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Research Article

PSYCHOLOGICAL COMPARISON OF ADULTS WITH DIZZINESS: DEPRESSION, ANXIETY, AND SOMATIZATION IN TYPICAL vs. ABNORMAL VESTIBULAR TEST RESULTS

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ABSTRACT

Objective: This study aimed to investigate the relationship between vestibular test results and levels of depression, anxiety, and somatization in patients with dizziness. It also examined the correlation between vestibulo-ocular reflex (VOR) findings and subjective assessment scales.

Materials and Methods: Sixty patients with complaints of dizziness were divided into two groups: Group I (n=30, abnormal vestibular test findings) and Group II (n=30, normal vestibular test results). All participants underwent audiological and vestibular evaluations [videonystagmography (VNG), video head impulse test (vHIT)] as well as psychological assessments using the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and the Somatization subscale of the Symptom Checklist-90 (SCL-90). Data were analyzed using SPSS version 22.0, with statistical significance set at $p<0.05$.

Results: No significant differences were found between the groups in terms of BDI, BAI, or somatization scores ($p>0.05$). However, Group I had significantly higher total and emotional subscale scores on the Dizziness Handicap Inventory (DHI) ($p<0.05$). In this group, DHI scores showed a positive correlation with both BDI and BAI scores ($p<0.05$). No significant correlation was observed between vHIT results and psychological measures in either group.

Conclusion: Vestibular test results do not appear to significantly influence levels of depression, anxiety, or somatization. However, subjective tools such as the DHI may reflect the psychological impact of dizziness and can be useful in guiding appropriate clinical management.

Keywords: Dizziness, vestibular system, vHIT, anxiety, depression, somatization

MMDJ
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INTRODUCTION

Dizziness and imbalance are common medical complaints, affecting 20%–30% of the general population, leading to a reduced quality of life (1).These symptoms often can result from various causes, including organic, psychosomatic, and psychiatric factors (2). The vestibular system, which plays a critical role in oculomotor control, balance regulation, and self-motion, is vital in maintaining equilibrium. Consequently, any dysfunction in the vestibular system can manifest as dizziness, balance issues, and even perceptual, memory, and emotional disturbances (2, 3). While psychological issues like depression and anxiety are commonly observed in vestibular disorder patients, dizziness and imbalance are also seen in individuals with psychiatric disorders (4). Some patients present with medically unexplained symptoms, such as fatigue, pain, and numbness, which may further complicate diagnosis and treatment (5).

The difficulty in identifying the main etiology of dizziness is exacerbated by the variability in how patients describe their symptoms. Patients are often referred to multiple specialists, such as neurologists or psychiatrists, before identifying the cause or ruling out others. This diagnostic process is not only emotionally and financially taxing for patients but also exhausting for healthcare providers, who may experience frustration and burnout due to poor clinical outcomes and patient dissatisfaction (5, 6).

Vestibular disorders affect individuals differently in terms of functional outcomes and recovery. As objectively measured, Vestibular deficits show little correlation with the severity of symptoms or functional impairment, except in cases of acute complaints (7, 8). Longitudinal studies have demonstrated that vestibular testing alone cannot predict which patients will recover following acute illness (7, 9, 10).

Given that dizziness can originate from various sensory and motor systems (11), comprehensive diagnostic methods are essential for accurate diagnosis. Test results should be interpreted alongside patient-reported symptoms and subjective evaluations. Diagnosing dizziness remains challenging due to the broad range of potential causes (12). Despite physical, neurological, and otological examinations, 10%–40% of dizziness cases remain undiagnosed (12, 13). Existing studies have largely focused on the comorbidity between vestibular disorders and psychological conditions. However, to our knowledge, no research has compared the subjective and objective findings in patients who report dizziness but show normal vestibular test results. According to a review by Hoffman et al.(14), 69% to 76% of dizziness diagnoses can be made based on patient history alone (15, 16) While self-reflection questionnaires provide valuable insights into the subjective experience of dizziness (17), factors such as anxiety and depression are consistently correlated with the severity of vestibular symptoms (18).

