Brief Report

J Babol Univ Med Sci
Vol 18, Issu 1; Jan 2016. P:57-61

Evaluation of Audiological Characteristics of Patients with Tinnitus Referring to Otolaryngology Clinics of Babol

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J Babol Univ Med Sci; 18(1); Jan 2016; PP:57-61

Received: Apr 4th 2015, Revised: Jul 29th 2015, Accepted: Sep 28th 2015.

ABSTRACT

BACKGROUND AND OBJECTIVE: Tinnitus is a common symptom associated with hearing loss and its related disorders. Awareness of audiological features is of paramount importance for effective management of tinnitus. This study aimed to evaluate audiological characteristics of tinnitus in patients referring to otolaryngology clinics of Babol, Iran.

METHODS: This cross-sectional study was conducted on 120 patients with tinnitus (47 male, 73 female) with mean age of 47.12±15.285 years referring to otolaryngology clinics of Babol, Iran. Patients were examined via pure tone audiometry at frequency of 250-8000 Hz to determine the location and type of tinnitus.

FINDINGS: In this study, 104 patients (88.7%) had hearing loss, 103 patients had tonal tinnitus with dizziness, 17 patients had loud tinnitus with no dizziness, 45 cases (37.5%) had bilateral tinnitus, 75 patients (62.5%) had unilateral tinnitus, and 17 patients had family history of tinnitus. Among female patients, two cases (1.7%) experienced tinnitus during pregnancy, while in four patients (3.3%), it was reported immediately after pregnancy.

CONCLUSION: According to the results of this study, bilateral sensorineural hearing loss has a higher prevalence among patients with tinnitus.

KEY WORDS: *Audiometry, Hearing loss, Tinnitus.*

Please cite this article as follows:

Kiakojouri K, Sheikhzade M, Shahani kalaki M, Monadi M, Khafri S. Evaluation of Audiological Characteristics of Patients with Tinnitus Referring to Otolaryngology Clinics of Babol. J Babol Univ Med Sci. 2016;18(1):57-61.

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[DOR: 20.1001.1.15614107.1394.18.1.9.9]
[DOI: 10.22088/jbums.18.1.57]

Introduction

Tinnitus is defined as audio perception in the absence of an external acoustic source (1). In fact, tinnitus is considered as a general sign of anomalies in the auditory system (2). Furthermore, it is one of the most frequent symptoms associated with hearing loss and its related disorders (3). Unlike auditory hallucinations, which mainly occur in patients with mental disorders and manifest in the form of musical hallucinations, tinnitus is usually marked by unorganized acoustic phenomena, such as hissing or ringing (1). These manifestations could be intermittent or of a pulsatile nature (1).

On the other hand, due to demographic alterations and increased exposure to noise, prevalence of tinnitus is expected to rise (1). In Norway, research has suggested that 21.3% of men and 16.2% of women suffer from tinnitus, out of which 4.4% of men and 2.1% of women complain of high severity of this condition. In addition, epidemiological studies have reported similar prevalence rates for tinnitus in Europe, America and Japan, as well as low-income countries in Africa and Asia; therefore, tinnitus is considered as a global health issue (1). In this regard, findings of Shao et al. are indicative of a significant correlation between tinnitus and hearing loss (4).

In one study, Zeng et al. observed that hearing loss could occur in three ranges of high, medium and low frequency (5). In another research, Axelsson et al. reported tinnitus to be more common in the left ear compared to the right ear assuming that tinnitus accompanied by hearing loss is more frequent than tinnitus with normal auditory function (6).

Evidence suggests that tinnitus is associated with several problems, including etiological, metabolic, neurological, cardiovascular, dental and psychological disorders and possible hearing loss. Moreover, tinnitus could adversely affect sleep cycles and lifestyle of patients through diminishing the focus of individual on daily tasks and debilitating social and emotional aspects of life, which may ultimately give rise to depression and anxiety (7).

Due to lack of available treatments for this disorder, regular and timely evaluation of patients with tinnitus and normal hearing, as well as the high-risk population (age range of 45-50 years), is of paramount importance. This study aimed to assess audiological features and other characteristics of patients presenting with tinnitus symptoms in order to identify effective treatment methods for this condition.

Methods

This cross-sectional study was conducted on 120 patients (47 male, 73 female) presented with tinnitus with mean age of 47.12±15.285 years during 2012-2013. Patients were selected via census sampling, and mean duration of tinnitus was estimated at 130 months. Initially, required data were collected, and otoscopy was performed by a specialist in order to examine the ear canal and eardrum of patients for possible masses. To evaluate hearing status, pure tone audiometry was performed at frequencies of 250, 500, 1000, 2000, 4000 and 8000 Hz using Diagnostic Audiometer AD229e (Interacoustic Co., Denmark). In addition, obtained data of patients and symptoms associated with tinnitus (e.g., type of noise, buzz sound, quality and place of noise) were recorded in questionnaires. All the aforementioned stages were carried out by an experienced audiologist.

