Evaluation of dizziness handicap and investigation of depression, anxiety disorder, migraine comorbidity in patients diagnosed with persistent postural-perceptual dizziness

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Abstract

There is still limited information about how, and to what extent, patients with Persistent Postural-Perceptual Dizziness (PPPD) feel inadequate in their daily lives. This study aims to evaluate the physical, functional, and emotional disability related to dizziness in patients diagnosed with PPPD, and to investigate the frequency of anxiety disorder, depression, and migraine. The files of patients who were diagnosed PPPD in the neurology outpatient clinic at our hospital were retrospectively reviewed. The results of the Dizziness Handicap Inventory (DHI), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI), which were implemented for treatment planning, were evaluated. Headache complaints were examined for whether they were compatible with migraine. Of the 65 patients diagnosed with Persistent postural-perceptual dizziness, 89% were female, 11% were male, and the mean age was 39. The total mean score of the DHI was 55.3. 86.1% of the patients experienced moderate or severe dizziness handicap. Moderate or severe depression was identified in 50.8% of the patients, moderate or severe anxiety in 80.8%, and migraine comorbidity in 70.8% of the patients. The majority of the patients with PPPD were in the young-middle age group and female. It was concluded that dizziness, migraine, depression, and anxiety disorder highly adversely affected the health-related quality of life of the patients.

Keywords: Persistent postural-perceptual dizziness, depression, anxiety, migraine

1. Introduction

Dizziness is primarily described as light headedness, pre-fainting state, unsteadiness, or spinning (1). Itis a chronic and multifactorial condition that is common in the community. Complaints should be evaluated systematically to determine the etiology. In people aged 30 to 50 years with chronic dizziness, the cause is often PPPD (2).

The PPPD diagnostic criteria were created by collecting and re-evaluating the clinical features of diseases called chronic subjective dizziness (CSD), space-motion sickness (SMD), phobic postural vertigo (PPV), visual vertigo (VV) in different time periods. The 30-year research results of the aforementioned diseases are defined by the Bárány diagnostic criteria with a comprehensive review (3). For a diagnosis of PPPD, complaints must persist most days for at least three months. Symptoms of imbalance or dizziness are exacerbated by active or passive movement, upright posture, and exposure to moving, complex visual stimuli (3). Symptoms can be triggered by other medical and psychological conditions that can cause balance disorders. The pathophysiology of PPPD has not yet been fully explained. There are those who say that it may be caused by functional disorders in the centers related to balance. There are also those who say that it may be caused by disorders in sensory information processing in cortical structures and the disorder in the perception of threat related to spatial orientation and balance (3). PPPD is diagnosed by evaluating the clinical history according to the Bárány criteria. There are no diagnostic examination findings, imaging findings, or laboratory tests. It may accompany some other diseases, or it may be the only diagnosis (3). As there are no diagnostic tests or biomarkers, its main clinical symptoms need careful examination (3).

In this study, it was planned to measure the extent to which patients diagnosed with PPPD felt inadequacy in their daily lives using DHI. In addition, it was aimed to investigate the comorbidities of depression, anxiety disorder and migraine.

2. Material and Method

This retrospective study was conducted by examining the files of patients diagnosed with PPPD, who were examined in the neurology headache-dizziness outpatient clinic of our hospital between 2020-2022. The study was conducted in a tertiary healthcare institution with a patient group consisting of patients with the most severe and chronic dizziness-headache. Patients were evaluated by history, neurological examination and neuroimaging. Patients were diagnosed with PPPD according to the diagnostic criteria set by the Committee on the

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Classification of Vestibular Disorders of the Bárány Society (3). The absence of neurodegenerative disease associated with chronic dizziness was confirmed by brain magnetic resonance (MR). No nystagmus was observed in the vestibular positional tests. Patients diagnosed with PPPD filled out 3 Likert-type questionnaires, and then the questionnaires were evaluated by a neurologist.

DHI was developed to investigate the factors exacerbating dizziness and balance disorders (4). It is a likert type scale and consists of 25 questions. It was created to determine the physical (DHIp), emotional (DHIe), and functional (DHIf) effects of dizziness. The answer to each question has 3 options; yes: 4 points, sometimes: 2 points and no: 0 points. DHI scores range from 0 (no disability) to 100 (severe disability) (5). According to the total score, 0-30 points means mild handicap, 30-60 points means handicap, 60-100 points means serious handicap (6,7). The reliability and validity tests of the scale in Turkey were performed (8).

The BDI is used to measure the presence and degree of depression in adults. The cut-off point of the scale was determined as 17. It consists of 21 questions. Each question consists of 4 options. Options score between 0 and 3. The person chooses the option that best describes himself. Then the points given to each item are added up. The lowest score that can be obtained from the scale is 0, and the highest score is 63. The scores obtained in the rating of depression are used. A score of 0-9 is interpreted as minimal, 10-16 as mild, 17-29 as moderate, and 30-63 as severe depression. Turkish validity and reliability tests of the scale were performed (9).

