Tinnitus and its Impact Measured by the Tinnitus Handicap Inventory in the Elderly

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ABSTRACT

Tinnitus is one of most widely known disorders of the auditory system and it affects the elderly more than the general population. Its prevalence is reported to increase with age and is said to be much higher than the number of patients who seek treatment**.** Tinnitus perception has been found to be strongly correlated with emotional impact. It has been reported that tinnitus can lead to significant distress, depression, anxiety and a decrease in quality of life. A cross-sectional, descriptive study was done at a tertiary hospital in Kathmandu, aimed to look at the impact of tinnitus on the elderly population using the Tinnitus Handicap Inventory (THI). All patients attending the hospital for perceived tinnitus from September 2015 to August 2016 were included in the study (N=110). Among the various age groups, the maximum number of patients were between 60-69 years (54.6%), with a male predominance overall. Most of the patients presented with mild handicap (37.3%), followed by moderate (28.2%), slight or no handicap (18.2%), severe (13.6%) and catastrophic handicap in 2.7%. Among the THI questionnaire subscales, the highest response in the emotional subscale was irritability (90.9%), in the functional subscale it was trouble falling asleep at night (81.8%) and feeling desperate in the catastrophic subscale (72.7%). Relationship of age with perceived tinnitus handicap showed no statistical significance (p=0.796).

Keywords: Elderly, tinnitus handicap inventory, tinnitus handicap subscale

INTRODUCTION

Tinnitus is a symptom rather than a disease, which is an ontological problem common among the elderly. It may be defined variously, as a sound perceived for more than five minutes at a time, in the absence of any external acoustical or electrical stimulation of the ear and not occurring immediately after exposure to loud noise, phantom auditory perception, or head noise.[1-3] Tinnitus is one of the most widespread disorders of the auditory system that affects 15% of the general population and 33% of elderly.[4] Its prevalence is reported to increase with age and is said to be much higher than the number of patients who seek treatment.[5] Although its etiology is still not fully understood, it is well documented that tinnitus and hearing loss are often associated .[6]

Hearing loss in the elderly (presbyacusis) is often associated with tinnitus, and they may find the tinnitus more troublesome than the hearing loss. It has been seen that there may be a relation between the presence of tinnitus and the hearing loss presented by the elderly.[7]

Tinnitus perception has been found to be strongly correlated with emotional impact.[8-10]

A study has reported that "tinnitus can lead to significant distress, depression, anxiety and a decrease in quality of life".[11]A direct measurement of the degree of tinnitus severity is often obtained through self-report questionnaires. Tinnitus handicap inventory (THI) is one of the most commonly used questionnaire, and it appears to be widely endorsed in many clinical practices and is gaining recognition as a useful tool for quantifying the impact of tinnitus on daily life.[12,13]

The World Health Organization defines the elderly in developing countries as persons aged 60 years or over, and in developed countries as persons aged 65 years or over.[14]The study is conducted to assess the impact of tinnitus perceived by the elderly patients using THI and also to determine the relationship between age with perceived tinnitus handicap.

MATERIAL AND METHODS

All elderly patients seeking medical treatment from September 2015 to August 2016 for tinnitus attending a tertiary hospital located in Kathmandu, were included in the study (N=110). The inclusion criteria were patients with bilateral tinnitus lasting more than 3

months, age sixty years and above and patients who were willing to participate in the study. The exclusion criteria were patients with acute or chronic infection of external or middle ear and patients unwilling to participate. A detailed history and clinical examination of otorhinolaryngology and head and neck was carried out at the out-patient department. Pure tone audiometry (PTA) was done in a sound treated room testing 250, 500, 1000, 2000, 4000 and 8000 Hz frequencies. Patients were then asked to fill up the Tinnitus Handicap Inventory (THI). Patients who had difficulty answering the THI questionnaire were assisted by the researchers.