Vestibular tests are fundamental clinical tools for distinguishing between peripheral and central causes of dizziness. In particular, the video Head Impulse Test (vHIT) and Suppression Head Impulse Paradigm (SHIMP) have proven effective in detecting peripheral vestibular hypofunction, demonstrating high diagnostic accuracy even in pediatric populations (19). In acute dizziness cases, vHIT offers 100% sensitivity for the rapid detection of central pathologies such as stroke (20). When combined with audiological assessments, vestibular testing provides a comprehensive evaluation of inner ear function (Garrison et al., 2019). The inclusion of caloric and oculomotor tests further enhances diagnostic precision and supports appropriate clinical decision-making (21).

Patients often bear negative beliefs about the consequences of dizziness, which can lead to avoidance of physical and social activities, further exacerbating the condition. Longitudinal studies have shown that such negative beliefs predict handicap severity, even after controlling for symptom severity (22). The agreement between patients' and physicians' assessments of dizziness symptoms tends to be moderate. Moreover, anticipating future dizziness episodes may cause greater distress than symptoms (23). Therefore, a preliminary evaluation using subjective surveys may help identify the psychological impact of dizziness before referring patients for further vestibular testing or to psychiatric services.

This study aimed to assess depression, anxiety, and somatization in patients with dizziness using subjective inventories to answer the following questions: 1. Do objective vestibular test results influence psychological test outcomes in patients with dizziness? 2. Are there any correlations between vestibuloocular test findings measured by vHIT and subjective findings? 3. How effective are subjective test findings in directing patients to appropriate outpatient clinics?

MATERIALS AND METHODS

This prospective study was derived from the master's thesis of Hanifi Korkmaz, conducted under the supervision of Ahmet Kutluhan. The study was approved

MMDJ
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by the University's Clinical Research Ethics Committee (January 17, 2018; Decision Number: 11) and conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants. The study was conducted in a tertiary medical center, with sample size calculations performed using G*Power 3.1 software. A total of 60 dizzy patients were divided into two groups: Group I (30 patients with positive vestibular test results) and Group II (30 patients with normal vestibular test results) (Faul et al., 2009). Exclusion criteria included central vestibular deficits, neurological disorders, musculoskeletal or visual disorders, tinnitus, hearing loss, chronic dizziness (⩾ three months), and psychiatric disorders (24). The sample included 60 patients (18 men, 42 women), aged 18–65. Group I consisted of patients with abnormal vestibular test results, while Group II included those with normal results.

Patient histories indicated that 65% of patients (n = 39) experienced position-related dizziness, overlapping with Persistent Postural-Perceptual Dizziness (PPPD) criteria. However, since no triggering factors for PPPD (e.g., upright posture or complex visual stimuli exposure) were present, the differential diagnosis was made (24). Patients underwent detailed medical histories, audiological assessments, and vestibular testing (VNG and vHIT). In this study, all patients underwent detailed clinical interviews, audiological assessments, and vestibular evaluations, including videonystagmography (VNG) and the vHIT, as part of a comprehensive diagnostic protocol. These tests were selected to objectively determine whether the dizziness originated from a peripheral vestibular dysfunction or a central/non-vestibular source. vHIT, in particular, was chosen due to its high sensitivity in detecting central pathologies such as stroke, especially in emergency clinical contexts (20). The integration of vestibular and audiological evaluations aimed to provide a complete assessment of inner ear function, which is particularly important in patients with overlapping or complex otological symptoms(25). Following the vestibular work-up, psychological assessments were conducted using the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), the Somatization subscale of the SCL-90, and the Dizziness Handicap Inventory (DHI).

Audiological evaluation

Pure-tone audiometry (0.25–8 kHz), high-frequency audiometry (10–16 kHz), and speech tests were performed using Interacoustic AC 40 clinical audiometry and TDH 39 P supra-aural headphones. Tympanometric and acoustic reflex tests were conducted using a 226-Hz probe tone (Interacoustics AZ 26, Denmark). Normal hearing was defined as a pure-tone threshold <25 dB HL at all frequencies (26).

