Original Article

Dizziness in elderly individuals: otoneurological diagnosis and interference on the quality of life

Tontura em idosos: diagnóstico otoneurológico e interferência na qualidade de vida

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ABSTRACT

Purpose: To verify the otoneurological diagnosis of elderly individuals with dizziness and the interference of this symptom in their quality of life. **Methods:** Cross-sectional study, conducted with 56 elderly individuals with dizziness. Subjects' mean age was 71.2 years, and they were submitted to otoneurological assessment, which involved: pure-tone, speech and impedance audiometry, balance assessment, testing for positional and positioning vertigo and nystagmus, and vectoelectronystagmography. A specific questionnaire for dizziness was used to assess the quality of life, the Dizziness Handicap Inventory (DHI), which verifies the handicap effects provoked by this symptom. **Results:** Rotatory dizziness was reported by 29 patients (51.8%), 75% presented some hearing complaint, and 69.6% had altered results in audiometry. Patients with vestibular complaints of positional dizziness presented significant difference for the physical aspect of the DHI. Patients with vestibular complaints of imbalance showed significant difference for the functional and emotional aspects. The computerized vectoelectronystagmography was altered in 47 patients (83.9%), indicating peripheral vestibular disorder in all cases. In the post-caloric assessment, hyperreflexia was the most prevalent alteration, and the most frequent diagnosis was Deficient Peripheral Vestibular Syndrome to the Left. Regarding quality of life, the functional aspect had the highest average score among the three aspects evaluated, and there was a significant difference between the functional and emotional aspects. **Conclusion:** Most elderly patients with dizziness present alterations in audiometry and vectoelectronystagmography, which indicate a disorder in the vestibulocochlear system; they also present impaired quality of life.

Keywords: Aged; Dizziness/etiology; Vertigo/diagnosis; Evaluation; Quality of life

INTRODUCTION

There has been an increase in the elderly population all over the world, and this phenomenon is equally happening in Brazil. According to the World Health Organization (WHO), until 2025, Brazil will be the sixth country in the world in number of elderly individuals[(1)]. Aging consists in a dynamic progressive process, characterized by morphological, functional, biochemical and psychological alterations that interfere in the individual's loss of adaptation capacity to the environment, causing greater vulnerability and higher incidence of pathological processes[(2)].

Elderly individuals present a high prevalence of vestibular and auditory symptoms, manifested through dizziness, tinnitus, body balance alterations, and falls[(3,4)]. Among the vestibular symptoms, dizziness is the most common after 65 years of age, and it interferes directly in the quality of life (QL); hence, it is considered an important public health issue[(5-8)].

There is a noticeable increase in dizziness with age, and this is a frequent complaint in elderly subjects[(5,7,9-11)]. There are many citations about its prevalence. Dizziness is the second highest prevalence symptom in the world's population until 65 years of age, behind headache. Dizziness is present in 5 to 10% of the world's population; it is the seventh complaint most reported by women, and the fourth by men. After 65 years of age, it is considered the most common symptom of geriatric population, reaching 85%[(6)]. Three in every four Americans with 70 years old or more have postural balance problems[(5)]. Studies have shown that the rate of vestibular vertigo, among participants with moderate-severe dizziness or vertigo, increases with age: 14% in the age range between 18 and 39 years, 28% between 40 and 59 years, and 37% in the age range older than 60 years[(10)].

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Dizziness is a generic term used to define imbalance symptoms. It may be considered an erroneous perception, a movement illusion or hallucination, a sensation of rotatory (vertigo) or non-rotatory (instability, flotation, oscillation) spatial disorientation, imbalance and visual distortion with the sensation to be moving forward or backwards (oscillopsia)[6]. Dizziness may or may not be due to vestibular disorders, and alterations in the vestibular system are responsible for 85% of the cases, and significantly impair the QL of elderly individuals[6,11-14]. The causes of dizziness might be physiological and/or not physiological (depending on organic and/or psychical disorders), and can have an extra-vestibular (visual, neurological, psychical) or vestibular origin[6].

In the aging process, the ability of the central nervous system to process vestibular, visual and proprioceptive signals is impaired[3]. Degenerative processes are responsible for the occurrence of vertigo and/or dizziness and imbalance, called presbyvertigo and presbyataxia, respectively, for this age range[3]. The association between multiple factors suggests that dizziness might be a multifactorial problem similar to other geriatric syndromes, such as fall, delirium, and urinary incontinence[15]. The loss of the peripheral vestibular function may be related to the presbyvertigo, and the cause of dizziness in elderly individuals with normal results in vestibular evaluation might be due to metabolic, psychical, dysautonomic, orthopedic, visual, or proprioceptive disorders[16].

