ORIGINAL ARTICLE

https://doi.org/10.61910/ricm.v9i2.458

Hearing loss and related etiologies in patients attended at a public otorhinolaryngology outpatient clinic of Belo Horizonte

ANA CRISTINA MILITÃO ABRANTES ABRAS[1], GABRIELE SANTOS PONTELLO NEVES[1], FERNANDA ALKMIM REZENDE TEIXEIRA[1], MARCELO CASTRO ALVES DE SOUSA[1].

[1]FACULDADE CIÊNCIAS MÉDICAS DE MINAS GERAIS, BELO HORIZONTE, MINAS GERAIS, BRAZIL.

CORRESPONDING AUTHOR: ANA CRISTINA MILITÃO ABRANTES ABRAS – AV. DOS ANDRADAS, 1093 - SANTA EFIGÊNIA, BELO HORIZONTE - MG, 30120-010, (+55) 31 987515877
EMAIL: ACMABRANTES3@GMAIL.COMZ

HIGHLIGHTS

What is already known?

- Hearing loss interferes with the intelligibility of the spoken message.
- Hearing loss is a condition that affects more than 8 million Brazilians.
- Among its subclassifications, presbycusis stands out.

What has been shown?

- Most common diagnoses: Hearing disorders (23%) and Presbycusis (21%).
- The presence of chronic diseases was the main risk indicator presented.
- There was an association between age over 64 years and use of hearing aids.

How can the study contribute to the literature?

- Presbycusis was a key cause of hearing loss complaints in this outpatient clinic.
- The adoption of a hearing aid was the preponderant conduct.
- Study shows presbycusis and hearing loss literature applies to this clinic.

ABSTRACT

Introduction: Hearing loss consists of the reduction of hearing to any degree that interferes with the intelligibility of the spoken message. It is a condition that affects more than 8 million Brazilians and has a multifactorial pathogenesis. Among its subclassifications, presbycusis stands out, a condition of reduced hearing acuity related to aging. **Objective:** To evaluate the main etiologies of complaints related to hearing loss in patients treated at an outpatient clinic in Belo Horizonte, the clinical-epidemiological profile, and the interventions/conduct adopted for these patients. **Methods:** Retrospective observational study with analysis of medical records of outpatients treated at the otorhinolaryngology, in 2022. After applying the inclusion and exclusion criteria, the adopted variables were analyzed. **Results:** The average age of the sample was 59.1 years, with 58% being female. The most prevalent final diagnosis was represented by ICD-10 H90 - Hearing disorders due to conduction, sensorineural, or mixed disorders (23%) and by ICD-10 H91.1 - presbycusis (21%). The main action taken was the adoption of a hearing aid (58%), and the presence of chronic diseases was the main risk indicator presented. There was a significant association between age over 64 years and the use of hearing aids. **Conclusion:** Presbycusis proved to be an important etiology of complaints of hearing loss in this outpatient clinic, and the adoption of a hearing aid was the predominant conduct.

Keywords: Hearing loss; Presbycusis; Diagnosis; Hearing Disorder, Outpatient Clinics.

Abbreviations:

HL: Hearing Loss

IBGE: Brazilian Institute of Geography and Statistics

CEP: Research Ethics Committee

ICD: International Classification of Diseases

CC: Chief Complaint

FH: Family history of deafness

HTN: Systemic Arterial Hypertension

DM: Diabetes Mellitus

MRI: Magnetic Resonance Imaging of the Ear

CT: Computed Tomography of the Temporal Bones

AR: Auditory Rehabilitation

HA: Hearing Aids

RF: Risk factors

INTRODUCTION

Hearing loss (HL) refers to a reduction in auditory perception of any degree that interferes with the intelligibility of spoken language, affecting two to four out of every thousand individuals by adulthood.[1] According to the demographic census conducted by the Brazilian Institute of Geography and Statistics (IBGE) in 2010, more than 8 million individuals residing in Brazil had some degree of hearing loss, representing a significant public health concern in the country.[2]

HL may present as hypoacusis - when there is a partial loss of hearing - or anacusis - when there is a total loss of hearing. It can be unilateral or bilateral, exhibit varying degrees of progression, and may present with associated symptoms such as dizziness and tinnitus. For example, the complaint of tinnitus is more than three times higher among those reporting hearing loss.[3] Similarly, the complaint of dizziness is approximately twice as prevalent in patients who self-report hearing impairment.[4] Among the various types of HL, presbycusis stands out, an age-related hearing disorder that affects more than 25% of the Brazilian population over the age of 65, and is ranked as the third or fourth most prevalent chronic condition in this age group.[1]

According to the World Health Organization, by the year 2025, it is estimated that there will be 1.2 billion people over the age of 60 worldwide, of whom ap-

proximately 500 million will suffer from presbycusis[5]. Given this global aging projection and the prevalence of presbycusis, this condition is expected to become increasingly relevant. It is known to have a multifactorial pathogenesis with an insidious onset, involving cognition and psychosocial factors, and is characterized by a slow and symmetrical progressive hearing decline. Over time, frequencies associated with human speech also become progressively affected.[1,6]