In all studied cases, particularly sudden and unilateral sensorineural hearing loss, measurements such as short increment sensitivity index (SISI), tone decay test, auditory brainstem responses (ABR) and magnetic resonance imaging (MRI) through injection were performed in order to distinguish between cochlear and retrocochlear disorders.

Data analysis was performed in SPSS V.18 using measures of central tendency and coefficients, and P value of less than 0.05 was considered significant.

Results

Among studied patients, 104 (88.7%) had hearing loss, out of whom 24 cases were diagnosed with unilateral hearing loss, 80 had bilateral hearing loss, 103 had tonal tinnitus with dizziness, and 17 had loud tinnitus without dizziness. Moreover, 45 cases (37.5%) were diagnosed with bilateral tinnitus, while 75 patients (62.5%) had unilateral tinnitus, and 17 patients had family history of tinnitus. Out of 73 female patients evaluated in this study, two cases (1.7%) experienced tinnitus during pregnancy, and in four cases (3.3%), tinnitus occurred immediately after pregnancy.

In this study, hearing loss was a common symptom in patients with unilateral and bilateral tinnitus, and sensorineural hearing loss was highly prevalent in both ears of these patients (fig 1). Moreover, bilateral hearing loss was observed to increase at frequencies above 2000 Hz (fig 2). According to our findings, otosclerosis was the most

[DOR: 20.1001.1.15614107.1394.18.1.9.9]
[DOI: 10.22088/jbums.18.1.57]

prevalent condition among patients with tinnitus, while vestibular neuritis and tympanic membrane perforation had the lowest prevalence (fig 3).

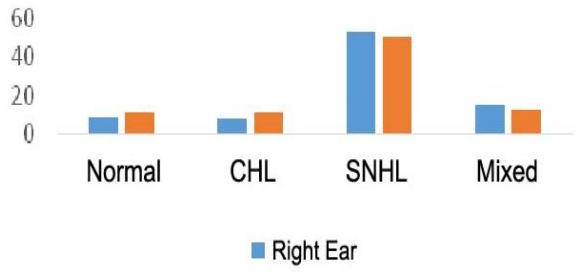

Figure 1. Distribution of Hearing Loss in Left Ear of Patients with Tinnitus in Percentage Terms (N=120)

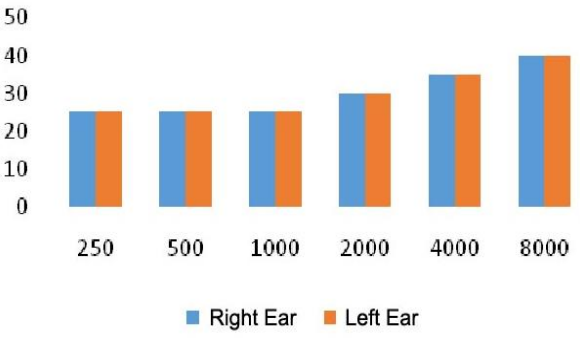

Figure 2. Audiogram of Right and Left Ear Airways in Patients Referring to Otolaryngology Clinics of Babol (N=120)

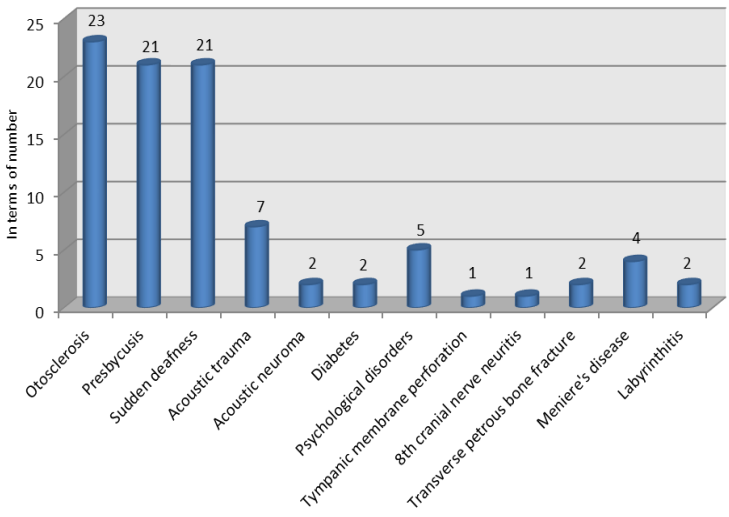

Figure 3. Distribution of Other Disorders in Patients with Tinnitus (N=120)

Discussion

In the present study, a significant number of patients were diagnosed with high-frequency bilateral hearing loss. This is similar to the results obtained by Zeng et al., which reported the highest rate of bilateral hearing loss at frequencies above 2000 Hz (5). However, this finding is inconsistent with the results obtained by Bakhshai et al., which reported the highest rate of hearing loss at frequencies above 4000 Hz (8). This discrepancy could be due to differences in sample size and age range of patients.

