Original Article

Prevalence of Hearing Loss among Newly Diagnosed Highly Active Antiretroviral Therapy (Haart) Naive Adult Patients in Port Harcourt

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Abstract

Background: Numerous studies have reported a relationship between human immune deficiency virus (HIV)/acquired immune deficiency virus (AIDS) and auditory functions. There is a dearth of information on the prevalence of hearing loss among newly diagnosed HAART naïve adult patients. **Aim:** This study therefore provides baseline information on the prevalence of hearing loss among newly diagnosed HAART naïve adult patients in Port Harcourt and serves as a reference for the role of HAART in HIV related hearing loss and for future studies. **Patients and Methods:** This is a prospective cross-sectional study involving 260 participants; 130 newly diagnosed and 130 HIV-negative controls aged 18 to 50 years from two centers in Port Harcourt from July, 2018 to January, 2019. Participants were clerked and diagnostic pure tone audiometry was done. **Results:** The rate of hearing loss was observed with Pure Tone Audiometry to be higher (*P*-value = 0.001) among newly diagnosed HAART naive adult patients 37 (28.5%) in comparison to the control 8 (6.2%). The mean age of all the study participants was 31.80 ± 9.61 years (study group 32.18 ± 10.18 years, control group 31.42 ± 9.12 years). Gender characteristic of participants also showed that males were 46 (35.4%) and females 84 (64.6%) giving a male, female ratio of 1:1.83 among newly diagnosed HAART naive adults, while among the control group there were males 49 (37.7%) and female 81 (62.3%) giving male: female ratio of 1:1.65. The rate of hearing loss at baseline was significantly (*P* = 0.001) higher among 37 HIV-positive HAART naïve patients (28.5%) compared with 8 control patients (6.2%). **Conclusion:** There was significant proportion of hearing loss among newly diagnosed HAART naive adult patients in Port Harcourt.

Keywords: *HAART naïve, hearing loss, prevalence*

Introduction

Highly active antiretroviral therapy (HAART) is a combination of drugs used to suppress replication of human immunodeficiency virus (HIV), the causative agent of acquired immunodeficiency syndrome (AIDS).[1]

A newly diagnosed HIV-positive patient is one just found to be retroviral positive and he is referred to as HAART naive if he has not been exposed to antiretroviral drugs in any form.[2]

According to World Health Organization (WHO), hearing loss is identified when pure tone audiometry (PTA) shows a pure tone average of more than 25 dB in the better ear.[3] Several studies have demonstrated a relationship between HIV/AIDS and auditory functions. However, prospective evaluation of hearing loss in patients with HIV before commencement of treatment is rarely done. This work will shed more light on it also, and will help to determine the role played by the virus in hearing loss.[4]

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Kohan *et al*.[5] conducted a 5-year retrospective study to evaluate otologic diseases in New York and reported the prevalence of hearing loss to be 62.0%. This showed association of hearing loss among HIV patients. However, this study was not done among HAART naïve subjects. A similar study done by Matas *et al.* reported 29.0% prevalence of hearing loss.[6] Suma *et al.* in a study, titled Audio-vestibular functions in HIV-infected patients in India reported 54% prevalence of hearing loss.[7] The same prevalence of 54.0% was reported in Brazil by Matas *et al*.[6] in their study of audiological manifestations in HIV-positive adults. Ongulo *et al*.[8] in a four-month prospective study on hearing disorder in HIV-positive adults in Nairobi Kenya reported a prevalence of hearing loss of 33.5%.

Furthermore, in Nigeria, a study done by Alabi *et al*.[9] on otologic and audiological evaluations among HIV-positive patients in Ilorin, reported a prevalence of 87.0%. Our clinical experience as ENT surgeons in Port Harcourt has shown that majority of patients living with HIV/AIDS present to our various ENT clinics with hearing loss. Meanwhile, there is paucity of information on the hearing loss among HAART naïve subjects in our environment. Besides, research on the prevalence of hearing loss among newly diagnosed HAART naive adult patients in Port Harcourt has not been done and there is no documentation on their hearing status before commencement of HAART. This research, therefore, provides baseline information on the prevalence of hearing loss among newly diagnosed HAART naïve adult patients (before commencement of HAART) and serves as a reference for further related studies in the nearest future.