A prevalence study found a 3.2-fold association between cognitive decline and hearing loss, although the confidence interval was not ideal, indicating the need for larger studies to confirm this relationship.[7] The treatment of this condition involves managing associated comorbidities, as well as implementing nutritional interventions, auditory rehabilitation, and multidisciplinary care.[8,9]

Currently, the prevalence of HL remains undercharacterized, as much about this condition is still unknown, and the literature is limited regarding data on the clinical and epidemiological profile of patients with hearing loss in Brazil, particularly in the state of Minas Gerais.[10] There is a scarcity of studies addressing hearing impairment in the elderly population, with heterogeneity in definitions and evaluation criteria for hearing loss.[11] In light of this informational gap and considering the current epidemiological landscape of global aging, this study aims to identify the epidemiological profile, main etiologies, interventions, and management approaches related to HL.

METHODS

Study design

It is an observational cross-sectional study, based on the analysis of digitized medical records from the Otolaryngology specialty in an outpatient clinic of the public healthcare system in Belo Horizonte. Data collection took place from September 2023 to February 2024. The study was submitted to the Research Ethics Committee (CEP), and data collection began after the approval of the research project by the CEP of the institution (CAAE N°.69910323.9.0000.5134– opinion N°.6.251.571/2023).

Participants:

For the sample size calculation, a finite population of 112 patients was considered, with a confidence level of 95% and an estimated proportion of 25% for the occurrence of the comorbidity under study - hearing loss - based on prevalence data for this condition according to the Brazilian Institute of Geography and Statistics (IBGE)[2]. A 10% margin of error was used, and based on these parameters, a sample of 45 patients was obtained.

The following inclusion criteria were applied: age 18 years or older, complaint of hearing loss and/or related terms, and presence of specific data in the medical records such as age, sex, audiometry results, and ICD-10 codes between H60 and H95 and ICD-10 code Z011. Exclusion criteria included records with missing data, age under 18 years, or loss to follow-up at the otorhinolaryngology outpatient clinic.

Instruments:

Data collection was performed through access to the electronic medical records of patients from this outpatient clinic. This access was restricted to the institution's computers, preventing data leakage. The selection of medical records began with the separation of records from patients who consulted in the otorhinolaryngology department in 2022, totaling 182 records. Among them, records were separated for those who had at some point reported the main complaints of HL or variant terms/expressions - hypoacusis/hearing loss: "I hear less," "I don't hear what people are saying clearly," "I need to ask people to speak louder," "I need to turn the television volume up a lot," reports of a feeling of a blocked ear, aural fullness, reports of total hearing loss, and reports of tinnitus. As a result, 112 records remained. Inclusion and exclusion criteria were then applied, yielding a final sample of 48 patients.

Procedures:

To analyze the etiologies related to HL, the ICD-10 codes recorded in the medical records were collected. To assess interventions and management taken for each patient, the following variables were used: diagnostic approach adopted during the consultation, including audiometry results and any additional diagnostic or therapeutic procedures, such as the use of medications, imaging, and adaptation to hearing aids. To assess the clinical-epidemiological profile, the following variables were also collected: other associated complaints (otalgia, dizziness), sex, age, comorbidities, chronic diseases of interest, risk indicators, participants' medical history, and family history of hearing loss. Among the chronic diseases of interest, the following were included in the analysis: obesity, dyslipidemia, diabetes mellitus, cardiovascular diseases, systemic arterial hypertension (HTN), nephropathies, autoimmune diseases, and sarcoidosis. Additionally, the participants' medical history was also analyzed to identify risk indicators for hearing loss, including neonatal or childhood infections, genetic syndromes associated with deafness, use of ototoxic medications, smoking, noise exposure, previous otitis, age > 65 years, and history of traumatic brain injury.

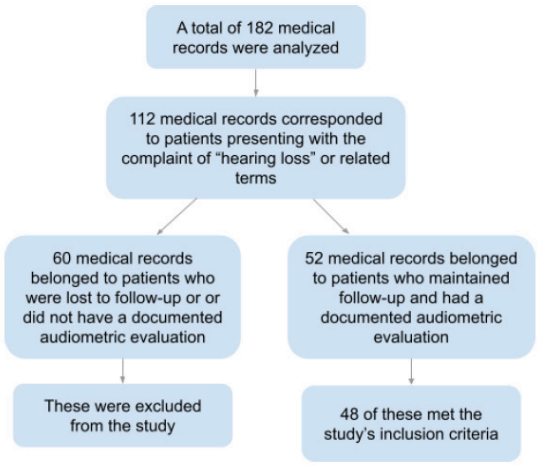
The necessary variables for the study were collected from the 48 eligible patients, following a standardized data collection form. Concurrently, the data were transferred to Excel spreadsheets, with access restricted to the researchers, for later analysis.

