Comparison of depression, anxiety, sleep quality and quality of life among benign paroxysmal positional vertigo with or without tinnitus

Tinnitusun eşlik ettiği ve etmediği benign paroksismal pozisyonel vertigo hastalarında depresyon anksiyete uyku ve yaşam kalitesi karşılaştırması

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Abstract

Aim: Patients with benign paroxysmal positional vertigo (BPPV) may be accompanied by tinnitus, less frequently and mildly than vertigo secondary to other vestibular disorders. In this study, we aimed to separate patients with BPPV into two different groups, those with and without tinnitus, and to examine and compare depression, anxiety, disability, sleep quality, and quality of life in these patient groups.

Methods: This cross-sectional study included 20 BPPV patients without an acute attack who were referred from the emergency department to the neurology outpatient clinic between April 2022 and July 2022. Beck anxiety scale was used for anxiety, Beck depression inventory was used for depression, Pitsburg sleep quality scale was used for sleep quality, the dizziness handicap inventory (DHI) was used for disability caused by dizziness, and 36-Item Short Form Health Survey (SF-36) was used for quality of life.

Results: 20 BPPV patients were included in the study. While 12 of 20 patients (7 Female, 5 Male) were not accompanied by tinnitus, 8 (5F, 3M) were accompanied by tinnitus. No significant difference was detected between BPVV groups with and without tinnitus. A positive correlation was found between sleep quality and quality of life and its subparameters in BPPV patients. A direct relationship was observed between DHI and its subparameters, physical, functional, and emotional parameters, and quality of life.

Conclusion: No significant relationship was found between the presence or absence of tinnitus and depression, anxiety, sleep quality, disability, and quality of life in BPVV patients.

Keywords: Anxiety; disability; quality of life; sleep; vertigo

Öz

Amaç: Benign paroksismal pozisyonel vertigo (BPPV) hastalarına diğer vestibüler bozukluklara sekonder olan vertigolardan daha seyrek ve ılımlı olarak tinnitus eşlik edebilmektedir. Bu çalışmada BPPV'li hastaları tinnitusun eşlik ettiği ve etmediği olmak üzere iki farklı grubu ayırarak, bu hasta gruplarında depresyon, anksiyete, engellilik, uyku kalitesi ve yaşam kalitesini incelemeyi ve birbirleriyle mukayese etmeyi amaçladık.

Yöntemler: Bu kesitsel çalışmaya Nisan 2022 ve Temmuz 2022 tarihleri arasında acil servisten nöroloji polikliniğine yönlendirilen akut atakta olmayan 20 BPPV hastası dâhil edilmiştir. Anksiyete için Beck Anksiyete Ölçeği, depresyon için Beck depresyon envanteri, uyku kalitesi için Pitsburg uyku kalite ölçeği, baş dönmesinin oluşturduğu engellilik için Baş Dönmesi Engellilik Anketi (Dizziness Handicap Invontery: DHI), yaşam kalitesi için SF-36 (36-Item Short Form Health Survey) kullanılmıştır.

Bulgular: Bu çalışmaya katılan toplam 20 hastanın 12'sine (7 Kadın, 5 Erkek) tinnitus eşlik etmiyorken 8'ine (5K, 3E) tinnitus eşlik etmekteydi. Tinnitus eşlik eden ve etmeyen BPVV grupları arasında anlamlı fark saptanmadı. Uyku kalitesinin BPPV hastalarında yaşam kalitesi ve alt parametreleri üzerinde pozitif korelasyonu saptandı. DHI ve alt parametreleri olan fiziksel, fonksiyonel ve emosyonel parametreler ve hayat kalitesi arasında doğrudan ilişki izlendi.

Sonuç: BPVV hastalarında tinnitusun eşlik edip etmemesi ile depresyon, anksiyete, uyku kalitesi, engellilik ve yaşam kalitesi üzerinde anlamlı bir ilişki bulunmamıştır.