Patients and Methods

This is a prospective cross-sectional study that involved newly diagnosed HAART naive adult patients aged 18 to 50 years in University of Port Harcourt Teaching Hospital (UPTH) and Rumuigbo health center both in Port Harcourt between July 2018 to January 2019.

Prior to the commencement of the study, ethical approvals were obtained from UPTH and Rivers State primary health management board. Two groups were involved: newly diagnosed HAART naive from HIV clinics and HIV-negative patients matched for age and sex.

Data collected included age, gender, and duration of hearing loss, when first diagnosed with HIV positive and worsening symptoms of hearing loss.

We carried out ear, nose, and throat examinations on all the participants. Subjects excluded from the study were those patients with ear diseases prior to diagnoses of HIV and those who did not give consent to participate in the study. Diagnostic PTA was done for all participants. Audiometric procedure was explained to the participants. The ears were tested separately for bone and air conduction. The threshold was determined using 250, 500, 1,000, 2,000, 4,000, and 8,000 Hz for air conduction and also for bone conduction with exception of 8,000 Hz. This was achieved by Highson–Westlake technique. Pure tone averages were determined by calculating the threshold averages for 500, 1,000, 2,000, and 4,000 Hz. Data was analyzed using SPSS version 20 and represented in simple tables. Statistical significance was done using the Chi square test ($P \leq 0.05$).

Results

The mean age of all the study participant was 31.80 + 90.61 (study group 32.18 + 10.50 year; control group 31.42 + 9.12 years).

The differences in proportions between the age categories in both groups were not statistically significant ($P = 0.685$).

There was also no significant difference in the proportion of males and females between the two groups as males were 46 (35.4%) of the study group and 49 (37.7%) of the control group ($P = 0.797$).

Table 1: Age and gender characteristics of participants

Variables	HIV Status Positive HAART- Naive *n*=130 *n* (%)	Negative Control *n*=130 *n* (%)	Total *n*=260 *n* (%)	Chi square	*P*
Age Category					
≤20 years	20 (15.4)	26 (20.0)	46 (17.7)		
21-30 years	37 (28.5)	35 (26.9)	72 (27.7)	1.550	0.685
31-40 years	43 (33.1)	45 (34.6)	88 (33.8)		
41-50 years	30 (23.1)	24 (18.5)	54 (20.8)		
Sex					
Male	46 (35.4)	49 (37.7)	95 (36.5)	0.149	0.797
Female	84 (64.6)	81 (62.3)	165 (63.5)		

Table 2: Prevalence of hearing loss among participants

Hearing Loss	HIV Status Positive HAART- Naive *n* (%)	Negative Control *n* (%)	Total *n* (%)	Chi square	*P*
Baseline					
Yes	37 (28.5)	8 (6.2)	45 (17.3)	22.601	0.001*
No	93 (71.5)	122 (93.8)	215 (82.7)		

(*P* value=0.001* is statistically significant). The rate of hearing loss at baseline was significantly (*P*=0.001) higher among HIV-positive HAART naïve patients 37 (28.5%) in comparison to the control 8 (6.2%)

