INTRODUCTION

Hearing impairment is a very common chronic disorder affecting both pediatric and adult age groups. Its prevalence is comparable to most of the common chronic disorders in the world such as diabetes mellitus, arthritis, and hypertension. According to the World Health Organization (WHO), 360 million persons in the world have disabling hearing loss and 328 million of these are adults mostly in developing countries. Poor health-care systems and paucity of hearing health-care physicians may be the contributing factors. Hearing impairment may be associated with severe physically challenged such as poor or no speech acquisition in children, social, emotional, and economic burden in adults. According to the WHO, hearing impairment is a dysfunction measurable
in the laboratory or clinic, activity limitation is the auditory difficulties experienced by an individual and participation restriction is the nonauditory effect of these on their life.[4]

Hearing loss can be divided into conductive, sensorineural, and mixed. Conductive occurs when there is defect in the sound conducting mechanism of the ear. The lesion could be anywhere from external auditory canal to the footplate of the stapes,[5] usually easily treatable.[6] Sensorineural hearing loss may be due to abnormality in the cochlear, auditory nerve, neural pathway, or their connection with auditory cortex.[6] Moreover, may be associated with grievous consequences usually requiring rehabilitation.[7] Mixed hearing loss is due to abnormality causing both conductive and sensorineural hearing losses.

Hearing loss can be due to congenital or acquired causes. It is congenital in form of hereditary and nonhereditary genetic factors such as maternal rubella and syphilis,[8,9] low birth weight, birth asphyxia, drugs such as aminoglycosides and cytotoxics as well as severe neonatal jaundice.[8,9] Acquired hearing loss may occur at any age and can be due to infectious diseases such as meningitis, measles, and mumps. Others are chronic ear discharge, ototoxicity, noise induced, and aging.[9] Various studies have shown that acquired causes of hearing loss are by far more common than hereditary in the developing countries.[10,11] The primary diagnosis of hearing loss is by auditory testing to detect loss in hearing acuity. Hearing function is measured in decibels and is considered normal if the lowest level (threshold) a sound can be perceived is between 0 and 25 dB.[12] Hearing acuity can be readily measured quantitatively and objectively by numerous physiologic tests, including auditory brainstem response measurements, impedance testing (tympanometry), and otoacoustic emissions (OAE). Currently, there are very few studies on hearing loss in the North Western Nigeria. The aim of this study is to determine the causes and pattern of hearing loss among the patients managed in Ahmadu Bello University Teaching Hospital (ABUTH) Zaria. ABUTH is a tertiary health-care facility in North Western Nigeria and is a referral center to many primary, secondary, tertiary, and private health facilities in Nigeria. Patients present any time of the year. It is one of the busiest teaching hospitals in the North West geopolitical zone of Nigeria, that cover patients from Kano, Katsina, Sokoto, Zamfara, Kebbi, Jigawa, Niger states, respectively and Federa Capital Territory Abuja.

MATERIALS AND METHODS

This was a retrospective descriptive study of patients who were managed for hearing loss at the Division of Otorhinolaryngology, Department of Surgery, ABUTH Zaria, Kaduna State, Nigeria, over a 5-year period between January 2011 and December 2015. Excluded from the study were patients whose case records were either not found or did not have complete information. Ethical approval for the study was obtained on 20th July 2018 from Ahmadu Bello University Teaching Hospital (ABUTH) Ethics committee. During the evaluation of our patients, OAE, pure tone audiometry (PTA), and tympanometry were conducted by the audiology technician. PTA was performed in a soundproof room. A duly calibrated diagnostic audiometer (model number 2111 49, manufactured in November 2004 by GN Otometrics, Copenhagen, Denmark) was applied to each of the two ears of the patients at frequencies of 0.5, 1, 2, 4, 6, and 8 kHz, respectively, and the average of 0.5–4 kHz values was used to determine the level of hearing loss. Tympanicometric test was conducted using tympanometer (tympanometric CE 01232011 EN 60645-5, Class 2 MAICO Saizufer 13/14) and results are plotted automatically as Types A, B, C, A_p, and A_s based on Jergers classification.[13] OAE test result was automatically generated as “pass” or “refer.”

Information obtained from the case files included demographic characteristics such as age and sex. Clinical information included main presenting symptoms, duration, and cause of hearing loss. Findings from PTA were classified into slight/mild (26–40 dB), moderate (41–55 dB), moderately severe (56–70dB), severe (71–90 dB), and profound (91 +dB) hearing losses respectively based on the American Speech-Language-Hearing Association (ASHA) criteria.[12] Findings from OAE tests were interpreted as pass (normal cochlear function) or refer (abnormal cochlear function) findings from tympanometry were interpreted as Type A (normal), Type B (fluid in the middle ear), and Type C (eustachian tube dysfunction).

The data were entered into the spreadsheet and analyzed using the Statistical Package for Social Science version 21.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were summarized as frequencies and percentages and presented as tables. Furthermore, statistical tools of mean, standard deviation (SD) and Fisher's exact test were also used. P ≤ 0.05 was considered statistically significant.
RESULTS

Within the 5-year review of the 277 patients who were managed for hearing loss, only 144 (52%) met the inclusion criteria. There were 86 (59.7%) males and 58 (40.3%) females with sex ratio (M: F) of 1.4:1. The mean age was 29.9 years with SD of ± 2.18. Majority of the patients 82 (56.9%) reviewed were above 20 years of age as shown in Table 1.

