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Research Article

Hearing Assessment of Primary School Pupils in Ibadan North Local Government Area of Oyo State, Nigeria

Akande A.A. and Adeosun A.A.

Department of Otorhinolaryngology, College of Medicine, University of Ibadan. Ibadan, Nigeria.

ABSTRACT

Hearing disorders are common birth defect affecting about 1 to 3 out of every 1000 child births. Hearing represent a critical aspect of the social, educational, economical and cognitive development of the child. This paper studied the hearing threshold, pattern and prevalence of hearing impairment in primary school pupil in Ibadan North local Government area of Oyo state (IBNLGA). This cross-sectional study was carried out in IBNLGA. Two hundred and six primary school pupils were recruited for this study from January 10, 2016 to June 10, 2016. Informed consent was obtained from each pupil's parent and thereafter, otoscopy and Pure tone audiometry (PTA) screening was carried out at the various schools. The data of each child screened was entered into the forms provided (Appendix i and ii) by the research assistants and crosschecked by the researcher. Data was analysed using Statistical Package for Social Science (SPSS) version 20. The percentage of male pupils that participated in the study was 52.9 while that of the female was 47.1. The mean age and ranged observed was 7.7 ± 1.6 years and 4 to 10years respectively. The pupils ages were evenly distributed with 94 pupils (45.7%) were between 4-7 years and 112 pupils (54.3%) were > 7years.The prevalence of hearing impairment in primary school pupils in IBNLGA was found to be 30.1% with females having a higher prevalence of 33.0% and males a lower prevalence of 27.2% respectively. This gender difference was however not statistically significant (X2,0.730, p=0.320). Of the 62 pupils with hearing impairment (hearing loss), 34 (54.8%) had Conductive Hearing Loss (CHL), 22(35.5%) had Sensorineural Hearing loss (SHL) and 6 (9.7%) had Mixed Hearing Loss (MHL). Furthermore, of the 62 pupils with hearing impairment, 29(46.8%) had moderate, 21 (33.8%) had mild, 12 (19.4%) had severe hearing impairment. None of the pupil exhibited slight and profound hearing impairment. The prevalence of hearing impairment in primary school pupils aged between 4-10 in Ibadan North Local Government Area was found to be 30.1%. Conductive hearing loss (CHL) was the most prevalent type of hearing impairment noted seen and in terms of severity, Moderate hearing loss accounted for major percentage of impairment observed

Keywords: *Hearing assessment; primary school pupils; otoscopy: pure tone audiometry*

*Author for correspondence: Email: *Aderemi.adeosun@gmail.com;* Tel: *+ 234 8024954656*

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INTRODUCTION

Hearing disorders are common birth defect affecting about 1 to 3 out of every 1000 child births (Adeosun et al,1999). A number of factors can lead to hearing disorders and about half the time, no cause is found. In the first few years of life, hearing is a critical aspect of a childs social, educational, economical and cognitive development. Even a mild or partial hearing disorders can affect a child's ability to speak and understand the language. Hearing problems can be treated if they are caught early. It is important to get new school entrants screened early and evaluated regularly (Olusanya, Okolo and Adeosun,2000).

In a survey carried out at a school in Mushin local government area of Lagos State, 84.4% out of 120 children had conductive deafness while 15.6% had sensorineural deafness (Adeosun et al, 1999). Olusanya, Okolo and Adeosun, (2000) also reported a 14.0% prevalence of ear diseases amongst pupils in Lagos State

In developed countries, school aged children are screened early for hearing loss and this has improved academic performance (Adams et al,1997). Unfortunately, school aged children are rarely screened for hearing loss in developing countries during routine clinical examination and most school health authorities make no provision for audiometric assessment. (Olusanya,Okolo and Adeosun,2000).

This study is therefore designed to investigate hearing threshold (normal hearing), type, severity and prevalence of

hearing loss in Primary school pupils in Ibadan North Local Government Area of Oyo State (IBNLGA) of Oyo state.

MATERIALS AND METHODS

Ethical Consideration: Ethical approval was sought and obtained from the University of Ibadan/University College Hospital Health Research Ethics Committee before the commencement of the study. Permission was sought and obtained from the head teachers of the primary schools and the parents of the students. The rationale and procedure of this study was explained to the pupils and their parents and their informed consent to participate in the study was obtained prior to data collection.

Research Design and Study population: This cross-sectional study was carried out on Primary school pupils (4-10 years) in Ibadan North Local Government Area of Oyo state that were recruited into the study from January 10th, 2016 to June 10th, 2016.

Study area and setting: The study was conducted in Ibadan North local Government Area of Oyo state, the largest local government area (LGA) out of the 33 LGAs in the state. It has 40 registered primary schools with an annual rate of 4000 school entrants per year.

Sample size determination: The sample size for this study was determined using Leslie Kish (reference) sample size formula below:

$$n = \frac{Z^2_{\alpha/2} P(1-P)}{e^2}$$

where n=required sample size

$Z_{\alpha/2}$=1.96 2(2-sided standard normal value corresponding to 95% confidence level)

p=14.0% (local prevalence obtained by Olusanya, Okolo and Adeosun, 2000)

e=degree of error tolerance at 5%

Based on the equation, a total of 206 participants were recruited into the study.