According to clinical studies, tinnitus mainly involves the internal ear and is normally accompanied by sensorineural hearing loss (9, 10). Additionally, presence of earwax and conductive hearing loss could lead to tinnitus. In our study, majority of the patients were diagnosed with sensorineural hearing loss, which is in line with the findings of Shao et al. (4), FarajiRad et al. (11) and Madani et al. (12).

In general, tinnitus is classified into two main types of subjective and objective, and subjective tinnitus is comparatively more prevalent (9). In the current study, all patients had subjective tinnitus, which is consistent with the findings of Madani et al. (12). Audiological evaluation of tinnitus in the present study indicated that a significant number of patients had tonal tinnitus, while only a few were presented with loud tinnitus. This finding is correspondent with the results obtained by Madani et al. (12). According to the literature, tinnitus could be unilateral or bilateral, while it could also be heard inside the head (1).

In the current study, majority of the patients complained of unilateral tinnitus, while only a few were presented with bilateral tinnitus. This is consistent with the results obtained by Madani et al. (12), Tang et al. (13) and Bakhshai et al. (8). In the present study, majority of the patients were middle-aged, and only a few were students, which is incompatible with the studies conducted by Kim et al. (14) and Raj-Koziak et al. (15). In the study by Kim et al., 46.9% of students experienced tinnitus more than once, while 4.4% complained of constant tinnitus (14). In contrast to the findings of our study, Raj-Koziak et al. reported tinnitus to be a common complaint among young students (15). This discrepancy could be due to different characteristics of study populations.

In the present study, women with tinnitus referred to otolaryngology clinics more frequently than men. However, this finding was inconsistent with the results obtained by Axelsson et al. (6) and Madani et al. (12),

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which indicated the number of male patients with tinnitus to be higher compared to female patients. In the study by Madani et al., out of 2,053 patient referrals to the otolaryngology clinic of Bu-Ali Hospital in Sari (Iran), 143 cases were presented with tinnitus, 61% of whom were male and 39% were female (12). This contradiction could be due to differences in sample size, age range and occupational status of patients.

Tinnitus is a common complaint during pregnancy (16). In explanation, hormonal changes that occur during menstruation, pregnancy and menopause cycles lead to homeostatic changes of labyrinth fluids, which directly affect the function of neurotransmitters (16). Disturbance of labyrinth fluids, as well as the sensitivity of enzyme receptors, could affect basic metabolic processes of internal ear and give rise to auditory symptoms such as tinnitus in women (16). In the current study, correlation between tinnitus and pregnancy was observed in a small number of patients. This is inconsistent with the findings of Scsmidt et al. (16) and Gurr et al. (17), which were indicative of high prevalence of tinnitus among pregnant women. This discrepancy could be due to differences in study populations. In the present study, simultaneous presence of other ear disorders was indicative of high prevalence of otosclerosis in our patients. This is inconsistent with the results obtained by Ferreira et al. (7), which denoted presbycusis as the most prevalent ear disorder among their patients (7). This discrepancy could be due to differences in the mean age of study populations. On the other hand, only a few patients in our study were presented with systemic disorders, such as diabetes, while in a research conducted by Nowak et al., 16% of patients had diabetes (18). This inconsistency could be due to differences in study groups and sample size.

In the current study, a significant number of patients had complaints of dizziness in addition to tinnitus; this could be due to the presence of associated disorders such as Meniere's disease, otosclerosis, labyrinthitis and vestibular neuritis. Furthermore, we observed a positive correlation between tinnitus and family history of this disorder among our patients. However, with respect to the sample size in our study, further investigation is required as to determine the exact mechanism of this correlation.

In conclusion, finding of the present study revealed that since tinnitus involves extensive regions of the brain, it is unlikely that use of a single medication or therapy could successfully reduce or eliminate this condition.

Effective management of patients with tinnitus is possible through a multidisciplinary approach and requires comprehensive knowledge of the associated characteristics and disorders, especially audiological features, such as hearing loss.

Acknowledgments

Hereby, we extend our gratitude to the Deputy of Research and Technology at Babol University of Medical Sciences for the financial support of this study.

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[DOR: 20.1001.1.15614107.1394.18.1.9.9]
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