

Vestibular function assessment in individuals with hearing loss with and without dizziness: a cross-sectional observational study

Avaliação da função vestibular em indivíduos com perda auditiva com e sem queixa de tontura: estudo observacional transversal

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ABSTRACT

Purpose: To evaluate functional balance and semicircular canal function in individuals with hearing loss, with and without dizziness. **Methods:** Observational, cross-sectional, analytical study with 59 participants (27–79 years old) treated at the Specialized Rehabilitation Center in Contagem, Minas Gerais, Brazil. Among them, 42 had dizziness and 17 did not. The following procedures were performed: medical history survey, application of questionnaires to assess the degree of hearing impairment and dizziness, Berg Balance Scale, and Timed Up and Go Test. The Video Head Impulse Test was performed on 33 participants (25 with dizziness, eight without dizziness) to assess semicircular canal function. Data were analyzed descriptively and compared between groups using Pearson's chi-square test, considering $p < 0.05$. **Results:** Complaints of tinnitus (88.1%) and discomfort with loud sounds (66.1%) were significantly more common among individuals with dizziness ($p = 0.008$ and $p = 0.049$, respectively). The use of antivertigo and central inhibitor medications was also more frequent in this group ($p = 0.031$). Of the 33 individuals evaluated with the video Head Impulse Test, 17 (51.5%) had normal results and 16 (48.5%) had semicircular canal dysfunction, predominantly in the dizziness group, but without significant differences between the groups ($p = 0.224$). **Conclusion:** In individuals with hearing loss, semicircular canal dysfunction can occur independently of dizziness complaints. The study highlights the relevance of vestibular evaluation in this population, even in the absence of balance-related symptoms.

Keywords: Hearing loss; Dizziness; Vestibular function tests; Adults; Elderly; Head impulse test

RESUMO

Objetivo: avaliar o equilíbrio funcional e a função dos canais semicirculares em indivíduos com perda auditiva, com e sem queixa de tontura. **Métodos:** estudo observacional, transversal e analítico com 59 participantes (27–79 anos) atendidos no Centro Especializado em Reabilitação de Contagem, Minas Gerais. Dentre eles, 42 apresentavam queixa de tontura e 17 não tinham a queixa. Foram realizados os seguintes procedimentos: anamnese, aplicação de questionários que avaliam o grau de desvantagem auditiva e da tontura, Escala de Equilíbrio de Berg e *Timed Up and Go Test*. Para avaliação da função dos canais semicirculares, foi realizado o Teste do Impulso Cefálico por vídeo (*Video Head Impulse Test - v-HIT*) em 33 participantes (25 com tontura, oito sem tontura). Os dados foram analisados descritivamente e comparados entre grupos por meio do teste Qui-quadrado de Pearson, considerando $p < 0,05$. **Resultados:** a queixa de zumbido (88,1%) e o desconforto a sons intensos (66,1%) foram significativamente mais comuns entre indivíduos com tontura ($p = 0,008$ e $p = 0,049$, respectivamente). O uso de medicamentos antivertiginosos e inibidores centrais também foi mais frequente nesse grupo ($p = 0,031$). Dos 33 indivíduos avaliados com o Teste do Impulso Cefálico por vídeo, 17 (51,5%) apresentaram resultado normal e 16 (48,5%) apresentaram alteração dos canais semicirculares, predominantemente no grupo com tontura, mas sem diferenças significativas entre os grupos ($p = 0,224$). **Conclusão:** em indivíduos com perda auditiva, a disfunção dos canais semicirculares pode ocorrer independentemente da presença de queixa de tontura. Destaca-se a relevância da avaliação vestibular nessa população, mesmo na ausência de sintomas relacionados ao equilíbrio.

Palavras-chave: Perda auditiva; Tontura; Testes de função vestibular; Adultos; Idosos; Teste do impulso da cabeça

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INTRODUCTION

Body balance is ensured by the processing of peripheral sensory information from the visual, proprioceptive, and vestibular systems, integrated by central coordination, which triggers reflex motor responses essential for regulating and maintaining this balance^(1,2). Under normal conditions, this process occurs automatically, but failures in this integration can generate symptoms such as dizziness and vertigo, which compromise spatial orientation and impact quality of life⁽³⁾. The term dizziness encompasses both rotatory vertigo, characterized by the illusory sensation of spinning, and non-rotatory vertigo, which includes visual distortion and instability^(3,4).

