

Characteristics and Management of Childhood Tinnitus in a Developing Country

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Abstract

Objectives: Tinnitus is a commonly neglected otologic symptom among children in developing country. This study aimed at determining the prevalence, clinical characteristics, diagnosis and management of childhood tinnitus in a developing country.

Method: This prospective hospital based study of patients' age 18 years and below with complaints of tinnitus was conducted in Ear, Nose and Throat Department of Ekiti state University Teaching Hospital, Ado Ekiti, Nigeria between April 2016 to March 2018. The parents/guardians/patients were briefed about the scope of the study. After getting oral consent, pretested interviewers assisted questionnaire was administered to collect data. Data obtained were collated and analyzed using SPSS software version 18.0 and was expressed in simple tables and charts.

Results: Prevalence of tinnitus in this study was 6.2%. There were 56.1% males and male to female ratio was 1.5:1. Majority 55.3% had single episode of tinnitus and long duration (>3 months) was commonest form of tinnitus in 59.1%. Bilateral tinnitus was recorded in 68.9% while subjective tinnitus constituted 93.9%. Discrete tinnitus was commoner in 67.4%. Major causes of tinnitus were febrile illnesses, otitis media, noise exposure, unknown (idiopathic), earwax impaction and ototoxicity in 19.7%, 16.7%, 15.9%, 14.4%, 12.9% and 9.8% respectively. A commonest tympanometric finding was type A in 72.7% of patients. Commonly affected quality of life were anxiety, depression and attention problem in 51.5%, 43.2% and 40.2% respectively. Associated comorbid illnesses in this study were 50.8% sleeping disorders, 42.4% concentration disorders and 31.1% headache. Referrals were mainly from paediatrician in 44.7%. Prehospital treatment was mainly medication in 62.1%. All the patients were counselled (assured). Other treatments given were conservative treatment, surgery, ear syringing and hearing aids in 56.1%, 15.9%, 12.9% and 9.1% patients respectively.

Conclusion: Childhood tinnitus is caused by preventable diseases. At presentation there were associated hearing impairment, comorbid illnesses and affectation of quality of life.

Keywords: tinnitus, children, hearing impairment, ear symptoms.

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INTRODUCTION

Tinnitus is said to occur when there is perception of abnormal sound in the absence of external stimuli around the patients. Patients may describe the sound as buzzing, ringing, roaring, clicking, pulsations, and other noises/sound in the ear, or inside the head^{1,2}. It is a common clinical complaint among children but often neglected or overlooked in children worldwide³. Tinnitus in children was rarely spontaneous in nature and does not progress to adult tinnitus⁴⁻⁶.

Generally, studies indicate tinnitus to be relatively common in childhood. Prevalence of tinnitus in children in previous studies varies from 7% in children age 5 to 17 years to 34% in children age 6 to 16 years in children with normal hearing^{7,8}. Tinnitus has also been reported in up to 66% in further children with hearing loss⁹. There were conflicting reports on prevalence of tinnitus in children. Some argued that the prevalence figures in children were underestimated owing to communication difficulties in children, while other argued that the tinnitus prevalence was over-reported in an effort to please the examiner¹⁰.

Tinnitus can be objective or subjective in nature. Objective tinnitus can be caused by sounds generated in the body that reaches the ear through conduction in body tissue¹¹. Subjective tinnitus is a phantom sensation, where abnormal neural activity is generated either in the ear, the auditory nerve, or the central nervous system¹². Subjective tinnitus and it can occur with hearing loss such as may occur after exposure to loud sounds, administration of drugs (ototoxicity).

Tinnitus may also be due to a variety of pathologies such as illnesses, noise medications, ageing, allergies, dietary changes, stresses, or traumatic events. Tinnitus is often caused by pathologies related to the ear, head, and neck organ disorders like: head trauma or whiplash. Other most common causes of tinnitus is noise exposure. Noise of long or short term exposure can produce substantial and irreparable damage to the delicate inner ear outer hair cells.

Tinnitus dramatically decreases the quality of life of the affected children which resulted in social isolation and when worst it gives rise to psychological disorders¹³. Associated psychological factors include insomnia, anxiety, depression, worry, listening and attention problems¹⁴. Psychological effect of tinnitus on group of children with normal hearing was more than those with impaired hearing¹⁵. Common accompanying morbidities include sleeping and concentration disorders in learning abilities and school grades. Tinnitus also leads to headache, dizziness and vertigo¹⁶.

