

Age-Associated Characteristics of Patients With Chronic Dizziness and Vertigo

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Abstract

Objective: The incidence of dizziness and vertigo is increasing with age, and symptoms lead to significant limitations in daily living and to disability in older patients. **Method:** Data of 1,752 patients with chronic dizziness/vertigo subjected to a tertiary care, specialized interdisciplinary vertigo center were analyzed. Age, gender, symptoms, medical diagnosis, and Dizziness Handicap Inventory (DHI) were collected based on a questionnaire and analysis of associated patient records. The patients were assigned to 3 age groups (< 41, 41–65, and > 65 years). **Results:** 33.7% of the patients were older than 65 years. Frequency of symptoms and DHI score increased with age. Older patients reported less frequently about coexisting symptoms such as nausea, headache, tinnitus, ear pressure, and visual impairment. Multisensory deficit, central vertigo, bilateral vestibulopathy, and benign paroxysmal positional vertigo were diagnosed increasingly with age, while persistent postural–perceptual dizziness and vestibular migraine were diagnosed in the younger age groups. **Conclusion:** In the diagnostic work-up of older patients age-specific characteristics of dizziness/vertigo have to be considered. The older patient generally is more impaired by the symptoms but possibly will not report typical diagnosis-defining symptoms.

Keywords

vertigo, dizziness, older age, age-specific characteristics

Introduction

Dizziness and vertigo belong to the most common complaints in clinical practice. About every fifth adult suffers from dizziness or vertigo.¹ Estimates of the 1-year prevalence of dizziness and vertigo range from 12 to 50% dependent on analyzed patient population, age distribution, and study design.^{2–4}

In patients of older age vertigo, dizziness and impaired balance play an increasing role compared to younger people.^{2,5} Its incidence is increasing in older age,⁶ and the complaints of dizziness and vertigo lead to significant limitations in daily living contributing to a significant disability in older patients.⁷ It has been shown that dizziness and vertigo lead to physical inactivity, worse functioning of the lower extremities,⁸ a higher risk of falls,⁹ as well as social isolation and depression.¹⁰

Thus, it plays a dominant role in determining mobility, health, and quality of life in older patients.¹¹ Considering demographic changes, the already increased prevalence of dizziness/vertigo in the elderly will continue to increase in the near future. Symptoms of dizziness and vertigo in older patients are often dismissed as unspecific and simply assumed to be age-associated. The etiology may be difficult to be assessed with mainly chronic and multifactorial origin.¹²

Nevertheless, a systematic and structured work-up of these highly relevant complaints in older aged people is most essential, especially to identify factors susceptible to therapeutic

interventions. Therefore, we analyzed age-associated characteristics of complaints related to dizziness and vertigo in a large database of patients treated in a tertiary care outpatient clinic. In particular, the aim of the study was to define the distribution of different diagnoses across the age groups and to identify vertigo- and dizziness-associated complaints in older age compared to younger patients. Therefore, special attention was paid to various dizziness entities, symptomatic characteristics and the Dizziness Handicap Inventory (DHI).

Methods

Data of 1,752 patients with chronic dizziness or vertigo were collected, who were treated in the Center for Vertigo and Dizziness at Jena University Hospital between January 2013 and March 2017. The Center for Vertigo and Dizziness is a tertiary

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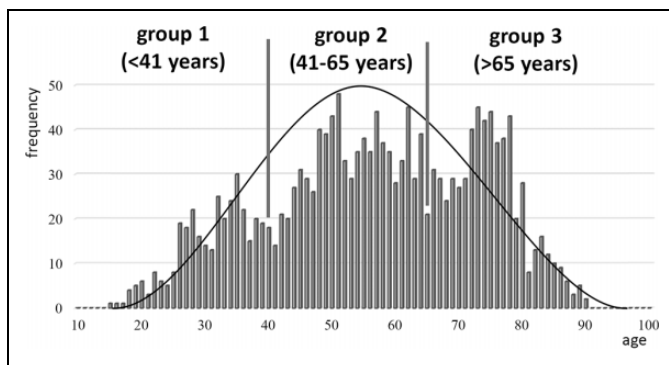


Figure 1. Age distribution of patients with chronic dizziness/vertigo.

care outpatient clinic with a multidisciplinary team from neurology, ENT, psychology and physical therapy.