The vestibular and the auditory systems share a close peripheral anatomical relationship, suggesting functional interdependence. Thus, changes in the structure or function of the auditory and vestibular pathways can result in hearing loss and/or dizziness, manifesting alone or simultaneously^(3,5,6).

Hearing loss, in addition to compromising communication, is associated with cognitive impairment, a higher risk of falls, social isolation, and a decline in quality of life^(7,8).

The relationship between hearing and balance has been extensively studied, with several epidemiological studies indicating an association between hearing impairment and compromised balance, increased risk of falls, and reduced mobility^(5,6,8-11). Evidence suggests that auditory stimuli play a complementary role in postural regulation mechanisms, working in conjunction with visual, proprioceptive, and vestibular information, although with less influence than these sensory systems⁽¹²⁾.

Studies highlight that the occurrence of dizziness in this population is higher when hearing loss is more severe (moderate and severe) and when hearing is asymmetrical between the two ears^(5,6). It has also been pointed out that aging-related moderate to profound bilateral sensorineural hearing loss may be linked to vestibular hypofunction, regardless of predisposing factors to vestibulopathy⁽¹³⁾.

Furthermore, studies highlight the importance of early screening for balance disorders in this population, emphasizing the need for rehabilitation programs focused on preventing falls and improving quality of life^(5,11). Functional analysis of the vestibular system is of great importance in this population, regardless of complaints, as it can reveal subclinical dysfunctions capable of influencing mobility, risk of falls, and long-term quality of life^(5,11,13).

Despite its clinical relevance, studies analyzing the prevalence of dizziness complaints and vestibular findings with objective evaluation in people with hearing loss, especially in hearing rehabilitation services in Brazil, are still scarce.

Considering this gap, this study was conducted in a hearing rehabilitation service to evaluate functional balance and semicircular canal function in individuals with hearing loss, comparing the results between those with and without complaints of dizziness. The hypothesis is that individuals with hearing loss may have vestibular dysfunctions, even in the absence of complaints related to body balance.

METHODS

The research procedures were approved by the Research Ethics Committee of the Federal University of Minas Gerais, Brazil (CEP/UFMG), under the Certificate of Presentation for Ethical Appraisal (CAAE) number 71842523.5.0000.5149 (according to Resolution of the Brazilian National Health Council – CNS 466/12) and approval number 6.266.445. The research was conducted in the audiology sector of the Specialized Rehabilitation Center of Contagem, Minas Gerais (CER IV). This is an analytical, cross-sectional, observational study with a convenience sample of individuals with hearing loss treated at CER IV.

Sample

The sample size was calculated based on the results of a previous study⁽¹⁰⁾, which evaluated the effect of auditory rehabilitation with hearing aids on dizziness symptoms in older adults with presbycusis and presbyvestibulopathy, using the Dizziness Handicap Inventory (DHI). It considered the mean total DHI score (30.1) and standard deviation (14.9), with a 5% significance level ($\alpha = 0.05$) and an 80% statistical power. The calculated sample size was 46 participants. Based on this calculation, the research sample consisted of 59 participants, of whom 33 were evaluated using the Video Head Impulse Test (v-HIT).

Inclusion and exclusion criteria

The study included individuals of both sexes with any degree of unilateral or bilateral sensorineural or mixed hearing loss, aged 18 to 80 years, who voluntarily consented to participate in the study, formalizing their agreement by signing an informed consent form.

It excluded participants with evident or self-reported orthopedic issues that compromised mobility or the ability to stand independently, cognitive, neurological, or linguistic difficulties that prevented the understanding and execution of simple verbal commands, severe visual impairment not corrected by glasses or contact lenses, and those who were continuously using medication for vertigo.

Although the literature is more restricted to studies with sensorineural hearing loss, individuals with mixed hearing loss were included because they also have sensorineural impairment. This decision sought to expand the number of participants and increase the clinical representativeness of the sample, reflecting the real profile of patients treated in public hearing health services.

Recruitment

Data were collected between August and December 2024, totaling 422 individuals with hearing loss seen at CER IV during that period.

The researchers invited 113 individuals with hearing loss to participate, regardless of whether they had complaints of dizziness. Of these, 59 agreed to participate, and 54 declined or did not attend the functional balance assessment. Of the 59 participants who participated in the research, 33 returned for assessment using the v-HIT (Figure 1).

