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Impact of Post-Earthquake Traumatic Levels on Migraine-Related Disability and Quality of Life

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Abstract

Introduction: This study aimed to determine the relationship between post-earthquake traumatic stress disorder level and disability, quality of life, and headache severity in patients with migraine. This study also aimed to reveal the relationship between migraine and post-earthquake traumatic stress disorder levels.

Materials and Methods: The study was conducted prospectively. A total of 150 patients aged 18 65 years who were diagnosed with migraine by a neurologist according to the International Headache Society criteria and who were treated at the Neurology Clinic, between July 2023 and September 2023, 6 months after the earthquake were included in the study. A total of 150 patients with similar demographic characteristics and no migraines were included in the control group. All participants were questioned and recorded regarding physical-demographic information, dizziness, the floor they were on during the earthquake, and symptoms accompanying migraines.

Results: Migraine scores such as the Migraine Disability Assessment Scale (MIDAS), Headache Impact Test (HIT-6), and Visual Analog Scale (VAS) were significantly higher in patients with high Post-Earthquake Trauma Level (PETL). The PETL was higher in the migraine group than in the control group. There was a positive correlation between PETL and the VAS, MIDAS, Hospital Anxiety and Depression Scale (HADS-A), and HIT-6.

Conclusion: High PETL in migraine patients is associated with more severe disability, lower quality of life, more severe headaches, and greater frequency of anxiety. The PETL was higher in patients with migraine than in healthy controls. This study revealed that patients with migraine are severely affected by devastating natural disasters such as earthquakes.

Key words: Migraine; post-earthquakes traumatic levels; migraine disability assessment scale; headache impact test; hospital anxiety and depression scale

Introduction

Migraine, a debilitating neurological condition marked by recurrent headache attacks, represents a major global health burden. Epidemiological studies rank it as the second leading contributor to worldwide disability, with disproportionate prevalence and severity observed among young women (1). The frequent occurrence of migraines has significant economic, personal, and social impacts (2). This condition can profoundly disrupt a person's daily activities and, in some instances, impair their work capability. The vast majority of migraine sufferers experience moderate to severe pain, have diminished functional ability during migraine attacks, and require bed rest during some of these attacks (3-4). In particular, comorbid psychiatric disorders impair migraine-related disability and quality of life (5-6). On February 6, 2023, Türkiye experienced a catastrophic seismic sequence, beginning with a Mw 7.7 earthquake (epicenter: Pazarcık, Kahramanmaraş; depth: 8.6 km) at 04:17 local time, followed by a Mw 7.6 event (epicenter: Elbistan, Kahramanmaraş; depth: 7 km) at 13:24. A subsequent Mw 6.4 aftershock (epicenter: Yayladagı, Hatay) occurred on February 20, 2023, at 20:04. This tectonic cascade resulted in unprecedented structural and humanitarian crises across 11 provinces, creating a unique natural experiment for investigating stress-related health outcomes. In terms of the magnitude and extent of the affected area, these earthquakes have been unparalleled in Turkey's recent history. Over 48,000 lives were lost, more than half a million buildings were damaged, communication and energy infrastructure experienced severe disruptions, and significant material losses were incurred (7). Earthquakes are severe traumatic events that inflict both human and environmental harm. Following major earthquakes, severe physical and psychological health issues can arise (8). Previous research has demonstrated that earthquakes can have profound effects on mental health, contributing to the development of post-traumatic stress disorder (PTSD), anxiety, mood disorders, and sleep disturbances. (9-10). Stress from everyday events

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and natural disasters is a known factor that can trigger or worsen migraine attacks. Following the Tohoku-Pacific Ocean earthquake, an increase in migraine frequency was observed in Sendai, Miyagi Prefecture (11). While earthquakes and other traumatic events may provoke or intensify migraine attacks in some individuals, responses can vary widely among patients. Our research indicates a lack of comprehensive scientific data on the characteristics and impacts of migraines following earthquakes. This study aimed to explore the correlation between post-earthquake trauma levels and factors such as disability, quality of life, and headache severity in patients with migraine. It also seeks to elucidate the relationship between migraine and the degree of post-earthquake trauma.

