

# Clinical And Audiogram Characteristics In Presbycusis Patients At ENT Clinic

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**ABSTRACT:** Presbycusis is the most common sensory impairment associated with ageing and presents a variability of symptoms. Otorhinolaryngologists and audiologists need to recognize early clinical and audiometric signs of presbycusis to render adequate and quality patient care and reduce associated morbidities. The current study focuses on the clinical modes of presentation and the typical audiometric tracings among patients with presbycusis. The records of patients with OPD cards and audiogram sheets were reviewed in the study. This descriptive health facility-based study had 73 patients with confirmed bilateral sensorineural hearing loss aged 50 years and above during the study period. Our study's findings showed that among 73 patients; tinnitus (79.7%) and vertigo 33.3% were the major clinical symptoms on presentation. The hearing loss increased with age, both in speech and at the higher frequencies of sounds. The most common type of hearing loss was strial.

**Keywords:** Audiometry, hearing loss, strial, tinnitus, vertigo.

## INTRODUCTION:

The global burden of disease in 2019 estimated that 1.57 billion people had hearing loss, accounting for one in five people [1]. In 2050 over 900 million people (one in every ten) will have disabling hearing loss [2]. Of all the people with a hearing impairment, 62.1% were older than 50 years in 2019 [1]. In 2025, there will be 1.2 billion people over 60 years of age worldwide, with more than 500 million individuals suffering significant impairment from age-related hearing loss (ARHL) [3]. The gradual, progressive, bilateral hearing loss commonly associated with ageing is called presbycusis or ARHL. Presbycusis is not a distinct disease entity but represents multiple ageing effects on the auditory system. Besides age-related degeneration leading to psychological and anatomical changes, other contributing factors include genetic, hormonal, exposure to loud noise or ototoxic, history of infections, and the presence of systemic disease [4, 5]. It becomes noticeable around age 60 and progresses slowly; however, there is evidence that certain stressors can speed the rate of deterioration [6]. Presbycusis affects speech comprehension first, then the capacity to recognize, identify, and localize the sounds. Their hearing sensitivity declines at higher frequencies, making it difficult to understand speech in noisy or reverberant environments. Once the loss progresses to the 2-4 kHz range, which is important in understanding the voiceless consonants (t, p, k, f, s and ch), speech understanding in any situation is affected [7]. Based on the result of the audiometry test, presbycusis is classified into four main categories; sensory (high frequency steeply sloping curve), neural (moderate down sloping curve towards high frequency with severely reduced speech discrimination), strial or metabolic (flat curve) & cochlear conductive or mechanical (high frequency gently sloping) [8]. Hearing loss is associated with poor quality of life in older people and may even lead to poor health and mental unitability, such as depression and Alzheimer's, as well as increased mortality risk [9-14]. Besides, hearing loss is associated with higher total medical expenditures [15]. Early identification and treatment using a hearing aid may help slow progression and improve the quality of life [6, 7]. However, impaired high-frequency hearing can lead to serious safety concerns, as it may be difficult for older adults to respond to warnings and signals, such as doorbells, ringing phones, smoke alarms, and turn signals [6].

The clinical and audiometric characteristics of presbycusis have not been described well among the people of our region, where audiology care is emerging. Hence, we conducted this study to find the clinical mode of presentation and audiometric characteristic of patients with presbycusis.

## Study objectives

- To describe the clinical presentations of patients with presbycusis
- To describe the audiometric tracings of patients with presbycusis

## REVIEW OF LITERATURE

Presbycusis is a typically sensorineural loss in which both cochlear hair cells and, to a lesser extent, the spiral ganglion cells in the auditory nerve can be affected [7, 16, 17]. Based on the audiometric test result and temporal bone pathology, presbycusis is commonly classified into four categories: sensory, neural metabolic, strial or cochlear conductive type. Later, mixed and indeterminate types were added to categorise it into six categories [16, 18].

Patients with presbycusis may rely strongly on lip reading to improve the intelligibility of spoken words. They may be associated with symptoms, including tinnitus and vertigo, which may also be associated with dementia. Presbycusis can also impact the quality of life, causing low esteem, isolation, and depression [19-22].

## METHODOLOGY

This descriptive health facility-based study had conducted in the Ear, Nose, and Throat (ENT) clinic in Kathmandu, Nepal. Only patients aged 50 years or above with a confirmed diagnosis of bilateral Sensory Neural Hearing Loss (SNHL) on diagnostic pure tone audiometry were included in the study. Conductive hearing loss with SNHL component was excluded from the study. The

certified audiology and speech-language pathologist evaluated the hearing sensitivity of the patient using a diagnostic audiometer (Maico, MA-42), a headphone, and a bone vibrator in sound-treated rooms.