Individuals in their first consultation or follow-up visit underwent standard procedures for basic audiological evaluation (audiological history, audiometry, speech audiometry, tympanometry, and otolaryngological evaluation). After reaching an audiological diagnosis, those who met the inclusion criteria were invited to participate in the research by signing an informed consent form, and those who consented underwent the data collection procedures.

The recruitment flow is illustrated in Figure 1, as recommended by Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). The main causes of sample loss were refusal to participate and difficulty attending the second stage of data collection, when the v-HIT was performed. There were no significant demographic differences between those who participated and those who did not participate in the second phase, minimizing the risk of selection bias.

Study variables

The primary exposure variable was any degree of sensorineural or mixed hearing loss. Outcome variables were the presence or absence of self-reported dizziness, performance on the Berg Balance Scale (BBS) and Timed Up and Go Test (TUG), and v-HIT findings. Secondary variables included age, sex, tinnitus, discomfort with loud sounds, medication use, and self-reported comorbidities.

Procedures and instruments

Their otoneurological history was initially surveyed to investigate aspects related to the history of dizziness, hearing, falls, eating habits, other health conditions, and medication use. Participants who reported a current or previous history

of dizziness, vertigo, or imbalance were classified as “with complaints.” Those who did not present such reports were classified as “without complaints.”

The following instruments were applied to assess handicap regarding hearing loss, dizziness, and the risk of falls:

- Hearing Handicap Inventory for Adults (HHIA)⁽¹⁴⁾ and Hearing Handicap Inventory for the Elderly – Screening (HHIE-S)⁽¹⁵⁾, which measure self-perceived hearing impairment in adults and older adults, respectively. The HHIA contains 25 questions divided between emotional and social/situational aspects, with scores ranging from 0 to 100, classifying the perception of impairment as absent, mild to moderate, and severe. The HHIE-S, a reduced version for older adults, has 10 questions and scores ranging from 0 to 42, classifying the perception of hearing impairment as absent, mild to moderate, and significant.
- BBS⁽¹⁶⁾, which assesses functional balance and fall risk through 14 tests. Each test has five alternatives ranging from 0 to 4 points. The maximum possible score is 56 points; scores lower than 45 points represent a risk of falls.
- TUG⁽¹⁷⁾, which assesses functional mobility by having the patient stand up from a chair, walk 3 meters, return, and sit down again. The execution time indicates functional independence: up to 20 seconds suggests adequate mobility, while longer times indicate a higher risk of falls.

The following additional instruments were applied to participants who complained of dizziness:

- DHI⁽¹⁸⁾, Brazilian version, which assesses the impact of dizziness on physical, functional, and emotional aspects through 25 questions, totaling up to 100 points. The analysis classifies the severity of the impact as mild, moderate, or severe.
- Visual Analog Scale (VAS)⁽¹⁹⁾, which quantifies the intensity of dizziness according to the patient’s self-perception, ranging from 0 (lowest level of dizziness) to 10 (highest level of dizziness).

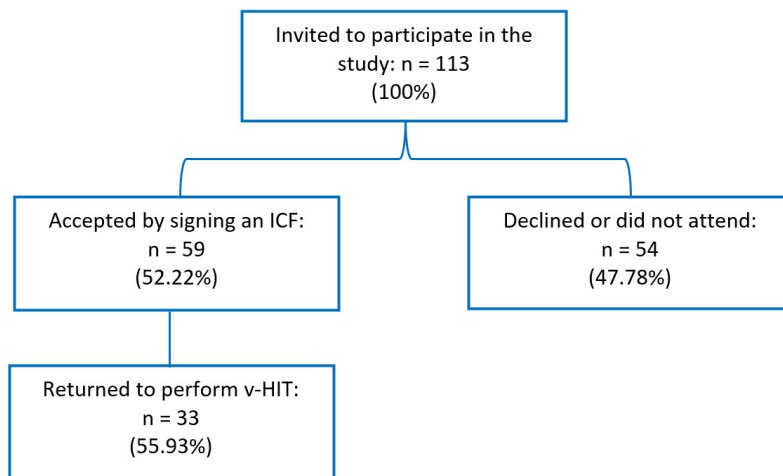


Figure 1. Flowchart of study participant selection and inclusion
Subtitle: n = number of participants; % = percentage; ICF = informed consent form; v-HIT = video Head Impulse Test

Next, all participants underwent static and dynamic balance tests and positional and positioning nystagmus research⁽²⁰⁾:

- Evaluation of static and dynamic balance with the Romberg, Romberg-Barré, and Unterberger tests⁽²⁰⁾, in which participants remained in different postures, with their eyes closed, to verify their ability to maintain balance and possible postural displacements.
- Research on positional and positioning nystagmus, performed by adopting different postures and using the Dix-Hallpike maneuver (for the posterior and anterior semicircular canals) and the Head Roll Test (for the lateral canals). It investigated the presence of benign paroxysmal positional vertigo (BPPV)⁽²⁰⁾.

