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Pattern of Otorhinolaryngological Disorders in HIV Positive Paediatric Patients at the University of Port Harcourt Teaching Hospital (UPTH)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: HIV is a worldwide disease and affects all systems of the body. Despite the high burden of Paediatric HIV in Nigeria, few studies have been done on Otolaryngological disorders in children living with HIV. This study aimed to determine the pattern and prevalence of Otorhinolaryngological disorders among HIV positive paediatric patients and to compare them with age and sex-matched control.
Methods: This was a descriptive cross-sectional case-control study carried out among 130 HIV positive and 130 HIV negative children aged 6 to 15 years at the University of Port Harcourt Teaching Hospital (UPTH). Eligible patients were recruited via a systematic sampling method and matched with HIV negative controls and an interviewer-administered questionnaire was used to extract relevant information. All patients had Otorhinolaryngological examination and CD4 count determination, while children with tonsillar enlargement underwent X-ray of the post nasal space. HIV patients were graded for severity using WHO clinical Staging.

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Results: A higher proportion of the HIV positive patients had allergic rhinitis (66.9% vs.30.8%, p=0.01), pharyngitis (40.8% vs.18.5%, p=0.01), tonsillitis (34.6% vs.20.8%, p=0.013), adenotonsilar disease (24.6% vs. 13.8%, p=0.028), cervical lymphadenopathy (15.4% vs. 5.4%, p=0.001) and otitis media (5.4% vs. 0.8%, p=0.031). There was a significantly higher prevalence of ORL disorders among HIV positive children (95.4%) compared to HIV negative children (78.5%). (P=0.001).
Conclusion: Pattern of ORL disorder appeared similar in both HIV-positive and -negative children. However, the overall high prevalence of the findings among the HIV-positive children required regular ORL assessment in these children.

Keywords: Otorhinolaryngological disorders; HIV; paediatric patients; CD4 count.

1. INTRODUCTION

Human Immunodeficiency Virus (HIV) infection is one of the most widespread diseases globally and has been referred to as the epidemic of the 20th century [1,2]. An estimated 42 million cases occur among adults worldwide with two-thirds of them in sub-Saharan Africa, about 47% of these cases are women and an estimated 1.8 million children less than 15 years of age are said to be affected [3]. The virus destroys and impairs the function of immune cells leading to an immunodeficiency state called Acquired Immune-Deficiency Syndrome (AIDS) in infected individuals [4]. Due to the immaturity of the immune system of young children, they are largely infected perinatally and the dissemination of the virus throughout the various organs may occur very early. HIV is a multisystem disorder and studies have shown that about 80% of patients with HIV infection presents with otolaryngological symptoms [5,6].

The otorhinolaryngological disorders in HIV infection vary widely among infants, young children and adolescents and are due to infection, neoplasms and primary neurologic damage caused by HIV [3]. Children with HIV frequently have recurrent otitis media, chronic rhinorrhoea, parotitis, chronic cough and other common Paediatric otolaryngologic problems like otitis externa, otitis media, rhinosinusitis, oral candidiasis, periodontal and gingival disease, Herpes Simplex Virus infection, oral hairy Leukoplakia, adenotonsillar hypertrophy, cervical lymphadenopathy and parotid gland enlargement [7,8].

An oral disorder like oral candidiasis, commonly known as thrush, is often the first clinical indication of the infection in young children and is a frequently occurring oral disorder of HIV infection in children [5,6,9]. Parotid enlargement could also occur in the neck of children living with HIV and mostly results from benign lymphoepithelial cysts that develop secondary to a benign lymphoproliferative disease [10]. These disorders though also occur in children without HIV may present differently and requiring a high index of suspicion, its frequency of occurrence among HIV positive children causes repeated hospital visits, school misses and often may lead to complications if not anticipated. With the high burden of Paediatric HIV in Nigeria, few studies have been done on otorhinolaryngological disorders in HIV positive children especially in South-South Nigeria [11]. This study was carried out to highlight the pattern and prevalence of otolaryngological disorders in Paediatric HIV positive patients attending the HIV outpatient clinic in UPTH. It will also compare the prevalence of otorhinolaryngological disorders between HIV positive Paediatric patients and age and sex-matched control.