Satistical analysis

The study was analyzed using absolute and relative frequencies for categorical variables, and mean ± standard deviation and/or median (1st quartile – 3rd quartile) for numerical variables. Normality tests (Anderson-Darling), t-tests, or Mann-Whitney tests were used to compare means/medians, and Chi-square or Fisher's Exact tests were used to assess associations between categorical variables, with a significance level of 5%. Data were analyzed using R software version 4.0.3.

RESULTS

A total of 182 medical records were analyzed, corresponding to the total number of patients treated by the otorhinolaryngology outpatient clinic in 2022. Among the records analyzed, 112 (61.5%) presented hearing loss as the primary complaint or related terms; however, only 52 (46.4%) of these cases had the results of tonal audiometry documented in the records. Additionally, most of the medical records of patients reporting hearing loss indicated that the conduct adopted was the request for tonal audiometry, but in 60 (53%) of the cases, there was a loss to follow-up by the patient. Figure 1 illustrates the sample selection flowchart for the research.



Among the 52 records that contained audiometry results, 48 records met the inclusion criteria and were eligible for the study. It was observed that the average age of the sample was 59.1 years (+/- 14.51 years), with a majority of the sample being female (58%). Regarding the age group of the participants, it is noteworthy that among female patients, most were over 64 years old, while in male patients, the age group of 18 to 44 years prevailed.

Regarding the main complaint of the consultation, it was observed that the mention of "Hearing loss" and related terms was the most frequent in 75% of the cases, followed by the complaint of "Tinnitus" in 63% of the patients and "Dizziness" in 21% of the cases. Table 1 shows the characterization of the main variables in the study.

Table 1. Sample Characterization

Characteristics	N = 48
Age[1]	63 (50, 69)
Sex	
Feminine	28 (58%)
Masculine	20 (42%)
CC Tinnitus	
No	18 (38%)
Yes	30 (63%)
CC Hearing Loss	
No	12 (25%)
Yes	36 (75%)
Complaint of Dizziness	
No	38 (79%)
Yes	10 (21%)
Complaint of Otalgia	
No	42 (88%)
Yes	6 (13%)
Other CC	
No	32 (67%)
Yes	16 (33%)
H90.3 - Bilateral Sensorineural Hearing Loss	
No	44 (92%)
Yes	4 (8.3%)
H90.5 - Unspecified Sensorineural Hearing Loss	
No	46 (96%)
Yes	2 (4.2%)
H91.1 - Presbycusis	
No	38 (79%)
Yes	10 (21%)
H93.1 - Tinnitus	
No	43 (90%)
Yes	5 (10%)
H90 - Hearing Loss Due to Conduction, Sensorineural or Mixed Disorder	
No	37 (77%)
Yes	11 (23%)
R42 - Dizziness and Unsteadiness	
No	45 (94%)
Yes	3 (6.3%)

Characteristics	N = 48
Other ICDs	
No	32 (67%)
Yes	16 (33%)
Chronic Diseases	
No	21 (44%)
Yes	27 (56%)
Age > 65 years	
No	34 (71%)
Yes	14 (29%)
Smoking	
No	32 (67%)
Yes	16 (33%)
Use of Ototoxic Medication	
No	43 (90%)
Yes	5 (10%)
Ear infections	
No	42 (88%)
Yes	6 (13%)
Noise Exposure	
No	42 (88%)
Yes	6 (13%)
FH	
No	45 (94%)
Yes	3 (6.3%)
Other Risk Indicators	
No	39 (81%)
Yes	9 (19%)
HTN	
No	10 (33%)
Yes	20 (67%)
Dyslipidemia	
No	22 (73%)
Yes	8 (27%)
DM	
No	22 (73%)
Yes	8 (27%)
Hypothyroidism	
No	24 (80%)
Yes	6 (20%)

Characteristics	N = 48
Cardiovascular Diseases	
No	26 (87%)
Yes	4 (13%)
Tonal Audiometry - Classification	
Anacusia	1 (2.1%)
Conductive HL	3 (6.3%)
Mixed HL	13 (27%)
Sensorineural HL	25 (52%)
No HL	6 (13%)
Hearing Aids	
No	20 (42%)
Yes	28 (58%)
MRI	
No	39 (81%)
Yes	9 (19%)
Budesonide	
No	44 (92%)
Yes	4 (8.3%)
Washing	
No	45 (94%)
Yes	3 (6.3%)
CT	
No	40 (83%)
Yes	8 (17%)
Age Group	
Between 18 and 44 years old	9 (19%)
Between 45 and 64 years old	17 (35%)
Over 64 years old	22 (46%)

The analyzed sample included 27 individuals who reported having some chronic disease of interest to the study, totaling 56% of the participants. Among individuals with chronic comorbidities, 67% had systemic arterial hypertension (HTN), followed by dyslipidemia and diabetes mellitus (DM), each accounting for 27% of the sample. Regarding the other risk indicators investigated, 29% of the sample was over 65 years old, and 33% of the participants were smokers, which is a risk factor for presbycusis. Only 5 individuals had the use of ototoxic medication reported in their records, representing 10% of the sample. Noise exposure was also another risk factor found in 6 patients (13%).