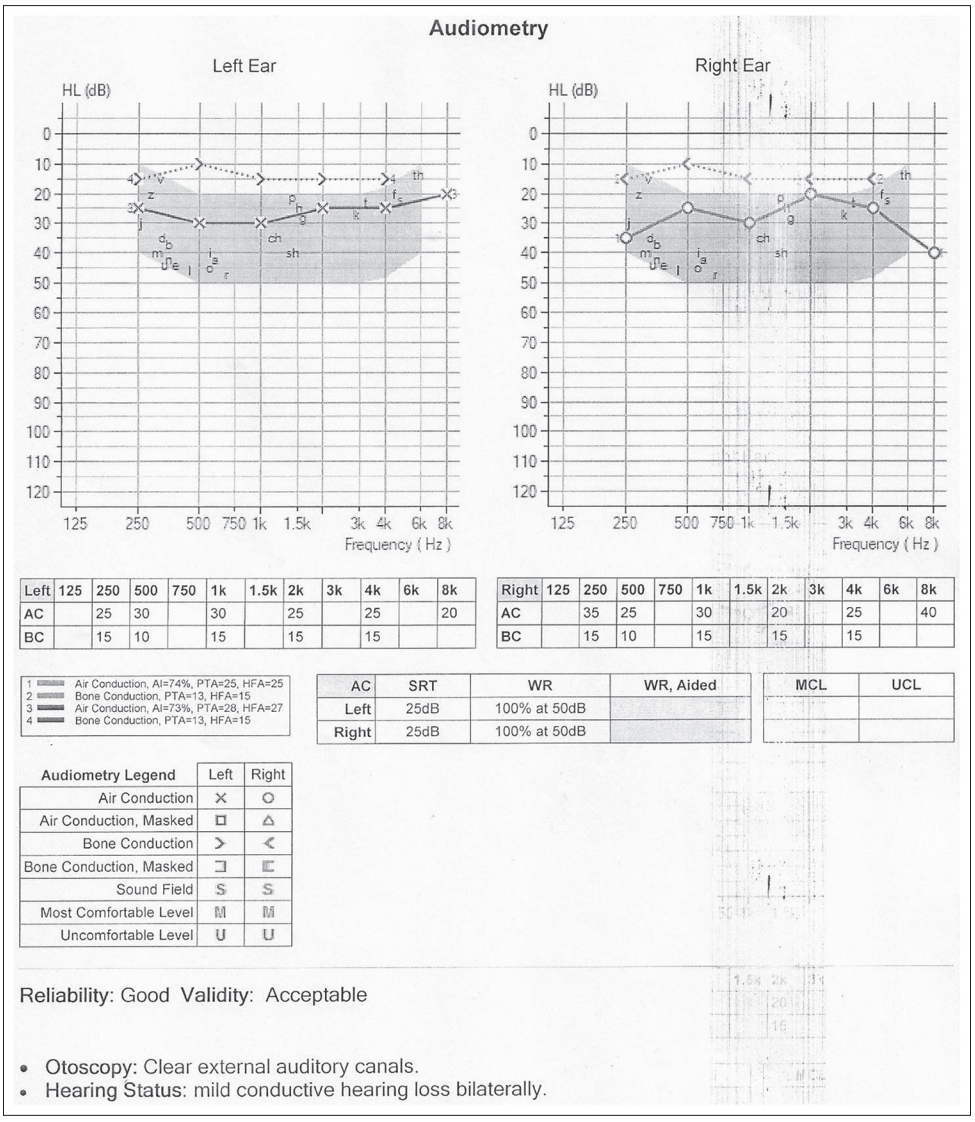

Figure 1: AUDIOGRAM IN STUDY GROUP: It Shows mild conductive hearing loss as the air-bone gap = 20 dB and 15 dB on the right and left audiogram respectively

Table 3: Type of hearing loss among participants

Type of Hearing Loss	HIV Status		Total	Fisher's Exact	*P*
	Positive HAART- Naive *n* (%)	Negative Control *n* (%)	*n* (%)		
Baseline					
Conductive Hearing Loss	23 (62.2)	1 (12.5	24 (53.3)		
Sensorineural Hearing Loss	7 (18.9)	0 (0.0)	7 (15.6)	11.953	0.002*
Mixed Hearing Loss	7 (18.9)	7 (87.5)	14 (31.1)		
Total	37 (100.0)	8 (100.0)	45 (100.0)		

Conductive hearing loss was the predominant type of hearing loss in 23 (62.2%) of HIV-positive HAART naïve subject while mixed hearing loss was predominant hearing loss among the HIV negative control group. The difference in proportion of type of hearing loss between the two groups was statistically *(*P* value ≤ 0.05 is statistically significant)

Discussion

In this study, most of the participants were within the age range of 31 to 40 years among both groups [Table 1]. Mean age for this study was 31.50 ± 9.61 years. Similar report was recorded in Benin City by Obasikene *et al*.[10] in a retrospective cross-sectional study of young adults with HIV, where mean age for the study group was 34.0 ± 7.19 and 35.0 ± 5.69 years for control group. This