Dizziness initiates a series of psychosocial consequences that are manifested through negative feelings and, moreover, can cause inability to perform professional, social and domestic activities, worsening the QL of individuals with this symptom[6,13,17]. Conventional tests that assess the vestibular system are not appropriate to show the psychological interference in the clinical aspects and in the suffering of patients with dizziness, as well as to evaluate the functional impairments imposed by this symptom[18].

Due to the effects of dizziness over the physical and psychological state of patients, it is important that this symptom is evaluated, in order to identify the degree of the difficulty and to determine intervention strategies. Four instruments are available to quantify the functional effect of dizziness: Dizziness Handicap Inventory Long Form, Dizziness Handicap Inventory Short Form, UCLA Dizziness Questionnaire, Vertigo-Dizziness-Imbalance Questionnaire[19]. The Dizziness Handicap Inventory (DHI) was elaborated and validated with the aim to assess the self-perception of the disabling effects of dizziness[20]. It is composed by 25 questions: seven that assess the physical aspects, nine that evaluate the emotional aspects, and nine that investigate the functional aspects[20].

The DHI is the only questionnaire with the aim to evaluate the QL impairments of patients with dizziness that was culturally adapted to the Brazilian population[21]. Researchers have conducted the cultural adaptation of the questionnaire, which consisted of the translation and linguistic adaptation of the instrument into Brazilian Portuguese, grammatical and idiomatic equivalence review, cultural adaptation, and intra- and inter-researchers reproducibility[21]. The DHI was applied to 250 subjects, in order to evaluate the impact of dizziness on the quality of life of individuals with chronic vestibulopathy[21]. All individuals presented impaired QL; the physical aspects were the most affected, and the functional aspects presented more problems in older individuals[21].

Besides the high prevalence of dizziness in elderly individuals, there is still little scientific evidence about the quality of life of these subjects, especially regarding the associations between QL and clinical and demographic variables, otoneurological evaluation and diagnosis, specifically with the results of vectoelectronystagmography. Moreover, the tests that assess the vestibular system do not show the interference of dizziness on the individuals' QL. Hence, the aim of this study was to verify the otoneurological diagnosis of elderly individuals with dizziness, and to the interference of this symptom on their QL.

METHODS

This study was approved by the Research Ethics Committee of the Universidade de Passo Fundo (UPF), under registration number 165/2009, CAAE nº 2809.0.000.398-09.

It was carried out a cross-sectional study with convenience sample, in which patients with dizziness were referred by neurologists to perform otoneurological evaluation. The diagnosis of dizziness was defined by the clinical assessment of the neurologist. The research was conducted at the Speech-Language Pathology and Audiology Sector of the Neurology and Neurosurgery Service (NNS) of the city of Passo Fundo (RS), Brazil.

Participants were 56 elderly patients, with mean age of 71.2 ± 8.5 years, ranging from 60 to 90 years, who were assessed between August 2009 and March 2010. Thirty three (58.9%) were female, and 23 (41.1%) were male. Patients with accute neurological alterations, severe psychiatric disorders, important visual impairment, neuromuscular degenerative diseases, or other impairments that prevented the vestibular assessment were excluded from the study. All subjects were informed about the procedures and signed a Free and Informed Consent Term.

Only 51 patients were considered for the analysis of association between the types of dizziness and the variables gender, age range, balance tasks, testing for positional and positioning vertigo and nystagmus (PPVN), and computerized vectoelectronystagmography (VENG). Five subjects were excluded because they were unable to perform the balance and PPVN tests, due to column and balance problems.

An anamnesis session was carried out to obtain the summary history of the disease and for application of the Brazilian version of the Dizziness Handicap Inventory (DHI). The physical, functional and emotional aspects related to dizziness were assessed through 25 questions: seven for the physical, nine for the functional, and nine for the emotional aspect. Each question allowed three levels of response (4: yes; 0: no; and 2: sometimes). The questionnaire generated a total score that varied from 0 (best) to 100 (worst quality of life).

Patients were submitted to audiological assessment, which was composed by: inspection of the external auditory canal; pure-tone audiometry; speech audiometry; impedance audiometry. For these procedures, the equipment used were a TK® – Missouri otoscope, a Vibrasom® VSA soundproof booth, an Interacoustics® AC 33 audiometer, and Interacoustics® At 22 t impedanciometer.

Tasks of static (Romberg and Romberg-Barré) and dynamic (Untemberger and gait) balance, and movement coordination (index-index, index-nose, and diadochokinesia) were conducted. For the testing for positional vertigo and nystagmus, the patient was instructed to lay in right and left lateral decubitus for observation of the presence of nystagmus and/or dizziness. The testing for positioning nystagmus and vertigo was carried out using the Dix-Hallpicke and the Brandt-Daroff maneuvers. The Dix-Hallpicke was conducted with the patient seating with his/her head rotated 45º to the side being examined and then being pushed backwards. At the end of the maneuver, the head was hanging slightly, rotated to the side examined. In the Brandt-Daroff maneuver, the patient was positioned in lateral decubitus to the same side of the affected internal ear, for two to three minutes, and, after that, positioned in lateral decubitus to the opposite side.