The results of tonal audiometry were also considered, and it was observed that most participants presented sensorineural hearing loss (52%), while a minority did not have any hearing loss (only 13% of the population). In 27% of the cases, the hearing loss was mixed, and in 6.3% of the cases, the loss was conductive.

Regarding the characterization of the sample regarding the main ICD codes assigned at the end of otolaryngological follow-up, it is worth highlighting that 23% of the interviewees were classified under ICD H90, which refers to hearing loss due to conductive, sensorineural, and/or mixed disorders. Another ICD that stood out was H91.1 – Presbycusis – with 21% of the sample. It is also noteworthy that the individuals predominantly affected by these conditions were female in both categories.

In terms of the management taken at the end of otorhinolaryngological follow-up, it was found that more than half of the patients were advised to undergo auditory rehabilitation, with 58% of these cases involving the adaptation of hearing aids. Other management approaches included requests for imaging exams, use of budesonide, and nasal irrigation. Magnetic resonance imaging of the ear was requested in 19% of the consultations, as well as temporal bone tomography in 17% of the cases.

This study also found an association between the variable sex and the variable auditory rehabilitation (AR) through the adaptation to hearing aids (HA), indicating that patients who underwent HA adaptation as the chosen management were statistically associated with being female. Table 2 illustrates the intersection between the AR variable through HA adaptation and the variables of interest. At a significance level of 0.05, a significant association between HA adaptation and age group was identified, indicating that patients over 64 years old are associated with the management of HA adaptation. It is also noteworthy that individuals diagnosed with sensorineural hearing loss are statistically associated with adopting auditory rehabilitation as a management approach.

Table 2: Cross-referencing between auditory rehabilitation (AR) through adaptation to hearing aids and the variables of interest in the study

Auditory rehabilitation (AR) through adaptation to hearing aids				
Characteristics	**Total, N = 48**	**No, N = 20**	**Yes, N = 28**	**p-value2**
Middle Ages[1]	63 (50, 69)	60 (51, 64)	66 (50, 71)	0.047
Sex				**0.029**
Feminine	28 (58%)	8 (40%)	20 (71%)	
Masculine	20 (42%)	12 (60%)	8 (29%)	
CC Hearing Loss				**0.2**
No	12 (25%)	7 (35%)	5 (18%)	
Yes	36 (75%)	13 (65%)	23 (82%)	
H90.3 - Bilateral Sensorineural Hearing Loss				**0.13**
No	44 (92%)	20 (100%)	24 (86%)	
Yes	4 (8.3%)	0 (0%)	4 (14%)	
H90.5 - Unspecified sensorineural hearing loss				**0.5**
No	46 (96%)	20 (100%)	26 (93%)	
Yes	2 (4.2%)	0 (0%)	2 (7.1%)	
H91.1 - Presbycusis				**0.031**
No	38 (79%)	19 (95%)	19 (68%)	
Yes	10 (21%)	1 (5.0%)	9 (32%)	
H93.1- Tinnitus				**0.009**
No	43 (90%)	15 (75%)	28 (100%)	
Yes	5 (10%)	5 (25%)	0 (0%)	

H90 - Hearing Loss Due to Conduction, Sensorineural or Mixed Disorder				**0.7**
No	37 (77%)	16 (80%)	21 (75%)	
Yes	11 (23%)	4 (20%)	7 (25%)	
Tonal Audiometry - Classification				**0.001**
Anacusia	1 (2.1%)	0 (0%)	1 (3.6%)	
Conductive HL	3 (6.3%)	3 (15%)	0 (0%)	
Mixed HL	13 (27%)	4 (20%)	9 (32%)	
Sensorineural HL	25 (52%)	7 (35%)	18 (64%)	
No HL	6 (13%)	6 (30%)	0 (0%)	
Age Group				**0.011**
Between 18 and 44 years old	9 (19%)	3 (15%)	6 (21%)	
Between 45 and 64 years old	17 (35%)	12 (60%)	5 (18%)	
Over 64 years old	22 (46%)	5 (25%)	17 (61%)	

Table 3 shows the intersection between the variable "Complaint of Hearing Loss" and the other variables of interest in the study. It is observed that among individuals whose main complaint in the consultation was "Hearing loss," 58% also reported tinnitus, and 31% were smokers. It is worth noting that among individuals with "age over 65 years" as a risk indicator, only 28% of them highlighted "Hearing loss" as their main complaint. However, despite these associations being clinically significant, none were considered statistically significant at a significance level of 0.05.