The study was approved by the local ethics committee (ethics committee of the Friedrich-Schiller-University Jena, number 5426-02/18) and written informed consent for study participation was obtained from all patients.

At the first appointment, each of the patients completed a questionnaire including age, gender, general questions about symptoms of dizziness/vertigo as well as the Dizziness Handicap Inventory (DHI). The DHI is a validated questionnaire consisting of 25 items to evaluate the patient-perceived handicap due to dizziness or vertigo.^{13,14} Each question can be answered with “yes” (4 points), “sometimes” (2 points), or “no” (no points), so that a sum score with a maximum of 100 points can be calculated. In addition, every question can be assigned to one of the subscales physical (DHI-P), functional (DHI-F), or emotional (DHI-E).

The questionnaire was routinely given to every patient at the first appointment in the Center for Dizziness and Vertigo. The patients had to indicate whether they agreed to allow their anonymized data to be analyzed for the study. All questionnaires were collected and the time interval for analysis from January 2013 and March 2017 was arbitrarily chosen as an a-priori decision in the study protocol. A total of 1.804 questionnaires were available. 52 patients gave no consent to participate in the study (and, therefore, were not analyzed). Thus, 1.752 questionnaires could be analyzed.

1.178 questionnaires were completely filled out, while single items were missing in 544 questionnaires. At a first step the data were searched for extreme values, missing data, and unreasonable values, which were corrected if possible and otherwise classified as missing. If a question was not answered, the missing item was not included in the overall calculation.

Furthermore, the patients’ medical records were analyzed to collect the re-evaluated medical diagnosis, the use of technical examinations, and therapeutical concepts. Diagnosis of each patient was done by the interdisciplinary team of experts at the outpatient clinic and was based on a detailed review of the patients’ medical history including a thorough anamnesis, a systematic clinical examination by a specialized medical doctor, and, if necessary, the use of technical examinations such as caloric testing, clinical neurophysiology, imaging, etc.

Diagnoses were generally based on the International Classification of Vestibular Disorders (ICVD) of the Bárány Society. The diagnosis “multisensory deficit” was chosen if the patient showed deficits in more than one sensory system (vestibular, somatosensory, or visual, of central or peripheral origin).

In order to evaluate age-related characteristics the patients were assigned to 3 age groups (< 41 years, 41-65 years, and > 65 years). The cut-off of 65 years was chosen because most people in Germany retire at this age and the age distribution of the patient population (Figure 1) suggested the division of the patients into younger, middle aged, and older adults.

SPSS 25 (IBM Corp., IBM SPSS Statistics for Windows, Version 25) was used for statistical analysis. All data are reported as mean and standard deviation. Generally, a two-sided significance level of $p < 0.05$ was assumed. Pearson’s chi-squared test was used to detect differences in demographic, symptom-, and diagnosis-associated data between the groups. Student *t*-test with Bonferroni-correction was used to analyze differences of DHI scores between the groups.

Results

In total 1,752 patients with chronic vertigo were analyzed with a mean age of 56.5 ± 16.6 (SD) years. 1,043 (59.5%) were female and 709 (40.5%) male. Figure 1 shows the age distribution of the patients.

343 (19.6%) patients were younger than 41 years (group 1), 819 (46.7%) between 41 and 65 years (group 2), and 590 (33.7%) were older than 65 years (group 3).

Table 1 summarizes the patients’ complaints. More than half of the patients suffered from dizziness or vertigo from a daily basis. With increasing age the frequency of daily complaints increases. Duration of dizziness and vertigo did not differ characteristically between age groups. The quality of vertigo showed less spinning and more staggering sensations in the older age group. However, the majority of common coexisting symptoms (especially nausea, headache and tinnitus) were reported less frequently in the older age group in contrast to hearing loss, which was more frequent in the older age group.

