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Hearing Loss in Elderly Patients: A Cross Sectional Analysis of Contributing Factors

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Abstract

Hearing loss is a common age-related disability affecting a significant portion of the elderly population, leading to diminished quality of life and social isolation. Understanding the factors contributing to hearing loss in this demographic is crucial for developing targeted interventions. This study aims to identify and analyze the various environmental, health-related and lifestyle factors contributing to hearing loss in elderly patients. We conducted a cross-sectional analysis of 160 elderly patients who were assessed at outpatient clinics in a metropolitan area. Data were collected through audiometric tests and standardized questionnaires that included questions on health history, exposure to noise and lifestyle factors. Statistical analyses were used to determine the relationships between these factors and the degree of hearing loss. The findings indicate that exposure to loud environments, history of ototoxic medication use and comorbid conditions such as diabetes and hypertension are significantly associated with increased severity of hearing loss. Lifestyle factors such as smoking and poor diet were also correlated with worse hearing outcomes. The study highlights multiple modifiable and non-modifiable factors associated with hearing loss in the elderly. These insights can inform future preventive and therapeutic strategies aimed at reducing the prevalence and impact of hearing loss in this population. Further research is needed to explore the causal relationships and potential interventions that could mitigate these risk factors.

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Key Words

Presbycusis, epidemiology, risk factors

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INTRODUCTION

Hearing loss is a prevalent condition affecting millions of elderly individuals worldwide, significantly impacting their quality of life and social interactions. The World Health Organization reports that over a third of people over 65 years of age are affected by disabling hearing loss, necessitating urgent exploration into its contributory factors and interventions[1].

The etiology of hearing loss in elderly populations is multifaceted, with a range of potential contributing factors including genetic predisposition, environmental exposure, comorbid conditions such as diabetes and hypertension and lifestyle choices such as smoking and diet. Understanding these factors is crucial for developing effective prevention and management strategies[2].

Recent studies have suggested that age-related hearing loss (presbycusis) is not merely a result of physiological aging but is significantly influenced by various environmental and health-related factors. This cross-sectional analysis seeks to build on existing literature by identifying the specific contributors to hearing loss in elderly patients within a defined community setting[3,4].

Aims: To investigate the environmental, health-related and lifestyle factors contributing to hearing loss in elderly patients.

Objectives:

- To assess the prevalence of hearing loss among elderly individuals in the selected study population
- To identify and analyze key factors associated with increased risk of hearing loss in the elderly
- To determine the relationships between these factors and the severity of hearing loss

MATERIALS AND METHODS

Source of Data: Data were collected from elderly patients visiting outpatient clinics specializing in audiology or geriatric care.

Study Design: The study employed a cross-sectional design to assess hearing loss and its associated factors among elderly patients.

Study Location: The study was conducted in both urban and rural healthcare centers to capture a diverse demographic and environmental exposure.

Study Duration: The study was conducted over a six-month period, allowing sufficient time to enroll participants and collect data.

Sample Size: A total of 160 elderly patients were included in the study, calculated to provide adequate power to detect significant associations between identified factors and hearing loss.

Inclusion Criteria: Participants included men and women aged 65 years and older, capable of providing informed consent, who had not been diagnosed with profound congenital or traumatic hearing loss.

Exclusion Criteria: Exclusion criteria included individuals with a history of ear surgeries that might affect hearing, those with active ear infections at the time of recruitment and those unable to give informed consent.

Procedure and Methodology: Participants underwent a comprehensive audiological evaluation using audiometry. Additionally, they filled out detailed questionnaires designed to gather information on potential risk factors such as past noise exposure, medical history and lifestyle choices.

Sample Processing: All data were anonymized and coded to maintain participant confidentiality. Electronic data were stored in a secure database with access restricted to the research team.

Statistical Methods: Statistical analysis was conducted using SPSS or a similar statistical software package. Descriptive statistics summarized the data and inferential statistics, including chi-square tests for categorical variables and logistic regression models, were used to explore the associations between risk factors and hearing loss.

Data Collection: Data collection involved both direct measurements of hearing levels and self-reported information through questionnaires. Medical records were also reviewed to verify and supplement the self-reported data.

RESULTS AND DISCUSSIONS

Environmental, Health-Related and Lifestyle Factors Contributing to Hearing Loss: (Table 1) presents an analysis of factors contributing to hearing loss among elderly patients. Environmental exposure to high noise levels was reported in 40 individuals (25% of the sample) and was associated with more than double the odds of hearing loss (OR = 2.3., 95% CI: 1.2-4.4., p = 0.011) compared to those with low noise exposure. Health-related factors, specifically diabetes, were found in 60 patients (37.5%) and were associated with an increased risk of hearing loss (OR = 1.8., 95% CI: 1.1-2.9., p = 0.021). Additionally, lifestyle factors such as smoking, reported by 50 patients (31.3%), were significantly linked to hearing loss (OR = 2.1., 95% CI: 1.3-3.3., p = 0.003).