2. METHODOLOGY

This was a hospital-based case-control cross-sectional study carried out over a 6 month period from May to October 2018. The study was carried out at the Paediatric infectious disease consultant clinic and the children outpatient clinic (CHOP) of the University of Port Harcourt Teaching Hospital (UPTH): A 700-bedded tertiary health care centre located at the outskirt of Port Harcourt in the south-south region of Nigeria. It is a major referral centre in Rivers State and offers services to people within and around the neighboring state. The Paediatric infectious disease outpatient clinic operates weekly, every Monday with an average of 40 patients aged 6-15 years, while children outpatient clinic operates from Monday to Friday with an average of 70 patients aged 6-15 years per day. The study consisted of HIV positive children aged 6-15 years who were receiving treatment at the consultant Paediatric infectious disease clinic as subjects and age and sex matched HIV negative children who were receiving treatment at the

Children outpatient Clinics of the University of Port Harcourt Teaching Hospital as controls. Ethical approval for the study was obtained from the Ethics and Research Committee of the UPTH, informed written consent was obtained from the parents/caregivers of the children while a verbal assent was obtained from children who were 7 years old and above. Children with cerebral palsy and those too ill to participate were excluded from the study. Paediatric HIV positive patients were selected by systematic random sampling. This involved the calculation of the sampling interval. This is computed by dividing the total number of patients in the clinic by the required number of patients to be sampled. From the hospital records, an average of 40 HIV positive children aged between 6years to 15years is seen on a weekly basis. In order to attain the sample size, 10 patients were sampled on the clinic day. The sampling interval is 40/10 = 4. The first sample was selected by a simple random sampling via balloting, after which every 4^{th} patient was selected in line with the sampling interval. Patients whose parents declined consents were replaced by the next available patient until the total sample size was obtained. An interviewer-administered questionnaire was used to obtain information on socio-demographic characteristics of the participants, the HIV status, CD4 count and WHO clinical staging of the subjects, while otological, rhinological, oral cavity/ oropharyngeal, laryngeal, head and neck examinations and tympanometry were carried out on all subjects. HIV testing for the controls was done in accordance with the recommended HIV serial testing by the National Guidelines on HIV counselling and testing using the Rapid Diagnostic Kit to ascertain that the controls do not have HIV. The WHO clinical staging of the HIV positive subjects was determined using the documented current clinical staging in the case notes of the subjects and confirmed with the WHO clinical staging of HIV disease in children. [12] They were classified as Stages I, II, III and IV. ORL features were elicited after the various clinical examination and thereafter clinical diagnoses were made based on the documented findings. Those with enlarged tonsillar growth had X-ray of the post nasal space carried out on them. Tympanometry was done on both ears using a tympanometer and the tympanometric graph was obtained for each ear showing the stapedial reflexes. All results were entered into the data tool. Obtained data were entered into Microsoft Excel spreadsheet and then exported to the statistical Package for Social Sciences (SPSS) version 22 for data analysis. Appropriate charts and graphs were used to illustrate categorical variables. Descriptive statistics were used to describe the socio-demographic characteristics of the participants. Chi-square statistics were used to compare the differences in proportions while independent t-test was employed to compare the differences in means across the groups. Odds ratio at 95% confidence interval was computed to determine the strength of association between categorical variables. The statistical significance was set at $p<0.05$.

3. RESULTS

3.1 Demographic Characteristics

A total of 260 children aged 6 years to 15 years were recruited for the study out of which 130 were HIV positive (cases), while 130 were HIV negative (controls). The mean age was 9.98±3.02 for the HIV positive children and 10.35±3.17 for the control group. (t=-0.961, p=0.337). Table 1 shows that there was no statistically significant difference between the proportions of the age and sex categories of the study participants across their HIV status (p=0.708 and p=1.000).

