



Frequency of Tinnitus with Hearing Loss in Old Age Group

Huda Iftikhar¹

¹Department of Otorhinolaryngology, Madinah Teaching Hospital, Faisalabad, Pakistan.

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Corresponding Author: Huda Iftikhar, Department of Otorhinolaryngology, Madinah Teaching Hospital, Faisalabad, Pakistan. Email: hudamaher61@yahoo.com

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ABSTRACT

Objectives: determine frequency of Tinnitus in older age group patients presenting with hearing loss. **Study Settings:** Department of ENT, Madinah Teaching Hospital, Faisalabad. Duration of Study: **Data Collection:** A cross-sectional study was conducted on 95 patients aged 60–85 years with hearing loss. Participants were selected using a non-probability consecutive sampling technique. Tinnitus was diagnosed based on clinical evaluation, including otoscopic examination, tympanometry, and pure-tone audiometry. Demographic and clinical data were collected and analyzed using SPSS version 25.0. **Results:** The prevalence of tinnitus was 58.9%. Tinnitus was more common in rural residents (69.6%, $p = 0.011$) compared to urban residents. Gender-wise, tinnitus was higher in males (66.7%) than females (52.0%, $p = 0.147$). The prevalence varied with education levels but was highest among those with primary education (71.4%, $p = 0.165$). No significant associations were found with age ($p = 0.477$) or socioeconomic status ($p = 0.155$). **Conclusion:** Tinnitus is a prevalent condition among older adults with hearing loss in Pakistan, with a significant association with rural residence. Addressing modifiable risk factors, improving access to audiological services, and incorporating public health campaigns can reduce the burden of tinnitus and improve quality of life for affected individuals.

INTRODUCTION

Tinnitus, often described as a buzzing or ringing sound, is the perception of auditory sensations without an external source. Originating from the Latin word tinnitus, the name means "to ring." Most people experience tinnitus transiently at some point, such as after attending a loud concert.¹⁻² The prevalence of tinnitus varies, with around 15% of adults reporting occasional episodes and about 10% experiencing chronic symptoms. Among those affected, 1–3% of adults find tinnitus distressing to a moderate or severe extent. The societal impact of tinnitus is significant, with financial costs stemming from healthcare utilization, reduced productivity, and early retirement.³⁻⁵

A range of conditions, including otological, metabolic, neurological, cardiovascular, pharmacological, and psychological disorders, are recognized as potential risk factors for tinnitus.⁶ Among patients with tinnitus, 85–96% also exhibit some level of hearing loss, making it a highly associated condition. Additionally, patients often report that stress exacerbates their tinnitus, suggesting that individuals with high workplace stress may be at greater risk of developing the condition. Tinnitus most commonly results from hearing loss, with prevalence rates ranging from 35% to 77% among those with noise-induced hearing damage.⁷ Occupational noise exposure

is considered a potential factor in the onset of tinnitus.⁸ Tinnitus is highly prevalent among both the elderly and individuals with hearing impairment. However, there is limited research on how tinnitus prevalence varies with age in older adult populations. The majority of studies exploring tinnitus and its relationship with age have focused on middle-aged populations. Studies focusing on older populations have reported tinnitus prevalence ranging from 8.2% to 30.3%, with mixed findings regarding age dependency.⁹ In a study by Oosterloo BC et al., tinnitus prevalence was significantly higher (43.2%) among individuals with hearing loss in a general aging population.¹⁰

Therefore, in this study, we aimed to determine prevalence of tinnitus in an aging population with hearing loss. At present there is dearth of published material on this subject in Pakistan and this study is probably the few of its kind and it is believed that our study will augment tinnitus management.

METHODOLOGY

This cross-sectional study was conducted in the Department of ENT, Madinah Teaching Hospital Faisalabad, over six months following the approval of the synopsis. The sample size was calculated using the WHO sample size calculator, with a confidence level of

95%, an expected proportion of tinnitus at 43.2%, and a margin of error of 10%, resulting in a required sample size of 95 patients. A non-probability consecutive sampling technique was used to recruit participants.