The vectoelectronystagmography (VENG) was carried out using the Vectoelectronystagmography Computerized System (VCS), with visual stimulator (LED bar from Contronic®), the Contronic® E 107 AR air otocalorimeter, and the Nistagmus software. For the VENG, electrodes were placed in the periorbital regions, after cleaning the skin with alcohol 70º and using electrolytic paste. The electrodes were placed forming an isosceles triangle, with a point in the front, 2 cm above the glabella, and the other two points in each external palpebral angle, which allowed verifying the horizontal, vertical and oblique eye movements. The sequence of the evaluation was: calibration of eye movements (horizontal and vertical), spontaneous nystagmus (open eyes and closed eyes), semi-spontaneous nystagmus (right, left, above, below), pendular tracking, optokinetic nystagmus (clockwise and counterclockwise directions), caloric test. The pre- and post-caloric nystagmus were conducted with the patient laying down with the head and the trunk inclined 60° backwards, for adequate stimulation of the lateral semicircular canals. Each ear was irrigated with air at 50°C and 24°C for 80 seconds (for each temperature), and the responses were registered with the eyes closed and, after that, with open eyes, in order to observe the inhibiting effect of ocular fixation (IEOF). This assessment observed the direction, the absolute values of angular speed of the slow component, and the calculation of the directional preponderance of nystagmus (DPN) and labyrinthine predominance (LP) of post-caloric nystagmus. The normality standards for this task were: until 2°C, labyrinthine hyporeflexia; above 2°C and until 45°C, normoreflexia; above 45°C, labyrinthine hyperreflexia; LP until 30%, and DPN until 25%.

Data were tabulated on Microsoft Office Excel© version 2007, and analyzed with the software SPSS version 10.0. To analyze the correlation between quantitative variables with normal distribution, the Student's t test and the ANOVA were used. To verify the association between qualitative variables the Chi-square test and the Fischer's Exact test were used. A significance level of $p<0.05$ was adopted.

RESULTS

Anamnesis data

Regarding the type of dizziness, 29 patients (51.8%) presented rotatory dizziness, while 27 (48.2%) had non-rotatory dizziness.

The main auditory and vestibular complaints reported in anamnesis are presented in Figures 1 and 2, respectively.

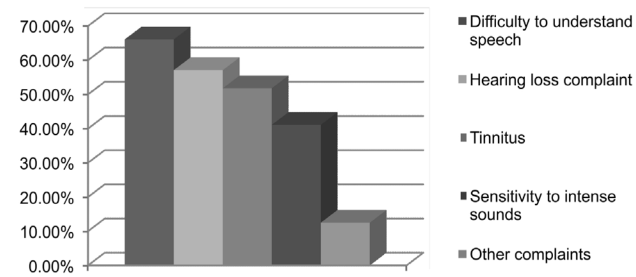


Figure 1. Distribution of auditory complaints

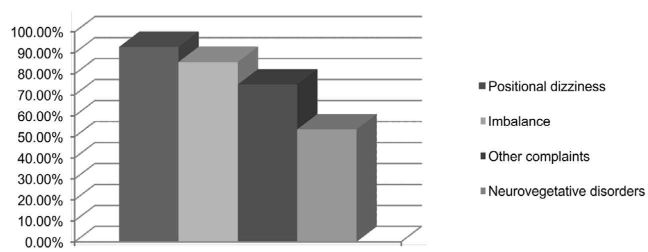


Figure 2. Distribution of vestibular complaints

Twenty five patients (44.6%) reported falls due to dizziness. The mean number of falls reported was 4.6±5.4, with minimum of one and maximum of 20 falls.

Data from otoneurological assessment

Regarding the results obtained in the pure-tone audiometry, 17 patients (30.4%) presented normal thresholds, while 39 (69.6%) had altered results. From these subjects, 27 (69.2%) had bilateral alterations (Figure 3). All of them presented sensorineural hearing loss, and the descendant bilateral configuration was found in 25 patients (64.1%).