Vestibulospinal tests and evaluation

Past pointing tests, static postural tests (Romberg and tandem Romberg), and gait evaluations were performed. Abnormal results indicated past pointing deviation, difficulty maintaining posture, or gait instability (Krager, 2018). Severe gait instability is often associated with neurological issues (27).

Videonystagmography (VNG)

The VNG included oculomotor tests, spontaneous nystagmus evaluation, head-shaking nystagmus, positional tests, and the Dix-Hallpike maneuver using the Micromedical Technologies INC device with VisualEyes software. Abnormal findings included gaze-evoked nystagmus and direction-changing nystagmus. The central vestibular disorder was considered present based on the results of the following tests: The Gaze-evoked nystagmus (horizontal or vertical axis) test, direction-changing nystagmus, and gaze-evoked nystagmus opposite to Alexander's law were considered as central vestibular findings (28).

Video head impulse test (vHIT)

The vHIT assessed all semicircular canals using the EyeSeeCam system (Interacoustics, Denmark). Abnormal results included gain scores outside the 0.76–1.18 range and corrective saccades (29).

Dizziness handicap inventory (DHI)

The DHI was used to assess patients' perceived disability due to dizziness, comprising emotional, physical, and functional domains. Higher scores indicate greater perceived disability (30). The Turkish version was utilized (31).

Beck depression inventory (BDI) and beck anxiety inventory (BAI)

The BDI and BAI were used to measure depression and anxiety severity, respectively (32, 33).

Symptom checklist 90 (SCL-90)

SCL-90 was employed to assess psychological symptoms across nine subscales, including somatization, anxiety, and depression (34).

Statistical analysis

Statistical analyses were performed using SPSS 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were

MMDJ
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used to summarize patient characteristics, including frequencies, means, and standard deviations. To compare psychological scores (BDI, BAI, SCL-90, and DHI) between Group I and Group II, independent t-tests were used. The chi-square test was applied for categorical variables. For correlations between psychological measures and vestibular test results, Pearson correlation coefficients were calculated. A p-value < 0.05 was considered statistically significant.

RESULTS

In Group I, vestibulospinal abnormalities were identified in 12 patients (40%), head-shaking test abnormalities in 4 patients (13%), positional test abnormalities in 16 patients (53%), and vHIT abnormalities in 14 patients (47%). Vertigo was reported by 60% of patients (n=39), lightheadedness by 33% (n=20), and disequilibrium by 7% (n=1). In 65% of patients (n=39), dizziness was episodic and position-related. Fifteen patients (23%) reported dizziness without any identifiable trigger, while 9 patients (15%) experienced dizziness in specific situations (e.g., stress, trauma, seasonal changes, or life events). No statistically significant differences were observed between groups in terms of age (p = 0.951) or gender (p = 0.261). (See Table 1).

Table 1. Comparison of groups by gender and age

Variable	Group I (n=30)	Group II (n=30)	Total (n=60)	Test Value	P Value
Gender					
Female	17 (56.6 %)	20 (66.6%)	37 (61.6%)	-0.131	0.261
Male	13 (43.3%))	10 (33.3%)	23 (38.3%)		
Age					
Mean ± SD	39.26 ± 12.04	37.16 ± 12.11		Mann-Whitney	0.951
Median (M)	39	37			
Min-Max	20-61	19-61			

n: number of samples, %: percent, Test value: Chi-square test value (χ^2), p value: statistical significance (p<0.05 indicates a statistically significant difference between the groups). While the different letters in the lines show the difference between the groups, the same letters indicate no difference.

Comparison of subjective scales between the groups

No statistically significant differences were found between the groups in BDI (p = 0.116), BAI (p = 0.230), or SOM scores (p = 0.953). However, a significant difference was observed in the emotional subscale and total scores of the DHI (p = 0.025), indicating a key finding. There were no significant differences in the physical and functional subscales of DHI (p = 0.727) (see Table 2).