At the end of the consultation, participants were informed that they would be contacted later to schedule the instrumental assessment with v-HIT. Its application⁽²¹⁾ did not cover the entire sample due to logistical restrictions, including the difficulty for participants to return for another assessment.

Two experienced speech-language-hearing pathologists performed v-HIT with the ICS-impulse equipment from Otometrics®. The v-HIT is a computerized examination that objectively assesses vestibulo-ocular reflex (VOR) gain⁽²¹⁾. Eye movements are captured using an accelerometer and a high-speed camera. The examination is painless for the patient and allows for the analysis of the function of all semicircular canals separately, through the investigation of the VOR. For the examination, the patient was asked to remain seated in a chair 120 cm from a target positioned in front of them, at eye level. The examiner precisely adjusted the equipment on the patient's head to avoid misalignments during the procedure.

The examination was carried out as follows:

- Calibration of the eye position signal: This was the first test performed, in which the patient was asked to fix their eyes on a target moving on the wall, keeping their head still.
- Evaluation of the lateral semicircular canals: The examiner performed rapid, short movements of the patient's head, alternating between the right and left sides unpredictably.
- Evaluation of the vertical semicircular canals (anterior left and posterior right): The examiner tilted the patient's head 45° to the right and then to the left. In this position, rapid, short, and unpredictable movements were performed forward and backward to evaluate the vertical canals.

Statistical analysis

The data analysis was performed by associating the results between the two groups, one group consisting of those who reported dizziness and the other group consisting of those who did not report dizziness.

The collected data were tabulated in a Microsoft Excel spreadsheet. Descriptive data analysis was performed using frequency distribution for categorical variables and measures of central tendency (mean and median) and variability (standard deviation, minimum, and maximum) for quantitative variables.

The Kolmogorov-Smirnov normality test was applied to choose appropriate statistical tests (parametric or non-parametric). Bivariate statistics were used for data analysis. Categorical variables were examined using the chi-square and Fisher's exact tests, expressing the results as absolute frequencies and proportions. For quantitative variables, comparisons between two groups were performed using the Mann-Whitney test (ranksum in STATA software), while the Kruskal-Wallis test was used for comparisons involving three or more groups. Results were presented in terms of median, mean, standard deviation, quartiles, minimum, and maximum values. Spearman's correlation test was used to correlate the total DHI score with the VAS score, as well as the duration of hearing loss with the duration of dizziness complaints. Statistically significant p-values were highlighted, considering a 5% significance level ($p < 0.05$) and 95% confidence intervals in all analyses. Statistical analyses were performed without formal adjustment for potential confounders, given the exploratory nature of the study and its limited sample size. However, relevant demographic and clinical variables were compared between groups to check for any imbalances.

RESULTS

The sample for functional balance assessment consisted of 59 individuals with hearing loss, of whom 42 belonged to the group with complaints of dizziness and 17 to the group without complaints. Women (71.2%) and individuals aged 60 years or older (61%) predominated, with no significant differences between the groups regarding age ($p = 0.162$) (Table 1).

This study could calculate the prevalence of dizziness in the sample because 422 individuals diagnosed with hearing loss were counted during the data collection period. It found that 90 (21.3%) of them reported complaints of dizziness, corresponding to a prevalence of 21.3% in the sample studied.

Tinnitus (88.1%) and discomfort with loud sounds (66.1%) stood out among the symptoms associated with hearing loss. Both were more frequent in the group with dizziness, with statistically significant differences ($p = 0.008$ and $p = 0.049$) (Table 1). Regarding the etiology of hearing loss, idiopathic causes (50.8%) and presbycusis (32.2%) predominated.