Majority of the affected children developed one or more coping strategies by suppressing the tinnitus by using external sound from small transistor, radio, television set and phone. They also distracted attention from tinnitus by playing with peers or reading. Tinnitus management in paediatric usually required multidisciplinary approaches¹⁷.

Tinnitus in children is often associated with hyperacusis and has also been associated with otitis media¹⁸.

Despite increase in number of children presenting with tinnitus worldwide there is paucity of literature on tinnitus in developing countries. This study aimed at determining the prevalence, clinical characteristics and diagnosis of tinnitus in a developing country.

METHODOLOGY

This was a prospective hospital based study of patients age 18 years and below with complaints of tinnitus. The study was conducted in ear, nose and throat department of Ekiti state university teaching hospital, Ado Ekiti, Nigeria.

This study was conducted over a period of two years during the months of April 2016 to March 2018.

The parents/guardians/patients were briefed about the scope of the study. After getting oral consent pretested interviewers assisted questionnaire was administered. Data obtained includes their bio-data and age at first presentation. Other information collected includes duration, onset, nature, relieving and aggravating factors of the tinnitus. Past medical, surgical, drugs, hospitalisation, family and social history were also obtained.

This was followed by otorhinolaryngological, head and neck examination while detailed ear examination with an Otoscope was performed. Aural and periaural auscultation was also done with stethoscope to exclude bruit.

The hearing evaluations were done which included tympanometry and pure tone audiometry for frequencies ranging from 250 Hz to 8.0 kHz were indicated. The findings were documented.

In this study, numbers and codes were assigned to each variable. Data entry was done in Excel spread sheet. Data was later transformed to SPSS (Statistical Package for Social Sciences) software version 18.0. Descriptive statistics was used to present the data. Data was analyzed and was expressed as simple tables and charts.

For this study, ethical clearance was sought for and obtained from the ethical committee of the hospital.

RESULTS

A total of 2,123 patients were seen in ear, nose and throat clinic during the study period, 132 children presented with tinnitus and were enrolled into the study. Their age ranged between 6-18 years with a mean of 14.2 ± 3.30 SD. Prevalence of tinnitus in this study was 6.2%. Tinnitus affected all the age group in this study. The peak age group was age 16-18 years in 67 (50.8%) of patients. Figure 1 showed the age group distribution of the patients.

There were 74 (56.1%) males and 58 (43.9%) females given a male to female ratio of 1.5:1. Christian faith

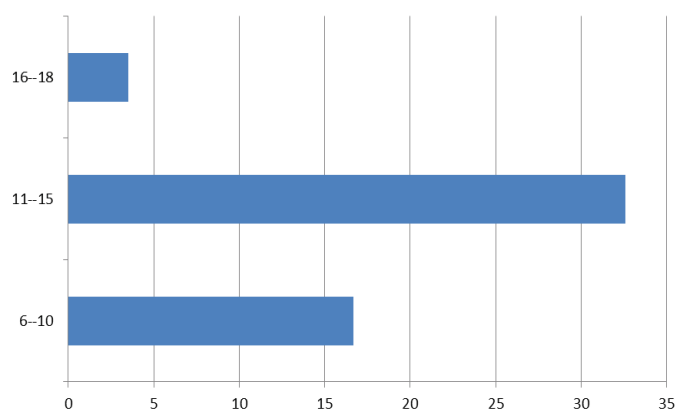


Figure 1. Age group distribution of the patients.

115 (87.1%), predominate over Muslim faith 17 (12.9%). Majority 71 (53.8%) were urban dwellers while minority 61 (46.2%) were rural dwellers. Based on parent education status, primary, post-secondary and secondary were 38 (28.8%), 34 (25.8%) and 31 (23.5%) respectively. Majority of the studied parents were civil servant in 49 (37.1%), artisan in 32 (24.2%) and business in 23 (17.4%). See Table 1 on sociodemographic features.

