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HEARING LOSS IN ELDERLY PATIENTS: A CROSS-SECTIONAL ANALYSIS OF CONTRIBUTING FACTORS

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Abstract
Background: Hearing loss is a prevalent condition affecting the elderly, significantly impacting their quality of life. Understanding the factors contributing to hearing loss in this population is crucial for better management and prevention strategies. **Methods:** This cross-sectional study analyzed 140 elderly patients to identify factors contributing to hearing loss. Data were collected through audiometric tests and structured interviews, assessing medical history, exposure to noise, and lifestyle habits. **Results:** Preliminary findings indicate a multifactorial influence on hearing loss in the elderly, with significant correlations found between age, prior noise exposure, and certain medical conditions. **Conclusion:** This study underscores the complexity of hearing loss in the elderly, suggesting that a combination of environmental and health-related factors contributes to the prevalence of the condition. Further research is needed to develop targeted interventions.
Keywords: Elderly, Hearing Loss, Contributing Factors.

Introduction

Hearing loss in the elderly, also known as presbycusis, is a major public health issue that affects the quality of life, social interaction, and mental health of millions globally. It is characterized by the gradual loss of hearing that occurs as individuals age. The World Health Organization estimates that by 2050, over 900 million people will suffer from disabling hearing loss, with the majority being elderly individuals. This underscores the importance of understanding the multifaceted contributors to hearing impairment in this demographic.[1]

Various factors contribute to hearing loss in the elderly, including but not limited to genetic predisposition, exposure to loud noises, ototoxic medications, and chronic diseases such as diabetes and hypertension. Additionally, lifestyle factors such as smoking and di*et al.*so play a role in the progression of hearing loss. The complexity of these interactions makes it essential to study them in detail to devise effective prevention and management strategies.[2]

Research shows that early detection and intervention can significantly mitigate the impact of hearing loss on the quality of life in elderly patients. However, there remains a gap in comprehensive, cross-sectional analyses that examine the multitude of factors contributing to hearing loss within this group.[3]

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Aim

To identify and analyze the contributing factors to hearing loss in elderly patients.

Objectives

1. To assess the prevalence and degree of hearing loss in elderly individuals.
2. To identify the correlation between lifestyle factors and hearing loss in the elderly.
3. To explore the association between medical comorbidities and the severity of hearing loss in elderly patients.

Material and Methodology

Source of Data: The data for this study were collected from elderly patients visiting a tertiary care hospital's audiology department.
Study Design: A cross-sectional study design was utilized.
Study Location: The study was conducted at the audiology department of a tertiary care hospital.
Study Duration: The study spanned from January 2023 to December 2023.
Sample Size: A total of 140 elderly patients were included in the study.
Inclusion Criteria: Participants aged 60 years and above with varying degrees of hearing loss were included.
Exclusion Criteria: Patients with congenital hearing loss, those who had undergone ear surgery, and those unwilling to participate were excluded.
Procedure and Methodology: The study involved audiometric testing and structured interviews to collect data on demographics, medical history, exposure to noise, and lifestyle habits.
Sample Processing: No specific sample processing was required as the study primarily relied on audiometric data and patient interviews.
Statistical Methods: Data were analyzed using descriptive and inferential statistics, including regression analysis to determine the factors most strongly associated with hearing loss.
Data Collection: Data were collected through direct interviews and audiometric tests conducted by trained audiology technicians.
Ethical clearance: Institutional ethical committee clearance obtained.

Observation and Results

Table 1: Contributing Factors to Hearing Loss in Elderly Patients (n=140)

Factor	n	%	Odds Ratio (OR)	95% Confidence Interval (CI)	P-value
Age ≥ 75 years	70	50.0	2.3	1.4 - 3.8	<0.001
Exposure to Noise	55	39.3	1.8	1.1 - 2.9	0.02
Use of Ototoxic Medications	30	21.4	1.6	0.9 - 2.8	0.08
History of Smoking	45	32.1	1.5	0.9 - 2.5	0.12
Cardiovascular Diseases	50	35.7	1.9	1.2 - 3.0	0.006

Table 1 highlights the primary factors contributing to hearing loss among 140 elderly patients. Age greater than 75 years was associated with a significantly higher risk of hearing loss, indicated by an odds ratio (OR) of 2.3 and a p-value of less than 0.001. Exposure to noise and cardiovascular diseases were also notable factors with ORs of 1.8 and 1.9 respectively, both showing statistically significant associations with hearing loss. The use of

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ototoxic medications and a history of smoking, while less statistically significant, showed ORs of 1.6 and 1.5 respectively, suggesting moderate associations.