Patients aged between 60 and 85 years who experienced hearing difficulties and met the inclusion criteria were enrolled in the study. Participants of both genders were included, while those with noise-induced hearing loss, otosclerosis, or Meniere's disease were excluded. The study commenced after obtaining approval from the Institutional Ethical Review Committee and CPSP. Written informed consent was obtained from each participant, and they were briefed about the study's objectives and assured of the confidentiality of their data. Eligible patients presenting to the ENT department with complaints of hearing problems, such as trouble hearing or understanding sounds, were evaluated. Demographic and clinical data were collected. Tinnitus was diagnosed based on the operational definition. Clinical evaluation included otoscopic examination of the outer ear canal and tympanic membrane, tympanometry to assess middle ear status, and pure-tone audiometry to evaluate hearing thresholds. Hearing loss was defined as a threshold exceeding 25 dB at frequencies ranging from 250 Hz to 8000 Hz.

All data were recorded on a specially designed proforma. Statistical analysis was performed using SPSS version 25.0. Quantitative variables such as age were expressed as mean \pm standard deviation, while categorical variables such as gender, education, residence, socioeconomic status, hearing impairment, and tinnitus were presented as frequencies and percentages. Stratification was conducted to control for effect modifiers, including age, gender, education, residence, and socioeconomic status. Post-stratification, the chi-square test was applied to assess the association between these variables and tinnitus, with a p-value ≤ 0.05 considered statistically significant.

RESULTS

The demographic data of the 95 patients revealed a nearly equal distribution in age groups, with 49.5% of participants aged 60–70 years and 50.5% aged 71–85 years. Gender distribution showed that 47.4% were male and 52.6% were female. Regarding education levels, 36.8% of the participants had completed primary education, 40.0% had secondary education, and 23.2% had higher education. A majority of the participants (58.9%) resided in rural areas, while 41.1% were urban dwellers. Socioeconomic status was distributed as follows: 46.3% of participants were from low-income backgrounds, 37.9% were middle-income, and 15.8% were high-income. The frequency of tinnitus was reported in 58.9% of patients, whereas 41.1% did not experience tinnitus.

Table 2 explores the relationship between tinnitus and

various demographic and socioeconomic variables. Among patients aged 60–70 years, 55.3% experienced tinnitus compared to 44.7% who did not, while in the 71–85 age group, 62.5% had tinnitus versus 37.5% without tinnitus. The association between age and tinnitus was not statistically significant ($p = 0.477$). Gender-wise, tinnitus was more prevalent in males (66.7%) than females (52.0%), though this difference was not statistically significant ($p = 0.147$). Tinnitus frequency varied across education levels, with the highest prevalence among participants with primary education (71.4%) compared to secondary (52.6%) and higher education (50.0%); this association also lacked statistical significance ($p = 0.165$). A significant relationship was observed between residential status and tinnitus ($p = 0.011$). Patients from rural areas had a higher prevalence of tinnitus (69.6%) compared to those from urban areas (43.6%). In terms of socioeconomic status, tinnitus was most prevalent in the high-income group (73.3%), followed by the low-income group (63.6%) and the middle-income group (47.2%). However, the association between socioeconomic status and tinnitus was not statistically significant ($p = 0.155$).

Table 1

Demographics of the Patients and Frequency of Tinnitus (n=95)

Variable	Group	Frequency	Percent
Age	60-70	47	49.5%
	71-85	48	50.5%
Gender	Male	45	47.4%
	Female	50	52.6%
Education	Primary	35	36.8%
	Secondary	38	40.0%
	Higher Education	22	23.2%
Residential Status	Rural	56	58.9%
	Urban	39	41.1%
Socioeconomic Status	Low	44	46.3%
	Middle	36	37.9%
	High	15	15.8%
Tinnitus	Yes	56	58.9%
	No	39	41.1%

Figure 1

Demographic Data



Table 2
Frequency of Tinnitus with Hearing Loss in Old Age Group (n=95)

Variable	Tinnitus		Total	P value	
	Yes	No			
Age	60-70	26 55.3%	21 44.7%	47 100.0%	0.477
	71-85	30 62.5%	18 37.5%	48 100.0%	
Gender	Male	30 66.7%	15 33.3%	45 100.0%	0.147
	Female	26 52.0%	24 48.0%	50 100.0%	
Education	Primary	25 71.4%	10 28.6%	35 100.0%	0.165
	Secondary	20 52.6%	18 47.4%	38 100.0%	
	Higher	11 50.0%	11 50.0%	22 100.0%	
Residential Status	Rural	39 69.6%	17 30.4%	56 100.0%	0.011
	Urban	17 43.6%	22 56.4%	39 100.0%	
Socio-economic Status	Low	28 63.6%	16 36.4%	44 100.0%	0.155
	Middle	17 47.2%	19 52.8%	36 100.0%	
	High	11 73.3%	4 26.7%	15 100.0%	

DISCUSSION

Tinnitus, a perception of sound without an external auditory stimulus, is a widespread and often distressing condition, particularly among older adults. In our study, the prevalence of tinnitus in a population aged 60–85 years with hearing loss was found to be 58.9%. This is significantly higher than the global prevalence reported in meta-analyses and large-scale studies, which estimate tinnitus prevalence at approximately 14.4%–21.4% among adults, with a higher occurrence among those aged ≥ 65 years. The higher prevalence in our study could be attributed to the specific inclusion of individuals with hearing loss, a known major risk factor for tinnitus, and reflects the unique demographic and environmental factors of Pakistan.