Medication use was reported by 27.1% of the sample, with a higher frequency of antivertigo drugs and central inhibitors in the group with dizziness ($p = 0.031$) (Table 1). Most participants (66.1%) had three or more comorbidities, including metabolic, cardiovascular, psychiatric, and orthopedic conditions.

The mean duration of hearing loss was 16.5 years, while the mean duration of dizziness complaints was 11.4 years. These variables were weakly positively correlated in the group with dizziness ($\rho = 0.2937$).

Regarding the characteristics of hearing loss, 43 individuals (72.9%) had sensorineural hearing loss, with 27 (45.8%) having moderate hearing loss in the right ear. Similarly, 38 participants (64.4%) had sensorineural hearing loss in the left ear, of which 21 (35.6%) had moderate hearing loss. As for laterality, 44 individuals (74.6%) had bilateral hearing loss, while 11 (18.6%) had unilateral hearing loss on the right, and four (6.8%) had unilateral hearing loss on the left. No statistically significant differences were observed between the types and degrees of hearing loss when comparing the groups. The association

analysis between the type of hearing loss and the v-HIT results, conducted with Fisher’s exact test, showed no statistically significant difference between the groups ($p = 0.688$).

The HHIE-S was applied to 37 older adults, and the HHIA was applied to 21 adults. Table 2 shows the distribution of individuals according to the HHIE-S and HHIA results. The association analysis between age and v-HIT results, using the chi-square test, did not show a statistically significant difference ($p = 0.996$).

The DHI and VAS were applied to the 42 individuals who reported dizziness (Table 3). The Spearman correlation test between the total DHI score and the VAS score revealed a moderate positive correlation ($\rho = 0.551$).

All participants had adequate functional performance results in the TUG, while 3.4% were classified as at risk of falls by the BBS. In the assessment of static and dynamic balance, using the Romberg, Romberg-Barré, and Unterberger tests,

Table 1. Clinical and sociodemographic characteristics and differences between groups

Sample Characterization	Frequency		With complaints		Without complaints		p-value
	Absolute (n)	Relative (%)	n	%	n	%	
Total	59	100.0	42	100.0	17	100.0	
Age range							
Up to 59 years	23	39.0	14	33.3	9	52.9	0.162
60 years or older	36	61.0	28	66.7	8	47.1	
Sex							
Females	45	76.3	34	81.0	11	65	0.012*
Males	14	23.7	8	19.0	6	35	
Otosurgery							
Yes	3	5.1	2	4.8	1	5.9	0.859
No	56	94.9	40	95.2	16	94.9	
Tinnitus							
Yes	52	88.1	40	95.2	12	70.6	0.008*
No	7	11.9	2	4.8	5	29.4	
Ear fullness							
Yes	33	55.9	24	57.1	9	52.9	0.768
No	26	44.1	18	42.9	8	47.1	
Discomfort from loud noises							
Yes	39	66.1	31	73.8	8	47.1	0.049*
No	20	33.9	11	26.2	9	52.9	
Family history of HL							
Yes	32	54.2	24	57.1	8	47.1	0.481
No	27	45.8	18	42.9	9	52.9	
Medications							
No	43	72.9	26	61.9	17	100.0	0.031*
Antivertigo	5	8.5	5	11.9	0	0.0	
Central inhibitor	10	17.0	10	23.8	0	0.0	
Antivertigo and central inhibitor	1	1.7	1	2.4	0	0.0	

Caption: n = number of participants; % = percentage; HL = hearing loss; *Pearson chi-square test

Table 2. Descriptive data and differences between the groups in the Hearing Handicap Inventory for the Elderly--Screening - short version and the Hearing Handicap Inventory for Adults

Instrument	Absolute frequency (n)	Relative frequency (%)	With complaints		Without complaints		p-value
			n	%	n	%	
HHIE-S							
Not perceived	5	13.5	4	14.3	1	11.1	0.676
Mild to moderate	12	32.4	8	28.6	4	44.4	
Significant	20	54.1	16	57.1	4	44.4	
Total	37	100.0	28	100.0	9	100.0	
HHIA							
Not perceived	4	19.1	3	21.4	1	14.3	0.829
Mild to moderate	2	9.5	1	7.1	1	14.3	
Severe	15	71.4	10	71.4	5	71.4	
Total	21	100.0	14	100.0	7	100.0	

Caption: n = number of participants; % = percentage; HHIE-S = Hearing Handicap Inventory for the Elderly-Screening – short version; HHIA = Hearing Handicap Inventory for Adults