Table 3: Cross-reference between Chief Complaint of Hearing Loss and the variables of interest in the study

	Complaint of Hearing Loss			
Characteristics	**Total, N = 48**	**No, N = 12**	**Yes, N = 36**	**p-value1**
Sex				**>0.9**
Feminine	28 (58%)	7 (58%)	21 (58%)	
Masculine	20 (42%)	5 (42%)	15 (42%)	
Tinnitus				**0.5**
No	18 (38%)	3 (25%)	15 (42%)	
Yes	30 (63%)	9 (75%)	21 (58%)	
Dizziness				**0.2**
No	38 (79%)	8 (67%)	30 (83%)	
Yes	10 (21%)	4 (33%)	6 (17%)	
H90.3- Bilateral Sensorineural Hearing Loss				**0.6**
No	44 (92%)	12 (100%)	32 (89%)	
Yes	4 (8.3%)	0 (0%)	4 (11%)	
H90.5- Unspecified Sensorineural Hearing Loss				**0.4**
No	46 (96%)	11 (92%)	35 (97%)	
Yes	2 (4.2%)	1 (8.3%)	1 (2.8%)	
H91.1- Presbycusis				**0.7**
No	38 (79%)	9 (75%)	29 (81%)	
Yes	10 (21%)	3 (25%)	7 (19%)	

H93.1- Tinnitus				**0.6**
No	43 (90%)	10 (83%)	33 (92%)	
Yes	5 (10%)	2 (17%)	3 (8.3%)	
H90 - Hearing Loss Due to Conduction, Sensorineural or Mixed Disorder				**0.2**
No	37 (77%)	11 (92%)	26 (72%)	
Yes	11 (23%)	1 (8.3%)	10 (28%)	
Age > 65 years				**0.7**
No	34 (71%)	8 (67%)	26 (72%)	
Yes	14 (29%)	4 (33%)	10 (28%)	
Smoking				**0.5**
No	32 (67%)	7 (58%)	25 (69%)	
Yes	16 (33%)	5 (42%)	11 (31%)	
Noise Exposure				**0.6**
No	42 (88%)	10 (83%)	32 (89%)	
Yes	6 (13%)	2 (17%)	4 (11%)	
Tonal Audiometry - Classification				**0.022**
Anacusia	1 (2.1%)	0 (0%)	1 (2.8%)	
Conductive HL	3 (6.3%)	3 (25%)	0 (0%)	
Mixed HL	13 (27%)	1 (8.3%)	12 (33%)	
Sensorineural HL	25 (52%)	6 (50%)	19 (53%)	
No HL	6 (13%)	2 (17%)	4 (11%)	
Hearing Aids				**0.2**
No	20 (42%)	7 (58%)	13 (36%)	
Yes	28 (58%)	5 (42%)	23 (64%)	

Table 4 presents the intersection between the variable "Age Group" and the main ICD codes recorded in the medical records. At a significance level of 0.05, it is possible to highlight that the age group variable is statistically associated with ICD H91.1 – Presbycusis, indicating that patients who did not receive this ICD as the final diagnosis are associated with the age group between 45 and 64 years. It was also possible to highlight an association between "Other ICDs" and age group, indicating that patients who did not fall under "Other ICDs," i.e., those classified with ICDs related to hearing loss, presbycusis, tinnitus, or dizziness, are statistically associated with the age group over 64 years.

Table 4: Crossing of Age Groups with the main ICDs analyzed

	AGE GROUP				
Characteristics	Total, N = 48[1]	Between 18 and 44 years old, N = 9[1]	Between 45 and 64 years old, N = 17[1]	Over 64 years old, N = 22[1]	Over 64 years old, N = 22[1]
H90.3 - Bilateral Sensorineural Hearing Loss					**0.2**
No	44 (92%)	7 (78%)	17 (100%)	20 (91%)	
Yes	4 (8.3%)	2 (22%)	0 (0%)	2 (9.1%)	

H90.5 - Unspecified Sensorineural Hearing Loss					**0.5**
No	46 (96%)	8 (89%)	17 (100%)	21 (95%)	
Yes	2 (4.2%)	1 (11%)	0 (0%)	1 (4.5%)	
H91.1 - Presbycusis					**0.048**
No	38 (79%)	9 (100%)	15 (88%)	14 (64%)	
Yes	10 (21%)	0 (0%)	2 (12%)	8 (36%)	
H93.1 - Tinnitus					**0.7**
No	43 (90%)	9 (100%)	15 (88%)	19 (86%)	
Yes	5 (10%)	0 (0%)	2 (12%)	3 (14%)	
H90 - Hearing Loss Due to Conduction, Sensorineural or Mixed Disorder					**0.6**
No	37 (77%)	8 (89%)	12 (71%)	17 (77%)	
Yes	11 (23%)	1 (11%)	5 (29%)	5 (23%)	
R42 - Dizziness and Unsteadiness					**0.8**
No	45 (94%)	8 (89%)	16 (94%)	21 (95%)	
Yes	3 (6.3%)	1 (11%)	1 (5.9%)	1 (4.5%)	
Other ICDs					**0.027**
No	32 (67%)	5 (56%)	8 (47%)	19 (86%)	
Yes	16 (33%)	4 (44%)	9 (53%)	3 (14%)	