Anahtar Sözcükler: Anksiyete; engellilik; uyku; vertigo; yaşam kalitesi

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INTRODUCTION

Vertigo, which can be defined as the illusion of rotation, is one of the most common reasons for admission to emergency departments and neurology outpatient clinics. It has been reported that the lifetime prevalence of vertigo in the population is approximately 30% (1). The most commonly known cause of vertigo is benign paroxysmal positional vertigo (BPPV) (2). BPPV is an episode of rotational vertigo that is triggered especially by head movements, regresses within seconds to minutes, and may be accompanied by nausea and vomiting (3). These episodes are expected not to be accompanied by neurological examination deficits or hearing deficits (4). Tinnitus, which is frequently observed in Meniere's disease, can also be observed in BPPV, although at a milder level (5). Abnormal stimulation of the semicircular canals due to otoconia displaced from the otolith organ (canalolithiasis) or otoconia attached to the cupula (capulolithiasis) constitutes the pathogenesis of BPPV (3). The direction of the horizontal nystagmus observed during the examination of the patient with BPPV changes direction depending on the affected semicircular canal and may be accompanied by tinnitus in the ear on the same side. Although tinnitus sometimes regresses to vertigo, it can persist in the patient for a long time, sometimes even throughout life, and can have negative effects on the patient's quality of life. Many studies emphasize that neuropsychiatric comorbidities may be observed in patients with vertigo. There are studies on depression, anxiety, and quality of life effects that can be observed in patients with BPPV (6-9). In this study, different and new from the literature, we aimed to separate patients with BPPV into two different groups, those with or without tinnitus, and compare these patient groups with each other by examining depression, anxiety, disability, sleep quality, and quality of life.

MATERIAL AND METHODS

Ethical approval for this study was obtained from the Clinical Research Ethics Committee of İstanbul Medeniyet University Göztepe Training and Research Hospital (date: 16.03.2022, decision no: 2022/0141). An informed consent form was obtained from the patients who participated in the study.

This prospective cross-sectional study included 20 patients with BPPV (12 not accompanied by tinnitus, 8 threshold tinnitus) who were not in an acute attack and were referred to the neurology outpatient clinic from the emergency department between April 2022 and July 2022. The presence of any additional neurological or psychiatric diagnosis or acute/chronic comorbidity that could affect the quality of life was determined as an exclusionary criterion.

The age, gender, and education levels of the patients were recorded. A visual analog scale (VAS) was used to measure vertigo and tinnitus severity. Beck anxiety scale was used for anxiety, Beck depression inventory was used for depression, Pittsburgh sleep quality inventory was used for sleep quality, dizziness handicap inventory (DHI) was used for disability caused by dizziness, and 36-Item Short Form Health Survey (SF-36) was used for quality of life.

Statistical Analysis

Statistical analysis in this study was conducted using the SPSS Statistics for Windows (Statistical Package for the Social Sciences package program version 15.0, IBM Corp., Armonk, N.Y., USA). Descriptive statistics were employed, wherein categorical variables were presented with numbers and percentages, while numerical variables were characterized by their mean, standard deviation, minimum, and maximum values. Group comparisons of rates were carried out using the Chi-Square Test. In cases where the normal distribution condition was satisfied, comparisons of numerical variables between two independent groups were performed using Student's t-test, whereas the Mann-Whitney U test was applied when the condition was not met. To explore relationships between numerical variables, Spearman Correlation Analysis was utilized due to the non-parametric nature of the data. The significance level, denoted as alpha, was set at $p<0.05$.

RESULTS

Of the 20 BPPV patients who participated in this study, 12 (7 Female, 5 Male) were not accompanied by tinnitus, and 8 (5F, 3M) were accompanied by tinnitus. No significant difference was observed between the patient groups in terms of age, gender, education period, and