Comparison of intra-intra-group vestibular test and subjective scale findings in group I

Table 2. Comparison of BDI, BAI, SOM, and DHI findings among the groups

Variable	Group I (n=30)	Group II (n=30)	P Value
Beck Depression Inventory	11.26±0.05 (2.00-37.00)	15.06±0.05 (0.00-39.00)	0.116
Beck Anxiety Inventory	15.06±0.05 (0.00-39.00)	16.56±0.05 (4.00-44.00)	0.230
Somatization	10.30±0.05 (0.50-2.41)	10.31±0.05 (0.20-2,50)	0.953
DHI-Physical	10.93±0.05 (2.00-20.00)	13.20±0.05 (2.00-22.00)	0.060
DHI - Emotional	10.03±0.05 (0.00-20.00)	12.86±0.05 (4.00-26.00)	0.025
DHI-Functional	11.13±0.05 (2.00-20.00)	11.56±0.05 (4.00-20.00)	0.727
DHI-Total	31.63±0.05 (12.00-54.00)	37.83±0.05 (10.00-54.00)	0.020

DHI: Dizziness Handicap Inventory, p value: statistical significance (p<0.05 indicates a statistically significant difference between the groups).

No statistically significant correlations were found between vHIT gain values and BDI, BAI, or somatization scores (p > 0.05) (see Table 3). In contrast, a statistically significant correlation was observed between DHI scores and both BDI (p = 0.004) and BAI (p = 0.034). Positive correlations were also identified between BDI, BAI, and the physical (p = 0.022; p = 0.012) and total (p = 0.004; p = 0.034) subscales of the DHI (see Table 3).

Comparison of intra-intra-group vestibular test and subjective scale findings in group II

No statistically significant correlations were observed between vHIT gain values and BDI, BAI, or somatization scores (p > 0.05) (see Table 4). However, a positive correlation was found between BAI and the functional subscale of the DHI (p = 0.023) (see Table 4).

DISCUSSION

The intricate relationship between dizziness and psychological distress is a complex phenomenon. While dizziness can lead to psychological distress in specific individuals, for others, the psychological distress they experience may manifest as dizziness or vertigo. The mechanism that connects psychological symptoms with dizziness symptoms has yet to be fully understood. However, some experts suggest it may be due to a significant overlap between neuroanatomical regions,

MMDJ
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Table 3. Correlation between BDI, BAI, SOM findings and vHIT gain findings, and DHI scores in Group I

Variable	vHIT Gain (n=60)	Right LSCC	Left LSCC	Right ASCC	Left PSCC	Left ASCC	Right PSCC	DHI-Physical	DHI-Emotional	DHI-Functional	DHI-Total
BDI	r	0.121	-0.237	0.003	0.127	-0.280	0.007	0.416	0.332	0.303	0.496
	p	0.523	0.207	0.989	0.503	0.133	0.969	0.022	0.076	0.104	0.004
BAI	r	0.113	-0.262	0.094	0.346	-0.335	0.022	0.451	0.198	0.235	0.389
	p	0.551	0.162	0.621	0.061	0.070	0.907	0.012	0.295	0.211	0.034
SOM	r	-0.052	-0.181	0.278	0.299	-0.283	0.159	0.268	0.361	0.093	0.280
	p	0.784	0.338	0.137	0.108	0.129	0.402	0.153	0.050	0.624	0.134

L = Lateral, A = Anterior, P = Posterior, SSC = Semicircular Canal, BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, DHI = Dizziness Handicap Inventory, SOM = Somatization Score. Pearson correlation is significant at the 0.05 level (2-tailed).