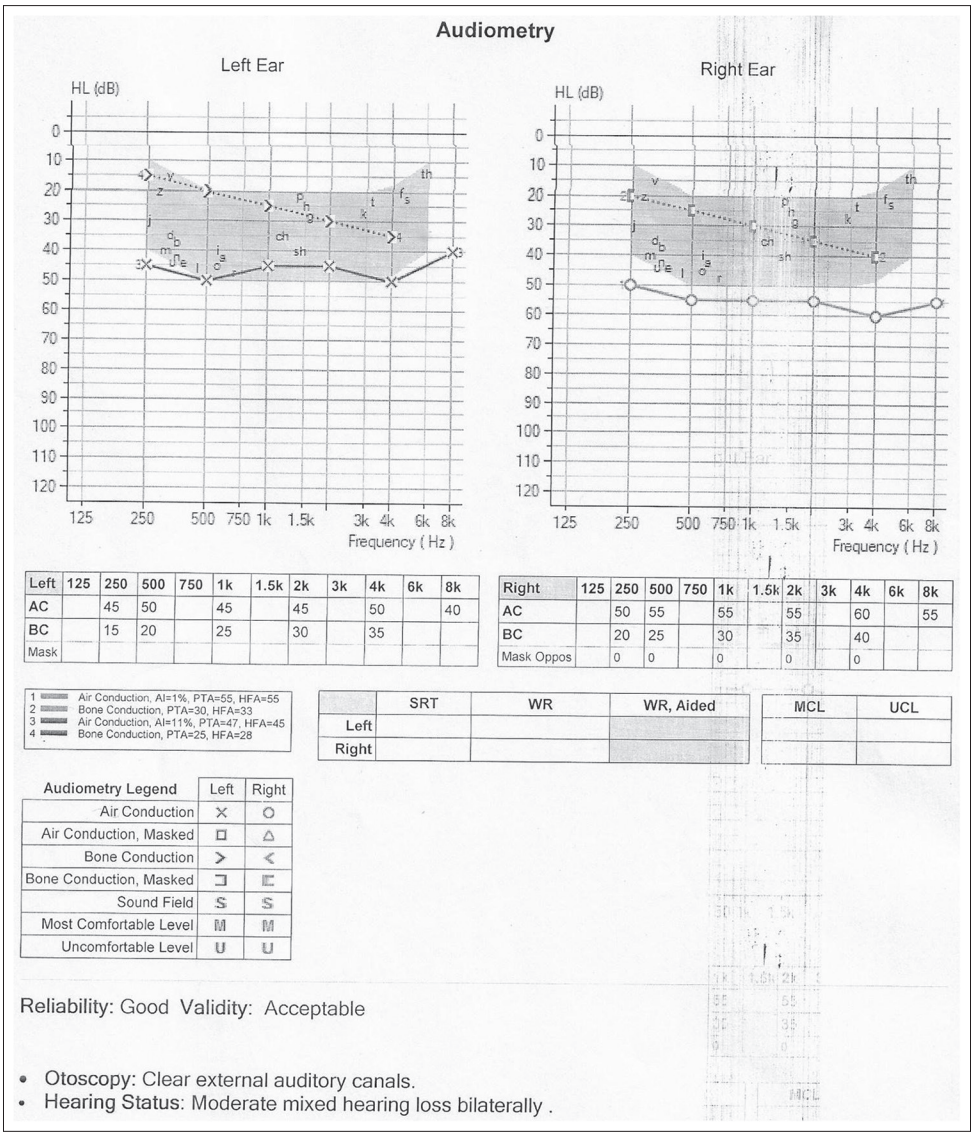

Figure 2: Typical audiogram in control group mixed hearing loss. It Shows mixed hearing loss as there was air-bone gap of 30 dB in both right and left Audiogram with corresponding air-conduction threshold of >25Db respectively

also compares with a study done by Fasunla *et al*.[11] in lbadan, which reported mean age for study group and control as 39.64 ± 12.45 years and 39.60 ± 12.45 years respectively. The similarity with those studies may be due to the fact that they were done among young adults.

Besides, this study showed that in the study group males were 46 (35.4%) and females 84 (64.6%) giving a male: female ratio of 1:1.83 [Table 1], while among the control there were males 49 (37.7%) and females 81 (62.3%) giving male: female ratio of 1:1.65. A similar report was recorded in the study by Ongulo *et al*.[8] involving 194 subjects who were HIV positive but not on ARDs and a control group of 124 HIV-negative subjects. In their study group, males were 75 (38.7%), while females were 199 (61.3%) giving a male: female ratio of 1:1.59; while in the control group, males were 47 (37.7%) and females were 77 (62.1%) giving male: female ratio of 1:1.64. The similarity in these reports could probably be due to similar study group and age range. This is not surprising as Thomas *et al*.[12] had earlier reported that women form an increasing subset of patients with retroviral infection[11] because the gender characteristics of participants obviously displayed female preponderance. In contrast to this, Alabi *et al*.[9] in Ilorin and Nazil *et al*.[13] in India reported a slight male preponderance with male: female ratio of 1.3:1 and 1.5:1 respectively. The slight difference may likely be due to their patient selections; their subjects were both HAART exposed and HAART naive.