DISCUSSION

The present study conducted an analysis of medical records from patients treated at an otolaryngology outpatient clinic within the public healthcare system in Belo Horizonte, aiming to obtain data on the clinical and epidemiological profile of patients presenting with hearing loss complaints, as well as to identify the main etiologies and management approaches taken following diagnosis. Among the 48 participants whose primary complaint was hearing loss or related terms, the majority were female with a mean age of 59.1 years. Among female individuals, the most prevalent age group was "over 64 years," while in males, the "18 to 44 years" age group predominated. These findings are consistent with the literature, as population studies estimate the prevalence of significant hearing loss among individuals aged 60–80 years to be between 21–27%.[12] Age-related degeneration may negatively affect the hair cells and vascular supply of the cochlea, as well as the transmission of auditory information along the neural pathways, leading to hearing impairment.[18]

Regarding reported complaints, tinnitus emerged as a significant symptom within the sample, potentially serving as the initial manifestation of hearing loss and being associated with various diseases, particularly those involving cochlear abnormalities. Studies support this finding, demonstrating that tinnitus is present in approximately 60% to 80% of patients with hearing loss and 70% of patients with presbycusis.[1,14] Additionally, the literature emphasizes that the main etiologies of tinnitus are often linked to sensorineural hearing loss secondary to noise exposure, aging (presbycusis), or the use of ototoxic agents. [1,14]

In terms of risk factors (RFs), a profile of patients with high cardiovascular risk is independently and significantly associated with the risk of sudden sensorineural hearing loss.[15] A systematic review involving a total of 61,060 patients investigated this possible association and found that dyslipidemia is a risk factor for sudden sensorineural hearing loss, possibly due to cochlear ischemia and microvascular compromise.[15] Furthermore, the same study showed that controlling hyperlipidemia may lead to hearing improvement in sudden losses and prevent hearing loss through the use of statins.[15]

In parallel, the results of this study indicated chronic diseases as the most prevalent conditions among the included patients, accounting for approximately 60% of the sample. However, the primary RF in the study, systemic arterial hypertension (HTN), is considered an isolated aggravating factor for hearing loss by only some authors.[1] Nevertheless, hypertension is an important contributor to increased cardiovascular risk, a parameter well known to be associated with sensorineural hearing loss.[15] Dyslipidemia and diabetes mellitus (DM) also had a notable prevalence in this study, highlighting the need for attention to these conditions in hearing loss prevention and diagnosis. Studies support the association between DM and sensorineural hearing loss, suggesting that the incidence and severity of hearing loss are related to the patient's age, elevated glycated hemoglobin levels, and the duration of diabetes.[15,17] A longitudinal study involving 139,909 women concluded that DM prevention could reduce complaints of hearing loss.[18]

Smoking also stands out, representing a risk indicator in 33% of the total study sample. These findings align with expectations, as smokers are more vulnerable to hearing loss.[1,15] In agreement, a cohort study conducted in the United States and published in 2011 found that smoking increased the risk of hearing impairment by 1.4 times.[19]

Among the ICD-10 codes identified in the study, 23% of the sample was classified under "ICD-10 H90 - Hearing loss due to conductive, sensorineural, or mixed disorders." However, this is a generic ICD-10 code that does not allow for the classification of hearing loss patterns nor the determination of etiology. Following that, "ICD-10 H91.1 - Presbycusis" accounted for 21% of the sample. Although a considerable number of patients presented diverse etiologies and others had non-specific ICD-10 classifications, presbycusis emerged as a significant etiology in this outpatient setting, likely the most frequent. Supporting this finding is the tonal audiometry result, in which more than half of the sample had sensorineural hearing loss, corresponding to the typical hearing loss profile seen in presbycusis.[1] Sensorineural hearing loss also showed statistical significance in association with the complaint of "hearing loss", indicating that, in this outpatient setting, most patients with this complaint presented with sensorineural hearing loss. Thus, the results suggest presbycusis as the main etiological hypothesis in the studied outpatient population.