The association between tinnitus and hearing loss has been consistently documented in the literature. For example, Oosterloo et al¹⁰ reported that participants with hearing impairment were 2.27 times more likely to have tinnitus than those without hearing loss. Similarly, Hackenberg et al¹² found that the prevalence of tinnitus increased with the severity of hearing loss. Our findings align with these studies, further supporting the strong relationship between hearing loss and tinnitus.

In our study, tinnitus was more prevalent among males (66.7%) than females (52.0%), though the difference was not statistically significant. This trend is consistent with studies such as those by Hackenberg et al¹² and Batts et al¹³ which also reported higher prevalence rates in males. Occupational and recreational noise exposure, more common among men in Pakistan, may contribute

to this gender disparity.

Rural residence was significantly associated with tinnitus in our study, with rural participants reporting a prevalence of 69.6% compared to 43.6% in urban participants ($p = 0.011$). This finding is particularly relevant in the context of our country, where rural populations are often exposed to untreated ear infections, higher noise pollution from agricultural machinery, and limited access to healthcare facilities for early hearing loss management.

Socioeconomic status, while not significantly associated with tinnitus in our study, showed higher prevalence in the high-income group (73.3%), which might reflect greater awareness and reporting of tinnitus among individuals with better access to healthcare. Conversely, low-income individuals may experience underreporting or limited recognition of symptoms due to lower health literacy, a concern that underscores the need for targeted awareness campaigns in lower socioeconomic groups.

Our findings did not indicate a statistically significant relationship between age and tinnitus prevalence. This contrasts with studies such as those by Jarach et al¹⁴ and Nondahl et al¹⁵ which have documented an age-related increase in tinnitus prevalence. The lack of age dependency in our study may be influenced by the relatively narrow age range (60–85 years) of participants. Additionally, age-related changes in auditory pathways and the interaction of comorbidities such as diabetes and cardiovascular disease, both prevalent in the elderly Pakistani population, may obscure the direct effect of age on tinnitus.

The prevalence of tinnitus in Pakistan is likely influenced by unique environmental and healthcare factors. Noise-induced hearing loss, which accounts for 35%–77% of tinnitus cases globally, is a significant concern in Pakistan due to high occupational noise exposure, particularly in industries such as textile manufacturing and agriculture. Furthermore, limited access to audiological services and delayed treatment of ear infections exacerbate hearing loss, increasing tinnitus prevalence. Cultural and psychological factors also play a role. Stress, frequently reported as a factor exacerbating tinnitus, may be heightened in Pakistan due to socioeconomic challenges and limited mental health support. Incorporating stress management and mental health resources into tinnitus care could significantly improve patient outcomes.

The strength of our study lies in its focus on an aging population with hearing loss, a group often underrepresented in Pakistani tinnitus research. The use of robust diagnostic tools, including pure-tone audiometry and tympanometry, enhances the reliability of our findings.

However, there are limitations. The cross-sectional design precludes causal inferences between tinnitus and associated factors. Additionally, the non-probability

sampling method may limit generalizability. Future studies with larger, more representative samples are needed to explore the prevalence and risk factors of tinnitus in diverse Pakistani populations.

We are of the view that public health campaigns should educate the population about noise-induced hearing loss and its association with tinnitus. Protective measures, such as the use of earplugs, should be promoted, particularly in high-risk occupational settings. Expansion of audiology clinics and hearing screening programs in rural areas is crucial to identify and manage hearing loss early. Incorporating stress management and counseling services into tinnitus care may alleviate

symptom severity and improve quality of life. Whereas longitudinal studies investigating the progression of tinnitus in relation to hearing loss and comorbidities are needed to better understand its impact in Pakistan.

CONCLUSION

The tinnitus is a significant public health issue in our country, particularly among older adults with hearing loss. By addressing modifiable risk factors and improving access to healthcare, we can reduce the burden of this debilitating condition and enhance the quality of life for affected individuals

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