Table 1. Socio-demographic characteristics of study participants

Variables	HIV positive n (%)	HIV negative n (%)	Total n (%)	Chi-square	p-value
Age group					
6-10 years	71 (54.6)	74 (56.9)	145 (55.8)	0.140	0.708
11-15 years	59 (45.4)	56 (43.1)	115 (44.2)		
Sex					
Males	58 (44.6)	58 (44.6)	116 (44.6)	0.001	1.000
Females	72 (55.4)	72 (55.4)	144 (55.4)		
Total	130 (100%)	130 (100%)	260 (100%)		

3.2 WHO Clinical Staging of the HIV Cases/Mean CD4 Count of the Study Population

Of the 130 HIV positive cases, 117 (90.0%) belonged to WHO clinical stage 2, 9 (6.9%) of them were in clinical state 3 and 4 (3.1%) were in clinical state 1. The mean CD4 count of the HIV positive cases was 814.0±468.4 and 911.5±329.0 for the HIV negative controls and this difference was significantly significant (p=0.037).

3.3 Prevalence of ORL Symptoms

In the Tables 2a and 2b, the occurrence of otorrhoea, nasal discharge, sore throat, sneezing, white mouth patches, mouth ulcer, painful swallowing , parotid swelling and cervical swelling were significantly higher (p-values< 0.05) among HIV positive patients in comparison to children who were HIV negative. The rates of occurrence of the different categories of symptoms are shown in the tables.

3.4 Pattern and Prevalence of ORL Disorders

Table 3 shows a similar pattern of ORL disorders among the HIV positive and negative children but the overall frequencies were significantly higher among the HIV positive patients. More of the HIV positive patients 87 (66.9%) had allergic rhinitis when compared to the HIV negative patients 40 (30.8%). Also, 53 (40.8%) of the HIV positive patients had pharyngitis as compared to the HIV negative patients 24 (18.5%). This was statistically significant (p<0.05). Forty-five (34.6%) of the HIV positive patients had Tonsillitis in comparison to 27 (20.8%) of the HIV negative patients (p<0.05). Regarding cervical lymphadenopathy, 20 (15.4%) of the patients who were HIV positive had lymphadenopathy in comparison to 7 (5.4%) of the HIV negative patients that had cervical lymphadenopathy. Other disorders that had a significantly (p<0.05) higher rate among those that were HIV positive included otitis media and oral candidiasis.

3.5 Overall Prevalence of ORL Disorders among the Study Participants

Two hundred and twenty-six (226) subjects had at least one ORL disorders given a prevalence of 86.9% for the entire study population.

3.6 Prevalence of ORL Disorders among HIV Positive and Negative Study Participants

The prevalence of ORL clinical disorders was significantly higher among HIV positive participants 124 (95.4%) in compared to those that were HIV negative 102 (78.5%) (Table 4).

3.7 Tympanometric Findings among the Study Participants

The most common abnormal pattern noticed on tympanometry was the Type B (OME). There was a significantly higher rate of Type B abnormality among those who were HIV positive in comparison to those who were not (p=0.0001) as shown in Table 5.

Table 2a. Prevalence of symptoms in HIV positive and negative study participants

Variables	HIV positive n (%)	HIV negative n (%)	Total n (%)	p-value
Otological symptoms				
Otorrhoea	29 (22.3)	3 (2.3)	32 (12.3)	0.001*
Otalgia	20 (15.4)	12 (9.2)	32 (12.3)	0.131
Itching Ear	9 (6.9)	9 (6.9)	18 (7.1)	1.000
Nasal cavity/Nasopharyngeal symptoms				
Nasal discharge	52 (40.0)	21(16.2)	73 (28.1)	0.001*
Nasal obstruction	33 (25.4)	30 (23.1)	63 (24.2)	0.664
Epistaxis	7 (5.4)	3 (3.2)	10 (3.8)	0.197
Itching nose	16 (12.3)	8 (6.2)	24 (9.2)	0.087
Facial Pain	3 (2.3)	2 (1.5)	5 (1.9)	0.652
Sneezing	18 (13.8)	4 (3.1)	22 (8.5)	0.002*
Noisy breathing	1 (0.8)	2 (3.1)	5 (1.9)	0.176
Rhinorrhoea	2 (1.5)	1 (0.8)	3 (1.2)	0.561