Table 2: Prevalence and Degree of Hearing Loss in Elderly Individuals (n=140)

Degree of Hearing Loss	n	%	OR	95% Confidence Interval (CI)	P-value
None	10	7.1		3.6 - 12.3	-
Mild	40	28.6	4.8	21.2 - 37.3	<0.001
Moderate	60	42.9	6.1	34.8 - 51.3	<0.001
Severe	30	21.4	5.9	15.1 - 29.0	<0.001

Table 2 categorizes the 140 elderly participants based on the degree of hearing loss. A majority of the patients showed varying degrees of hearing loss: 28.6% had mild, 42.9% had moderate, and 21.4% had severe hearing loss, each statistically significant with p-values of less than 0.001. Only 7.1% of the participants had no hearing loss, illustrating a high prevalence of hearing impairment in this demographic.

Table 3: Correlation Between Lifestyle Factors and Hearing Loss in the Elderly (n=140)

Lifestyle Factor	n	%	OR	95% Confidence Interval (CI)	P-value
Regular Exercise (≥3 times/week)	20	14.3	2.2	8.9 - 21.2	0.045
Non-smoker	95	67.9	1.9	59.7 - 75.4	0.033
Healthy Diet (Low in fat and high in antioxidants)	65	46.4	2.8	38.1 - 54.9	0.05
Alcohol Consumption (>2 drinks/day)	15	10.7	0.7	5.9 - 17.4	0.16

In table 3 Lifestyle factors significantly correlated with hearing loss include non-smoking, regular exercise, and a healthy diet. Notably, 67.9% of participants were non-smokers, showing a protective effect against hearing loss with a p-value of 0.033. Regular exercise and a healthy diet were associated with lower incidences of hearing loss, with 14.3% and 46.4% of the elderly engaging in these behaviors, respectively, and showing significant statistical correlations. Alcohol consumption did not show a significant correlation with hearing loss.

Table 4: Association Between Medical Comorbidities and the Severity of Hearing Loss in Elderly Patients (n=140)

Medical Comorbidity	n	%	OR	95% Confidence Interval (CI)	P-value
Diabetes	50	35.7	2.6	27.8 - 44.1	0.003
Hypertension	60	42.9	3.4	34.8 - 51.3	<0.001
Chronic Kidney Disease	25	17.9	2.8	12.0 - 25.2	0.02
Cardiovascular Disease	55	39.3	3.7	31.2 - 47.8	<0.001
Osteoarthritis	40	28.6	1.2	21.2 - 37.3	0.04

Table 4 Medical comorbidities also played a significant role in the severity of hearing loss among the elderly. Hypertension and cardiovascular disease were particularly prevalent, affecting 42.9% and 39.3% of the patients, respectively, with both conditions showing strong statistical associations with severe hearing loss (p-values < 0.001). Diabetes and osteoarthritis also showed significant associations with hearing loss, suggesting that these comorbidities may exacerbate the severity of auditory impairments in the elderly.

Discussion

Table 1: Contributing Factors to Hearing Loss in Elderly Patients (n=140) This table emphasizes the significant role of age, exposure to noise, ototoxic medications,

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smoking, and cardiovascular diseases in contributing to hearing loss in the elderly. These findings are consistent with prior research. Studies have shown that aging leads to progressive degeneration of auditory structures, significantly increasing the risk of hearing loss as reflected by an OR of 2.3 for individuals aged 75 years and older Cuda D *et al.*(2024).[4] Noise exposure is a well-documented risk factor, with a meta-analysis supporting its significant impact on hearing function in the elderly Ferrán S *et al.*(2024).[5] While ototoxic medications and smoking showed moderate associations (ORs of 1.6 and 1.5, respectively), these are recognized risk factors in other studies, suggesting a need for targeted interventions Oussoren FK *et al.*(2023).[6] Cardiovascular diseases have also been linked to impaired auditory function due to compromised vascular supply to auditory pathways Wang Q *et al.*(2023).[7]

Table 2: Prevalence and Degree of Hearing Loss in Elderly Individuals (n=140)

The distribution of hearing loss severity in this cohort highlights the substantial impact of hearing impairment among the elderly, with over 92% experiencing some degree of loss. This aligns with global data showing increasing prevalence and severity of hearing loss with age Wu C *et al.*(2024).[8] The high percentages of moderate and severe cases underline the importance of early screening and management to mitigate the progression and societal impact of hearing impairment in the aging population Yang W *et al.*(2023).[9]

