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Original Article

Risk Factors Associated with Presbycusis Among Elderly: A Hospital-Based Cross-Sectional Study

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ABSTRACT

Background: Presbycusis or age related hearing loss is a common sensory disorder in an elderly which due to cumulative degenerative changes arising in cochlea and auditory pathway. Additional systemic co-morbidity and life-style also playing a role.
Methods: This hospital-based cross-sectional study was conducted for a period of 12 months in the Department of ENT, Bangalore Medical College and Research Institute (BMCRI) using a sample size of 90 elderly patients aged 60 years and above. Pure tone audiometry was done to confirm presbycusis and related risk factors such as hypertension, diabetes mellitus, noise exposure, smoking and family history were assessed by structured interview and clinical examination.
Results: Out of 90 patients evaluated, 58 (64.4%) were diagnosed with presbycusis using audiometric criteria. A history of chronic noise exposure was reported in 39.7% of the patients and smoking was reported in 32.8% of affected patients. The most frequent audiometric pattern seen in the patients was a moderate degree of sensorineural hearing loss (39.7%), and the risk was significantly more in patients older than 70 years. 57.3% of cases that existed with diabetes and hypertension.
Conclusion: Presbycusis is very common the elderly attending this tertiary care center. diabetes mellitus, hypertension, noise exposure and smoking are significantly associated risk factors. If the modifiable comorbidities are screened at an earlier stage and managed aggressively, it will aid in reducing the burden of age-related hearing loss.

Keywords*: Presbycusis; Age-related hearing loss; Risk factors; Elderly.*

INTRODUCTION

Presbycusis is an often irreversible bilateral symmetrical, sensorineural hearing loss that appears with increasing age or advance in age and is caused by degeneration of cochlear hair cells, stria vascularis and afferent spiral ganglion neurons. It usually shows symptoms after 60 years and mild progressive aphasia, a specific difficulty of hearing and loss of high frequency sounds and voiceless consonants, resulting in speech discrimination and communication.[1,2]

Across the globe, years lived with disability (YLDs) due to hearing loss is among the leading causes. Presbycusis represents the most common form of hearing loss in elderly persons. Research conducted in India has shown that a huge burden of hearing loss exists in older adults. Many of these adults have not been diagnosed; nor have they reported this symptom owing to low awareness and help-seeking behaviour.[3,4]

The cause of presbycusis is multi-factorial, and it occurs due to genetic vulnerability and environmental (noise) exposure, and system disorders like diabetic mellitus, hypertension, hypercholesterinemia and smoking these are all believed to accelerate cochlea's drug vascular and neuronal degeneration. Despite some studies demonstrating significant relationships between metabolic risk factors and severity of presbycusis, other studies reported conflicting or non-significant associations, particularly for hypertension and smoking. Thus region-specific studies are warranted.[5-7]

Because of the inconsistency in the reported associations of the risk factors and lack of hospital-based data in the region, the study was conducted to determine the prevalence of presbycusis and the association of risk factors in the elderly visiting a tertiary care centre.

MATERIAL AND METHODS

Study Design and Setting: This was a hospital-based, cross-sectional study conducted in the Department of Otorhinolaryngology at Bangalore Medical College and Research Institute (BMCRI), a tertiary care teaching institute, over a period of 12 months.

Study Population: A total of 90 patients aged 60 years and above presenting to the ENT outpatient department with complaints of hearing difficulty were enrolled consecutively after obtaining informed written consent and institutional ethics committee approval.

Inclusion and Exclusion Criteria: Patients aged 60 years and above with bilateral sensorineural hearing loss consistent with presbycusis on audiometric evaluation were included. Patients with conductive or mixed hearing loss due to identifiable causes such as otitis media, otosclerosis, or cerumen impaction, history of ototoxic drug use, prior ear surgery, or occupational noise-induced hearing loss with a clear industrial exposure history were excluded.

Data Collection: A structured questionnaire was used to record demographic details and potential risk factors, including history of diabetes mellitus, hypertension, chronic noise exposure, smoking, alcohol use, and family history of hearing loss. Pure tone audiometry (PTA) was performed for all patients to confirm the diagnosis and grade the severity and type of hearing loss.

Variables Analyzed: Age and sex distribution, severity and audiometric pattern of hearing loss, and prevalence of associated risk factors including diabetes mellitus, hypertension, noise exposure, smoking, alcohol consumption, and family history.

Statistical Analysis: Data were entered into a Microsoft Excel spreadsheet and analyzed using descriptive statistics, with results expressed as frequencies and percentages. Chi-square test was applied to assess associations between risk factors and presbycusis severity, with p-value less than 0.05 considered statistically significant.

RESULTS

Of the 90 patients screened, 58 (64.4%) were diagnosed with presbycusis based on pure tone audiometric criteria, while 32 (35.6%) had hearing thresholds within acceptable limits for age or other identifiable causes.