Table 2b. Prevalence of symptoms in HIV positive and negative study participants (Continued)

Variables	HIV positive n (%)	HIV negative n (%)	Total n (%)	p-value
Oral cavity /Oropharyngeal symptoms				
Sore throat	32(28.1)	15(10.4)	47 (18.1)	0.006*
White mouth patches	10 (7.7)	0 (0.0)	10 (3.8)	0.001*
Painful swallowing	12 (9.2)	0 (0.0)	12 (4.6)	0.001*
Mouth ulcer	9 (6.9)	0 (0.0)	9 (3.5)	0.002*
Refusal to feed	4 (3.1)	0 (0.0)	4 (1.5)	0.044*
Dysphagia	1 (0.8)	0 (0.0)	1 (0.4)	0.316
Itching throat	0 (0.0)	1 (0.8)	1 (0.4)	0.316
Odynophagia	1 (0.8)	0 (0.0)	1 (0.4)	0.316
Laryngeal symptoms				
Voice change	1 (0.8)	2 (1.5)	3 (1.2)	0.561
Hoarseness	1 (0.8)	0 (0.0)	1(0.4)	0.316
Head and neck symptoms				
Parotid swelling	27 (20.8)	1 (0.8)	28 (10.8)	0.001*
Cervical swelling	11 (8.5)	5 (3.8)	16 (6.2)	0.001*

**Statistically significant*

Table 3. Prevalence and pattern of various ORL clinical disorders in HIV positive and negative study participants

Variables	HIV positive n (%)	HIV negative n (%)	Total n (%)	p-value
Otological				
Perforated TM	10 (7.7)	4 (3.1)	14 (5.4)	0.990
Otitis media	7 (5.4)	1 (0.8)	8 (3.1)	0.031*
Otomycoses	3 (2.3)	0 (0.0)	3(1.2)	0.081
Nasal cavity/Nasopharyngeal				
Allergic Rhinitis	87 (66.9)	40 (30.8)	127 (48.8)	0.001*
Adenotonsillar Disease	32 (24.6)	18 (13.8)	50 (19.2)	0.028*
Oral cavity/Oropharyngeal				
Pharyngitis	53 (40.8)	24 (18.5)	77 (29.6)	0.001*
Tonsillitis	45 (34.6)	27 (20.8)	72 (27.7)	0.013*
Inflamed soft palate	22 (16.9)	6 (4.7)	28 (10.5)	0.001*
Oral candidiasis	5 (3.8)	0 (0.0)	5 (1.9)	0.024*
Granular PPW	1 (0.8)	1 (0.8)	2 (0.8)	1.000
Head and neck				
Cervical lymphadenopathy	20 (15.4)	7 (5.4)	27 (10.4)	0.001*
Parotitis	5 (3.8)	1 (0.8)	6 (2.3)	0.099

**Statistically significant*

Table 4. Prevalence of clinical disorders among HIV positive and negative study participants

Presence of disorders	HIV positive n (%)	HIV negative n (%)	Total N (%)	Chi-square	p-value
Yes	124 (95.4)	102 (78.5)	226 (86.9)	16.37	0.001*
No	6 (4.6)	28 (21.5)	34 (13.1)		
Total`	130(100%)	130(100%)	260(100%)		