A study proforma was developed from the literature review and finalized after the expert's advice. The records of patients with the clinical diagnosis of presbycusis confirmed with bilateral SNHL on diagnostic audiometry were reviewed. Information obtained was analyzed using SPSS statistical package version 26.0 and presented in descriptive forms as percentages, means, and graphs. The percentage, mean and standard deviations (S.D.) were obtained from descriptive statistical analysis.

## RESULT AND DISCUSSIONS

Among 73 presbycusis patients, the mean age was 70.22 ( $\pm 11.05$ ) years. More than half ( $n=41$ , 56.2%) were male, and nearly four in ten (39.7%) patients were from the 70-79 years age group.

The pure tone average in the right and left ear was 60.0( $\pm 20.6$ ) dB and 58.8( $\pm 17.3$ ) dB, respectively. Figure 1 shows the graphical representation depicting increased hearing thresholds with the increase in age in both ears of the patients.

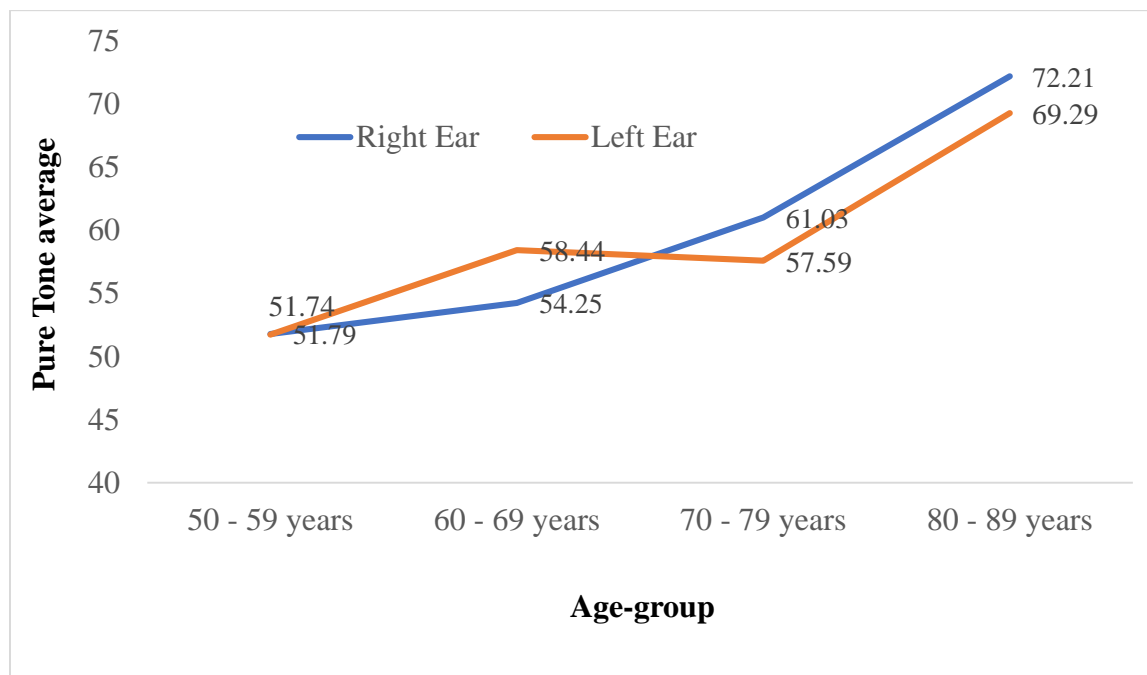


Figure 1: Age group and pure tone average in both ears.

In the present study, age was significantly associated with presbycusis, and the prevalence of presbycusis increased with age. This finding corroborates with that of North America, which found that around 10% of the population suffers from hearing loss, with the highest prevalence rates among the aged population, such as those aged 65 or above [23]. A fact sheet in Canada also shows that 20% of adults over 65 years, 40% over 75 years, and 80% of nursing home residents have significant hearing problems [24]. Furthermore, the older the population, the higher the prevalence. The present study's findings support these studies showing the graphical representation of increased hearing thresholds or severity with the increase in age.

In our study, more than six in ten (63.0%) patients had a history of tinnitus. Less than four in ten (39.7%) also had a history of vertigo. Similarly, 32.9%, 43.8%, and 2.7% of patients also had fullness of the ear, itching, and the use of ototoxic drugs. Nearly three in ten (30.1%) were under hypertension medication, and 11.0% had diabetes.