Table 3. Data from the Dizziness Handicap Inventory and Visual Analog Scale in the group reporting dizziness

Instrument	Absolute frequency (n)	Relative frequency (%)
DHI		
Mild	28	66.7
Moderate	7	16.7
Severe	7	16.7
Total	42	100.0
VAS		
Mild	6	14.3
Moderate	24	57.1
Severe	12	28.6
Total	42	100.0

Caption: n = number of participants; % = percentage; DHI = Dizziness Handicap Inventory; VAS = Visual Analog Scale

Table 4. Results of the video Head Impulse Test by group

v-HIT results	Absolute frequency (n)	Relative frequency (%)	With complaints		Without complaints		p-value
			n	%	n	%	
No detectable changes	17	51.5	11	44	6	75	0.224
Changes on the right	2	6.1	1	4	1	12.5	
Changes on the left	6	18.2	6	24	0	0	
Bilateral changes	8	24.2	7	28	1	12.5	
Total	33	100	25	100	8	100	

Caption: n = number of participants; % = percentage; v-HIT = video Head Impulse Test

57 (96.6%) individuals had adequate results in the Romberg test, while 34 (49.2%) had inadequate results in the Romberg-Barré test, with statistically significant differences ($p = 0.018$) between the groups. In the Unterberger test, 29 (49.2%) had inadequacies, but without statistically significant differences between the groups ($p = 0.539$).

In the positioning tests, only one individual (1.69%) presented nystagmus compatible with BPPV of the posterior canal.

Of the 59 participants, 33 (55.9%) performed v-HIT; 17 (51.5%) had adequate function of the semicircular canals. Detailed results by group are shown in Table 4.

DISCUSSION

The prevalence of dizziness complaints in this sample (21.3%) was similar to that reported in previous studies^(5,22). One of them, for instance, identified a prevalence of 21.13% of dizziness in older people with asymmetrical hearing loss, especially among women with severe hearing loss⁽⁵⁾. Another study, also in an older population with different types, degrees, and symmetries of hearing loss, found a prevalence of 20.3%, frequently associating dizziness with difficulty in auditory comprehension⁽²²⁾.

Although the predominance of older people in this sample was not statistically significant, this finding is consistent with what the literature already points out – a solid consensus that aging affects both hearing and balance^(5,10).

The association between complaints of dizziness and female sex proved to be significant, agreeing with a study that highlighted that it is difficult to find balanced samples between men and women in the context of aging. This is because, in general, there is a greater number of women in studies, as they represent most of the older population in all regions of the world⁽⁵⁾.

On the other hand, other studies have identified a correlation between dizziness and hearing loss, but without establishing any direct relationship with the participants' sex^(11,12).

The association between tinnitus complaints and discomfort with loud sounds was statistically significant among the analyzed groups, being more prevalent among individuals with hearing loss who also reported dizziness than among those without this complaint. Previous studies have also pointed to tinnitus as a common symptom in these individuals. One example is a study conducted in a hearing health service, which profiled patients with tinnitus and found that 46% of them also had vertigo⁽²³⁾. This association suggests that several anatomical, pathological, and even psychological factors may contribute to the simultaneous presence of these symptoms, due to the structural and functional connections between the vestibular and cochlear systems⁽²³⁾. Thus, alterations in the same structure can simultaneously result in hearing loss and dizziness, justifying their coexistence. However, it is important to highlight that most participants were older adults with two or more comorbidities, and a significant portion (18.7%) used central inhibitor medications that may also contribute to the perception of tinnitus.

The higher frequency of use of antivertigo and central inhibitor medications in the dizziness group indicates that these patients may present more intense or uncomfortable vestibular symptoms, leading them to seek drug treatment. Medications for depression and anxiety can influence the perception of dizziness, since there is a strong interrelation between vestibular symptoms and emotional disorders⁽²⁴⁾. Patients with dizziness may develop secondary anxiety and, conversely, anxious states may worsen the perception of dizziness⁽²⁴⁾.

The high prevalence of idiopathic hearing loss and presbycusis in the sample suggests that most individuals had hearing loss without a clearly identifiable cause or associated with aging.

Studies indicate that vestibular dysfunction in individuals with hearing loss may also be related to aging processes that simultaneously affect the auditory and vestibular systems, due to common biological mechanisms. The cochlea and saccule share the same embryonic origin, making them susceptible to similar degenerative processes^(25,26).

