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Impact of Earthquakes on Dizziness-Related Disabilities and Quality of Life: Comparative Analysis

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ABSTRACT

Aim: *The aim of the study was to examine the effects of the major earthquake that occurred in Turkey in 2023, especially on symptoms such as dizziness, vertigo and imbalance.*

Material and Method: *This is a cross-sectional study. The patient group consisted of individuals between the ages of 18-65, who were exposed to the earthquake, who did not have vestibular, neurological, orthopedic, circulatory or visual problems that may cause dizziness, and who applied to the hospital with dizziness or vertigo. The control group consisted of participants with the same age range, who were not exposed to earthquake and did not have health problems (vestibular, neurological, orthopedic, circulatory system or visual problems). During the data collection process, written informed consent was obtained from the participants and demographic information, post-earthquake experiences and life situations were recorded. Dizziness symptoms and quality of life of the patients were evaluated using the Dizziness Disability Inventory and Vertigo-Dizziness-Unsteadiness Questionnaire. Normality and homogeneity tests were applied for data analysis, and t test and ANOVA were used for statistical analysis of the results ($p < 0.05$).*

Result: *Statistically significant differences were found between the patient and control groups in "Dizziness", "Quality of Life" and "Vertigo Symptoms" ($p < 0.05$). The scores of the patient group were statistically higher than the control group in each measurement.*

Conclusion: *It was concluded that there was a significant relationship between earthquake and "Dizziness", "Quality of Life" and "Vertigo Symptoms".*

Keywords: *Earthquake, dizziness, imbalance*

Introduction

Undoubtedly one of the most remarkable geological phenomena, earthquakes continue to be discussed in the scientific community due to their unpredictable nature and their capacity to cause significant damage to both human life and infrastructure [1].

It is important to recognise that the intense shaking experienced during earthquakes can have negative effects on both the physical and emotional well-being of individuals [1-6]. Post-earthquake health problems may vary depending on the geographical region, the severity of the earthquake and the effectiveness of the local health infrastructure. Especially symptoms such as vertigo and dizziness have a prominent place among the health problems experienced after the earthquake..

The expression "dizziness" is a vague term that can include a range of medical disorders, so it is important to use a step-by-step approach to distinguish the causes [7]. "Vertigo", characterized by a sensation of motion, often perceived as rotational, is a frequent complaint encountered in primary care settings and emergency departments [8]. Vertigo and dizziness are not distinct disease entities; instead, they represent nonspecific syndromes encompassing a diverse range of disorders stemming from various underlying causes. These symptoms often serve as clinical indicators of underlying medical issues rather than standalone diagnoses. As such, a comprehensive assessment and diagnostic approach are essential in order to pinpoint the specific etiology and provide appropriate management for individuals experiencing vertigo and dizziness [9].

In the literature, significant vertigo and dizziness dysfunctions [7-10] have been reported in a large area surrounding the epicentre of the earthquake several months after the first earthquake. These symptoms may occur as a result of trauma and stress caused by the earthquake and may negatively affect individuals' daily life activities. Therefore, it is vital that post-earthquake health services are planned to address such symptoms and that the community develops skills to cope with these problems. Further research on the health impacts of earthquakes is important to create better preparedness and response strategies for future disasters.

The 7.7 magnitude earthquake recorded in Turkey on 6 February 2023, centred in Kahramanmaraş, caused devastating effects in 11 cities. Following this natural disaster, the effects of the earthquake were not only limited to physical damages, but also post-earthquake health problems were brought to the agenda. In this context, we aim to investigate the effects of symptoms such as dizziness, vertigo and dizziness on post-earthquake health problems. This research will contribute to our understanding of the effects of earthquake on human health and to improve post-earthquake health services.

Method

Study Design: The design of the study was based on a cross-sectional research design and was carried out taking into account the inclusion and exclusion criteria. The inclusion criteria for the patient group were as follows:

1. being between the ages of 18-65,
2. being exposed to the Kahramanmaraş earthquake on 6 February 2023,
3. Having vertigo or dizziness for at least 2 months,
4. Having no vestibular, neurological, orthopedic, circulatory system or visual problems that may cause vertigo, dizziness and balance disorder.