Table 1. Clinical modes of presentation of patients

Characteristics	Gender		Total (%)#
	Male (%)*	Female (%)*	
<b>History of Tinnitus</b>			
Right Ear	4 (44.4)	5 (55.6)	9 (12.3)
Left Ear	8 (7ass2.7)	3 (27.3)	11 (15.1)
Both Ear	11 (42.3)	15 (57.7)	26 (35.6)
Not present	18 (66.7)	9 (33.3)	27 (37.0)
<b>History of vertigo</b>			
Yes	15 (51.7)	14 (48.3)	29 (39.7)
No	26 (59.1)	18 (40.9)	44 (60.3)
<b>Fullness of ear</b>			
Yes	18 (75.0)	6 (25.0)	24 (32.9)
No	23 (46.9)	26 (53.1)	49 (67.1)
<b>Itching of ear</b>			
Yes	18 (56.3)	14 (43.7)	32 (43.8)

No	23 (56.1)	18 (43.9)	41 (56.2)
<b>Use of ototoxic drugs</b>			
Yes	2 (100.0)	0 (0.0)	2 (2.7)
No	39 (54.9)	32 (45.1)	71 (97.3)
<b>Hypertension</b>			
Yes	10 (45.5)	12 (54.5)	22 (30.1)
No	31 (60.8)	20 (39.2)	51 (69.9)
<b>Diabetes</b>			
Yes	6 (75.0)	2 (25.0)	8 (11.0)
No	35 (53.8)	30 (46.2)	65 (89.0)

**NOTE: \*: Row Percentage, #: Column percentage**

Presbycusis is a common cause of tinnitus, and 63.0% of presbycusis patients in our study presented this symptom. This result is similar to a survey in Brazil, which reported 72.5% and 64.4% tinnitus in males and females, respectively [25]. Gates et al. investigated the relationship between cardiovascular disorder and hearing status in the elderly and revealed a statistically significant relationship between these two factors [7]. This result aligns with our result, showing that 30.1 % of presbycusis patients had hypertension.

In our study, nearly three in ten (30.1%) patients had moderately severe hearing loss in the better ear. The most common audiogram pattern was sloping among 46.6% of the patients, followed by high frequency in 34.2%.

*Table 2. Audiological features of patients*

Characteristics	Gender		Total (%)#
	Male (%)*	Female (%)*	
<b>Degree of hearing loss in better ear</b>			
Mild	11 (61.1)	7 (38.9)	18 (24.7)
Moderate	11 (47.8)	12 (52.2)	23 (31.5)
Moderately severe	15 (68.2)	7 (31.8)	22 (30.1)
Severe	3 (42.9)	4 (57.1)	7 (9.6)
Profound	1 (33.3)	2 (66.7)	3 (4.1)
<b>Same degree of hearing loss in both ear</b>			
Mild	5 (71.4)	2 (28.6)	7 (21.2)
Moderate	4 (44.4)	5 (55.6)	9 (27.3)
Moderately severe	5 (50.0)	5 (50.0)	10 (30.3)
Severe	2 (40.0)	3 (60.0)	5 (15.2)
Profound	1 (50.0)	1 (50.0)	2 (6.1)
	<b>17 (51.2)</b>	<b>16 (48.5)</b>	<b>33</b>
<b>Pattern of audiogram</b>			
Sloping	18 (52.9)	16 (47.1)	34 (46.6)
Rising	0 (0.0)	1 (100.0)	1 (1.4)
Flat	1 (25.0)	3 (75.0)	4 (5.5)
Notch type	7 (77.8)	2 (22.2)	9 (12.3)
High frequency	15 (60.0)	10 (40.0)	25 (34.2)

**NOTE: \*: Row Percentage, #: Column percentage**

In the present study, the most prevalent audiogram configuration was sloping, and steeply high frequency (46.6%) and (34.2%), respectively. Our results align with Koichiro's survey, which also showed that the most prevalent audiogram configuration among men and women was sloping and high-frequency hearing loss [26]. In better ear, moderate hearing loss was more common in the 60-69 years age group (39.1%), 70- 79 years age group (39.1%), and female patients (52.2%).

## CONCLUSION

Our study showed that hearing impairment in older patients increased with age and affected speech and higher frequencies. Tinnitus and vertigo were common clinical modes of presentation, and the strial type of audiometric pattern was the most common. The importance of screening for hearing impairment in symptomatic people starting in early middle age is recommended.

## ACKNOWLEDGMENT

I want to thank the faculty and staff of Naseema Institute of Speech and Hearing, Bangalore, India and ENT Care Hospital, Kathmandu, Nepal, for their kind support during the study period.

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