Figure 2 shows the patients’ medical diagnoses as defined by the expert team. Diagnoses which were more often found with increasing age were benign paroxysmal positional vertigo (BPPV), multisensory deficit, central vertigo, and bilateral vestibulopathy, whereas the frequency of persistent postural-perceptual dizziness (PPPD) and vestibular migraine decreased with age.

In addition, for a number of conditions (e.g. vestibular neuritis and Meniere’s disease) it looks like they actually peak in middle age, or there is not much of difference between middle and older age (e.g. BPPV).

The DHI scores increased across the age groups (Figure 3). Especially the DHI total score, and its physical and functional subscores increased statistically significantly over the age groups, whereas no statistically significant differences by age were found for the emotional subscore of the DHI (Table 2).

Table 1. Patients' Complaints.

	All patients (age range 15-90)	Age group 1 (< 41 years)	Age group 2 (41-65 years)	Age group 3 (> 65 years)	Pearson's chi-squared test	
					F	P
Number of patients	100% (n = 1752)	19.6% (n = 343)	46.7% (n = 819)	33.7% (n = 590)		
Gender					2.769	0.250
Female	59.5% (n = 1043)	59.8% (n = 205)	57.6% (n = 472)	62.0% (n = 366)		
Male	40.5% (n = 709)	40.2% (n = 138)	42.4% (n = 347)	38.0% (n = 224)		
Frequency of symptoms					50.289	< 0.001
less than once a month	6.7% (n = 116)	4.7% (n = 16)	7.7% (n = 63)	6.4% (n = 37)		
several times a month	14.2% (n = 247)	13.4% (n = 46)	16.8% (n = 137)	11.1% (n = 64)		
several times a week	22.7% (n = 394)	30.0% (n = 103)	24.5% (n = 200)	15.7% (n = 91)		
Daily	55.2% (n = 958)	51.9% (n = 178)	49.1% (n = 401)	65.6% (n = 379)		
	total: 1737	total: 343	total: 816	total: 578		
Duration of symptoms					10.875	0.092
Days	28.8% (n = 500)	29.7% (n = 102)	26.1% (n = 213)	32.0% (n = 185)		
Hours	30.1% (n = 522)	32.9% (n = 113)	30.6% (n = 250)	27.5% (n = 159)		
Minutes	21.6% (n = 376)	20.4% (n = 70)	23.8% (n = 194)	19.4% (n = 112)		
Seconds	13.4% (n = 233)	12.2% (n = 42)	14.6% (n = 119)	12.5% (n = 72)		
	total: 1737	total: 343	total: 816	total: 578		
Quality of symptoms					35.965	< 0.001
Spinning	48.5% (n = 841)	46.9% (n = 161)	53.9% (n = 439)	41.7% (n = 241)		
Swaying	56.4% (n = 979)	53.9% (n = 185)	53.7% (n = 437)	61.8% (n = 357)		
Tilting	16.1% (n = 280)	14.6% (n = 50)	16.8% (n = 137)	16.1% (n = 93)		
general feeling of unsteadiness	60.2% (n = 1044)	64.1% (n = 220)	58.8% (n = 479)	59.7% (n = 345)		
	total: 1735	total: 343	total: 814	total: 578		
Co-existing symptoms					164.722	< 0.001
nausea/vomiting	40.5% (n = 704)	44.3% (n = 152)	48.0% (n = 392)	27.7% (n = 160)		
Headache	41.0% (n = 712)	55.4% (n = 190)	44.5% (n = 363)	27.5% (n = 159)		
ear pressure	22.4% (n = 389)	24.5% (n = 84)	25.7% (n = 210)	16.4% (n = 95)		
Tinnitus	40.5% (n = 704)	37.6% (n = 129)	47.1% (n = 384)	33.0% (n = 191)		
hearing loss	20.0% (n = 347)	9.9% (n = 34)	20.5% (n = 167)	25.3% (n = 146)		
visual impairment	41.5% (n = 720)	46.4% (n = 159)	43.1% (n = 352)	36.2% (n = 209)		
	total: 1737	total: 343	total: 816	total: 578		

The increase in mean DHI scores with age represents an age-dependent increase of dizziness-associated handicap. Although the magnitude of the differences between the groups suggests relatively moderate group differences, the increase of dizziness-associated handicap is also reflected in the shift toward a higher ratio of more severe impairment in the older age group (Table 3).