The inclusion criteria for the control group were as follows:

1. being between the ages of 18-65,
2. not having been exposed to the 6 February 2023 earthquake,
3. No neurological, orthopaedic, circulatory system or visual problems that may cause vertigo, dizziness and balance disorders.

During the conduct of the study, written consent forms were obtained from the patients. These consent forms included the consent of the participants to voluntarily participate in the study and to allow the use of their data. In addition, demographic data of the patients (age, gender, marital status, marital status, educational status, chronic disease), their post-earthquake life (house before the earthquake, a different house, container, tent), and whether they lived alone or not were also recorded. Dizziness Handicap Inventory and Vertigo-Dizziness-Unsteadiness Questionnaire were applied to evaluate the level of disability caused by dizziness and quality of life of the patients after the earthquake.

Dizziness Handicap Inventory (DHI) is an academic scale used to assess the level of disability and quality of life of patients with dizziness symptoms. This scale consists of a total of 25 questions to assess the functional, physical and emotional effects of dizziness in the last 1 month; 9 in the functional, 7 in the physical and 9 in the emotional domain. The answers to the questions are evaluated as 0 points for "No", 2 points for "Sometimes" and 4 points for "Yes". In addition to each subcategory score, a total score is also calculated; the highest total score is 100 and the lowest is 0. Higher total scores reflect higher levels of disability and lower quality of life. This scale is used to determine the level of disability, with a score of 16-34 indicating mild disability, 36-52 indicating moderate disability, and 54 and above indicating severe disability [11].

Vertigo Dizziness Imbalance Questionnaire (VDI) is an academic scale used to measure the frequency of disability experienced by patients with vertigo and dizziness symptoms and to understand how these symptoms affect the quality of daily life of patients. The scale consists of two main parts: a symptom scale (13 questions) and a quality of life scale (22 questions). Each question is rated on a scale of 0 to 5 to assess the frequency of symptoms from "always" to "never". Patients are asked to select the answers that best match the frequency of symptoms. The maximum score for the symptom scale is 70 and the maximum score for the quality of life scale is 110. The maximum total score is 180 and a high score indicates that the patient has few symptoms and good quality of life in daily life [12].

Data Analysis: In data analysis, appropriate tests (Shapiro-Wilk normality test and Levene's homogeneity test) were used to assess the normal distribution and homogeneity of the data. The data were found to be normal and homogeneous. Independent sample t-test and ANOVA (analysis of variance) were used for statistical analyses and p value was accepted as 0.05.

Results

Table 1: Demographic and Socioeconomic Characteristics of Patient and Control Groups

		PatientGroup	Control Group
Age	18-29	17(%34,7)	15(%30)
	30-39	8(%16,3)	13(%26)
	40-49	10(%20,4)	9(%18)
	50-59	10(%20,4)	6(%12)
	60 andabove	4(%8,2)	7(%14)
	Total	49(49,5%)	50(50,5%)

Gender	Male	24 (%48,0)	26(52,0%)
	Female	25(51,0%)	24(48,0%)
	Total	49(49,5%)	50(50,5%)
MaritalStatus	Married	31(47,0%)	35(53,0%)
	Single	18(54,5%)	15(45,5%)
	Total	49(49,5%)	50(50,5%)
Education	Illiterate	4(57,1%)	3(42,9%)
	Literate	8(57,1%)	6(42,9%)
	Primary School Graduate	4(44,4%)	5(55,6%)
	Middle School Graduate	3(33,3%)	6(66,7%)
	High School Graduate	17(50,0%)	17(50,0%)
	Bachelor'sDegree& PostgraduateEducation	13(50,0%)	13(50,0%)
	Total	49(49,5%)	50(50,5%)
ChronicDiseases	None	36(48,6%)	38(51,4%)
	Hypertension	8(53,3%)	7(46,7%)
	Diabetes	3(42,9%)	4(57,1%)
	Depression	1(100,0%)	0(0,0%)
	LungDisease	1(50,0%)	1(50,0%)
	Total	49(49,5%)	50(50,5%)
CurrentResidence	InthePrevious Home beforetheEarthquake	27(35,1%)	50(64,9%)
	MovedtoAnother Home	9(100,0%)	0(0,0%)
	WithRelatives/Friends	4(100,0%)	0(0,0%)
	In a Container	5(100,0%)	0(0,0%)
	In a Tent	4(100,0%)	0(0,0%)
Do you live alone	Yes	7(63,6%)	4(36,4%)
	No	42(47,7%)	46(52,3%)
	Total	49(49,5%)	50(50,5%)