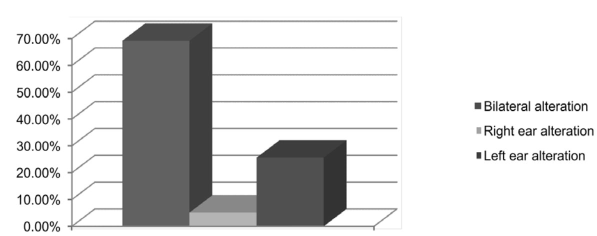


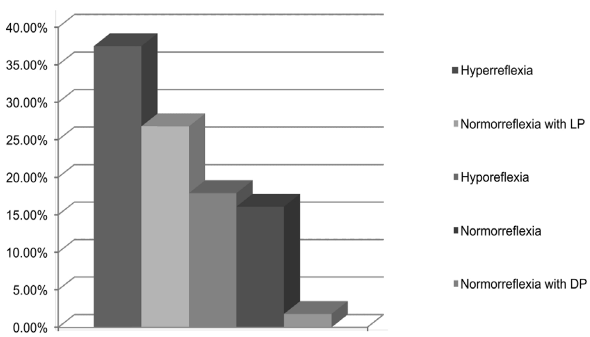
Figure 3. Pure-tone audiometry

Concerning the results obtained in speech audiometry, 34 patients (60.7%) presented normal results in the Speech Recognition Percentage Index (SRPI) (speech recognition between 100% and 92%), and the Speech Reception Threshold (SRT) was altered in 39 patients (69.6%).

In the tympanometry, 48 subjects (85.5%) presented type A curve bilaterally. The acoustic reflex was bilaterally absent in 39 subjects (69.6%), and present in 14 (25%).

The balance tasks were conducted with 51 patients; the others were not able to carry out the tests, due to body balance impairments. The results of the static, dynamic and cerebelar balance tests were normal in 30 subjects (58.8%), and altered in 21 (41.2%). The testing for positional and positioning vertigo and nystagmus (PPVN) was conducted with 54 patients. Two subjects did not carry out the test due to cervical hernia. From these 54 patients, 35 (64.8%) presented alterations that suggested Benign Paroxysmal Positional Vertigo (BPPV), while 19 (35.2%) obtained normal results.

As for the VENG results, all assessed patients presented regular calibration. The spontaneous nystagmus with open eyes was absent in 51 patients (91.1%) and present in five (8.9%). The spontaneous nystagmus with closed eyes was absent in 28 subjects (50%) and present in 28 (50%). The semi-spontaneous nystagmus was absent in all patients. The pendular tracking type II was the most frequent, presented by 32 subjects (57.1%), followed by type I, in 12 subjects (21.4%), and type III, in 12 subjects (21.4%). The optokinetic nystagmus was symmetric in 30 patients (53.6%) and asymmetric in 26 (46.4%). Regarding the post-caloric nystagmus, it was observed predominance of hyperreflexia in the elderly subjects (Figure 4).



Note: LP = labyrinthine preponderance; DP = directional preponderance

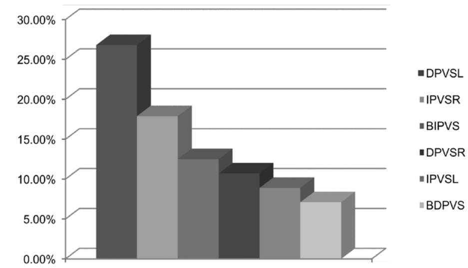
Figure 4. Post-caloric nystagmus

Concerning the final VENG results, only nine (16.1%) from the 56 subjects assessed presented normal results, and 47 (83.9%) presented altered evaluation. There was predominance of Deficient Peripheral Vestibular Syndrome to the Left (DPVSL), presented by 15 patients (31.9%) (Figure 5).

The types of dizziness were analyzed comparing the variables gender, age range, balance tasks, PPVN, and VENG (Table 1).

Quality of life assessment (DHI)

The most affected aspects were the functional (19.5) and the physical (16.7). There was difference (p=0.00) between the emotional and functional aspects; the mean emotional score (13.2) was below the mean functional score (19.5). The mean total score on the questionnaire was 51±20.9; the minimum score was 12 and the maximum was 84.



Note: DPVSL = Deficient Peripheral Vestibular Syndrome to the Left; IPVSR = Irritative Peripheral Vestibular Syndrome to the Right; BIPVS = Bilateral Irritative Peripheral Vestibular Syndrome; DPVSR = Deficient Peripheral Vestibular Syndrome to the Right; IPVSL = Irritative Peripheral Vestibular Syndrome to the Left; BDPVS = Bilateral Deficient Peripheral Vestibular Syndrome

Figure 5. Final results of the VENG

Table 1. Analysis of the types of dizziness and the variables gender, age range, balance tests, PPVN and VENG

Variables	Type of dizziness		p-value
	Rotatory	Non-rotatory	
Gender			
Masculine	13	10	0.554[A]
Feminine	16	17	
Age range			
60-70 years	18	12	0.186[A]
70-90 years	11	15	
Balance tests			
Normal	15	15	0.867[A]
Altered	11	10	
PPVN			
Normal	8	11	0.393[A]
Altered	19	16	
VENG			
Normal	2	7	0.053[B]
Altered	27	20	

[A] Pearson Chi-square test (p≤0.05)
[B] Fisher's Exact test (p≤0.05)
Note: PPVN = testing for positional and positioning vertigo and nystagmus; VENG = computerized vectoelectronystagmography

Vestibular complaints were related to physical, functional and emotional aspects, and to the total DHI score (Table 2). For the positional dizziness complaint there was significant difference only when the physical aspect was assessed (p=0.01). For the imbalance complaint, differences were found for the functional (p=0.02) and emotional (p=0.03) aspects. Regarding the presence or absence of complaints of gait deviation and neurovegetative disorders, no differences were found when compared to the DHI.