Table 4. Correlation between BDI, BAI, SOM findings and vHIT gain findings, and DHI scores in Group II

Variable	vHIT Gain (n=60)	Right LSCC	Left LSCC	Right ASCC	Left PSCC	Left ASCC	Right PSCC	DHI-Physical	DHI-Emotional	DHI-Functional	DHI-Total
BDI	r	0.307	0.099	-0.084	-0.009	-0.228	0.356	0.048	0.196	0.206	0.229
	p	0.099	0.602	0.658	0.964	0.226	0.054	0.803	0.298	0.275	0.223
BAI	r	0.102	0.146	-0.013	-0.185	-0.010	0.107	-0.451	0.218	0.415	0.238
	p	0.591	0.442	0.947	0.329	0.958	0.574	0.441	0.247	0.023	0.205
SOM	r	0.284	0.275	0.041	-0.190	0.034	0.014	-0.115	0.196	0.323	0.190
	p	0.128	0.141	0.829	0.313	0.859	0.940	0.544	0.300	0.082	0.315

L = Lateral, A = Anterior, P = Posterior, SSC = Semicircular Canal, BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, DHI = Dizziness Handicap Inventory, SOM = Somatization Score. Pearson correlation is significant at the 0.05 level (2-tailed).

vestibular system neurotransmitters, and emotional state pathways (1).

Psychological Test Results and Vestibular Findings: Our study showed no significant differences in BDA, BAI, and SOM scores between patients with and without vestibular test findings. Both groups exhibited mild to moderate depression, anxiety, and somatization. In Group I, these findings could be due to psychogenic symptoms secondary to vestibular disorders, while in Group II, dizziness might be due to psychological factors. No significant correlation was found between vestibular findings and psychological test results, which aligns with Best et al. (35) who also found no direct link between vestibular test results and psychological symptoms in patients with dizziness. In our clinical approach, all patients presenting with dizziness undergo comprehensive audiological and vestibular evaluation, regardless of initial diagnostic assumptions, to distinguish peripheral, central, or psychogenic origins. This inclusive strategy reflects real-world clinical diversity. The presence of dizziness in patients with normal vestibular test results (Group II) may indeed influence psychological findings. However, this subgroup represents a clinically relevant population, and their inclusion highlights the importance of integrating subjective and psychological assessments into the diagnostic pathway for dizziness.

Recent studies have increasingly emphasized the role of psychological factors in dizziness severity, particularly among patients with vestibular pathologies. Rutenkröger et al. (2024) (22) reported that higher levels of depression and anxiety were significantly correlated with increased DHI scores in patients with vestibular schwannoma. Similarly, Inoue et al. (2023)(36) and Kim et al. (2024) found that psychiatric symptoms were highly prevalent in patients with vestibular disorders such as vestibular migraine (37), with clinically significant anxiety reported in nearly half of the cases. Omara et al. (2022)(38) further demonstrated that a substantial proportion of dizzy patients experience comorbid anxiety and depression, often simultaneously. Consistent with these findings, our study identified moderate levels of depression and anxiety in both groups, regardless of objective vestibular test results. The lack of significant differences in BDE scores between vestibular-positive and vestibular-negative groups may reflect the multifactorial and perceptual nature of dizziness, where subjective distress is not always aligned with measurable vestibular dysfunction. These results underscore the importance of including

MMDJ
MEANDROS MEDICAL AND DENTAL JOURNAL
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Meandros Medical and Dental Journal
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psychological assessment in routine dizziness evaluations and support our study's objective of highlighting subjective factors as key diagnostic and therapeutic considerations.

(2) vHIT Findings and Psychological Measures: Our study found no significant correlation between vHIT results and anxiety, depression, or somatization. However, a relationship was found with DHI scores. Gurgel et al. (5) and Subası et al. (39) found links between psychological factors and vestibular dysfunction. However, this was not observed in our study due to the exclusion of conditions such as hearing loss or tinnitus. This might have reduced the impact of vestibular dysfunction on vHIT results, as mild findings were observed in our patients (3).

Subjective Assessments and Dizziness Perception: A significant difference in dizziness perception, as measured by the DHI, was found between patients with and without abnormal vestibular findings. Dizziness perception was higher in patients with regular vestibular tests, aligning with Yip & Strupp and Zamyslowska-Szmytke et al. (40), who found that psychological factors influence dizziness perception in patients with normal vestibular findings. Psychological factors often influence dizziness perception more than vestibular findings when tests are inconclusive. Piker et al. (41) found that psychological comorbidities correlated with self-reported dizziness disability, and Schmid et al. (42) showed strong correlations between DHI scores and emotional sub-scores. Our findings support these results, suggesting that subjective assessments should guide further diagnostic and psychological evaluations for patients with dizziness.