Minority 59 (44.7%) of the studied patients had recurrent/persistent tinnitus while 73 (55.3%) had single episode of tinnitus. Long duration (>3 months) was commonest form of tinnitus in 78 (59.1%) followed by 43 (32.6%) in 3 months duration. Bilateral tinnitus was commonest in 91 (68.9%) followed by right tinnitus in 27 (20.5%) and left tinnitus in 14 (10.6%). Subjective tinnitus constituted 124 (93.9%) while objective tinnitus constituted 8 (6.1%). Discrete tinnitus was commoner in 89 (67.4%) than multiple (musical) tinnitus in 43 (32.6%). Intermittent tinnitus in 86 (65.2%) was commoner than continuous tinnitus in 46 (34.8%). Non pulsatile tinnitus was commonest and accounted for 123 (93.2%) than pulsatile tinnitus in 9 (6.8%). Ringing tinnitus was commonest in 72 (54.5%) followed by clicking tinnitus in 37 (28.0%) and roaring tinnitus in 14 (10.6%). This is shown in Table 2.

In this study major causes of tinnitus were febrile illnesses, otitis media, noise exposure, unknown (idiopathic), earwax impaction and ototoxicity in 26 (19.7%), 22 (16.7%), 21 (15.9%), 19 (14.4%), 17 (12.9%) and 13 (9.8%) respectively. Less common causes were 6 (4.5%) ear trauma and 5 (3.8%) dental procedure. This is illustrated in Table 3.

In this study, commonest tympanometric findings was 96 (72.7%) type A followed by 28 (21.2%) type B and 8 (6.1%) type C. Pure tone audiometry findings revealed normal hearing in 38 (36.4%) while sensorineural hearing loss and conductive hearing loss accounted for 64 (48.5%) and 15 (11.4%) respectively. Further analysis revealed 32 (24.2%) mild hearing loss, 14 (10.6%) moderate hearing loss and 9 (6.8%) moderate severe hearing loss. Others were severe hearing loss in 7 (5.3%) and profound hearing loss in 2 (1.5%). Table 4 illustrated audiometric findings among patients.

Table 1. Sociodemographic features of the patients (N=132).

Sociodemographic features	Frequency (N)	Percentage (%)
Sex		
Male	74	56.1
Female	58	43.9
Religion		
Christian	115	87.1
Muslim	17	12.9
Residential		
Urban	71	53.8
Rural	61	46.2
Parent education level		
Nil	29	22
Primary	38	28.8
Secondary	31	23.5
Post-secondary	34	25.8
Parents occupation		
Applicant	12	9.1
Business	23	17.4
Artisan	32	24.2
Civil servant	49	37.1
Farming	16	12.1

Table 2. Patterns of tinnitus among patients (N=132).

Pattern of tinnitus	Frequency (N)	Percentage (%)
Recurrence		
Single episode	73	55.3
Recurrent	59	44.7
Duration		
1 month	11	8.3
3 months	43	32.6
>3 months	78	59.1
Laterality		
Bilateral	91	68.9
Right	27	20.5
Left	14	10.6
Types		
Subjective	124	93.9
Objective	8	6.1
Form		
Discrete	89	67.4
Multiple	43	32.6
Occurrence		
Intermittent	86	65.2
Continuous	46	34.8
Nature		
Pulsatile	9	6.8
Non pulsatile	123	93.2
Quality		
Beating	9	6.8
Ringing	72	54.5
Roaring	14	10.6
Clicking	37	28

In this study majority of the affected quality of life were anxiety, depression and attention problem in 68 (51.5%), 57 (43.2%) and 53 (40.2%) respectively. Others were 43 (32.6%) social isolation and 39 (29.5%) worry. This is illustrated in Figure 2.

Comorbid illnesses recorded with tinnitus in this

Table 3. Aetiology of tinnitus among patients.

Aetiology	Frequency (N)	Percentage (%)
Febrile illnesses	26	19.7
Ear trauma	6	4.5
Noise exposure	21	15.9
Ototoxicity	13	9.8
Dental procedure	5	3.8
Unknown	19	14.4
Earwax impaction	17	12.9
Otitis media	22	16.7
Patulous Eustachian tube	3	2.3

Table 4. Audiometric findings among tinnitus patients (N=132).