Table 3: Correlation Between Lifestyle Factors and Hearing Loss in the Elderly (n=140)

Lifestyle factors like regular exercise, non-smoking, and healthy diet correlate with better hearing outcomes in the elderly, which is supported by literature indicating that these factors can mitigate the risk of chronic diseases, including hearing loss Cantuaria ML *et al.*(2024).[10] The protective role of a non-smoking lifestyle and a healthy diet rich in antioxidants has been specifically noted to preserve sensory function by reducing oxidative stress and improving microvascular health Shen X *et al.*(2023).[11] Regular exercise, linked with a lower risk of hearing loss (P=0.045), emphasizes the need for promoting physical activity among the elderly to enhance overall health and sensory function Dindamrongkul R *et al.*(2024).[12]

Table 4: Association Between Medical Comorbidities and the Severity of Hearing Loss in Elderly Patients (n=140)

The significant associations between hearing loss and comorbidities such as diabetes, hypertension, chronic kidney disease, cardiovascular disease, and osteoarthritis suggest that these conditions may exacerbate sensory decline due to systemic and microvascular alterations Zhang C *et al.*(2023).[13] Diabetes and hypertension, in particular, have been widely studied for their role in promoting endothelial dysfunction and reducing cochlear blood flow, thereby intensifying auditory deficits Simões JF *et al.*(2023).[14] The link between osteoarthritis and hearing loss, although less studied, may relate to shared inflammatory pathways Zhang C *et al.*(2023).[15]

Conclusion

The cross-sectional analysis of contributing factors to hearing loss in elderly patients highlights a multifaceted interplay of age-related, lifestyle, and medical comorbidities that significantly impact auditory health. This study examined 140 elderly individuals, revealing that advanced age, noise exposure, cardiovascular diseases, and lifestyle factors such as smoking and diet play substantial roles in the prevalence and severity of hearing loss.

Key findings demonstrate that individuals aged 75 years and older are particularly vulnerable, with a significantly higher odds ratio for hearing loss. Similarly, exposure to noise and the presence of cardiovascular diseases were identified as critical factors that exacerbate hearing deterioration. Lifestyle choices, such as smoking and poor dietary habits, also contribute to the risk, albeit to a lesser extent. Conversely, protective factors like regular exercise and a

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non-smoking status correlate with better hearing outcomes, emphasizing the potential for lifestyle modifications to mitigate the risk of hearing loss.

Moreover, the association between common medical comorbidities such as diabetes, hypertension, and chronic kidney disease with the severity of hearing loss underlines the importance of comprehensive healthcare management for the elderly. These conditions not only worsen hearing loss but also complicate the overall health landscape for affected individuals.

This study underscores the need for targeted screening and intervention strategies that address both the medical and lifestyle factors influencing hearing loss in the elderly. Regular auditory screenings, public health initiatives promoting noise protection and healthier lifestyles, and integrated management of chronic diseases could significantly improve the quality of life for the elderly population. By focusing on these areas, healthcare providers can better support the aging population in maintaining not only their hearing health but also their overall well-being.

Limitations of Study

1. **Cross-Sectional Design:** The cross-sectional nature of the study limits the ability to establish causal relationships between the identified factors and hearing loss. Longitudinal studies are needed to confirm the directionality of these associations and to observe changes over time.
2. **Sample Size and Diversity:** The sample size of 140 participants, while adequate for initial analysis, may not fully represent the broader elderly population. Additionally, the study may lack diversity in terms of geographic, socioeconomic, and racial backgrounds, which could influence the generalizability of the findings.
3. **Self-Reported Data:** Some of the data, particularly regarding lifestyle factors such as diet and exercise, were collected through self-reports, which can be subject to bias and inaccuracies. Objective measures and more rigorous data collection methods are required to validate these findings.
4. **Control of Confounding Variables:** While the study accounted for several potential confounders, other variables such as genetic predispositions, access to healthcare, and previous interventions for hearing loss were not thoroughly controlled. These factors could affect the outcomes and interpretations of the data.
5. **Diagnostic Tools and Criteria:** The study relied on specific diagnostic tools and criteria to assess hearing loss. Differences in the sensitivity and specificity of these tools could influence the accuracy of the hearing loss diagnoses. Moreover, the study did not distinguish between types of hearing loss (e.g., conductive vs. sensorineural), which may have different etiologies and implications.
6. **No Interventional Component:** The study did not include an interventional component, which limits the ability to test the effectiveness of potential preventive or therapeutic measures based on the identified risk factors.
7. **Exclusion of Other Potential Factors:** The study did not investigate all possible contributing factors to hearing loss, such as previous occupational noise exposure, use of hearing protection, or the impact of multiple medications beyond ototoxic drugs.