The study of the type of dizziness presented by the patient (rotatory or non-rotatory) did not show differences when assessed by the DHI, whether on the physical, functional or emotional aspects, or on the total score (Student's t test). It was observed that individuals with rotatory dizziness presented higher total score, and the functional aspect was the most

Table 2. Vestibular complaints and quality of life (DHI), assessed by physical, functional and emotional aspects

DHI and complaints	Mean	SD	p-value
Physical aspect			
Positional dizziness			
Yes	17.23	5.22	0.01*
No	10.50	3.78	
Imbalance			
Yes	16.83	5.48	0.77
No	16.25	5.17	
Gait deviation			
Yes	16.25	4.59	0.75
No	16.83	5.56	
Neurovegetative disorders			
Yes	17.46	5.82	0.28
No	15.92	4.84	
Functional aspect			
Positional dizziness			
Yes	19.65	9.65	0.78
No	18.00	12.96	
Imbalance			
Yes	20.54	9.89	0.02*
No	13.50	6.90	
Gait deviation			
Yes	19.50	10.56	0.99
No	19.54	9.77	
Neurovegetative disorders			
Yes	21.20	9.09	0.17
No	17.61	10.38	
Emotional aspect			
Positional dizziness			
Yes	13.46	8.51	0.43
No	10.00	5.88	
Imbalance			
Yes	14.25	8.10	0.03*
No	7.00	7.55	
Gait deviation			
Yes	16.50	9.60	0.31
No	12.66	8.11	
Neurovegetative disorders			
Yes	14.13	7.84	0.38
No	12.15	8.96	

* Significant values (p≤0.05) – Student's t test
Note: DHI = Dizziness Handicap Inventory; SD = standard deviation

affected in both types of dizziness, even though no significant difference was found (Table 3).

The results of the post-caloric nystagmus assessment were studied by the DHI on the physical, functional and emotional aspects, and on the total score (Table 4). The labyrinthine predominance results of the post-caloric nystagmus showed higher mean in all aspects of the DHI and in the total DHI, although no significant difference was found.

Table 3. Comparison of the aspects of quality of life (DHI) with the types of dizziness (rotatory versus non-rotatory)

DHI	Rotatory (n=29)		Non-rotatory (n=27)		p-value
	Mean	SD	Mean	SD	
Functional	20.68	9.84	18.29	9.76	0.36
Physical	17.58	4.91	15.85	5.84	0.23
Emotional	12.20	8.40	14.29	8.33	0.35
Total score	52.41	21.30	49.56	20.75	0.61

* Significant values (p≤0.05) – Student's t test
Note: DHI = Dizziness Handicap Inventory; SD = standard deviation

Table 4. Association between quality of life (DHI) and post-caloric nystagmus

DHI	Post-caloric nystagmus	Mean	SD	p-value
Physical aspect	Normoreflexia	14.22	5.95	0.11
	Labyrinthine preponderance	18.26	4.13	
	Hyporeflexia	14.40	6.38	
	Hyperreflexia	17.90	5.19	
Functional aspect	Normoreflexia	14.22	10.31	0.18
	Labyrinthine preponderance	22.40	10.42	
	Hyporeflexia	17.40	8.99	
	Hyperreflexia	21.04	9.13	
Emotional aspect	Normoreflexia	10.22	7.77	0.62
	Labyrinthine preponderance	14.93	9.19	
	Hyporeflexia	13.80	11.90	
	Hyperreflexia	13.14	6.182	
Total DHI	Normoreflexia	39.56	22.37	0.23
	Labyrinthine preponderance	56.80	21.44	
	Hyporeflexia	48.20	23.95	
	Hyperreflexia	53.71	17.84	

One Way ANOVA(p≤0.05)
Note: DHI = Dizziness Handicap Inventory; SD = standard deviation

The final VENG results (normal or altered) were analyzed on the physical, functional and emotional aspects, and on the total score of the DHI. It was observed that the higher values were present in patients with altered results, and the functional aspect was the most affected, however without significant differences.