The relationship between anxiety and balance disorders involves shared neural pathways, which may contribute to dizziness caused by psychological factors. Saman et al. (43) noted that many patients with dizziness also require psychological support. This underscores the importance of psychological evaluation in patients with dizziness and expected vestibular test results.

We see exciting potential for future studies to refine our patient grouping methods. For instance, we could compare PPPD with other potentially confusing patients, such as those with presbyeqiriblium, to further enrich our understanding Future studies could improve patient grouping considering symptom severity and triggers.

CONCLUSION

Psychological assessments in patients with dizziness may serve as a valuable tool in guiding further vestibular testing and facilitating referrals for psychological evaluation, particularly when vestibular findings are inconclusive.

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Authorship contributions
Hanifi Korkmaz: Conceptualized the study, designed the methodology, and conducted the data collection. Ahmet Kutluhan: Provided expertise in vestibular assessments, supervised the clinical procedures, and contributed to the interpretation of the test results. Banu Mujdeci: Analyzed the data, contributed to the statistical analysis, and drafted sections related to depression, anxiety, and somatization. Erkan Karatas Reviewed and edited the manuscript, ensuring academic rigor, and coordinated the collaboration between the authors. All authors read and approved the final manuscript.

Data availibity statement
The datasets generated and/or analyzed during the current study are not publicly available due to privacy restrictions but are available from the corresponding author upon reasonable request.

Declaration of competing interest
The authors declare no financial interests, connections, or other situations that could potentially raise questions of bias regarding the work reported, its conclusions, implications, or opinions. Furthermore, there are no pertinent commercial interests, sources of funding, or affiliations with any organization, department, or individual that could influence the content of this article. The authors also confirm the absence of personal relationships or direct academic competition that may impact the objectivity or integrity of the presented work.

Ethics
Ethical approval was obtained from the İnönü University of Medical Clinical Research Ethics Committee (Protocol number: 2017/29, Date:17.01.2018/11).