Discussion

Vertigo and dizziness are frequent complaints in general medicine which affect all age groups.³ However, prevalence of vertigo and dizziness increases with age⁷ and contributes to significant disability in older people.^{8,15}

Here, we analyzed 1,752 patients with chronic dizziness and/or vertigo who consulted our specialized and multidisciplinary outpatient clinic. Thus, it has to be kept in mind that the patient population with chronic dizziness and vertigo was rather selected and the analyzed study population may not be representative of the general population. The majority of these patients had preserved mobility and the patients were able to walk—at least with help. A third (33.7%) of the patients were

older than 65 years. While the age distribution of the patients showed a peak between 50 and 60 years, a second peak was found between 70 and 80 years, which stresses the need to address these complaints in older people. In comparison to the younger patients some important age-specific characteristics of dizziness in the older patients could be identified.

It is generally recognized that the symptoms of different diseases may change in older age.¹⁶ Our data showed that the duration of dizziness episodes increased in the older population. Older patients suffered about 15% more often from daily dizziness complaints than younger patients. In addition, dizziness was perceived as to be more severe in the older population as evidenced by an increase in DHI scores with age. Although the importance of age differences is generally recognized, symptoms of dizziness and vertigo have generally been surveyed in the elderly population alone^{2,17,18} but not in comparison to younger patients.

The quality of dizziness and vertigo alone is not suited to determine the diagnosis as dizziness is often caused by multifactorial medical and functional conditions.¹⁹ Our data also demonstrates that older patients complain more often about swaying perceptions and unsteadiness than about spinning

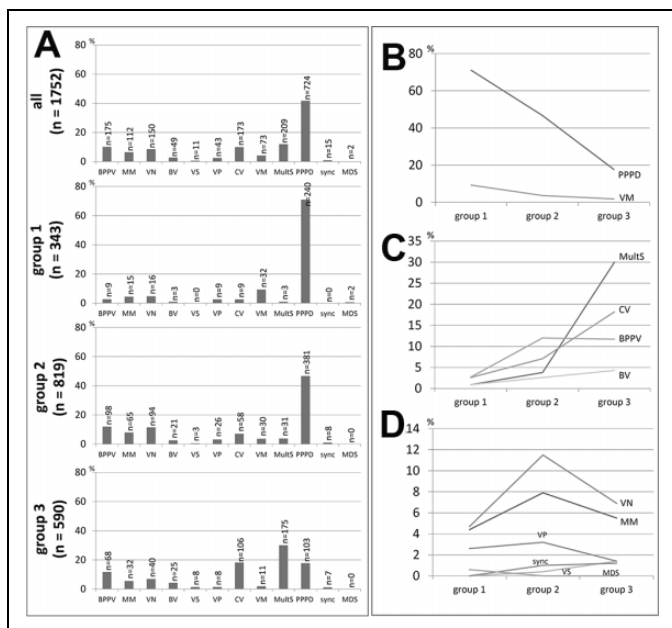


Figure 2. Medical diagnoses. A, Histograms of diagnoses in the age groups. B, PPD and VM were primarily diagnosed in the younger age groups. C, MultD, CV, BV, and BPPV were found increasingly over the age groups. D, MM and VN most often occurred in the middle age group. BPPV indicates benign paroxysmal positional vertigo; MM, Meniere’s disease; VN, vestibular neuritis; BV, bilateral vestibulopathy; VS, vestibular schwannoma; VP, vestibular paroxysmia; CV, central vertigo; VM, vestibular migraine; MultD, multisensory deficit; PPD, persistent postural–perceptual dizziness; sync, syncope; MDS, mal de débarquement syndrome.

vertigo with no clear detectable correlation to the medical diagnosis.