Table 1: Age and Sex Distribution of Patients Diagnosed with Presbycusis (n=58)

Age Group (years)	Male, n (%)	Female, n (%)	Total, n (%)
60-69	14 (24.1)	10 (17.2)	24 (41.4)
70-79	12 (20.7)	9 (15.5)	21 (36.2)
≥80	7 (12.1)	6 (10.3)	13 (22.4)
Total	**33 (56.9)**	**25 (43.1)**	**58 (100)**

Table 2: Severity of Hearing Loss Among Presbycusis Patients (n=58)

Severity (based on PTA)	Number of Patients	Percentage (%)
Mild (26-40 dB)	13	22.4
Moderate (41-55 dB)	23	39.7
Moderately severe (56-70 dB)	16	27.6
Severe (71-90 dB)	6	10.3

Table 3: Distribution of Associated Risk Factors Among Presbycusis Patients (n=58)

Risk Factor	Number of Patients	Percentage (%)
Diabetes mellitus	27	46.6
Hypertension	25	43.1
Chronic noise exposure	23	39.7
Smoking	19	32.8
Alcohol consumption	15	25.9
Family history of hearing loss	12	20.7
Hypercholesterolemia	11	19.0

Table 4: Association Between Selected Risk Factors and Age Group (n=58)

Risk Factor	60-69 years, n (%)	70-79 years, n (%)	≥80 years, n (%)	p-value
Diabetes mellitus	8 (33.3)	11 (52.4)	8 (61.5)	0.041
Hypertension	7 (29.2)	10 (47.6)	8 (61.5)	0.037
Chronic noise exposure	9 (37.5)	8 (38.1)	6 (46.2)	0.221
Smoking	6 (25.0)	8 (38.1)	5 (38.5)	0.184

The prevalence of diabetes mellitus and hypertension increased significantly with advancing age group ($p<0.05$), while chronic noise exposure and smoking showed a higher trend in older patients without reaching statistical significance. Moderate sensorineural hearing loss was the most common audiometric pattern observed, and severity of hearing loss tended to be greater among patients with coexisting diabetes and hypertension compared to those without these comorbidities.

DISCUSSION

The rate of presbycusis noted in our study (64.4%) was more than the reported rate of 55.6% in a community-based Singapore screening study by Tan et al. [8] Nonetheless, similar rates have been reported from various geriatric and ENT outpatient-based hospital cohorts. The discrepancy is probably due to differing selections of study populations and audiometric diagnostic thresholds. The Nigerian geriatric study by Sule et al. [4]had a significantly higher number of males. On the other hand, Ferré Rey et al. [9] notes that some European studies have reported contrary results. This indicates susceptibility to presbycusis may vary depending on the population and risk factors, and at least in part, sex based.This research found a significant link between diabetes mellitus and hypertension and the increasing severity of presbycusis. This study finding is similar to Manullang et al. [5]who found at a hospital-based study in Indonesia that high blood sugar with hypercholesterolemia and smoking significantly predict presbycusis on audiometric testing. Diabetes-related microangiopathy and vascular changes due to hypertension, likely compromise cochlear blood supply, which nectar of hair cells and stria vascularis. With respect to the above, broader reviews of presbycusis pathophysiology have noted that cochlear oxidative stress and mitochondrial DNA damage accelerate age-related cochlear injury. The above is as per de Sousa et al. [6]and Huang and Tang [7]. However, the Spanish cross-sectional study by Ferré Rey et al. [9] conducted in institutionalized elderly patients found no association between hypertension, smoking and presbycusis; showing conflicting results. In fact, there was strong negative association with hypertension. The literature continues to demonstrate inconsistencies - regarding the specific cardiovascular risk factors linked to sudden strokes.In this group of patients there is a high incidence of chronic exposure to loud noises which further endorses the theory of cumulative noise trauma contributing to earlier cochlear impairment as an age-related situation which often is cited as a possible risk factor for ARHL in the literature. The results of Tan et al. [8] showed a significant association of vestibular dysfunction with presbycusis in other populations. Therefore, patients with presbycusis, particularly those with vascular risk factors, could benefit from vestibular assessment at the same time. In future comprehensive geriatric evaluations for ENT, this should definitely be included though not done in the current study. It is recommended that audiometric screening be made mandatory in geriatric health screening. Especially, elderly patients with diabetes mellitus and hypertension have a significant association with the severity of presbycusis. Proactive management of these modifiable systemic risk factors at an early stage, along with counselling against noise exposure and smoking, may decelerate age-related hearing loss and improve quality of life in this cohort.This study's single center, cross sectional design and smaller sample of 90 assessed patients neither allows inference of causation nor generalization of findings to the elderly population at large. Also, the data on risk factors such as noise exposure and smoking history were self-reported and subject to recall bias, and objective audiometric follow-up to monitor the disease evolution over time was not conducted.

CONCLUSION

This study shows a high prevalence of presbycusis in the elderly attending a tertiary care centre. Diabetes mellitus, hypertension, chronic exposure a noise and smoking are the most common and significant risk factors associated with it. Most association was in patients above 70 years. In conclusion, the study results further strengthen the argument that routine hearing screening and tackling of modifiable co-morbidities in elderly patients will prove helpful to diminish the burden of age-related hearing loss.

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