The BAI is used to measure the degree of anxiety experienced by individuals. The patient can self-administer. It consists of 21 questions. Each question gets points between 0-3. According to the score obtained, 8-15 is interpreted as mild, 16-25 as moderate, 26-63 as severe anxiety. A score of 17 and above is significant in terms of anxiety. Validity and reliability tests were performed in Turkey (10).

The ICHD-3 beta version of the headache classification was used for the diagnosis of migraine in PPPD patients (11).

Ethical approval was obtained for the study from the Ethics Committee of the Ministry of Health of the Republic of Turkey, University of Health Sciences, Dışkapı Yıldırım Beyazıt Training and Research Hospital. Date: 20.06.2022, No:140/05

Informed Consent: As the study was conducted retrospectively, no informed consent was obtained.

Statistical Analysis: The data were entered to the IBM SPSS 26.0 program prior to the analysis. After the analysis, descriptive statistics were presented with numbers, percentages, minimum and maximum values, and mean and median values. The assumption of normal distribution of the data was checked with the Kolmogorov-Smirnov test. As the number of people in some of the groups to be compared was less than 30, the Mann-Whitney U test was used to evaluate the differences between the two independent groups. A Pearson correlation test was completed for normally distributed variables and a Spearman correlation test was completed for non-normally distributed variables to determine the relationships between variables. The statistically significance level was accepted as $p<0.05$.

3. Results
65 patients diagnosed with PPPD were included in the study. Of the patients, 58 (89%) were female, 7 (11%) were male, and the mean age was 39 (19-63). Mean body mass index (BMI) was 27.5 (17.5-39.5). The total mean DHI score was found to be 55.3 (18-92). 9 (13.8%) patients had mild, 24 (36.9%) moderate, and 32 (49.2%) had severe dizziness handicap. In the mean scores of DHI subgroups, the mean DHIe disability score was 1.53, mean DHIf disability score was 2.55, and the mean DHIp disability score was 2.73. 21 (32.3%) of the PPPD patients had moderate depression and 12 (18.5%) had severe depression. 18 (27%) of the patients had moderate and 35 had (53.8%) severe anxiety disorders. Migraine comorbidity was observed in 46 patients (70.8%) (Table 1). There was a positive correlation between the DHI score of PPPD patients and depression (p: 0.020) and anxiety disorder (p: 0.00) (Table 2). There was no significant relationship between the DHI score and the presence of migraine (p: 0.50). Those without migraine had a significantly higher age (p:0.043). There was no significant correlation between the DHI score and gender (p:0.75), age (p:0.95), and BMI (p:0.23).

4. Discussion
PPPD is in the 11th revision of the International Classification of Diseases (3). This condition can also be seen in children and is 4 times more common in women than in men (12). Prospective studies have shown that PPPD-like disorders may develop in 25% of acute or episodic vestibular attacks (3). A complete history is required in patients with PPPD, as symptoms are the most important diagnostic data. It is also important to get detailed information about depression, migraine and anxiety disorder. Generally, physical and neurological examinations of patients presenting with PPPD are normal (12). PPPD can be triggered by peripheral and central vestibular attacks, migraine, psychiatric disorders, head trauma, metabolic changes, cardiovascular diseases and some drug reactions (3,13). In our study, the diagnosis of PPPD was made with a detailed history and physical and neurological examination. There was no pathological findings in the neurological examination. There was no nystagmus in the vestibular examination. Brain MRI was within normal limits.

In studies on the demographic characteristics of PPPD patients, the mean age is reported as 47.6, and the ratio of women as 69% (14). In another study, the mean age was found as 50.06±12.16, female/male ratio was 5.7/1 (15). There are also studies reporting 80% of the patients as females (16). In our study, the mean age of the patients was 39 (19-63), and the

female ratio was 89% (approximately 7/1). The female dominance is slightly higher than detailed in the literature while the mean age was similar to the literature.

Table 1. Descriptive findings, DHI score; DHIe, DHIf, DHIp mean; BDI, BAI scores and rate of migraine comorbidity

		n	%	Minimum	Maximum	Mean	Median
Gender	Female	58	89.2				
	Male	7	10.8				
Age				19	63	39.02	40.00
Weight (kilogram)				44	119	72.12	70.00
Height (meter)				1.48	1.80	1.62	1.62
BMI				17.58	39.54	27.25	26.21
Total DHI score				18	92	55.32	60.00
DHI score	Mild (0-30)	9	13.8				
	Moderate (31-60)	24	36.9				
	Severe (61-100)	32	49.2				
DHIe mean				0	3.56	1.53	1.33
DHIf mean				0.44	4.00	2.55	2.66
DHIp mean				0.86	4.00	2.73	2.85
Depression				1	50		
Depression	Minimal (0-9)	15	23.1				
	Mild (10-16)	17	26.2				
	Moderate (17-29)	21	32.3				
	Severe (30-63)	12	18.5				
Anxiety				4	61		
Anxiety	Mild (8-15)	12	18.5				
	Moderate (16-25)	18	27.7				
	Severe (26-63)	35	53.8				
Migraine	No	19	29.2				
	Yes	46	70.8				