Another remarkable finding of our study is that the older patients described coexisting symptoms such as nausea, headache, tinnitus, ear pressure, and visual impairment less frequently than the younger age groups. Only hearing loss was complained more frequently in the older age group. It has been described previously that characterizing symptoms of dizziness and vertigo may go unrecognized in older patients.^{18,20}

At first glance this suggests that the classification of dizziness and vertigo in the older patients can be based not only on anamnesis alone but to a greater extent on additional clinical and technical examinations of the patients. However, we also found that some diagnoses such as migraine or Meniere’s disease are less common in older adults. Thus, the differences in complaints of coexisting symptoms, such as the differences in the quality of vertigo/dizziness between the groups, may also simply be caused by differences in the distribution of diagnoses in the different age groups.

The distribution of medical diagnoses changes with age (Figure 2). This has been obviously expected and was found consecutively in our data. Diagnoses associated to degenerative disorders were found to increase with age, especially multisensory deficit, central vertigo, and bilateral vestibulopathy. In addition, a risk factor to develop benign paroxysmal

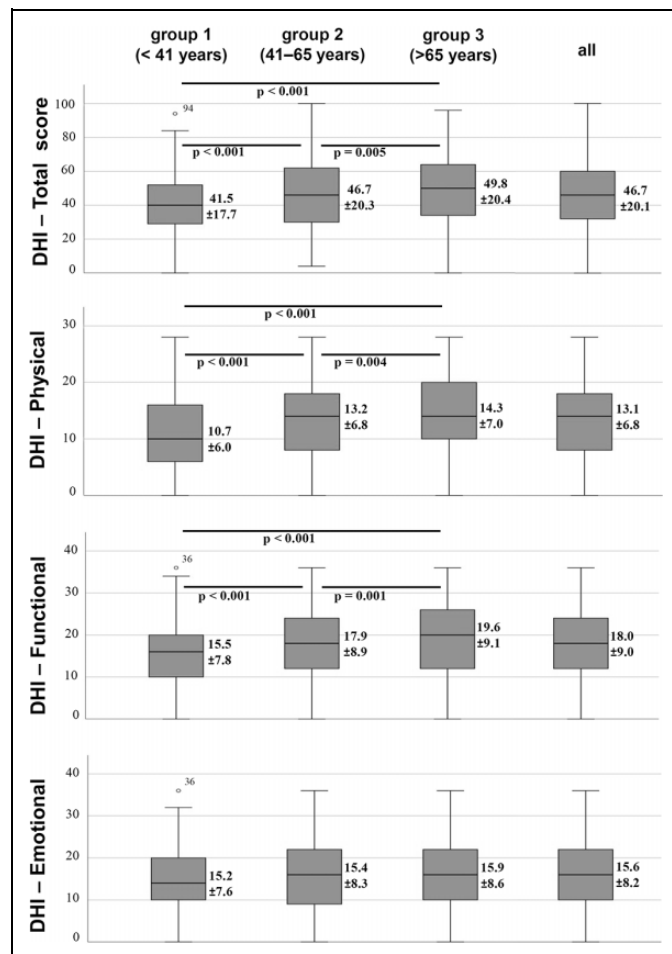


Figure 3. DHI scores. Mean ± SD is shown beside each boxplot.

positional vertigo has been shown to be vitamin D deficiency^{21,22} which plays a role with increasing age. In contrast, diagnoses such as persistent postural-perceptual dizziness²³ and vestibular migraine clearly are diagnoses of the younger age groups. Meniere’s disease and vestibular neuritis occurred most frequently in the middle age group. These data are in good accordance with the study of Kim et al,²⁴ who analyzed the etiologic distribution of dizziness and vertigo in a South Korean clinic.