Table 1 provides a comprehensive dataset that compares various demographic and health characteristics between the patient and control groups. Regarding age distribution, it's evident that the number of individuals in the 18-29 age range is roughly equivalent in both patient and control groups. Nevertheless, as age increases, the patient group becomes more predominant, particularly in individuals aged 60 and above. Gender distribution exhibits a balanced representation in both groups, with nearly identical gender ratios. In terms of marital status, the patient group comprises fewer married individuals compared to the control group, possibly suggesting a correlation between health issues and marital status. The educational level shows no significant disparities between the two groups, with individuals from diverse educational backgrounds present in both. The prevalence of chronic diseases like hypertension and diabetes is notably higher in the patient group, implying a greater burden of health issues among this cohort. The present housing situation indicates alterations following the earthquake, as most individuals in the control group continue to live in their homes from before the earthquake. Conversely, some individuals in the patient group have moved to different locations. To conclude, an examination of living conditions discloses a slightly elevated percentage of individuals living independently within the patient group compared to the control group.

Table 2: Mean Scores for Dizziness, Quality of Life, and Vertigo Symptoms by Demographic and Socioeconomic Characteristics

		Dizziness		Quality of Life		VertigoSymptom	
		Mean	p	Mean	p	Mean	p
Age	18-29	44,35	0,541	62,94	0,421	33,18	0,511
	30-39	50,50		52,75		28,75	
	40-49	54,00		48,20		24,20	
	50-59	56,00		45,50		25,60	
	60 andabove	50,50		56,50		33,50	
Gender	Female	51,28	0,678	52,56	0,65	26	0,131
	Male	49,08		55,88		32,33	
MaritalStatus	Married	52,32	0,291	50,84	0,22	27,55	0,29
	Single	46,56		59,94		31,78	
Education	Illiterate	47,5	0,142	53,5	0,08	28	0,16
	Literate	55,5		47,13		28,25	
	Primary School Graduate	68,5		28,75		13,25	
	Middle School Graduate	35,33		76,67		37,67	
	High School Graduate	45,29		62,53		33,76	
	Bachelor'sDegree& PostgraduateEducation	52		50,46		26,77	
ChronicDiseases	None	47,94	0,159	57,22	0,4	30,17	0,409
	Hypertension	56,5		45,5		24,75	
	Diabetes	43,33		59		36,67	
	Depression	86		22		7	
	LungDisease	66		32		25	
CurrentResidence	InthePrevious Home beforetheEarthquake	50	0,498	54,44	0,66	29,22	0,749
	MovedtoAnother Home	47,11		55,11		30,44	
	WithRelatives/Friends	64,5		40,75		20,5	
	In a Container	51,6		50,8		28,6	
	In a Tent	42,5		68		34,5	
Do you live alone	Yes	52,29	0,748	46,29	0,37	25,86	0,386
	No	49,86		55,5		29,64	

We aimed to evaluate how demographic variables affect the disease in the patient group. Anova test was applied, but no statistically significant result was obtained. The results show that demographic variables do not have a significant effect on the disease (Table 2).

Statistically significant disparities in dizziness severity were identified between the patient and control groups ($p < 0.05$). In the patient group, the average severity of dizziness measured at 50.2 (52.00), whereas in the control group, it was quantified at 29.44 (28.00). Dizziness was notably more prevalent in the patient group (Table 3).