Table 2. Correlation between the DHI mean score and depression and anxiety disorder

		Total DHI mean	Depression	Anxiety
Total DHI mean	r	1		
	p	-		
Depression	r	0.288	1	
	p	**0.020** [*]	-	
Anxiety	r	0.580	0.535	1
	p	**0.000** [*]	**0.000** [†]	-

The main symptoms of PPPD are dizziness and a feeling of instability that is exacerbated by upright posture, active or passive movement. Watching moving visual stimuli or complex visual objects can also trigger imbalance (3). Regardless of direction or position, active or passive movement is an important factor exacerbating symptoms in 90.9% of patients (17). Patients generally state that they feel swaying while standing, and that the problems increase with walking and driving (18). Several studies have been conducted investigating the triggering factors and the degree of disability. In a large-scale study, the disability caused by dizziness was investigated using the DHI, and the total disability mean score was found to be 50.03. Patients have been reported to have a moderate or severe range of vertigo disability (14,16). DHI scores mostly vary between 52.66 and 58.7 in the literature (7,15,19). The difference is related to the duration of the disease and PPPD patients whose symptoms have persisted for more than **o**ne year are said to have higher physical handicap means (20). The total DHI mean score in our study was found to be 55.3 (18-92), similar to the literature. We found moderate and severe dizziness handicap in 86% of the PPPD patients. In the mean scores of the DHI sub-groups, the DHIe disability ratio was 1.53, the DHIf handicap ratio was 2.55, and the DHIp handicap ratio was 2.73 (Table 1). Consistent with the literature, the patients experienced the most significant handicap in physical and the least handicap in emotional

stimuli. There was no significant correlation between the DHI score and gender (p: 0.75), age (p: 0.95) and BMI (p: 0.23). We could not find any study on this subject in the literature.

In studies conducted on PPPD, female gender, migraine, anxiety, and depression were found as predictors (21). In studies on PPPD, it is thought that the association of neurotic disorder is common (22,23), and personality traits related to anxiety increase the susceptibility to PPPD (22-26). According to studies, 42% of PPPD patients have a coexistence of post-traumatic stress disorder and anxiety disorder. In studies, 53.5% of the patients had moderate to severe depression, and 64% had minimal or mild level anxiety (16). In another study, the frequency of anxiety was found to be 29% and the frequency of depression to be 32.2% (21). The results of the BDI implemented to patients showed that 50.8% of the patients had severe depression, while the BAI results showed that 80.8% of the patients had a moderate or severe anxiety disorder. The depression rate was consistent with the literature, but the anxiety rate was higher than the literature. Additionally, a significant positive correlation was found between the DHI score of PPPD patients and depression (p: 0.020) and anxiety disorder (p: 0.00) in our study (Table 2).

Another common comorbid condition associated with PPPD is migraine. Patients with recurrent vertigo are more likely to coexist with migraine. As with vestibular migraine, this may be a pathogenetic association (27). A prospective study showed that the presence of PPPD is more common in patients with migraine than in those without migraine, and comorbidity is even more common in vestibular migraine. (28). 53% of the patients met the International Classification of Headache Disorders criteria for migraine headache (29). A comorbidity of 45.2% and 49% has been reported for the frequency of migraine (16,21). In our study, migraine comorbidity was found in 70.8% of PPPD patients. Patients with migraine were significantly younger than the patients without migraine (p: 0.043). In our study, anxiety and migraine comorbidities were higher than the literature. As this study was conducted in a tertiary health institution, we thought that it might be due to the homogenization of the most severe and long-term patients.

As in the literature, we found in our study that the association of PPPD and female gender, migraine, anxiety, and depression was common. Our current results have revealed that PPPD patients experience severe dizziness, and their quality of life is low due to the comorbidity of anxiety, depression, and migraine.

Conflict of Interest
The author has no conflict of interest with any person or institution.

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Authors' contributions
Concept: F.Y.C., Design: F.Y.C., Data Collection or Processing: F.Y.C., Analysis or Interpretation: F.Y.C., Literature Search: F.Y.C., Writing: F.Y.C.

Ethical Statement
Ethical approval was obtained for the study from the Ethics Committee of the Ministry of Health of the Republic of Turkey, University of Health Sciences, Dışkapı Yıldırım Beyazıt Training and Research Hospital. Date: 20.06.2022, No:140/05

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