Tinnitus Handicap Inventory (THI) is a self-administered 25 item questionnaire that is scored on a 3point Likert scale (N =0, Sometimes= 2 and Yes= 4) in three subscales: emotional, functional and catastrophic. The emotional subscale was assessed in this study by adding the scores of nine questions relating to anger, frustration, irritability, anxiety, depression and insecurity. The functional subscale was determined by totaling the scores of 11 questions pertaining to stress, loss of concentration and sleep, interference with job, household responsibilities and social activities. The catastrophic subscale of tinnitus was evaluated using the total score of five questions relating to a sense of desperation, perception of having a terrible disease, lack of control, and inability to escape and cope. The total THI score was the sum of the scores for all three subscales. Based on the total THI score, tinnitus sufferers were classified into four categories denoting handicap severity: slight or no handicap (0–16), mild handicap (18–36), moderate handicap (38–56) or severe handicap (58–76) and catastrophic (78- 100).[12]

Scores were added to yield a classification that ranged from slight or no handicap to catastrophic handicap. Emotional, functional and catastrophic subscale percentages were assessed in patients who gave positive response (who answered yes and sometimes) to the THI. Relationship between age and gender with perceived tinnitus handicap were statistically determined in the study. Statistical analysis was done using SPSS version 17.0 and descriptive statistics were calculated such as frequency, mean and standard deviation. Chi-square test was used to find the association between the variables. Statistical test was done at 95% confidence interval. Counseling and consent was taken from the patient. Permission for the study was obtained from the Research and Ethical Sub Committee (RESC) of Nepal Medical College.

RESULT

The study included 110 patients among which 60 (54.5%) were male patients and 50 (45.5%) were female patients. All patients who participated in the study were 60 years and above, and the age ranged from 60 to 92 years with the mean age 69.8 years. Of the total number of patients (N=110), 60 (54.6%) patients were in the age group 60-69 years and among them the highest number had mild handicap (Grade 2) and moderate (Grade 3) handicap, 18(30.0%) in both groups. This was followed by patients who had slight or no handicap (Grade 1), severe (Grade 4) and catastrophic (Grade 5)

Table 1: Age and perceived tinnitus handicap

Age (years)	Slight or no handicap (Grade 1)	Mild handicap (Grade 2)	Moderate handicap (Grade 3)	Severe handicap (Grade 4)	Catastrophic handicap (Grade 5)	Total no. of cases %
60 -69	13 (21.7%)	18 (30.0%)	18 (30.0%)	10 (16.7%)	1 (1.7%)	60 (54.6%)
70 – 79	4 (13.3%)	15 (50.0%)	6 (20.0%)	3 (10.0%)	2 (6.7%)	30 (27.3%)
80 – 89	2 (13.3%)	6 (40.0%)	5 (33.3%)	2 (13.3%)	0 (0.0%)	15 (13.6%)
90 and above	1 (20.0%)	2 (40.0%)	2 (40.0%)	0 (0.0%)	0 (0.0%)	5 (4.5%)
Total	20 (18.2%)	41 (37.3%)	31 (28.2%)	15 (13.6%)	3 (2.7%)	110 (100.0%)

Similarly, in the age between 70-79 years there were 30(27.3%) patients that were divided as 15(50.0%) patients with mild handicap (Grade 2) followed by moderate handicap (Grade 3) in 6(20%) patients, slight or no handicap (Grade 1) in 4(13.3%) patients, severe handicap (Grade 4) in 3(10.0%) and catastrophic (Grade 5) in 2 (6.7%) patients. Patients aged between 80- 89 years were 15(13.6%) in number and among them 6(40.0%) patients had mild handicap (Grade 2), moderate (Grade 3) in 5(33.3%), slight or no handicap (Grade1) in 2(13.3%) and severe handicap (Grade 4) also in 2 (13.3%) patients. Catastrophic handicap (Grade 5) was not seen in age group 80- 89 years. Five (4.5%) patients were ninety years and above, and among them mild handicap (grade 2) was found in 2 (40.0%) patients, moderate handicap (Grade 3) in another 2(40.0%) and slight or no handicap (Grade 1) in 1(20.0%) patient.