The most common cause of hearing loss was presbyacusis (age related) 24 (16.7%) followed by ototoxicity 14 (9.7%), congenital 14 (9.7%), meningitis 14 (9.7%), chronic suppurative otitis media (CSOM) 14 (9.7%), and noise-induced hearing loss 11 (7.6%) [Table 2].

Most of the patients 91 (63.2%) had bilateral hearing loss while 53 (36.8%) had unilateral hearing loss as shown in Table 3.

Sensorineural hearing loss was the most common 124 (77.8%), followed by conductive 24 (16.7%) and mixed 8 (5.5%) hearing losses, respectively. All the types of hearing loss were more common among males compared to females as shown in Table 4.

Using multivariate analysis, there was no statistically significant association between sex of the participants and the type of hearing loss (P > 0.05).

Majority of the patients 94 (64.3%) had mild to moderately severe with the remaining 50 (34.7%) having severe to profound hearing losses respectively as shown in Table 5. All the children whose OAE results revealed “refer” were considered to have a profound hearing loss.

Tympanometric findings showed that 118 (90.8%) and 11 (8.5%) had Types A and B tympanograms, respectively. Only 1 (0.7%) had Type C tympanogram. In up to 14 patients, with CSOM, tympanometric tests were not requested due to ear discharge as shown in Table 6. There was no statistically significant relationship between the ages of the patients and occurrence of Type B tympanogram (P > 0.05).

DISCUSSION

Hearing loss is an important public health concern with substantial economic and societal costs.[14] In infants and children hearing impairment retards language development and educational progress.[14] In adults, it causes difficulties in both professional and social life as well as stigmatization.[14]

Worldwide, the prevalence of hearing loss is more common in adults than the children.[13] Our study found hearing loss to be more common in adults constituting about 57% while 43% were children. This is similar to the findings by Rabbani et al.[15]
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The most common cause of hearing loss in this study was presbyacusis followed by ototoxicity, CSOM, congenital hearing loss, and meningitis. This is comparable to the findings by Adobamen et al. where ototoxicity, CSOM, and presbyacusis were the most common. Similar study from Bangladesh showed that CSOM, otitis media with effusion and idiopathic sudden sensorineural hearing loss were the most common. This may be due to our relatively smaller study population as compared to theirs. Most of the cases of ototoxicity in our study were linked to use of gentamicin and quinine.

From the 144 cases of patients reviewed in this study, 53 (36.8%) had unilateral while 91 (63.2%) had bilateral hearing losses, respectively. This is comparable to the findings by Adobamen et al. in which unilateral and bilateral hearing losses were 32% and 68%, respectively. A similar study by Rabbani et al. in Bangladesh showed that bilateral hearing loss occurred among 76% of their study population.

Sensorineural hearing loss is an extremely common disorder with spectrum of effect ranging from an almost undetectable degree of disability to a profound alteration in the ability to function in society. It is the most common type of hearing loss in this study followed by conductive and mixed, respectively. This was also the findings of several other studies.

Sensorineural hearing loss may be due to wide range of genetic, infectious, vascular, neoplastic, traumatic, toxic, iatrogenic, degenerative, immunologic, and inflammatory pathologies that can affect the cochlea.

Majority of the patients (64.3%) had mild-to-moderate hearing losses. This is in line with the findings of Adobamen et al. where up to 80% of their patients had mild-to-moderate hearing loss. Ogah and Abraham also reported mild-to-moderate degree of hearing loss as the most common in their studies. This may be due to the fact that majority of our patients had presbyacusis which commonly presents with symmetrical mild-to-moderate hearing loss.

Typanometry can be especially helpful in excluding the possibility of a conductive component in patients with profound losses or bilateral losses in the presence of a masking dilemma. In this study, Type A tympanogram was the most common 118 (90.8%) followed by Types B 11 (8.5%) and C 1 (0.7%) tympanograms, respectively. Studies by other workers also showed that Type A tympanogram was the most common followed by Types B and C, respectively. OME is a middle ear disease characterized by the presence of serous or mucoid effusion in the middle ear with intact tympanic membrane and without any signs of acute infection.

Rehabilitating patients with hearing loss is often challenging and may require a significant amount of resources, expertise, and experience. Most of our patients with sensorineural hearing loss were treated with hearing aids fitting, nicotinic acid, and vitamins in addition to adequate counseling. Those with conductive hearing loss were treated with one or more of the following: ear dressing/toileting, antibiotics, adenoidectomy, ventilation tube insertion, and mastoidectomy with significant improvement.

Limitations
Possible biases may have existed in the recorded information. Some patients’ information was missing or not reported by the attending surgeon and this has markedly limited the number of cases included in this study. Furthermore, the sample size may be too small to make population-based conclusions.

CONCLUSION
Age-related hearing loss was the most common cause of hearing loss followed by ototoxicity in this study.
Majority of the patients were adult male with bilateral mild to moderately severe sensorineural hearing loss.

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**Conflicts of interest**
There are no conflicts of interest.

**REFERENCES**