The final VENG results regarding the otoneurological diagnosis were studied on the physical, functional and emotional aspects, and on the total score of the DHI (Table 5). Individuals with DPVSL had the worse scores on the total DHI (55.3). Although there were differences on the DHI scores between VENG results, no significant differences were found between aspects. For these analyzes, a patient with normoreflexia with directional preponderance was excluded, so that an ANOVA could be carried out.

Table 5. Association between quality of life (DHI) and otoneurological diagnosis

DHI	VENG final result	Mean	SD	p-value
Physical aspect	Normal	14.22	5.95	0.69
	BIPVS	18.57	5.38	
	IPVSR	16.60	5.73	
	IPVSL	19.20	3.34	
	BDPVS	15.50	3.41	
	DPVSR	17.00	5.32	
	DPVSL	16.93	6.04	
Functional aspect	Normal	14.22	10.31	0.72
	BIPVS	21.14	11.18	
	IPVSR	20.60	8.11	
	IPVSL	20.40	9.63	
	BDPVS	17.00	9.59	
	DPVSR	21.00	11.29	
	DPVSL	21.06	10.10	
Emotional aspect	Normal	10.22	7.77	0.78
	BIPVS	12.28	4.95	
	IPVSR	13.80	4.66	
	IPVSL	12.40	10.23	
	BDPVS	14.50	15.94	
	DPVSR	11.00	10.63	
	DPVSL	15.86	8.60	
Total DHI	Normal	39.56	22.37	0.74
	BIPVS	54.29	21.30	
	IPVSR	52.20	14.25	
	IPVSL	53.20	22.25	
	BDPVS	49.50	24.24	
	DPVSR	51.00	25.41	
	DPVSL	55.33	22.20	

One Way ANOVA ($p \leq 0.05$)

Note: DHI = Dizziness Handicap Inventory; SD = standard deviation; VENG = computerized vectoelectronystagmography; BIPVS = Bilateral Irritative Peripheral Vestibular Syndrome; IPVSR = Irritative Peripheral Vestibular Syndrome to the Right; IPVSL = Irritative Peripheral Vestibular Syndrome to the Left; BDPVS = Bilateral Deficient Peripheral Vestibular Syndrome; DPVSR = Deficient Peripheral Vestibular Syndrome to the Right; DPVSL = Deficient Peripheral Vestibular Syndrome to the Left

DISCUSSION

The present study corroborated the literature regarding the prevalence of dizziness complaints in women(7,10,19,22,23). A high frequency of auditory complaints was also verified, and the difficulty to understand speech in noisy environments was the most reported. Similar findings with elderly individuals with dizziness symptoms were found in other studies(4,24,25).

The vestibular complaint of positional dizziness was the most frequent, followed by complaints of imbalance and neurovegetative disorders. These findings corroborate those of other authors(4,23,25). The high occurrence of positional vertigo found in the present study (92.9%) was also evidenced in other studies and referred as a frequent symptom in elderly individuals with Benign Paroxysmal Positional Vertigo (BPPV)(26-28). The imbalance complaint was also frequent in this study, referred by 48 patients (85.7%). Some authors have suggested that the imbalance of elderly subjects might be considered a geriatric syndrome, characterized by multisensory alterations, secondary to diseases affecting several systems and organs(15,29).

Rotatory dizziness was the most frequent in this study, affecting 29 patients (51.8%), which corroborates other studies conducted with geriatric population(16). On the other hand, studies have verified higher prevalence of non-vestibular vertigo, compared to vestibular vertigo(7,10).

Regarding the occurrence of falls, 25 patients (44.6%) reported falls due to dizziness. In another study, falls were caused by dizziness in 25% of the elderly individuals assessed, and fear of falls and tendency to fall were referred by most elderly individuals with chronic vestibulopathy(26).

With regards to the pure-tone audiometry findings, most elderly patients presented altered results bilaterally, and the descending sensorineural hearing loss was the most frequent one. These findings were similar to those of other authors, who also verified high occurrence of descending bilateral sensorineural hearing loss in elderly subjects with dizziness complaints(8,25). In a study conducted with elderly individuals with dizziness, the presence of hearing loss and tinnitus were significant(4).

Similarly, authors have emphasized that dizziness might be related to hearing loss, tinnitus, sensation of pressure in the ear, hypersensitivity to sounds, distortion of the sound sensation, vocal intelligibility difficulty, and auditory attention alteration, due to structural relationships between auditory and vestibular systems(6). In a study conducted with 37 elderly patients with posterior canal BPPV and 37 elderly with no complaints of dizziness and/or vertigo, the authors observed that both groups presented high rates of hearing loss, and concluded that posterior canal BPPV do not influence the hearing loss characteristics in elderly subjects.

In the testing for positional and positioning vertigo and nystagmus (PPVN), 64.8% of the subjects presented alterations that suggested BPPV. These findings corroborate other studies that refer that BPPV is the main cause of dizziness in elderly individuals(26,28).