Table 1. Descriptive and clinical characteristics of groups

		Tinnitus		
		Without	**With**	
Demographic information				
Age Mean.±SD (Min-Max)		42,3±17,0 (20-74)	53,3±11,0 (38-72)	0,126**
Sex	**Female**	7 (58,3)	5 (62,5)	1,000#
	Male	5 (41,7)	3 (37,5)	
Education years Mean.±SD (Min-Max)		10,8±2,9 (5-16)	11,6±4,2 (5-16)	0,610*
Disease duration Mean.±SD (Min-Max)		2,25±1,29 (1-5)	5,38±5,10 (1-15)	0,206*
Vertigo VAS[1] Mean.±SD (Min-Max)		6,00±2,13 (3-9)	6,63±1,41 (5-9)	0,477**
Tinnitus VAS[1]	**2**		1 (12,5)	-
	3		1 (12,5)	
	5		5 (62,5)	
	7		1 (12,5)	

Max: Maximum, Min: Minimum, n: Number, SD: Standard deviation, %: Percent, *Mann Whitney U testi **Student t Testi #Ki Kare Testi. 1: Visual Analog Scale

Table 2. Comparative analysis of groups

	Tinnitus				
	With		**Without**		
	Mean±SD	Min-Max (median)	Mean±SD	Min-Max (median)	p*
Background Tasks:					
Beck depression	5,25±4,27	0-11 (5)	5,38±2,33	3-9 (4,5)	0,934**
Beck anxiety	32,7±9,4	21-57 (33)	38,3±5,9	28-46 (39,5)	0,155**
PSQI[1]	3,58±4,54	0-12 (1)	4,29±5,22	0-12 (1)	0,729
DHI[2] **total**	36,0±23,4	8-80 (32)	45,5±30,5	18-92 (35)	0,463
Physical	13,7±7,8	4-28 (14)	19,0±8,3	8-30 (20)	0,131
Emotional	8,7±9,3	0-28 (7)	11,8±12,1	4-32 (5)	0,390
Functional	13,7±7,1	4-24 (12)	14,8±12,0	2-34 (11)	0,803**
SF-36[3]					
Physical functioning (PF)	77,1±24,2	5-90 (85)	65,0±24,6	30-90 (67,5)	0,935
Social functioning (SF)	74,0±30,4	0-100 (87,5)	72,0±31,7	26-100 (81,25)	0,670
Role limitation due to physical problems (RP)	61,3±43,6	0-100 (80)	56,3±49,6	0-100 (75)	0,877
Role limitation due to emotional problems (RE)	70,1±43,7	0-100 (100)	58,3±46,3	0-100 (66,65)	0,398
Mental health (MH)	62,9±32,8	12-100 (72)	72,0±18,5	44-95 (80)	0,877
Energy and vitality (VT)	56,7±37,6	0-100 (67,5)	63,0±21,4	40-95 (64,5)	0,672**
Bodily pain (BP)	81,0±31,1	0-100 (100)	67,5±35,5	20-100 (72,5)	0,398
General perception of health (GH)	67,9±23,4	30-95 (67,5)	68,3±28,4	25-96 (77,5)	0,846

Max: Maximum, Min: Minimum, n: Number, SD: Standard deviation, %: Percent, *Mann Whitney U testi **Student t Testi. 1: Pittsburgh Sleep Quality Index, 2: Dizziness Handicap Inventory, 3: 36-Item Short Form Health Survey

vertigo severity (Table 1). When the anxiety, depression, sleep quality, DHI (physical, functional, and emotional subparameters are stated separately), quality of life scale and its subsections were analyzed between the groups as given in Table 2, no significant difference was observed between the two groups (Table 2).

Spearman correlation analysis was performed to examine the effects of all parameters on the quality

Table 3. Effect of other factors on quality of life in vertigo patients

SF-36[1]		Age	Education	Disease Duration	Tinnitus VAS[2]
Physical functioning (PF)	r	-0,183	0,461	-0,440	-0,196
	p	0,439	0,041	0,052	0,642
Social functioning (SF)	r	-0,028	0,346	-0,156	0,160
	p	0,907	0,135	0,510	0,705
Role limitation due to physical problems (RP)	r	-0,030	0,166	-0,064	0,164
	p	0,901	0,483	0,787	0,697
Role limitation due to emotional problems (RE)	r	-0,131	0,205	-0,196	0,029
	p	0,581	0,386	0,407	0,945
Mental health (MH)	r	0,153	0,138	0,145	0,447
	p	0,520	0,562	0,541	0,267
Energy and vitality (VT)	r	0,048	0,077	0,129	0,450
	p	0,840	0,748	0,587	0,263
Bodily pain (BP)	r	-0,261	0,317	-0,277	0,247
	p	0,266	0,173	0,237	0,555
General perception of health (GH)	r	0,306	0,413	-0,255	0,027
	p	0,189	0,070	0,279	0,949