Sampling method: 2 stage sampling technique was used

Stage 1- The sample size was drawn from 2 schools chosen by simple random sampling. A total of 103 students (4-10yrs) were selected from each school using the school register. The two (2) primary schools selected for the conduct of the study:

1. UCH Staff School, Ibadan.
2. Omolewa Nursery and Primary School, Oritamefa, Ibadan

Stage 2-Purposive sampling technique was used to select all eligible participants in both schools.

Inclusion and exclusion criteria: Pupils between 4-10years present in school at the time/whose parents gave consent were included in the study while all pupils between 4-10years present in school at the time but whose parents declined consent or were sick at the time of d test were excluded.

Data Collection, instruments and Quality control: Data was collated using the non-audiological and audiological instruments.

Non-Audiological instruments

Individual hearing screening form -this includes enough information to identify the child, the screening results, the date of screening and the name and title of screeners.

Roster for each class - this includes school names, age, entrants name, referral and results.

Audiological Examinations.

Otoscopy: The ear canals were examined with an otoscope.The purpose of conducting this test was to detect any pathologies of the outer/middle ear that may require medical attention and to note any conditions that may affect the results of the other hearing tests. .

Pure tone audiometry: It involves the use of an electronic device capable of generating discrete tones of varying frequency and intensity. It is recommended for children that are 3years and above. Duly calibrated pure tone audiometer with TDH-39 ear phones and audiocup for extra attenuation was used. The test was performed in the quietest section of each school. Two-stage audiometric examination was conducted, at the first stage a pass or fail criterion of 20Db was applied to each ear at frequency 0.5,1.0,2.0 and 4.0kHz. A pass represents correct responses to signal at all frequency in both ears. A fail represents no response at one or more frequency in either ear (Adeosun and Fajola, 2007).Those that fail the first stage proceed to second stage where the pure tone audiometry was performed by trained audiologists.

A pure-tone average >15 dB HL at frequencies 0.5-4.0 kHz was considered as failure. Pure-tone averages were classified into one of the following hearing loss categories: slight (16-25 dB HL), mild (26- 40 dB HL), moderate (41- 70 dB HL), severe (71- 90 dB HL), and profound (>90 dB HL). Hearing loss was classified as sensorineural if the airborne gap was <15 dB and conductive if it was >15 dB. Hearing loss was regarded as mixed if the air-bone gap was >15 dB and the bone conduction thresholds were also elevated (>15 dB) (Obukwoho et al, 2016)

Data Analysis: Data was analyzed using IBM Statistical Package for Social Science (SPSS) version 20. Descriptive statistics of mean, standard deviation and percentages were used to summarize the socio-demographic and clinical characteristics of the participants.

Descriptive statistics of proportion and percentages were used to summarise the types and prevalence of hearing disorders. Chi square test was used to describe the association between socio-demographic variables and level of hearing disorders. The level of significance was set at 0.05.

RESULTS

A total number of 206 students participated in the study. 109 pupils (52.9%) were male while 42.15% were female. (Table 1).

The mean age was 7.7 ± 1.6 years with age range from 4 to 10years. (Table 1). The number of pupils was almost equally distributed in all the age groups; 94 pupils (45.7%) were between 4-7 years whereas 112 pupils (54.3%) were > 7years. (Table 1).

Table 1.
Socio-demographics of Primary School pupils in IBNLGA in relation to Hearing status

Characteristics	Normal hearing n (%)	Impaired hearing n (%)	Total n (%)
Age(in years)			
4	3(2.1)	0(0.0)	3(1.5)
5	10(6.9)	3(4.8)	13(6.3)
6	26(18.1)	10(16.1)	36(17.5)
7	34(23.6)	8(12.9)	42(20.4)
8	30(20.8)	14(22.6)	44(21.4)
9	21(14.6)	10(16.1)	31(15.0)
10	20(13.9)	17(27.4)	37(18.0)
Mean age			7.7±1.6
Gender			
Male	79(54.9)	30(48.4)	109(52.9)
Female	65(45.1)	32(51.6)	97(47.1)
Total	144(69.9)	62(30.1)	206

The prevalence of hearing impairment in primary school pupils in Ibadan north local government area was found to be 30.1% (Fig. 1). The prevalence of hearing impairment was higher in females (33.0%) than in males (27.2%) as shown in Table 1. The gender difference was not statistically significant (X2=0.730, p=0.320). Of the 62 pupils with hearing impairment (hearing loss), 34 pupils (54.8%) had Conductive Hearing Loss (CHL), 22(35.5%) had Sensorineural Hearing loss (SHL) and 6 (9.7%) had Mixed Hearing Loss (MHL) (Fig. 2).