Regarding the final VENG results, 47 subjects (83.9%) presented altered exams. This finding corroborates the results of other studies conducted with elderly subjects, which also found high occurrence of altered VENG findings(4,23,25). On the other hand, other researches have found normal results with elderly patients(3,16,24).

Calibration (horizontal and vertical) were regular in all assessed patients. This finding corroborates other studies that also presented regular calibration in the evaluation of elderly individuals(3,16,25).

The spontaneous nystagmus with open eyes was absent in 51 patients (91.1%). The spontaneous nystagmus with closed eyes was absent in 28 patients (50%), and present in 28 (50%). These findings are different from other authors, who observed absent spontaneous nystagmus with eyes open or closed, in all elderly patients assessed(3,25). The semi-spontaneous nystagmus was absent in all patients, and this finding corroborates other studies[3,25].

The pendular tracking (horizontal) type II was the most frequent, presented by 32 patients (57.1%). Authors have found predominance of pendular tracking type I in elderly without complaints, and type II in elderly with complaints of body balance complaints[3].

The optokinetic nystagmus was symmetric in 30 patients (53.6%) and assymetrical in 26 (46.4%). In the present study, a high number of optokinetic nystagmus was verified. This finding might be due to the speed used in this task (20º/s), which was determined by the equipment's manufacturer. Another important issue to be highlighted is the great difficulty the elderly subjects had to carry out this task, which might be explained by difficulties in visual movements due to aging. The findings of the present research are different from another study that did not find asymmetry of the optokinetic nystagmus in any of the elderly patients assessed; however, they observed that 85.3% of their subjects presented mild gain reduction[25].

Regarding the results of the post-caloric nystagmus, 21 patients (37.5%) presented hyperreflexia, and this was the most frequent finding. An important aspect to be emphasized is that the temperature of the air used for hot stimulation was 50°C, according to the guidelines of the equipment's manufacturer. This aspect might be one of the reasons for the high occurrence of hyperreflexia found in the elderly subjects of this research. In disagreement with this result, hyporeflexia is described by many authors as a common finding in the vestibular assessment of elderly individuals[12,25,27]. However, other studies have verified that the elderly presented absolute results of normoreflexia regarding the angular speed of the slow component[3,16,24]. Studies have shown disagreement between findings concerning the results of the post-caloric nystagmus in elderly subjects[3,24,25,27].

The alterations evidenced in the VENG were 100% due to peripheral vestibular syndromes, which is similar to the results of other studies[4,26]. The final VENG results showed predominance of the diagnostic hypothesis of DPVSL, present in 15 patients (31.9%). Our findings corroborate those of other studies that also verified higher prevalence of unilateral deficient peripheral vestibular syndrome in elderly individuals[23,25]. On the other hand, our results disagree from other authors who found high prevalence of irritative alteration in elderly[4,12]. Yet other studies have shown normal results in the otoneurological evaluation of elderly patients[3,16,24].

In the present research, IEOF was present in all exams, and there was no pathognomonic sign of central alteration. This finding corroborates other studies with elderly subjects with dizziness[3,4,25].

The type of dizziness was not significant when associated to the variables gender, age range, balance tasks, PPVN and VENG. Authors have related otoneurological symptoms to the results of the caloric test, and verified that the postural instability complaint was statistically associated to bilateral hyporeflexia[16].

The DHI results showed mean total score of 51 points. The functional aspect was the most affected one, with significant difference between emotional and functional aspects. These findings corroborate another study, which verified that the functional domain was the most affected in elderly with dizziness[30]. In yet another study, the physical aspects were the most affected, followed by the functional and emotional aspects, in descending order. Moreover, the functional aspects were more affected in older patients[21]. Authors have verified a predominant decrease in the QL of elderly regarding the physical and emotional dimensions[9]. A study found that 41% and 33% of the individuals assessed were in the mild and moderate levels of handicap, respectively, and the physical and functional aspects had similar proportions[13].

Regarding the vestibular complaints and the DHI results, significant differences were observed only between positional vertigo and the physical aspect. The positional vertigo is characterized by rotatory dizziness, which is triggered by specific positions assumed by the head in space, such as in cervical hyperextension, lateral rotation of the cephalic segment, and getting up and/or lying down on the bed. These activities, which refer to the physical aspect of the DHI, were affected, and interfered on the quality of life of the elderly subjects in this study. Compared to the functional and emotional aspects, the physical aspect has less questions on the DHI (seven questions), allowing the evaluation of the impairment in quality of life in relation to the beginning and/or the worsening of the symptoms caused by dizziness, regarding eye, head and body movements[21].