*Spearman Korelasyon Analizi. 1: 36-Item Short Form Health Survey, 2: Visual Analog Scale

Table 4. Effect of other factors on quality of life in vertigo patients

SF-36[1]		Vertigo VAS[2]	Beck D.[3]	Beck A.[4]	PSQI[5]	DHI[6] total	Physical	Emotional	Functional
Physical functioning (PF)	r	-0,124	0,072	0,025	-0,364	-0,320	-0,406	-0,269	-0,251
	p	0,602	0,763	0,917	0,125	0,169	0,076	0,251	0,286
Social functioning (SF)	r	-0,305	-0,072	-0,246	-0,512	-0,703	-0,749	-0,499	-0,650
	p	0,191	0,762	0,296	0,025	0,001	<0,001	0,025	0,002
Role limitation due to physical problems (RP)	r	-0,352	-0,186	-0,298	-0,493	-0,747	-0,741	-0,637	-0,673
	p	0,128	0,433	0,202	0,032	<0,001	<0,001	0,003	0,001
Role limitation due to emotional problems (RE)	r	-0,316	-0,144	-0,345	-0,470	-0,680	-0,712	-0,572	-0,605
	p	0,175	0,544	0,136	0,042	0,001	<0,001	0,008	0,005
Mental health (MH)	r	-0,407	-0,330	-0,196	-0,501	-0,330	-0,401	-0,298	-0,272
	p	0,075	0,155	0,408	0,029	0,155	0,080	0,202	0,246
Energy and vitality (VT)	r	-0,433	-0,514	-0,227	-0,747	-0,346	-0,441	-0,301	-0,291
	p	0,056	0,021	0,335	<0,001	0,135	0,052	0,197	0,214
Bodily pain (BP)	r	-0,240	-0,107	-0,274	-0,637	-0,632	-0,782	-0,394	-0,549
	p	0,308	0,654	0,242	0,003	0,003	<0,001	0,086	0,012
General perception of health (GH)	r	-0,316	-0,108	-0,296	-0,448	-0,246	-0,345	-0,108	-0,242
	p	0,174	0,650	0,204	0,054	0,295	0,136	0,651	0,303

*Spearman Korelasyon Analizi. 1: 36-Item Short Form Health Survey, 2: Visual Analog Scale, 3: Beck's Depression Invantory 4: Beck Anxiety Scale, 5: Pittsburgh Sleep Quality Index, 6: Dizziness Handicap Inventory.

of life in vertigo patients. As a result of this analysis; It was observed that the duration of education had a positive correlation on physical functions (p=0.041) (Table 3). A significant correlation was observed between sleep quality and social functioning (SF) (p=0.025), role limitation due to physical problems (RP) (p=0.032), role limitation due to emotional problems (RE) (p=0.042), mental health (MH) (p=0.029),

energy and vitality (VT) (p=<0.001), bodily pain (BP) (p=0.003), As sleep quality decreased, patients' social functionality decreased, their physical limitations increased, limitations due to emotional problems increased, they described more pain, and their energy vitality values decreased.

DHI total score (p=0.001) and physical (p<0.001), emotional (p=0.025), and functional (p=0.002) subscores were found to be negatively correlated with SF. The social functionality of the patients was decreasing due to increasing disability due to vertigo (table 4). A negative correlation was observed between role limitation due to physical problems and DHI total score (p<0.001) and physical (p<0.001), emotional (p=0.003), and functional (p=0.001) subscores. As disability scores increased, patients' physical functionality was restricted. A negative correlation was detected between role limitation due to emotional problems and DHI total score (p<0.001) and physical (p<0.001), emotional (p=0.008), and functional (p=0.005) subscores. A negative correlation was found between DHI total score (p=0.003) and physical (p<0.001) and functional (p=0.012) subscores and physical pain (Table 4).