Audiometric findings	Frequency (N)	Percentage (%)
Tympanometry		
Type A	96	72.7
Type B	28	21.2
Type C	8	6.1
Types of hearing loss		
Normal	48	36.4
Sensorineural hearing loss	64	48.5
Conductive hearing loss	15	11.4
Mixed hearing loss	5	3.8
Degree of hearing loss		
Normal (<26 dB)	48	36.4
Mild (26-40 dB)	32	24.2
Moderate (41-55 dB)	14	10.6
Moderate severe (56-70 dB)	9	6.8
Severe (71-90 dB)	7	5.3
Profound (>90 dB)	2	1.5

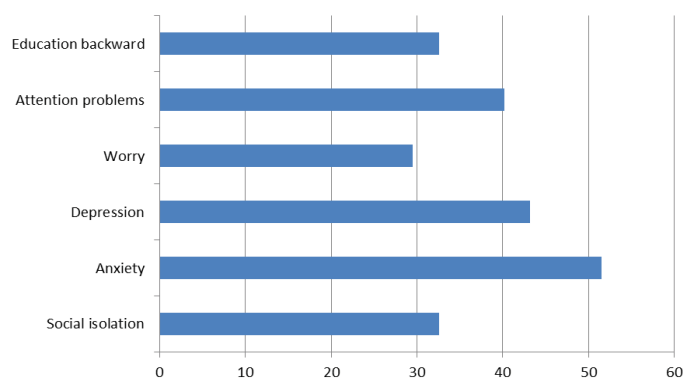


Figure 2. Quality of life among tinnitus patients.

study were sleeping disorders in 67 (50.8%), concentration disorders in 56 (42.4%) and headache in 41 (31.1%). This is illustrated in Figure 3.

Referral were mainly from paediatrician, general practitioners and self-reports in 59 (44.7%), 46 (34.8%) and 23 (17.4%) respectively. Prehospital treatment were medication in 82 (62.1%), no treatment in 39 (29.5%) and hearing aids in 11 (8.3%). Levels of prehospital treatment dissatisfaction were no treatment in 89 (67.4%), medication in 18 (13.6%) and hearing aids in 9 (6.8%). Commonest treatment offered to patients was counselling (reassurance) in all the patients. Other treatment were conservative treatment, surgery, ear syringing and hearing aids in 74 (56.1%), 21 (15.9%), 17 (12.9%) and 12 (9.1%) respectively. See Table 5 for the illustration.

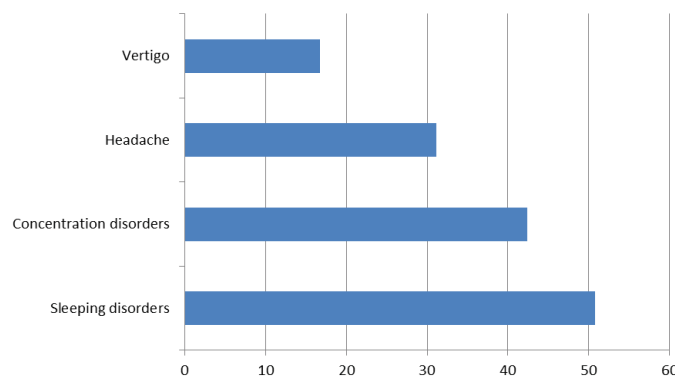


Figure 3. Comorbid illnesses among tinnitus patients.

Table 5. Pattern of management of tinnitus patients (N=132).

Management	Frequency (N)	Percentage (%)
Referral		
Self-reports	23	17.4
General practitioners	46	34.8
Psychiatrist	4	3
Paediatrician	59	44.7
Previous treatment		
No treatment	39	29.5
Medication	82	62.1
Hearing aids	11	8.3
Previous Rx dissatisfaction		
No effect	89	67.4
Medication	18	13.6
Hearing aids	9	6.8
Treatment		
Counseling	132	100
Conservative	74	56.1
Ear syringing	17	12.9
Hearing aids	12	9.1
Surgery	21	15.9

DISCUSSION

Tinnitus in children is a common otological symptom with possible varying pattern of presentation in adult and children worldwide. This study revealed a prevalence of 6.2% in the studied paediatric patients. In this study, all paediatric age group with or without hearing impairment were studied. Different studies reported varied prevalence up to 70.0% within which the prevalence in this study falls¹⁹⁻²¹. The observed prevalence in those studies depended on associated otological diseases and patients age group. These otologic diseases may be associated with or without hearing impairment.