It may be important not only to recognize the increased prevalence of multisensory dizziness, central vertigo and bilateral vestibulopathy in this population but also to address its treatment. Multisensory dizziness is difficult to treat, as is central vertigo and bilateral vestibulopathy, leaving many of these older patients refractory to treatment. This highlights the importance of not missing BPPV or vestibular migraine in this population. Some central vertigo patients have vestibular migraine that does not meet criteria but does respond to treatment. We recently demonstrated the benefit of a multimodal interdisciplinary therapy program in various conditions of chronic dizziness and vertigo²³ as well as in different age groups.¹¹

Table 2. Results of Statistical Tests (t-Tests).

Test	Score	T	Significance	Mean difference	Standard error of difference	95% confidence interval of difference	
						Lower	Upper
Group 1 vs. Group 2	DHI	-4.130	<0.001	-5.211	1.262	-7.686	-2.735
	DHI-P	-5.928	<0.001	-2.499	0.422	-3.326	-1.672
	DHI-F	-4.380	<0.001	-2.430	0.555	-3.519	-1.342
	DHI-E	-0.355	0.723	-0.185	0.520	-1.205	0.836
Group 2 vs. Group 3	DHI	-6.274	<0.001	-8.333	1.328	-10.940	-5.727
	DHI-P	-7.943	<0.001	-3.589	0.452	-4.475	-2.702
	DHI-F	-6.929	<0.001	-4.090	0.590	-5.249	-2.932
	DHI-E	-1.167	0.244	-0.654	0.561	-1.754	0.446
Group 1 vs. Group 3	DHI	-2.800	0.005	-3.123	1.115	-5.311	-0.935
	DHI-P	-2.893	0.004	-1.090	0.377	-1.829	-0.351
	DHI-F	-3.353	0.001	-1.660	0.495	-2.631	-0.689
	DHI-E	-1.018	0.309	-0.469	0.461	-1.374	0.436

Table 3. The Severeness of Dizziness-Associated Impairment Increases Over the Age Groups.

	Mild handicap (DHI 0-30)	Moderate handicap (DHI 31-60)	Severe handicap (DHI 61-100)
All	24.7%	50.6%	24.8%
Group 1	30.3%	54.5%	15.2%
Group 2	25.5%	48.5%	26.1%
Group 3	20.3%	51.1%	28.5%

The DHI has been used as a validated evaluation tool for perceived impairment associated to dizziness and vertigo in a variety of studies.^{25,26} The mean DHI score in our study (46.7 ± 20.1 standard deviation) was higher than a multidisciplinary dizziness unit in the Netherlands (40.6),²⁷ an ENT department in Brazil (43.9),²⁸ and a tertiary care center in Switzerland (44.8)²⁹ indicating that the patients analyzed here were significantly affected from dizziness/vertigo which may mainly be based upon the more severely affected older age group.

The older patients in our study showed significantly higher scores in the total sum score of the DHI as well as its physical (DHI-P) and functional (DHI-F) subscores than the younger patients. Thus, dizziness-associated impairment increases with age and thus, functional handicap is more severe. The increase in DHI with age was also found in other investigations.^{26,27} In addition, multimorbidity was reported to be associated to a higher handicap in DHI, but this was not limited to older age groups.³⁰

Emotional distress (as represented in the DHI-E) was not influenced by age, but the mean DHI-E of 15.6 ± 8.2 (SD) arguably demonstrates impaired mental health due to chronic dizziness in the older age as also described by other authors.¹⁰

As a limitation of the study and data, it has to be kept in mind that the study does not adjust for confounding in the analysis—hence it is not clear whether the differences in DHI were due to age, or simply due to the different distribution of diagnoses or some other confounder.

In conclusion, we were able to define age-specific characteristics of dizziness/vertigo in our study. In the diagnostic work-up of older patients these age-specific characteristics have to be considered carefully. Especially diagnoses with multifactorial and degenerative aspects stand out. The older patient generally is more impaired by the symptoms but possibly will not report typical diagnosis-defining symptoms.


Declaration of Conflicting Interests

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