatism (minus cylinder format; cylindrical error greater than  $0.5D$ <sup>[17]</sup>).

Communication with the students was achieved with the assistance of their teachers using sign language.

Data collected was entered and analyzed using the IBM-Statistical Package for the Social Sciences version 22.0

software (IBM-SPSS Inc., Chicago, IL, United States). Summary statistics are presented using mean and standard deviation as well as frequency tables and charts.

## RESULTS

A total of 335 students attending schools for the hearing impaired participated in the survey comprising 195 (58.2%) males and 140 (41.8%) females (M:F; 1:0.7). Mean age was  $17 \pm 2.9$  years. The age and sex distribution of all respondents are shown in Figure 1.

Two hundred and twenty-eight (68.1%) respondents had a presenting visual acuity better than 6/18 in both eyes at presentation as shown in Table 1.

The proportion of respondents with ocular abnormalities was 188 (56.1%). All the respondents with ocular abnormalities had refractive error. The pattern of refractive error is presented in Tables 2 and 3.

## DISCUSSION

In this study, there were more male participants (58.2%) than female participants which was similar to the findings of Abah *et al.*<sup>[4]</sup> (male: 61.3%, female: 38.7%) and Omolase *et al.*<sup>[9]</sup> (male: 56.9%, female: 43.1%). This preference is at variance to normal hearing school children where the gross enrolment ratio is 1:0.9 for the male-to-female sex.<sup>[18]</sup> This may suggest a higher preference for the education of the male hearing-impaired child. This could have some devastating

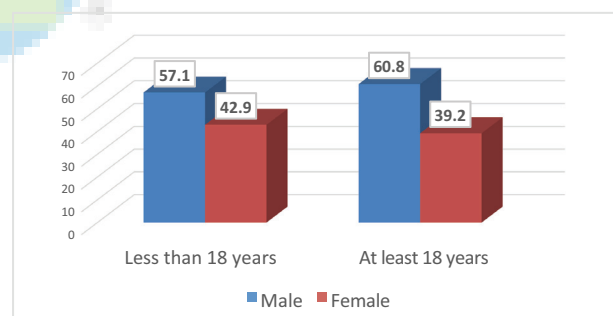


Figure 1: Sex and age distribution of respondents

Table 1: Visual acuity of respondents

|                            | Right eyeN (%) | Left eyeN (%) | Both eyesN (%) |
|----------------------------|----------------|---------------|----------------|
| Presenting visual acuity   |                |               |                |
| >6/18                      | 218 (65.1)     | 223 (66.6)    | 228 (68.1)     |
| 6/18–6/60                  | 104 (31)       | 101 (30.1)    | 101 (30.1)     |
| 6/60–3/60                  | 8 (2.4)        | 4 (1.2)       | 5 (1.5)        |
| <3/60                      | 5 (1.5)        | 7 (2.1)       | 1 (3)          |
| Visual acuity with pinhole |                |               |                |
| >6/18                      | 315 (94)       | 321 (95.8)    | –              |
| 6/18–6/60                  | 7 (3.6)        | 7 (2.1)       | –              |
| 6/60–3/60                  | 4 (1.2)        | 1 (0.3)       | –              |
| <3/60                      | 4 (1.2)        | 6 (1.8)       | –              |

**Table 2: Pattern of refractive errors among hearing-impaired students (N = 335)**

| Abnormalities    | N (%)      |
|------------------|------------|
| Refractive error | 188 (100)  |
| Hyperopia        | 108 (57.5) |
| Myopia           | 54 (28.7)  |
| Astigmatism      | 26 (13.8)  |

**Table 3: Other ocular abnormalities among hearing-impaired students (N = 335)**

| Abnormalities                | N (%)   |
|------------------------------|---------|
| Allergic conjunctivitis      | 8 (2.4) |
| Microphthalmia               | 4 (1.2) |
| Phthisis bulbi               | 3 (0.9) |
| Retinitis pigmentosa         | 3 (0.9) |
| Wardenburg syndrome          | 2 (0.6) |
| Cataract                     | 2 (0.6) |
| Pseudophakia                 | 1 (0.3) |
| Presbyopia                   | 1 (0.3) |
| Corneal scar (postkeratitis) | 1 (0.3) |
| Squint                       | 1 (0.3) |

\*Some respondents had more than one ocular abnormality.

consequences on the development of the hearing-impaired female child, for example, social neglect, financial handicap, teenage pregnancy, etc. These risks were also highlighted by Akinpelu.<sup>[19]</sup>

More than half of the secondary school students were younger than 18 years old. This may also suggest that there is still some preference for educating the hearing-impaired child to at least up to secondary school despite the shortage of learning aids and equipment as well as adequate schools to cater for their educational and social needs.<sup>[20]</sup>

Ocular abnormalities were found among 188 students with a prevalence of 56.1%. This differs from the results of other studies conducted in other states in Nigeria, viz., Lagos,<sup>[21]</sup> Akure,<sup>[9]</sup> Benin,<sup>[10]</sup> and Kaduna<sup>[4]</sup> which showed a prevalence of 34, 73.75, 73.26, and 20.9%, respectively. Moreover, it is higher than the values obtained from similar studies<sup>[12,17,22]</sup> conducted in other continents of the world. This could be due to the fact that developed countries have comprehensive healthcare systems to cater for their citizens. Similar studies<sup>[23-26]</sup> among school children with normal hearing reported a lower prevalence rate than the hearing-impaired children of similar age group. More than half of the respondents had ocular abnormalities, with refractive error being the most common. The pattern of refractive error in this study is similar to the findings of Abah in Kaduna where hyperopia was the most common followed by myopia and then astigmatism. While another study conducted by Omolase in Akure showed that myopia (21.4%) was the most common, followed by hyperopia (11.9%) and astigmatism (4.8%). As at the time of this

study, only about 7.5% of the 56.1% of students with refractive error were still wearing spectacles that were obtained for them by their parent/caregiver after examination at an outside facility. In addition, during the course of this study, it was also observed that there was no established pre-enrolment comprehensive health screening protocol. Therefore, this further confirms that little is being done to address the scourge of preventable and treatable visual impairment among this special group of people who need optimum vision. The prevalence of these ocular abnormalities tends to generally increase with the severity of hearing impairment,<sup>[27]</sup> resulting in significant deprivation of educational attainment and psychosocial well-being. Available evidence suggests that ophthalmologic screening and detection of visual problems in deaf children is important because most of their knowledge is obtained through the senses of sight and hearing, while the remaining can be obtained through other senses, consequently revealing that even a mild refractive error may reduce the visual signals available to the deaf-mute person.<sup>[28,29]</sup> Therefore, regular and periodic visual screening is vital for the early diagnosis and treatment of ocular and other associated abnormalities because having combined hearing and visual impairment causes greater challenge than having either one.

Spectacle prescriptions were given to all students who required glasses, while those without refractive errors and those with appropriate spectacle correction were reassured. Participants with simple ocular pathologies were counseled and treated by the primary investigator, while those that required further subspecialty evaluation were referred to a tertiary hospital using an appropriately filled referral form.

## CONCLUSION

This study has demonstrated that there is still a high prevalence of treatable ocular abnormalities among hearing-impaired students, with uncorrected refractive error being the highest cause of ocular abnormality. Preadmission and periodic comprehensive health screening must be made mandatory at enrolment in schools for hearing-impaired children. Therefore, it is important for the eye care providers and other stakeholders to provide eye care programs for the hearing impaired, such as eye health education and affordable or subsidized eye care services, with the aim of achieving an improvement in their overall quality of life.

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## Conflicts of interest

There are no conflicts of interest.

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