The v-HIT results indicated that a significant proportion of participants had some degree of semicircular canal dysfunction, predominantly among those complaining of dizziness, although without statistically significant differences between the groups, possibly due to the small sample size of the v-HIT test. Moreover, some individuals without complaints had abnormal examination results, while others with dizziness had results within the normal range. This finding suggests that the manifestation of symptoms may involve other vestibular structures not evaluated by the v-HIT, or non-vestibular factors, reinforcing the multifactorial nature of dizziness.

Evidence from the literature demonstrates that the assessment of vestibular function using the v-HIT can reveal heterogeneous patterns of impairment, even in asymptomatic individuals^(25,26,27,28). A recent study, for example, investigated patients with sudden idiopathic sensorineural hearing loss, with and without vertigo, and compared the v-HIT findings between the groups. The authors found that the proportion of abnormal tests did not differ statistically between the groups, concluding that, in most cases, vestibular dysfunction was not detected by the v-HIT, regardless of symptoms. The study also revealed that asymptomatic individuals (without vertigo or dizziness) may have abnormal v-HIT results, highlighting the importance of objective assessment of vestibular function, even in patients without evident clinical manifestations⁽²⁸⁾. In another, more recent study, also in patients with sudden sensorineural hearing loss, the authors identified greater susceptibility of the posterior semicircular canal to dysfunction when associated with vertigo, as well as a greater predisposition to abnormalities in the v-HIT in individuals with profound hearing loss⁽²⁷⁾.

The present study did not identify an association between the type, degree, or laterality of hearing loss and the complaint of dizziness. Nevertheless, vestibular assessment should consider not only the presence of symptoms but also the severity of hearing loss, since the literature describes correlations between greater severity of hearing loss and the occurrence of vestibular symptoms^(5,6,27,28,29). The inclusion of vestibular assessment in the clinical routine of patients with hearing loss is recommended, since subclinical changes may not be perceptible, but may impact functionality and balance.

Some limitations of this study should be considered, such as the small size of the sample submitted to v-HIT. Furthermore, the absence of complementary vestibular tests, such as the caloric test and vestibular evoked myogenic potentials (VEMPs), restricted a more detailed assessment of vestibular function. The caloric test would have allowed for the analysis of the system at low frequencies, and VEMPs would have made it possible to assess the integrity of the otolithic organs, structures closer to the cochlea than the semicircular canals.

Another point to consider relates to possible biases: (1) selection bias, as individuals were recruited from a hearing health care service of the Brazilian Unified Health System (SUS), which may have limited the representativeness of the sample in relation to the general population. Furthermore, participants with complaints of dizziness may have shown greater interest in joining the study due to the expectation of symptom assessment,

which possibly resulted in an over-representation of this group; (2) information bias, due to the reliance on self-reporting of symptoms; (3) potential confounding factors, such as medication use and multiple comorbidities, which can influence both the perception and the clinical manifestation of dizziness.

Despite these limitations, the results reinforce the importance of assessing not only auditory aspects but also vestibular aspects in individuals with hearing loss. The clinical relevance of the findings highlights that the coexistence of hearing loss and dizziness is frequent, potentially multifactorial, and requires a comprehensive approach in clinical practice.

This study aimed to evaluate functional balance and semicircular canal function, comparing the results between individuals with and without dizziness, based on the hypothesis that vestibular dysfunctions could be present even in the absence of symptoms. The data obtained indicated alterations in the semicircular canals also in asymptomatic participants, suggesting this possibility. However, no statistically significant differences were found between the groups, which may be related to the small sample size of the v-HIT test and the multifactorial nature of vestibular symptoms. Thus, although the objectives were achieved from a methodological and analytical standpoint, the results indicate the need for studies with larger samples and the inclusion of complementary vestibular tests for a better understanding of the relationship between hearing loss and vestibular dysfunction.

CONCLUSION

Individuals with hearing loss had alterations in the semicircular canals, even those without complaints of dizziness. Although no statistically significant differences were identified between the groups, these findings indicate that vestibular dysfunctions can occur independently of perceptible symptoms. These results reinforce the importance of considering balance assessment in the clinical approach to individuals with hearing loss and highlight the need for future studies with larger samples and complementary methods to deepen the understanding of this relationship.

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