Table 3: Comparison of Handicap Severity between Patient and Control Groups

	PatientGroup		Control Group		p
	N/%	Mean (Median)	N/%	Mean (Median)	
MildHandicap	12(24,5)	50,2(52,00)	34 (68,0)	29,44 (28,00)	0,00
ModerateHandicap	14(28,6)		15 (30,0)		
Severe Handicap	23(46,9)		1 (2,0)		

"Quality of Life" and "Vertigo Symptom" levels were compared between the patient group and the control group. The quality of life level of the patient group was 54.18 (41.00 median value), while the quality of life of the control group showed a statistically significant difference. Similarly, the dizziness symptom of the patient group was 29.1 (26.00 median value), while the dizziness symptom of the control group was 48.04 (50.00). In conclusion, quality of life was lower and dizziness symptom was more common in the patient group (Table 4).

Table 4: Comparison of Quality of Life and Vertigo Symptoms between Patient and Control Groups

	PatientGroup		Control Group		p
	Min-Max	Mean (Median)	Min-Max	Mean (Median)	
Quality of Life	16-103	54,18 (41,00)	32-103	83,1 (87,50)	0,00
VertigoSymptom	5-56	29,1 (26,00)	20-60	48,04 (50,00)	0,00

Discussion

Earthquakes have historically been a major threat to humanity and have caused many disasters. However, the effects of earthquakes on human health are still not fully understood. Therefore, in this article, we focused on examining the potential effects of earthquake on human health (dizziness, Vertigo Dizziness). The findings of our study are quite remarkable.

In our study, it was observed that dizziness was more common in the patient group. In addition, statistically significant differences were found in Quality of Life and Vertigo Symptom levels. These results suggest that earthquake may be associated with dizziness and vertigo symptoms. In a study conducted by Miwa et al. [9], it was reported that there was a relationship between earthquake and dizziness. In addition, Tevzadze et al. [13] reported that earthquake may increase secondary benign paroxysmal positional vertigo (BPPV) symptoms and that these symptoms are often associated with anxiety. Similarly, Hasegawa et al. [14] reported that cases of vertigo, Meniere's disease and acute low-tone sensorineural hearing loss increased following similar disasters, and 4.8% of patients suffering from these neuro-otological disorders had complications of depression and other mental disorders. Furthermore, Tevzadze and Shakarishvili [13] suggested that earthquake may cause symptoms such as panic attacks, anxiety and psychogenic vertigo and trigger the transition from organic vertigo to BPPV. These results suggest that physical stress factors such as imbalance caused by earthquake, sensory disturbances caused by earthquake vibrations, changes in living conditions and autonomic stress may be effective on dizziness [9].

In our study, the effects of demographic variables on dizziness, Quality of Life and Vertigo Symptom were analysed. Analyses performed on the patient group showed that demographic variables did not have a statistically significant effect on dizziness, Quality of Life and Vertigo Symptom. Although our study showed that post-earthquake dizziness syndrome was not related to demographic factors, there are results in the opposite direction in the literature. In the study of Miwa et al. [9], it was reported that demographic factors such as 21 ≥, female and building floor number 3 ≥ were associated with visual and somatosensory symptoms such as anxiety and autonomic symptoms (such as sweating abnormalities and digestive difficulties). Nomura and Toi [15] investigated post-earthquake dizziness syndrome. According to the results of the study, dizziness complaints were higher in women than in men and dizziness complaints were more common among adults under the age of 50. In the same study, it was reported that among school children, dizziness syndrome was more common among primary school students than among middle and high school students.

Limitation of Our Study

This study utilised a cross-sectional design and is based on data obtained only during a specific time period and is therefore limited for assessing long-term changes or causal relationships. The sample used in the study focussed on a specific age range and a specific geographical region. Therefore, the generalisability of the results obtained is limited and cannot be generalised to individuals with other demographic characteristics.

Conclusion

According to the results of the study, Dizziness Handicap Inventory (DHI) and Vertigo Dizziness Imbalance Questionnaire (VDI) scores were significantly higher in the post-earthquake patient group. The findings of our study indicate that post-earthquake dizziness and balance problems may have negative effects on patients' quality of life. These results provide important clues for health management and policy makers who evaluate the health problems that may occur after the earthquake.

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None

Conflict Of Interest

There is no conflict of interest of this study.

Informed consent/ Patient consent

Informed consent was obtained from patients

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