Severe and catastrophic handicap were not seen in this group. (Table 1)

Tinnitus handicap was also assessed according to gender in our study. Mild handicap (Grade 2) was present in 15 (25.0%) male and 26 (52.0%) female patients. Moderate handicap (Grade 3) was seen in 20 (33.3%) male and 11(22.0%) female patients. Slight or no handicap (Grade 1) was only seen in 15(25.0%) female and 5(10.0%) male patients. Severe handicap (Grade 4) was seen in 10(16.7%) male and 5(10.0%) female patients.Catastrophic handicap (Grade 5) was only seen in 3(6.0%) female patients. Among the total male patients moderate handicap (Grade 3) was found to be the highest, where as in females mild handicap (Grade 2) was the most common. (Table 2)

The THI score showed 41 (37.3%) patients had mild handicap (Grade 2), 31 (28.2%) had moderate handicap (Grade 3), 20(18.2%) had slight or no handicap (Grade 1), 15 (13.6%) had severe handicap (Grade 4) and 3 (2.7%) of the patients had catastrophic handicap (Grade 5). (Figure 1)

Emotional, functional and catastrophic subscale were also assessed using the THI questionnaire in our study. The percentage of 110 patients who gave positive (yes and sometimes) response to THI questionnaire was tabulated. The highest number of positive responses related to emotional subscale was E14 "Because of your tinnitus, do you find that you are often irritable?"(90.9%).The highest percentage for functional subscale was F7 "Because of your tinnitus, do you have trouble falling asleep at night?" (81.8%). The highest percentage for catastrophic subscale was C5 "Because of your tinnitus, do you feel desperate?" (72.7%). (Table 3).

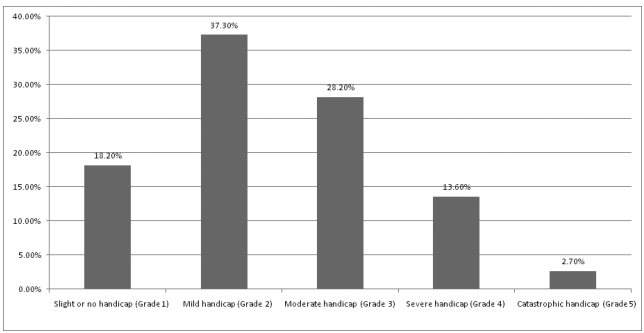

Fig. 1: Tinnitus handicap score

Table 2: Gender and Grades of perceived tinnitus handicap

Male N (%)	Female N (%)	Handicap perceived	THI Grade	Number of patients
15 (25.0%)	5 (10.0%)	Slight or no handicap (Grade 1)	1	20 (18.2%)
15 (25.0%)	26 (52.0%)	Mild handicap (Grade 2)	2	41 (37.3%)
20 (33.3%)	11 (22.0%)	Moderate handicap (Grade 3)	3	31 (28.2%)
10 (16.7%)	5 (10.0%)	Severe handicap (Grade 4)	4	15 (13.6%)
0 (0.0%)	3 (6.0%)	Catastrophic handicap (Grade 5)	5	3 (2.7%)

Chi-square test was used to analyze the statistical significance between the age with perceived tinnitus handicap. The relationship between the age with perceived tinnitus was not found to be statistically significant, with p-value=0.796.

DISCUSSION

In our study participants showed a wide range of perceived tinnitus handicap scores, in which the age ranged from 60 to 92 years and among them the highest number of patients

Table 3: Percentage of the 110 respondents with positive responses to the Tinnitus Handicap Inventory (THI) questions

Subscale	Patients who answered positively (%) (yes and sometimes)
Emotional subscale	
E3 Does your tinnitus make you angry ?	72.7
E6 Do you complain a great deal about your tinnitus ?	54.5
E10 Because of your tinnitus, do you feel frustrated ?	86.3
E14 Because of your tinnitus, do you find that you are often irritable ?	90.9
E16 Does your tinnitus make you upset ?	62.7
E17 Do you feel that your tinnitus problem has placed stress on your relationships ?	50.0
E21 Because of your tinnitus, do you feel depressed ?	72.7
E22 Does your tinnitus make you feel anxious ?	44.5
E25 Does your tinnitus make you feel insecure ?	53.6
Functional subscale	
F1 Because of your tinnitus, is it difficult for you to concentrate?	76.3
F2 Does the loudness of your tinnitus make it difficult for you to hear people ?	59.0
F4 Does your tinnitus make you feel confused ?	54.5
F7 Because of your tinnitus, do you have trouble falling asleep at night ?	81.8
F9 Does your tinnitus interfere with your ability to enjoy social activities ?	68.1
F12 Does your tinnitus make it difficult for you to enjoy life ?	68.1
F13 Does your tinnitus interfere with your job or household responsibilities ?	68.1
F15 Because of your tinnitus, is it difficult for you to read ?	77.2
F18 Do you find it difficult to focus your attention away from your tinnitus and on other things ?	59.0
F20 Because of your tinnitus, do you often feel tired ?	63.6
F24 Does your tinnitus get worse when you are under stress ?	72.7
Catastrophic subscale	
C5 Because of your tinnitus, do you feel desperate ?	72.7
C8 Do you feel as though you cannot escape your tinnitus ?	53.6
C11 Because of your tinnitus, do you feel that you have a terrible disease ?	44.0
C19 Do you feel that you have no control over your tinnitus ?	67.2
C23 Do you feel that you can no longer cope with your tinnitus ?	53.6