**Statistically significant*

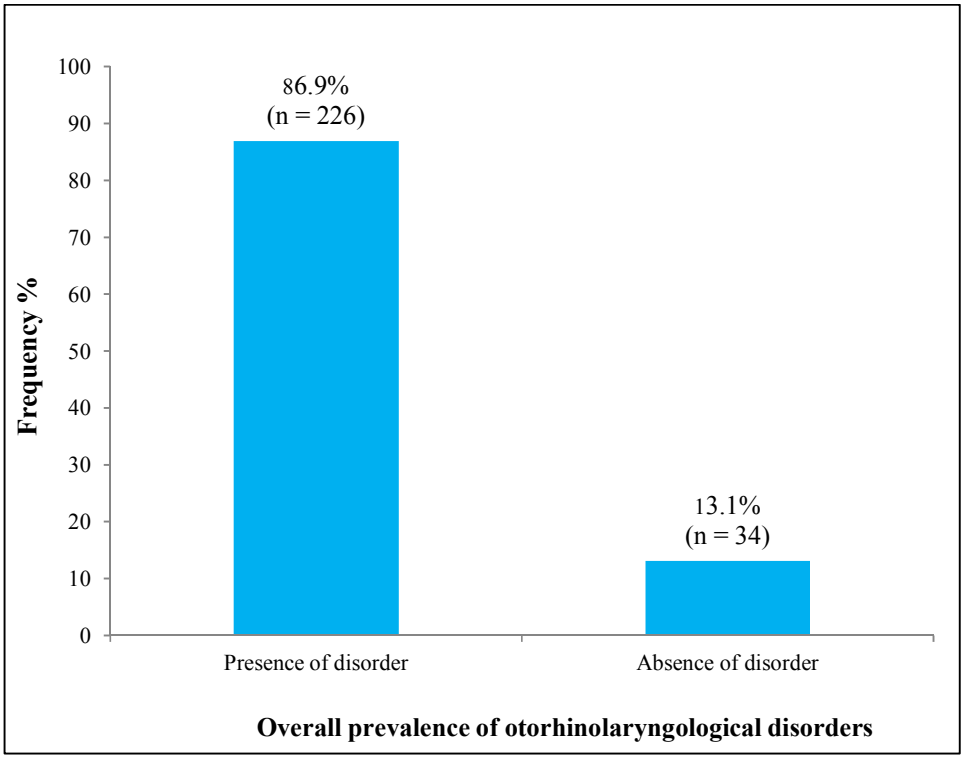

Fig. 1. Overall prevalence of ORL disorders in all study participants

Table 5. Tympanometry findings among HIV positive and HIV negative study participants

Tympanometry findings	HIV positive n (%)	HIV negative n (%)	Total n (%)	Fisher's exact p-value
Type A (Normal)	73 (56.2)	115 (88.5)	188 (72.3)	
Type B (OME)	55 (42.3)	13 (10.0)	68 (26.2)	0.001*
Type C (ETD)	2 (1.5)	2 (1.5)	4 (1.5)	
Total	130 (100)	130 (100)	260 (100)	

**Statistically significant*
OME: Otitis media with effusion
ETD: Eustachian tube dysfunction

Table 6. Relationship between HIV staging and presence of ORL disorders among HIV positive study participants

HIV staging	Have disorder n (%)	No disorder n (%)	Total n (%)	Chi-square	p-value
Stage 1	4 (3.3)	0 (0.0)	4 (3.1)		
Stage 2	111 (90.2)	6 (85.7)	117 (90.0)	0.822	0.663
Stage 3	8 (6.5)	1 (14.3)	9 (6.9)		

Table 7. Comparison of mean CD4 count by presence or absence of ORL disorders among HIV positive study participants

	ORL disorder			
Variable	**Present Mean ± SD**	**Absent Mean ± SD**	**T**	**p-value**
CD4 count	785.17±462.29	930.00±401.38	-0.753	0.453

SD – Standard Deviation

3.8 HIV Staging and the Presence of Disorders among HIV Positive Participants

There was no statistically significant association found between HIV staging and presence of ORL disorder (p=0.663) (Table 6).

3.9 Comparison of Mean CD4 Count between HIV Patients with and without ORL Disorders

The mean CD4 Count was lower in HIV patients with ORL Disorders in comparison to those without. However, this difference in mean was not statistically significant (p=0.453).