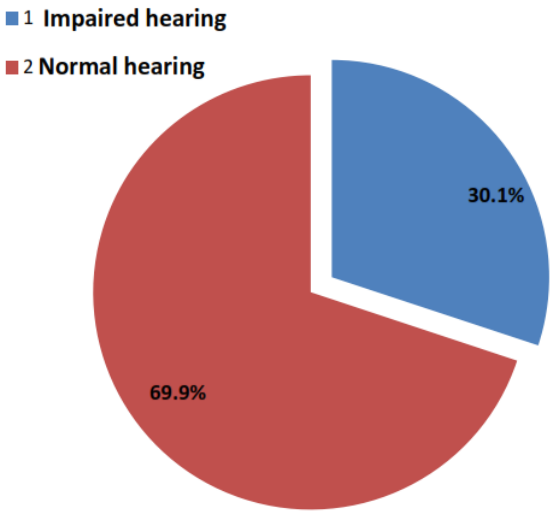

Figure 1.
Prevalence of hearing impairment in Primary School pupils in IBNLGA

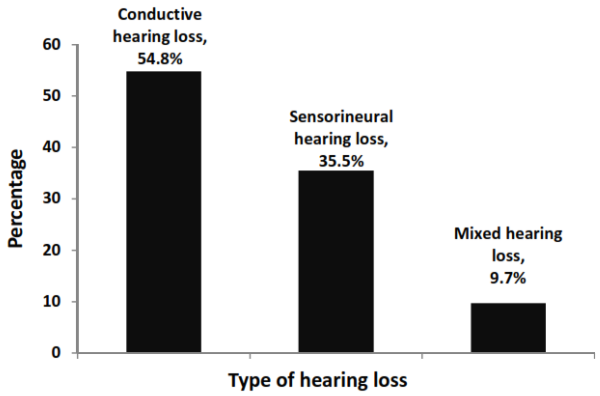

Figure 2.
Type of Hearing loss in Primary school pupils in Ibadan North Local Government Area, Nigeria.

A larger percentage 46.8% (29) of the 62 pupils with hearing impairment had moderate hearing impairment. Twenty-one pupils (33.8%) had mild, 12 (19.4%) had severe hearing impairment. None had neither slight nor profound hearing impairment (Table 2).

Table 2
Severity of hearing loss in Primary School pupils in IBNLGA

Severity of hearing loss	Number of entrants (%)
Slight	0(0%)
Mild	21(33.8%)
Moderate	29(46.8%)
Severe	12(19.4%)
Profound	0(0%)
Total	62(100%)

DISCUSSION

This study showed a high prevalence rate of hearing impairment among primary school pupils which is comparable to that reported by Obukwoho et al,2016 which show prevalence of 29.4% in Port Harcout, Nigeria and Taha et al ,2010 which showed a prevalence of 25.6% in primary school children in Shebin El-Kom district, Egypt. Mourad et al,1993 reported a prevalence of 36.2% in another population of school children (in Alexandra) in Egypt.

The slightly higher prevalence rate observed may be due to the fact that in addition to pure tone audiometry and otoscopy, tympanometry was used in the evaluation of the pupils. Thus, some hearing-impaired pupils with middle ear problems who otherwise might have been missed out were detected by tympanometry. Daud et al, 2010 also reported a lower prevalence of 15% in primary school children in Malaysia. This study, however, included only primary 5 pupils and those with mild hearing loss (20-39 dB HL).

A much lower prevalence rate was reported by studies done in more developed countries such as USA (0.4-0.7%) (Mathers et al, 2000) and South Africa (2.5%) (Prescot and Kibel,1991). This may be as a result of the generally higher standard of living, better access to adequate health care, early screening programs.

Conductive hearing loss was the most common type of hearing impairment seen among the pupils with hearing

impairment in this study (54.8%) while 35.5% had SNHL and 9.7% had MHL. This is similar to the findings reported by a study done in the Western part of Nigeria, which showed CHL to be the most common type (54%) among school children (Akinpelu and Amusa ,2007)

This has also been confirmed by several studies carried out in other countries (Adams et al,1997). In fact, it has been established that CHL is the most common type of hearing loss in young children (Haddad et al, 2004). Research studies have determined that 50% of children less than 5 years of age will experience a conductive hearing loss (Haddad et al,2004).

Most of the pupils (46.8%) with hearing impairment had moderate hearing loss. About 34% (21 pupils) had mild hearing loss while 12 pupils (19.4%) had severe hearing loss. None had slight and profound hearing loss. This finding is comparable to a study done in Tanzania which shows 40.0% moderate hearing loss while 22% had severe to mild hearing loss (Baston et al,1995). Also, in Sierra Leone, 2.58% of children were shown to have mild hearing loss while only 0.65% had moderate hearing loss and 0.5% had severe hearing loss (Seely et al,1995). In Nigeria, in a study which shows the prevalence of hearing loss of 9.3%, only 0.58% and 0.93% of the study population had profound and severe hearing loss respectively (Mathers, Smith and Cancher,2000)

In conclusion, the prevalence of hearing impairment in primary school pupils in IBNLGA was found to be 30.1%. Conductive hearing loss (CHL) was the commonest type of hearing loss seen. Moderate hearing loss accounted for majority of severity of hearing loss.

Routine hearing screening should be carried out in school children for early detection of hearing impairment. This should be implemented as an integral part of the school health program and should be repeated yearly

Acknowledgements

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