The imbalance complaint was significantly different between functional and emotional aspects. The emotional aspect assessed by the DHI investigates the disabling effects of dizziness over the individual's quality of life, in which are referred: fear to go out unaccompanied or to be alone at home, besides embarrassment about the symptoms generated by dizziness. In the functional aspect, the impairment occurs on the performance in professional, domestic, social, and leisure activities, restraining and creating dependence for the realization of certain tasks[21]. The imbalance provoked by dizziness triggers a series of psychosocial consequences that are manifested through negative feelings, interfering on the daily life activities of the individuals[6,13,21].

It was observed that individuals with rotatory dizziness presented higher total DHI score, and the functional aspect was the most affected one, even though no significant difference was found. These findings corroborate those of other authors, who verified that patients with vestibular vertigo presented higher scores on the DHI scale, indicating worse quality of life[7].

The post-caloric nystagmus and the final VENG results were studied regarding the physical, functional, and emotional aspects and the total DHI score. The results of labyrinthine prevalence of the post-caloric nystagmus showed higher means in all aspects of the DHI and on the total DHI score, even though there was no significant difference.

Regarding the final results of the VENG on the three aspects studied and on the mean total score of DHI, it was observed that the higher DHI scores were found in patients with altered VENG results, and the functional aspect was the most affected. Individuals with DPVLS had the worse score on the total DHI. However, no significant differences were found between the DHI scores and the VENG results. Similar results were found in a study that verified that type of dizziness, presence of neurovegetative symptoms, gender, age, and vestibulometry findings were not significant for the DHI score[13].

In another study, the authors found that patients with DPVS had their quality of life more impaired on the functional aspects of the Brazilian DHI, when compared to patients with IPVS[17]. In a study carried out with 36 patients with ages ranging from 20 to 73 years, no significant differences were found between patients with DPVS and IPVS regarding the total score and the physical and emotional scores, obtained in the application of the Brazilian DHI. The authors verified that the functional aspect had higher scores than the physical and emotional aspects, however there were no significant differences between the DHI aspects and the VENG results[11]. Another study conducted the evaluation of 53 patients with ages between 20 and 86 years, and the results of the vestibular assessment were correlated to those of the DHI. It was found that the functional aspect was the most affected, both in DPVS and IPVS, and both bilateral[14].

The present study established the otoneurological diagnosis of 56 elderly patients with dizziness and its relationship with quality of life. Further studies are important, in order to help evaluation and diagnosis, to identify elderly subjects at more risk for impairments on the quality of life, and also to determine the best therapeutic procedure on the monitoring of these patients.

CONCLUSION

Most elderly individuals present vestibular alterations, diagnosed through otoneurological assessment, and have their quality of life impaired due to dizziness. The most frequent diagnosis in this population was the Deficient Peripheral Vestibular Syndrome to the Left (DPVSL), and the quality of life is affected mainly in the functional aspect of the DHI.

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RESUMO

Objetivo: Verificar o diagnóstico otoneurológico de idosos com tontura e a interferência deste sintoma na qualidade de vida. **Métodos:** Trata-se de um estudo transversal, realizado com 56 idosos com tontura, com média de idade de 71,2 anos, submetidos à avaliação otoneurológica que envolveu: audiometria tonal, audiometria vocal, imitanciometria, provas de equilíbrio, pesquisa do nistagmo e vertigem de posição e posicionamento e vectoeletronistagmografia. Para avaliar a qualidade de vida, utilizou-se um questionário específico para tontura, o *Dizziness Handicap Inventory* (DHI), que verifica os efeitos incapacitantes provocados por este distúrbio. **Resultados:** A tontura rotatória foi referida por 29 pacientes (51,8%), 75% apresentaram alguma queixa auditiva e 69,6% apresentaram audiometria alterada. Os pacientes com queixas vestibulares de tontura posicional apresentaram diferença significativa para o aspecto físico do DHI. Já os pacientes com queixas vestibulares de desequilíbrio apresentaram diferença significativa para os aspectos funcional e emocional. A vectoeletronistagmografia computadorizada esteve alterada em 47 pacientes (83,9%), indicando comprometimento vestibular periférico em todos os casos. No exame pós-calórico, a hiperreflexia foi a alteração mais prevalente e o diagnóstico mais frequente foi o de síndrome Vestibular Periférica Deficitária à Esquerda. Com relação à qualidade de vida, o aspecto funcional apresentou o maior escore médio entre os três aspectos avaliados, e observou-se diferença significativa entre os aspectos funcional e o emocional. **Conclusão:** Idosos com tontura apresentam, em sua maioria, alterações na audiometria e na vectoeletronistagmografia, indicando disfunção do sistema cócleo-vestibular; apresentam também qualidade de vida comprometida.

Descritores: Idoso; Tontura/etiologia; Vertigem/diagnóstico; Avaliação; Qualidade de vida

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