In this study, the prevalence of hearing loss was 28.5% among newly diagnosed HAART naïve adults, while for the control group it was 6.2% [Table 2]. This shows that

before commencement of HAART, approximately three in every ten newly diagnosed HAART naïve subjects within the age of 18 and 50 years have hearing loss in Port Harcourt. This is similar to a study in Cameroon by Fakouo *et al*.[14] where 27.2% prevalence of hearing loss was recorded in HIV-positive group and 5.6% prevalence of hearing loss in HIV-negative group.[13] Also, in Kenya, Ongulo *et al*.[8] in a 4-month case–control study involving 194 retroviral-positive patients not on antiretroviral drugs and 124 HIV-negative control aged 18 to 50 years, prevalence of hearing loss was recorded as 33.5% in HIV positive and 8.1% in negative subjects. The relatively similar prevalence may be due to the same age range, similar sample size and duration of study. The prevalence of 4.0% in the general population worldwide as earlier reported by world health organization compares favorably with the prevalence of 6.2% that was observed among the control group[14] that were HIV negative.

In contrast to this study, Alabi *et al*.[9] in Ilorin studied 89 HIV-positive patient aged 18 to 56 years and reported a prevalence of 87% additionally, these subjects may have already been started on antiretrovirals. The difference may be probably due to smaller sample size used in Ilorin. Also, Kohan *et al*.[5] in the USA reported a prevalence of 62%, while that in Brazil by Matas *et al*.[6] recorded a prevalence of 54%. The high prevalence may likely be due to smaller sample size, different study design, and wider age range.

Among the study group, conductive hearing loss 23 (62.2%) was the commonest, while mixed hearing loss 7 (87.5%) was the commonest among the control group [Table 3]. The conductive hearing loss could probably be due to otitis media with effusion and inflammatory processes taking place in the middle ear such as acute or chronic otitis media, which were reported in the past as common otologic diagnosis among the HIV-positive individuals.[14] HIV-positive patients are more susceptible to ear infections such as recurrent acute otitis media and chronic suppurative otitis media. These may arise from unresolved and frequent eustachian tube dysfunctions causing otitis media with effusion which can be complicated to cause a discharging ear. The most common microorganisms implicated in causing chronic suppurative otitis media were P. *aeruginosa* and *Proteus*.[14]

Figure 1 Shows a typical conductive hearing loss audiogram, with air-bone gap of greater than 10 dB with pure tone average of air and bone conduction being more than 25 dB, respectively. Conductive hearing loss is mainly due to otitis media with effusion due to the associated nasopharyngeal lymphoid hyperplasia in patients with HIV infections.

Figure 2 shows a mixed hearing loss audiogram with air-bone gap of more than 10 dB with pure tone average of both bone conduction and air conduction being greater than 25 dB. Mixed hearing loss as observed among the control group could probably be due to exposure to environmental factors such as noise and trauma. A combination of factors responsible for conductive and sensorineural hearing losses are implicated in mixed hearing loss.[15] The sensorineural hearing loss in HIV patients may be due to direct neurotropic effect of HIV on either the central nervous system or peripheral auditory nerve (neurotoxicity). Some drugs used during the treatment of the patient may have neurotoxicity effect thereby causing sensorineural hearing loss.[16]

Conclusion

The proportion of hearing loss among the newly diagnosed HAART naive was higher in comparison with the control group. There was significant proportion of hearing loss among newly diagnosed HAART naive adult patients in Port Harcourt. Three in every 10 newly diagnosed HAART naive adult subjects were found to have hearing loss. To this effect, at least a diagnostic hearing assessment should be carried out on adult patients before commencement of HAART and there is need for subsequent follow up of patients to evaluate their hearing for possible early management and rehabilitation.

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Conflicts of interest

There are no conflicts of interest.

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