* Item describes the subscales (E: emotional, F: functional and C: catastrophic) and the question number as it appears in the THI Questionnaire.

who attended the hospital regarding tinnitus were in the age group 60 to 69 years (54.6%) followed by 70 to 79 years (27.3%), 80 to 89 years (13.6%) and the least in 90 years and above. The probable reason for this age group having the highest number of patients could be due to the awareness of tinnitus in the ear for the first time. This may have lead to anxiety and their need to look for medical advice. Sixty to sixty-five years followed by 66-70 years age group was seen to be high in a study done by Ferreira LM which is similar to our findings.[15]

In this study male patients (54.5%) showed more participation than females (45.5%). The gender breakdown with tinnitus showed more male patients in the early stage with slight or no handicap (25%) followed by moderate handicap (33.3%) and severe handicap (16.6%), whereas, a higher number of female patients came to the hospital with mild handicap (52.0%)(Table 2). A possible explanation for a higher prevalence of males may be that men are more exposed to occupational noise.[16] In our context another reason could be that male patients are more open to discussion about their problems. However, studies have shown controversies regarding gender in relation to tinnitus. Some studies have described a slightly higher prevalence in females, whereas, others have suggested that the prevalence is higher in males.[17-19] A study has suggested that the number of females going to the doctor or an audiologist is more because they have more free time to consult.[20] Nevertheless, this is different in our context as probably women are still dependent on the men to take them to hospital, which is particularly true among the elderly population. The study showed wide range of tinnitus handicap from slight or no handicap (18.2%), mild handicap (37.3%), moderate handicap (28.2%), severe handicap (13.6%), and catastrophic handicap (2.7%). These figures contrasted with the study done by Pinto, Sanchez and Tomita, which showed THI scores of slight or no handicap in 32.3%; mild in19.1%; moderate in 20.6%; severe in 13.2%; and catastrophic in 14.7%.[20] A study done in Singapore by Lim, Lu and Eng showed THI score distribution were mild or no handicap in 33% patients, mild in 31%, moderate in 18% and severe in 19%.[21]

Patients who responded positively (yes and sometimes) on the impact of tinnitus on emotional, functional and catastrophic subscales were evaluated using the 25 questions of the THI. In our study percentage of the patients who gave positive response on the emotional subscale showed highest score in question E14 "Because of your tinnitus, do you find that you are often irritable?"(90.9%). The functional subscale question F7 "Because of your tinnitus, do you have trouble falling asleep at night?" had the highest percentage of positive answers (81.8%). The question C5 "Because of your tinnitus, do you feel desperate?" was seen to be the highest positive response in Catastrophic subscale (72.7%) Table 3. Whereas, Lim, Lu and Eng in their study found percentage of patients who answered yes in emotional subscale was E10" Because of your tinnitus, do you feel frustrated?"(29.4%), in functional subscale, F24 "Does your tinnitus get worse when you

are under stress?" (32.1%) and C19 "Do you feel that you have no control over your tinnitus?" (53.2%).[21] The relationship between the age with perceived tinnitus severity showed no statistical significance in our study with the p-value (p=0.796). Pinto, Sanchez and Tomita found no significant correlation between age and tinnitus severity (p=0.77). [20]Similarly, another study carried out an independent t-test to determine whether there was an association between age and the type of perceived disability. Findings revealed that there was no statistically significant relationship between these two variables ($p > 0.05$); with p-values being 0.08 for functional disability and 0.57 for catastrophic disability.[22] Tinnitus handicap inventory is a useful baseline clinical tool for diagnosis and counseling for patients suffering from tinnitus. It also helps the clinician to understand the impact of tinnitus on day to day life of patients.

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