Materials and Methods

This prospective cohort study received ethical approval in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants. The study was approved by the Ethics Committee of Diyarbakır Gazi Yaşargil Training and Research Hospital with the approval number 464 and the date of approval being 14 July 2023. A total of 150 migraine patients (aged 18–65 years), diagnosed by board-certified neurologists using International Classification of Headache Disorders (ICHD-3) criteria, were consecutively recruited from the Neurology Clinic between July and September 2023. Inclusion criteria prioritized individuals residing in earthquake-affected regions during the seismic events. Cranial MRIs of the patients were evaluated by an experienced radiologist and were considered natural. Additionally, a control group of 150 patients with similar demographic characteristics, but without migraine, was included. Individuals with mental and cooperative problems, serious psychiatric illnesses, illiteracy, or incomplete information in the assessment questionnaires were excluded from the study. The epicenters of the earthquakes were the Kahramanmaraş and Hatay. Despite being approximately 290 km from these epicenters, the effects of the earthquake were strongly felt in Diyarbakır. Furthermore, aftershocks continued for several months. Diyarbakır is located in the seismic zone of the East Anatolian fault. This map shows the seismic belts along the East and North Anatolian fault lines (Figure 1). All participants were questioned regarding their physical and demographic information, dizziness, the floor they were on during the earthquake, and the symptoms accompanying their migraines. Patients were

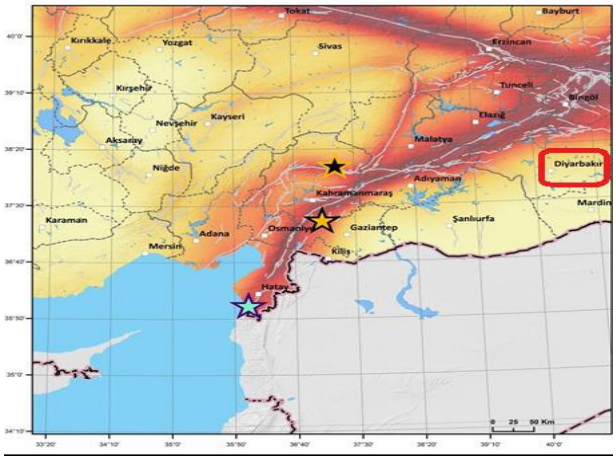

Figure 1: The epicenters of the earthquakes are shown with stars. Diyarbakır is approximately 290 km away from the epicenters. The center where the study was conducted is indicated with a red circle. This map shows the seismic zone in the Eastern Anatolian and North Anatolian Fault lines.

evaluated using several validated tools: the Post-Earthquake Trauma Level (PETL) scale, the Visual Analog Scale (VAS), the Headache Impact Test (HIT-6), the Migraine Disability Assessment Scale (MIDAS), and the Hospital Anxiety and Depression Scale (HADS). Headache severity was assessed using the VAS. The HIT-6, which includes six domains-pain, social functioning, role functioning, vitality, daily activities, and psychological distresswas used to determine the impact of migraine on quality of life. For each of these six questions, patients select one of five possible answers: "never," "rarely," "sometimes,"- "very often," or "always." The answers are then summed to produce a HIT-6 score ranging from 36 to 78, with a higher score indicating a stronger impact of migraine on an individual's daily life (12). This test has been translated into Turkish, with its validity and reliability confirmed (13). One of the most widely used scales for measuring migraine-related disability is the MIDAS (14). MIDAS has been translated into Turkish, and validity and reliability studies have been conducted to assess migraine disability across all activity areas over the past 3 months. It consists of the following five questions. The MIDAS is calculated by counting the number of days that work and school tasks, household chores, and social activities were reduced or completely prevented. Based on assessment results, migraine disability was categorized into four levels: no or minimal disability (0–5 days), mild (6–10 days), moderate (11–20 days), and severe (21 days or more) (15). Psychological status was evaluated using the HADS, which was adapted to Turkish. The HADS includes two subscales to measure anxiety (HAD-A) and depression (HAD-D).

Table 1: Comparative analysis of sociodemographic characteristics, headache character, quality of life, mental health and disability among migraine patients with high and low trauma levels after earthquake.