MMDJ
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REFERENCES

1. Neuhauser HK. Epidemiology of vertigo. Current opinion in neurology. 2007;20(1):40-6.
2. Cullen KE. The vestibular system: multimodal integration and encoding of self-motion for motor control. Trends Neurosci. 2012;35(3):185-96.
3. Borel L, Lopez C, Péruch P, Lacour M. Vestibular syndrome: a change in internal spatial representation. Neurophysiologie Clinique/Clinical Neurophysiology. 2008;38(6):375-89.
4. Best C, Tschan R, Eckhardt-Henn A, Dieterich M. Who is at risk for ongoing dizziness and psychological strain after a vestibular disorder? Neuroscience. 2009;164(4):1579-87.
5. Gurgel LG, Dourado MR, Moreira TdC, Serafini AJ, Menegotto IH, Reppold CT, et al. Correlation between vestibular test results and self-reported psychological complaints of patients with vestibular symptoms. Brazilian Journal of otorhinolaryngology. 2012;78:62-7.
6. Strupp M, Brandt T. Diagnosis and treatment of vertigo and dizziness. Dtsch Arztebl Int. 2008;105(10):173-80.
7. Patel M, Arshad Q, Roberts RE, Ahmad H, Bronstein AM. Chronic symptoms after vestibular neuritis and the high-velocity vestibulo-ocular reflex. Otology & Neurotology. 2016;37(2):179-84.
8. Yip CW, Strupp M. The Dizziness Handicap Inventory does not correlate with vestibular function tests: a prospective study. Journal of neurology. 2018;265:1210-8.
9. Phillips JS, FitzGerald JE, Bath AP. The role of the vestibular assessment. J Laryngol Otol. 2009;123(11):1212-5.
10. Post RE, Dickerson LM. Dizziness: a diagnostic approach. Am Fam Physician. 2010;82(4):361-8, 9.
11. Tirelli G, Rigo S, Bullo F, Meneguzzi C, Gregori D, Gatto A. Saccades and smooth pursuit eye movements in central vertigo. ACTA otorhinolaryngologica italica. 2011;31(2):96.
12. Newman-Toker DE, Hsieh Y-H, Camargo Jr CA, Pelletier AJ, Butchy GT, Edlow JA, editors. Spectrum of dizziness visits to US emergency departments: cross-sectional analysis from a nationally representative sample. Mayo Clinic Proceedings; 2008: Elsevier.
13. Nishikawa D, Wada Y, Shiozaki T, Shugyo M, Ito T, Ota I, et al. Patients with vertigo/dizziness of unknown origin during follow-ups by general otolaryngologists at outpatient town clinic. Auris Nasus Larynx. 2021;48(3):400-7.
14. Hoffman RM, Einstadter D, Kroenke K. Evaluating dizziness. Am J Med. 1999;107(5):468-78.
15. Eckhardt-Henn A, Best C, Bense S, Breuer P, Diener G, Tschan R, et al. Psychiatric comorbidity in different organic vertigo syndromes. J Neurol. 2008;255(3):420-8.
16. Yardley L, Beech S, Weinman J. Influence of beliefs about the consequences of dizziness on handicap in people with dizziness, and the effect of therapy on beliefs. Journal of psychosomatic research. 2001;50(1):1-6.
17. Gofrit SG, Mayler Y, Eliashar R, Bdolah-Abram T, Ilan O, Gross M. The association between vestibular physical examination, vertigo questionnaires, and the electronystagmography in patients with vestibular symptoms: a prospective study. Annals of Otology, Rhinology & Laryngology. 2017;126(4):315-21.
18. Herdman D, Norton S, Pavlou M, Murdin L, Moss-Morris R. Vestibular deficits and psychological factors correlating to dizziness handicap and symptom severity. Journal of psychosomatic research. 2020;132:109969.
19. Kirbac A, Kaya E, Incesulu SA, Carman KB, Yarar C, Ozen H, et al. Differentiation of peripheral and non-peripheral etiologies in children with vertigo/dizziness: The video-head impulse test and suppression head impulse paradigm. International Journal of Pediatric Otorhinolaryngology. 2024;179:111935.
20. Vorobyev A, Farrelly S, Hartis A, Monsch E, Strange C, Rizk H, et al. Optimizing Stroke Assessment of Dizziness: The Role and Impact of Video Head Impulse Testing. Stroke: Vascular and Interventional Neurology. 2024;4:e12984_350.
21. Luchikhin L, Kunel'skaya N, Guseva A, Dovlatova E, Chistov S. The diagnostic significance of the clinical methods for the investigation into the oculomotor reactions to dizziness. Vestnik otorinolaringologii. 2015;80(2):8-11.
22. Rutenkröger M, Scheer M, Rampp S, Strauss C, Schönfeld R, Leplow B. Associations between Psychological Factors and Long-Term Dizziness Handicap in Vestibular Schwannoma Patients: A Cross-Sectional Study. medRxiv. 2024:2024.10. 19.24315803.
23. Jacobson GP, Piker EG, Hatton K, Watford KE, Trone T, McCaslin DL, et al. Development and preliminary findings of the dizziness symptom profile. Ear and hearing. 2019;40(3):568-76.
24. Staab JP, Eckhardt-Henn A, Horii A, Jacob R, Strupp M, Brandt T, et al. Diagnostic criteria for persistent postural-perceptual dizziness (PPPD): Consensus document of the committee for the Classification of Vestibular Disorders of the Bárány Society. Journal of Vestibular Research. 2017;27(4):191-208.
25. Garrison D, Barth L, Kaylie D, Riska K. Symptoms, audiometric and vestibular laboratory findings, and imaging in a concurrent superior canal dehiscence syndrome and vestibular schwannoma: a case report. Journal of the American Academy of Audiology. 2020;31(01):076-82.
26. Behrbohm H, Kaschke O. Ear, nose, and throat diseases: with head and neck surgery: Thieme; 2009.
27. Kerber KA, Baloh RW. The evaluation of a patient with dizziness. Neurol Clin Pract. 2011;1(1):24-33.
28. Wu C-N, Luo S-D, Chen S-F, Huang C-W, Chiang P-L, Hwang C-F, et al. Applicability of Oculomotor Tests for Predicting Central Vestibular Disorder Using Principal Component Analysis. Journal of Personalized Medicine. 2022;12(2):203.