4. DISCUSSION

The HIV positive patients involved in this study had a higher prevalence of otorhinolaryngological (ORL) disorders. The pattern of occurrence included allergic rhinitis, pharyngitis, tonsillitis, adenotonsillar disease and cervical lymphadenopathy. Others were Epistaxis, sore throat, parotitis, otitis media and oral candidiasis. This pattern of occurrence of ORL disorders among HIV positive patients is similar to that found in the HIV negative patients. This study shares the views of other authors who reported the occurrence of these disorders in a large number of HIV positive patients involved in their study [13,14]. However, apart from the excessive production of IgE in HIV positive children, the black soot (air pollution) prevalent in this region may have also contributed to the high prevalence of allergic rhinitis in this study [15]. Furthermore, findings in this study differ significantly from the findings of other authors who reported common otorhinolaryngological disorders in their studies to be cervical lymphadenopathy, otitis media and oropharyngeal candidiasis [5,14,16].

The high prevalence (95.4%) of ORL disorders among HIV positive children found in this study is similar to the findings of Alabi, et al. [3] who reported a prevalence of 83.1% among HIV positive patients. However, the various ORL disorders were different probably due to the small sample size in their study and wider age range among the subjects. Taipale et al. [13] also reported a similar prevalence of 92.0% for ORL disorders in HIV positive children as compared to 78% who were HIV negative, similar to the finding (78.5%) of this study.

The present study found that most of the ORL disorders in HIV positive patients belonged to WHO clinical stage 2. Most of the children in this study were on HAART and were clinically stable; this may have contributed to the clinical staging of many of the children with ORL disorders. This finding is similar to that of Tshifularo, et al. [17] who reported that ORL disorders in their study corresponded to WHO HIV clinical stages I and II, however, there existed disparity in the prevalence of ORL disorders in both studies.

This study found that Otitis media with effusion (OME) was the commonest abnormality on tympanometry among the study participants and this was contributed to mainly by HIV positive patients. Other authors [18,19] have shown this and is said to contribute to eustachian tube disorders (ETD) which may lead to hearing impairment among children with severe HIV disease. However, in this study very few patients had ETD and this is probably due to the fact that many HIV patients in this study population were well controlled on HAART and belonged to WHO clinical stage 2 which indicates a good response to HAART or an early disease stage.

Although the mean CD4 count was lower in those with otorhinolaryngological disorders among children with HIV infection in this study, this was however not statistically significant. A study by Yamini, et al. [20], reported that as the CD4 count of the HIV positive children increased, the ORL manifestations in these children reduced. Highly active antiretroviral therapy (HAART) leads to suppression of viral loads and elevated levels of CD4 count, thereby causing a reduction in the rate of otorhinolaryngological disorders [21]. This result shows that with effective management using HAART in children, CD4 count improves with a consequent decrease in the occurrence of otorhinolaryngological disorders [19]. It implies that management efforts for HIV positive patients should be largely targeted at the suppression of the viral load and improving the CD4 count of the patients, which inadvertently ensures that the dissemination and destructive effects of the virus are drastically reduced. It also implies that measures be put in place to ensure prompt diagnosis and prophylactic treatment of HIV positive infants in order to prevent dissemination of the virus and its nefarious activities and thus prevent the occurrence of disorders in these infants [3,6].

5. CONCLUSION

There is a similar pattern of ORL disorders among the HIV positive and negative children but there is a preponderance of ORL disorders among HIV positive Paediatric patients at the

University of Port Harcourt Teaching Hospital, with allergic rhinitis being the most common disorder noticed. Also, the prevalence of ORL disorders was significantly higher among HIV positive patients than in HIV negative patients. It is therefore recommended that there should be a high index of suspicion for ORL disorders by physicians who care for children with HIV infections and regular routine ORL Screening should be conducted among children attending Paediatric HIV clinic.

CONSENT AND ETHICAL APPROVAL

Ethical approval for the study was obtained from the Ethics and Research Committee of the UPTH, informed written consent was obtained from the parents/caregivers of the children while a verbal assent was obtained from children who were 7 years old and above.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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