DISCUSSION AND CONCLUSION

This study demonstrated that there is no difference in quality of life, sleep quality, depression, and anxiety between BPPV patients with or without tinnitus. This study suggests a direct correlation between sleep quality and several aspects of well-being in patients diagnosed with BPPV. Specifically, the research indicates that sleep quality has a significant impact on social functioning, role limitations stemming from physical and emotional issues, mental health, and bodily pain among BPPV patients. It's conducted that physical, emotional, and functional disability due to vertigo has a direct negative effect on SF, RP, and RE. It also shows that patients with higher physical and functional disabilities described more bodily pain in BPPV.

Various studies have been conducted investigating the relationship between quality of life and different parameters in BPPV patients (10-12). One of the results of Handa et al.'s study showed that the quality of life in BPPV patients was primarily affected by functional, physical, and emotional aspects (10). Similar results were obtained in the above study, and in addition, increased physical and functional parameters in DHI were also associated with higher bodily pain.

It is known that involuntary head movements during sleep can trigger vertigo attacks (3). In the study of Iranfar et al., it was reported that the sleep quality of BPPV patients was worse than that of healthy controls (13). In the study by Shigeno et al., where they examined sleep and vertigo attacks in 50 BPPV patients by monitoring them with a linear acceleration sensor for 3 days, it was shown that head movements during sleep caused the recurrence of vertigo attacks in 22/55 patients (14). In this study, in addition to literature information, a direct relationship was found between sleep quality and quality of life of BPPV patients. While attacks in BPPV patients can be triggered during sleep, on the other hand, it has been observed that decreased sleep quality has a negative impact on the quality of life in this patient group. It was also concluded that sleep quality had a significant effect on mental health in BPPV patients.

In a study examining the relationship between DHI and quality of life in BPPV patients, it was concluded that three subparameters, namely physical, functional, and emotional, affected the quality of life (10). In this study, while examining the correlation between DHI and quality of life, it was concluded that functional, physical, and emotional quality of life was affected, supporting the literature information, and in addition, it was observed that as the physical and functional component of DHI increased, the patients' bodily pain scores also increased.

There are various studies examining depression and anxiety in BPPV patients (7-9). Staab et al. reported that vertigo may trigger primary anxiety disorders (15). In the study of Ferrari et al., it was reported that mood disorder may accompany approximately 20% of vertigo patients (16). DHI, depression, and anxiety were examined in Zhu et al.'s patients with BPPV and Merinere's, and it was concluded that disability, depression, and anxiety were more prominent in Meniere's patients (6). In the above study, depression and anxiety were examined according to whether they were accompanied by tinnitus or not, and their effects on quality of life were studied, but no significant results were obtained. It was concluded that the main

reason for this may be due to the exclusion of subjects diagnosed with psychiatric diseases in the study methodology.

In the quality of life study conducted by Hoof et al. in patients with tinnitus, primary tinnitus patients were examined and it was concluded that it had a negative and strong effect on the quality of life (17). In our study, no significant difference was observed between the groups with and without tinnitus, and it was thought that the reason was that BPPV patients were accompanied by mild and moderate tinnitus.

The study has limitations. First of all, the number of patients is limited. Secondly, when designing this cross-sectional study, a control group was not included because it was aimed to compare BPPV patients with and without tinnitus, but as a result of the study, it was thought that additional data could be obtained if all BPPV patients were compared with healthy controls according to the existing parameters. It is thought that in further studies, primary tinnitus, BPPV patients with tinnitus, and Meniere's patients can be compared in terms of the effect of tinnitus on quality of life and disability.

In conclusion, this study examined depression, anxiety, sleep quality, DHI, and quality of life in BPPV patients with and without tinnitus. No significant difference was detected between the two groups. It was concluded that sleep quality, DHI and its functional, physical, and emotional sub-parameters directly affect the quality of life.

Conflict-of-Interest and Financial Disclosure

The authors declare that they have no conflict of interest to disclose. The authors also declare that they did not receive any financial support for the study.

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