Studies have shown a reduction in auditory thresholds with age, generally caused by cochlear aging. Presbycusis is the most common sensory deficit in the elderly and the leading cause of progressive deafness.[1,20,21] It involves various mechanisms such as strial vascular degeneration, atrophy of the organ of Corti, atrophy of cochlear neurons, and stiffening of the basilar membrane. As a result of these mechanisms, it is characterized by bilateral and symmetrical sensorineural hearing loss, more significantly affecting higher frequencies and slowly progressing to involve mid and flat frequencies. It is worth noting that presbycusis may also present with conductive hearing loss, resulting in a mixed hearing loss pattern in some cases.[1]

The analysis of clinical management in the present study revealed a positive and significant association between auditory rehabilitation and the following variables: female sex, ICD-10 H91.1 - Presbycusis, sensorineural hearing loss, and age over 64 years. These results suggest that male individuals and older adults constitute the primary target population for hearing loss prevention and diagnostic efforts. This study supports that observation,

as men tend to seek healthcare services less frequently and are more affected by severe and chronic illnesses. [22]

Finally, hearing aids proved to be important tools in the auditory rehabilitation process for the patients analyzed. It is well established that the cornerstone of audiological intervention for hearing loss is auditory rehabilitation (AR) via HA adaptation, which is effective in most cases.[23] The indication for using these devices depends on the configuration of hearing loss and the individual characteristics of each patient. Among these, conductive hearing loss tends to respond better to HA than sensorineural hearing loss.[1,24] Growing evidence suggests improved quality of life and delayed or even prevented cognitive decline in individuals with sensorineural hearing loss who are well adapted to HA.[23] However, despite these benefits, HA remain underutilized. It is estimated that fewer than half of older adults with significant hearing loss who would benefit from HA actually use the device.[23] This situation results from factors such as undiagnosed cases, patient refusal, loss to follow-up, high cost of purchasing and maintaining the device, fear of social stigma, and neglect of the consequences of hearing loss.[23] Therefore, although on a small scale, this study suggests the need to improve outpatient preparedness to appropriately receive and manage this patient profile, given its relevance in the current healthcare context.

LIMITATIONS

One limitation noted in this study was the small sample size of 48 patients. This occurred because of the loss to follow-up among outpatient clinic patients, as 53% of those eligible for the study lacked documented tonal audiometry results and were therefore excluded. Finally, it is important to acknowledge selection biases in the study, including sex and age, with a predominance of women and elderly individuals, as well as the fact that the analysis was conducted in a specific otorhinolaryngology outpatient setting. Additionally, as this was an observational study, the presence of uncontrolled factors that may have impacted the results must be considered, such as the content entered in the medical records, highlighting the increased risk of errors or omissions in the recorded data.

CONCLUSION

Based on the data discussed, this study outlined the epidemiological profile of patients seen at an otorhinolaryngology outpatient clinic in Belo Horizonte, identifying presbycusis as a significant etiology among hearing loss complaints. Most participants were female, with a considerable prevalence of elderly patients. These findings emphasize the need for targeted actions focused on the prevention and early diagnosis of hearing loss, particularly in elderly and male populations. Furthermore, the study revealed gaps in the patient care pathway, with a significant portion failing to undergo essential tests, such as audiometry, or being lost to follow-up. The information obtained reinforces the importance of preventive and diagnostic strategies centered on proper medical follow-up and rehabilitation.

REFERENCES

1. Pignatari SS, Anselmo-Lima WT, eds. Tratado de otorrinolaringologia. 3rd ed. Elsevier; 2018.
2. Instituto Brasileiro de Geografia e Estatística (IBGE). Censo demográfico 2010: características gerais da população, religião e pessoas com deficiência. Accessed August 25, 2024. https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=794
3. Nondahl DM, Cruickshanks KJ, Huang GH et al. Tinnitus and its risk factors in the Beaver Dam Offspring Study. Int J Audiol. 2011;50(5):313-320. doi:10.3109/14992027.2010.551220
4. Quevedo AL, Leotti VB, Goulart BN. Análise da prevalência de perda auditiva autodeclarada e fatores associados: informante primário versus proxy. Cad Saude Publica. 2017;33(6). doi:10.1590/0102-311x00076216
5. Sprinzl GM, Riechelmann H. Current trends in treating hearing loss in elderly people: a review of the technology and treatment options - a mini-review. Gerontology. 2010;56(3):351-358. doi:10.1159/000275062