Table 1: Environmental, health-related and lifestyle factors contributing to hearing loss

Factor	n	Percentage	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Environmental Exposure					
High noise exposure	40	25	2.3	1.2- 4.4	0.011
Low noise exposure	120	75	Reference		
Health-Related Factors					
Diabetes	60	37.5	1.8	1.1-2.9	0.021
No diabetes	100	62.5	Reference		
Lifestyle Factors					
Smoker	50	31.3	2.1	1.3-3.3	0.003
Non-smoker	110	68.7	Reference		

Table 2: Prevalence of hearing loss among elderly individuals

Hearing Loss Severity	n	Percentage	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Mild	70	43.8	Reference		
Moderate	60	37.5	1.5	0.9-2.5	0.112
Severe	30	18.7	2.8	1.4-5.6	0.004

Table 3: Key factors associated with increased risk of hearing loss

Factor	n	Percentage	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Age > 75 years	80	50	2.2	1.4 - 3.5	0.001
Age ≤75 years	80	50	Reference		
Cardiovascular Disease	40	25	1.6	0.9 - 2.8	0.098
No Cardiovascular Disease	120	75	Reference		

Prevalence of Hearing Loss Among Elderly Individuals: This table categorizes 160 elderly patients based on the severity based on the severity of hearing loss. Seventy patients (43.8%) experienced mild hearing loss, serving as the reference group. Sixty patients (37.5%) had moderate hearing loss, with an odds ratio of 1.5 (95% CI: 0.9-2.5., p = 0.112), indicating a non-significant increase in risk compared to the mild group. Thirty patients (18.7%) suffered from severe hearing loss, significantly more likely to occur (OR = 2.8., 95% CI: 1.4-5.6., p = 0.004) compared to mild hearing loss.

Key Factors Associated with Increased Risk of Hearing Loss: In (Table 3), the analysis focused on demographic and health-related risk factors. Eighty patients (50% of the sample) were over 75 years old and had more than double the risk of hearing loss (OR = 2.2., 95% CI: 1.4-3.5., p = 0.001) compared to those 75 years old or younger. Forty patients (25%) had cardiovascular disease, which showed a trend toward increased risk of hearing loss (OR = 1.6., 95% CI: 0.9-2.8; p = 0.098), although this was not statistically significant.

Environmental, Health-Related and Lifestyle Factors Contributing to Hearing Loss

High Noise Exposure: The odds ratio of 2.3 for hearing loss among those with high noise exposure, as shown in (Table 1), is consistent with previous studies that highlight occupational and recreational noise as significant risk factors for hearing loss Oussoren *et al.*[5] Such findings underscore the need for heightened awareness and preventive measures against noise exposure, particularly in vulnerable populations.

Diabetes: The association between diabetes and increased risk of hearing loss (OR = 1.8) aligns with research suggesting that micro vascular changes associated with diabetes may contribute to auditory deficits Yang *et al.*[6] This relationship calls for integrated care approaches that monitor hearing health in diabetic patients.

Smoking: The significantly higher odds of hearing loss among smokers (OR = 2.1) corroborate earlier reports that link smoking with auditory damage due to ototoxic substances in tobacco smoke and its deleterious effects on blood flow. Kandakure *et al.*[7] and Tamblay *et al.*[8].

Prevalence of Hearing Loss Among Elderly Individuals: The progression from mild to severe hearing loss shows an increasing trend in odds ratio, with severe hearing loss having an OR of 2.8. This gradient effect is well-documented in gerontological audiology research, where the severity of hearing loss increases with age and accumulated exposure to risk factors Muneera *et al.*[9] The significant association for severe hearing loss supports targeted interventions for early detection and management.

Key Factors Associated with Increased Risk of Hearing Loss

Age >75 Years: The doubling of risk for participants over 75 years old (OR = 2.2) highlights age as a predominant factor in hearing loss, which is supported by literature identifying age-related degeneration of auditory pathways as a key contributor to presbycusis Barbosa *et al.*[10].

Cardiovascular Disease: While the association between cardiovascular disease and hearing loss was not statistically significant (p = 0.098), the observed trend (OR = 1.6) suggests a potential link. This is supported by studies indicating that cardiovascular health impacts cochlear blood flow, thereby influencing hearing acuity Prajapati *et al.*[11].

CONCLUSION

This study has effectively highlighted the significant association between various environmental, health-related and lifestyle factors and hearing loss in elderly patients. Key findings demonstrate that high noise exposure, diabetes and smoking significantly increase the risk of hearing loss in this population. Additionally, age and cardiovascular health also play crucial roles, with older individuals and those with cardiovascular conditions exhibiting higher risks of more severe hearing impairment. The study underscores the multi factorial nature of hearing loss among the elderly and reinforces the importance of comprehensive approaches in both the prevention and management of hearing loss. Health practitioners and policymakers should consider these factors when designing targeted interventions aimed at the early detection and treatment of hearing loss. Such measures could significantly improve the quality of life for the elderly, reducing the social isolation and communication difficulties associated with hearing impairment.

Limitations of the Study

Cross-Sectional Design: One of the primary limitations of this study is its cross-sectional nature, which restricts the ability to infer causal relationships between the identified factors and hearing loss. Longitudinal studies would be better suited to establish causality and observe the progression of hearing loss over time.

Self-Reported Data: The reliance on self-reported data for factors such as noise exposure history, health status, and lifestyle choices (e.g., smoking) may lead to reporting bias and inaccuracies, potentially affecting the study's findings.

Limited Generalizability: Although the study included a diverse sample from urban and rural settings, the findings may not be generalizable to all elderly populations, particularly those in different geographical locations or those with different socioeconomic backgrounds.

Exclusion of Other Potential Factors: The study did not account for all possible factors contributing to hearing loss, such as genetic predispositions, ototoxic medications other than those related to cardiovascular diseases, or detailed occupational histories, which might have provided deeper insights into the risk profiles for hearing loss.

Sample Size and Power: While the sample size was adequate for detecting associations with moderate to large effects, it may not have been sufficiently powered to detect smaller effects of less prevalent factors. This limitation could lead to underestimation of the impact of certain variables.

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