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MEANDROS MEDICAL AND DENTAL JOURNAL
June 2025 26(2):177-184
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doi: 10.69601/meandrosmdj.1609141

29. Mossman B, Mossman S, Purdie G, Schneider E. Age dependent normal horizontal VOR gain of head impulse test as measured with video-oculography. Journal of Otolaryngology-Head & Neck Surgery. 2015;44:1-8.
30. Vereeck L, Truijen S, Wuyts FL, Van de Heyning PH. The dizziness handicap inventory and its relationship with functional balance performance. Otology & neurotology. 2007;28(1):87-93.
31. Karapolat H, Eyigor S, Kirazlı Y, Celebisoy N, Bilgen C, Kirazli T. Reliability, Validity and Sensitivity to Change of Turkish Dizziness Handicap Inventory (DHI) in Patients with Unilateral Peripheral Vestibular Disease. Journal of International Advanced Otology. 2009;5(2).
32. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Archives of general psychiatry. 1961;4(6):561-71.
33. Ulusoy M, Sahin NH, Erkmen H. Turkish version of the Beck Anxiety Inventory: psychometric properties. Journal of cognitive psychotherapy. 1998;12(2):163.
34. Holi M. Assessment of psychiatric symptoms using the SCL-90: Helsingin yliopisto; 2003.
35. Best C, Eckhardt-Henn A, Diener G, Bense S, Breuer P, Dieterich M. Interaction of somatoform and vestibular disorders. Journal of Neurology, Neurosurgery & Psychiatry. 2006;77(5):658-64.
36. 井上亜希, 西村信一, 藤本千里, 岩﨑真一. めまい疾患における日常生活障害度に関連する心理学的特性について. Equilibrium Research. 2023;82(2):98-104.
37. Kim TS, Lee WH, Heo Y. Prevalence and contributing factors of anxiety and depression in patients with vestibular migraine. Ear, Nose & Throat Journal. 2024;103(5):305-12.
38. Omara A, Basiouny EM, Shabrawy ME, Shafei RRE. The correlation between anxiety, depression, and vertigo: a cross-sectional study. The Egyptian Journal of Otolaryngology. 2022;38(1):143.
39. Subasi B, Yildirim N, Akbey ZY, Karaman NE, Arik O. Correlations of Clinical and Audio-Vestibulometric Findings with Coexisting Anxiety and Depression in Meniere's Disease Patients. Audiol Neurootol. 2023;28(2):75-83.
40. Zamyslowska-Szmytke E, Politanski P, Jozefowicz-Korczynska M. Dizziness handicap inventory in clinical evaluation of dizzy patients. International Journal of Environmental Research and Public Health. 2021;18(5):2210.
41. Piker EG, Jacobson GP, McCaslin DL, Grantham SL. Psychological comorbidities and their relationship to self-reported handicap in samples of dizzy patients. Journal of the American Academy of Audiology. 2008;19(04):337-47.
42. Schmid D, Allum J, Sleptsova M, Welge-Lüssen A, Schaefert R, Meinlschmidt G, et al. Relation of anxiety and other psychometric measures, balance deficits, impaired quality of life, and perceived state of health to dizziness handicap inventory scores for patients with dizziness. Health and quality of life outcomes. 2020;18:1-15.
43. Saman Y, McLellan L, McKenna L, Dutia MB, Obholzer R, Libby G, et al. State Anxiety Subjective Imbalance and Handicap in Vestibular Schwannoma. Front Neurol. 2016;7:101.
44. Swamy SN, Yuvaraj P, Pruthi N, Thennarasu K, Rajasekaran AK. Comprehensive normative data for objective vestibular tests. Cureus. 2023;15(6).