6. Gates GA, Mills JH. Presbycusis. Lancet. 2005;366(9491):1111-1120. doi:10.1016/S0140-6736(05)67423-5
7. Luchesi BM, Kajiyama MT, Abreu AR, Kwiatkoski M, Martins TC. Monitoring risk factors for dementia in middle-aged and older adults: a longitudinal study. Dement Amp Neuropsychol. 2024;18. doi:10.1590/1980-5764-dn-2023-0095
8. Yang J, Shao Z, Zhang D, Wang K. Pathogenesis and treatment progress in age-related hearing loss: a literature review. Int J Clin Exp Pathol. 2023;16(11):315-320. Accessed August 5, 2024. https://pmc.ncbi.nlm.nih.gov/articles/PMC10695747/
9. Thomas JP, Völter C. Update on surgical and nonsurgical treatment options for age-related hearing loss. Z Gerontol Geriatr. 2023;56(4):276-282. doi:10.1007/s00391-023-02182-3
10. Tiensoli LO, Goulart LM, Resende LM, Colosimo EA. Triagem auditiva em hospital público de Belo Horizonte, Minas Gerais, Brasil: deficiência auditiva e seus fatores de risco em neonatos e lactentes. Cad Saude Publica. 2007;23(6):1431-1441. doi:10.1590/s0102-311x2007000600018
11. Gondim LM, Balen SA, Zimmermann KJ, Pagnossin DF, Fialho Ide M, Roggia SM. Study of the prevalence of impaired hearing and its determinants in the city of Itajaí, Santa Catarina State, Brazil. Braz J Otorhinolaryngol. 2012;78(2):27-34. doi:10.1590/S1808-86942012000200006
12. Chern A, Irace AL, Golub JS. The Laterality of Age-related Hearing Loss and Cognition. Otol Neurotol Open. 2022;2(1):e008. doi:10.1097/ono.0000000000000008
13. Keithley EM. Pathology and mechanisms of cochlear aging. J Neurosci Res. 2020;98(9):1674-1684. doi:10.1002/jnr.24439
14. Dinces EA. Etiology and diagnosis of tinnitus. In: Deschler DG, ed. UpToDate. UpToDate; 2024. Accessed August 24, 2024. www.updtodate.com
15. Papadopoulou AM, Papouliakos S, Karkos P, Chaidas K. The Impact of Cardiovascular Risk Factors on the Incidence, Severity, and Prognosis of Sudden Sensorineural Hearing Loss (SSHL): A Systematic Review. Cureus. 2024;16(4):e58377. doi:10.7759/cureus.58377
16. Gioacchini FM, Pisani D, Viola P, et al. Diabetes Mellitus and Hearing Loss: A Complex Relationship. Medicina (Kaunas). 2023;59(2):269. doi:10.3390/medicina59020269
17. Mishra A, Poorey VK. Clinical and Audiometric Assessment of Hearing Loss in Diabetes Mellitus. Indian J Otolaryngol Head Neck Surg. 2019;71(Suppl 2):1490-1494. doi:10.1007/s12070-018-1566-2
18. Gupta S, Eavey RD, Wang M, Curhan SG, Curhan GC. Type 2 diabetes and the risk of incident hearing loss. Diabetologia. 2019;62(2):281-285. doi:10.1007/s00125-018-4766-0
19. Nash SD, Cruickshanks KJ, Klein R, et al. The prevalence of hearing impairment and associated risk factors: the Beaver Dam Offspring Study. Arch Otolaryngol Head Neck Surg. 2011;137(5):432-439. doi:10.1001/archoto.2011.15
20. Huang Q, Tang J. Age-related hearing loss or presbycusis. Eur Arch Otorhinolaryngol. 2010;267(8):1179-1191. doi:10.1007/s00405-010-1270-7
21. Weber PC. Evaluation of hearing loss in adults. In: Deschler DG, ed. UpToDate. UpToDate; 2024. Accessed August 24, 2024. www.updtodate.com
22. Gomes R, Nascimento EF, Araújo FC. Por que os homens buscam menos os serviços de saúde do que as mulheres? As explicações de homens com baixa escolaridade e homens com ensino superior. Cad Publica. 2007;23(3):565-574. doi:10.1590/s0102-311x2007000300015
23. Ren H, Hu B, Jiang G. Advancements in prevention and intervention of sensorineural hearing loss. Ther Adv Chronic Dis. 2022;13:20406223221104987. Published 2022 Jun 27. doi:10.1177/20406223221104987
24. Weber PC. Hearing amplification in adults. In: Deschler DG, ed. UpToDate. UpToDate; 2024. Accessed August 24, 2024. www.updtodate.com

FIGURE AND TABLE LEGENDS

Figure 01 - Flowchart illustrating the steps for selecting the study sample.

Table 01 - Characterization of the clinical-epidemiological profile of the study in absolute and percentage terms. 1Median (AIQ); n (%). CC: Chief Complaint; FH: Family history of deafness; HTN: Systemic Arterial Hypertension; DM: Diabetes Mellitus; HL: Hearing Loss; MRI: Magnetic Resonance Imaging of the Ear; CT: Computed Tomography of the Temporal Bones

Table 02 - Cross-referencing between the variable auditory rehabilitation (AR) through adaptation to hearing aids and the other variables of interest of the study. "CC: Chief Complaint"; "HL: Hearing loss" 1Median (AIQ); n (%) 2Wilcoxon rank sum test; Chi-square test of independence; Fisher's exact test.

Table 03 - Cross-reference between Chief Complaint of Hearing Loss and the variables of interest in the study. 1Wilcoxon Rank Sum Test; Chi-Square Test of Independence; Fisher's Exact Test.

Table 04 - Crossing between Age Groups with the main CIDs analyzed. 1n (%). 2Fisher's exact test.

THE AUTHORS DECLARE THAT THEY HAVE NO KNOWN COMPETING FINANCIAL INTERESTS OR PERSONAL RELATIONSHIPS THAT COULD HAVE APPEARED TO INFLUENCE THE WORK REPORTED IN THIS PAPER.