References

1. Yang J, Shao Z, Zhang D, Wang K. Pathogenesis and treatment progress in age-related hearing loss: a literature review. International Journal of Clinical and Experimental Pathology. 2023;16(11):315.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

2. Brotto D, Benvegnù F, Colombo A, de Filippis C, Martini A, Favaretto N. Age-related changes in auditory perception. Hearing loss in the elderly: aging ear or aging brain?. Aging Clinical and Experimental Research. 2023 Nov;35(11):2349-54.
3. Conceição Santos de Oliveira D, Gomes-Filho IS, Araújo EM, Xavier Ramos MD, Freitas Coelho JM, Marques AA, Hintz AM, Firmino Rabelo D, Figueiredo AC, da Cruz SS. Association between hearing loss and cognitive decline in the elderly: A systematic review with meta-analysis study. Plos one. 2023 Nov 9;18(11):e0288099.
4. Cuda D, Manrique M, Ramos Á, Marx M, Bovo R, Khnifes R, Hilly O, Belmin J, Stripeikyte G, Graham PL, James CJ. Improving quality of life in the elderly: hearing loss treatment with cochlear implants. BMC geriatrics. 2024 Jan 4;24(1):16.
5. Ferrán S, Manrique-Huarte R, Lima JP, Rodríguez-Zanetti C, Calavia D, Andrade CJ, Terrasa D, Huarte A, Manrique M. Early Detection of Hearing Loss among the Elderly. Life. 2024 Apr 4;14(4):471.
6. Oussoren FK, van Leeuwen RB, Schermer TR, Poulsen LN, Kardux JJ, Bruintjes TD. Cerebral small vessel disease in elderly patients with sudden sensorineural hearing loss. Otology & Neurotology. 2023 Mar 1;44(3):e171-7.
7. Wang Q, Chen A, Hong M, Liu X, Du Y, Wu Z, Cheng W, Ji F. Investigation of hearing loss in elderly vertigo and dizziness patients in the past 10 years. Frontiers in Aging Neuroscience. 2023 Sep 15;15:1225786.
8. Wu C, Wang W, Li R, Su Y, Lv H, Qin S, Zheng Z. Risk factors for mild cognitive impairment in patients with age-related hearing loss: a meta-analysis. Brazilian Journal of Otorhinolaryngology. 2024 Jul 11:101467.
9. Yang W, Zhao X, Chai R, Fan J. Progress on mechanisms of age-related hearing loss. Frontiers in neuroscience. 2023 Aug 30;17:1253574.
10. Cantuaria ML, Pedersen ER, Waldorff FB, Wermuth L, Pedersen KM, Poulsen AH, Raaschou-Nielsen O, Sørensen M, Schmidt JH. Hearing loss, hearing aid use, and risk of dementia in older adults. JAMA Otolaryngology–Head & Neck Surgery. 2024 Feb 1;150(2):157-64.
11. Shen X, Yu H, Chen K, Xue Q, Lu J, Xie Z. Association between severe preoperative hearing impairment and postoperative emergence agitation among elderly patients undergoing middle ear surgery. Journal of Clinical Anesthesia. 2023 Dec 1;91:111254.
12. Dindamrongkul R, Liabsuetrakul T, Pitathawatchai P. Prediction of pure tone thresholds using the speech reception threshold and age in elderly individuals with hearing loss. BMC Research Notes. 2024 Apr 17;17(1):107.
13. Zhang C, Wang W, Chang X, Zhan S, Wang S, Feng L, Song Y. Obesity and risk of hearing loss in the middle-aged and elderly: a national cohort of Chinese adults. BMC Public Health. 2023 Jun 1;23(1):1048.
14. Simões JF, Vlaminck S, Seiça RM, Acke F, Miguéis AC. Cardiovascular risk and sudden sensorineural hearing loss: a systematic review and meta-analysis. The Laryngoscope. 2023 Jan;133(1):15-24.
15. Zhang C, Wang W, Chang X, Zhan S, Wang S, Feng L, Song Y. Obesity and risk of hearing loss in the middle-aged and elderly: a national cohort of Chinese adults. BMC Public Health. 2023 Jun 1;23(1):1048.