In this study, increases in prevalence of observed tinnitus increase with patient's age. Similar findings were reported by previous research work²²⁻²⁵. The reason may be that older children tend to identify tinnitus as an abnormal sensation. The younger children with tinnitus complaint were less than older ones. The younger children thought tinnitus experiences have always existed and normal. Other reason may be tinnitus in older children is more troublesome.

There was male gender preponderance in this

study which is similar to findings in other study with male gender preponderance²⁶. This is contrary to other studies with female preponderance^{27,28}. These findings may be due to overactive male over female. Male are more troublesome and prone to infection, trauma and excessive noise. Majority of the studied patients were urban dwellers this may be due to barriers such as geographical location of the center in the state capital, financial constraints for transportation, hospital fee with medication also sociocultural background of the parents on available alternative medicine and poor understanding of tinnitus in children^{29,30}. In this study there is no significant difference in parental education levels and parental occupation status. The aetiopathogenesis and management of tinnitus are poorly understood by the parents. Only very few patients were self-reports to the department for otorhinolaryngology intervention.

Childhood tinnitus in this study was characterized by single episode, short term, bilateral, discrete, intermittent, subjective and non-pulsatile pattern to be the commonest. These features help in determining the nature of patient aetiopathogenesis, diagnosis and subsequent management. This finding is comparable to other study³¹.

The duration of symptoms at presentation was mainly after 3 months in majority of the patients. Like other disorder it was first diagnosed and treated for too long by local health care services provider with referred to a specialist as the last resort. Children may take tinnitus to be normal, ignore the sensation or parents do not the complaint seriously. This report is similar to finding in other studies^{32,33}.

In this study, the commonly implicated aetiologic factors of tinnitus in this study were febrile illnesses, noise exposure, otitis media, idiopathic, ototoxicity, and earwax impaction. These findings were also noted in reports from previous studies^{28,33}. These factors are preventable with paediatric good health practices. It therefore means that parent should be health educated on common causes of tinnitus in children in our environment.

In this study, minority of the patients had affection of the middle ear cleft as demonstrated in the tympanometric findings. Few of the studied patients had normal hearing in our findings. Majority had associated sensorineural hearing impairment while few had conductive and mixed hearing impairment. Majority have bilateral severe to profound sensorineural hearing loss. It was also noted that majority of those with sensorineural hearing impairment were of mild type while minority were of severe and profound types. This contributed to low level of awareness and early presentation of tinnitus in our studied paediatric patients. These findings were reported in previous studies^{26,28,33}.

Most of the patients presented often too late with severe consequences such as reduction in quality of life. The affected quality of life in this study includes attention

problem and social isolation. These were reported in other studies^{28,34}.

In this study, there was no associated mortality to tinnitus in our findings. Common associated comorbid illnesses in children with tinnitus in this study were sleeping disorders, concentration disorders and headache. This is caused by persistent noise in the ear or head. These were the common reason for presentation in our department for treatment.

Majority of tinnitus patients wrongly presented other specialist. They are subsequently referred for otorhinolaryngology review and management. Only few patients were self-reports for treatment. Prior to otological presentation and due to poor understanding of treatment intervention majority seek over the counter drug. Few patients had no treatment with few patients on hearing aids. There were associated poor satisfactions to all preotological treatment such as over the counter medication and hearing aids. All patients had counseling alone or and other treatment. Childhood tinnitus is usually not distressing and some of the childhood tinnitus is self-limiting, counseling or reassuring is often beneficial as in other study³⁵. Treatment of underlying causes such as earwax impaction, otitis media and patulous eustachian tube were treatment. Conditions that were not amenable to treatment due to sensorineural hearing impairment were treated with hearing aids. All patients were followed up for three months, 101 (76.5%) satisfied with tinnitus treatment, 31 (23.5%) did not satisfied with tinnitus treatment and none reported worsen tinnitus. This finding is similar to reported findings in other study³⁶.

CONCLUSION

In our study, childhood tinnitus is caused by preventable diseases leading to permanent otoneurological damage. At presentation, there were associated hearing impairment, comorbid illnesses and affection of quality of life. Early diagnosis and management will prevent untoward effect.

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