		Migraine Group		
		High PETL (N:96)	Low PETL (N:54)	p-value
Gender, n(%)	Female	82(%85.4)	47(%87)	0.977**
	Male	14(%14.6)	7(%13)	
Age		29(18-55)	33(20-51)	0.103*
Body-mass index (kg/m2)		23.1(16.3-34.2)	24.2(18.0-35.1)	0.073*
Educational level	Primary school	32(%33.3)	18(%33.3)	
	High school	25(%26)	15(%27.8)	0.968**
	University	39(%30.6)	21(%38.9)	
3-month migraine frequency		21(9-55)	15(6-48)	0.002*
Duration of migraine attacks (hours)		48(6-72)	24(6-72	<0.001*
Pain location	Unilateral	69(%71.9)	32(%59.3)	0.081**
	Bilateral	27(%28.1)	22(%40.7)	
Associated Symptoms	Photophobia	94(%97.9)	52(%96.2)	0.706 **
	Phonophobia	92(%95.8)	50(%92.5)	0.536**
	Osmophobia	75(%78.1)	31(%57.4)	0.013**
	Nausea	82(%85.4)	48(%88.9)	0.726**
	Vomiting	33(%34.4)	14(25.9%)	0.375 **
Aura		28(%29.2)	11(%20.4)	0.325**
Sleeping disorder		79(%82.3)	39(%72.2)	0.216**
Family history of migraine		74(%77.1)	41(%75.9)	0.872**
Allodynia		57(%59.4)	19(%35.2)	0.004
Migraine types	Episodic	74(%77.1)	46(%85.2)	0.328**
	Chronic	22(%22.9)	8(%14.8)	
Medication overuse headaches		46(%47.9)	14(%25.9)	0.014**
Migraine duration (years)		7(1-30)	6(1-30)	0.881*
Floor at the time of the earthquake		4(1-14)	2(1-12)	0.101*
Dizziness		89(%92.7)	40(%74.1)	0.004**
	Grade 1	2(%2.1)	4(%7.4)	
	Grade 2	3(%3.1)	17(%31.5)	<0.001**
MIDAS	Grade 3	24(%25.0)	20(%37.0)	
	Grade 4	67(%69.8)	13(%24.1)	
VAS		9(6-10)	8(6-10)	<0.001*
HIT-6		70(42-78)	62(48-78)	<0.001*
HADS Anxiety	Normal	25(%26.0)	27(%50.0)	
	Borderline abnormal	15(%15.6)	10(%18.5)	0.004**
	Abnormal	56(%58.3)	17(%31.5)	
HADS Depression	Normal	34(%35.4)	25(%46.3)	
	Borderline abnormal	25(%26.0)	12(%22.2)	0.425**
	Abnormal	37(%38.5)	17(%31.5)	

***** Mann Whitney U, ****** Chi-Square test

PETL: Post-Earthquake Trauma Level ; **MIDAS:** Migraine Disability Assessment Scale; **VAS:** Visual Analogue Scale; **HIT-6:** Headache Impact Test; **HADS-A:** Hospital Anxiety Scale; **HADS-D:** Hospital Depression Scale

This 14-item scale divided the questions equally between anxiety and depression. The HADS uses a four-point Likert scale ranging from 0 to 3 to evaluate anxiety and depression symptoms. Total scores range from 0 to 21, with 0–7 indicating a normal range, 8–10 suggesting possible emotional disturbance, and scores ≥11 indicating a probable emotional disorder (16-17). The PETL system consists of 20 items that have been adapted to Turkish and are rated on a Likert scale. Responses were based on a series of negatively framed statements, rated from "strongly disagree" to "strongly agree."The lowest score was 20, while the highest score was 100. Higher scores indicate a greater impact from the earthquake, with a score range of 52.385±5.051, representing a threshold where individuals show signs of trauma. Patients with PETL scores above the sample mean (52.385 ± 5.051) were classified as 'high PETL'; others were grouped as 'low PETL' (18).

Statistical analyses: Statistical analyses were conducted utilizing IBM SPSS Statistics for Windows (Version X; IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequency

distributions and tabular summaries, were employed to characterize the dataset. Continuous variables were summarized as mean ± standard deviation when parametric assumptions were satisfied, whereas non-normally distributed variables were reported as median (interquartile range). Categorical variables were expressed as frequencies and proportions. The normality of continuous variables was assessed via the Shapiro–Wilk or Kolmogorov–Smirnov tests. For categorical data comparisons, the chi-square test was applied; Fisher's exact test was substituted for contingency tables containing expected cell counts ≤5. Bivariate correlations were evaluated using Pearson's coefficient for normally distributed variables and Spearman's rho for non-parametric data. Groupwise comparisons were performed as follows: dependent samples were analyzed using paired t-tests or Wilcoxon signed-rank tests, while independent groups were compared via Student's t-test or Mann–Whitney U test, contingent on range). Categorical variables were expressed as frequencies and proportions. The normality of continuous variables was assessed via the Shapiro-Wilk or Kolmogorov-Smirnov tests. For categorical data comparisons, the chi-square test was applied; Fisher's exact test was substituted for contingency tables containing expected cell counts ≤5. Bivariate correlations were evaluated using Pearson's coefficient for normally distributed variables and Spearman's rho for non-parametric data. Groupwise comparisons were performed as follows: dependent samples were analyzed using paired t-tests or Wilcoxon signed-rank tests, while independent groups were compared via Student's t-test or Mann–Whitney U test, contingent on distributional assumptions. A p-value < 0.05 was considered statistically significant, and all tests were conducted within a 95% confidence interval.

Table 2: Comparison of migraine with control groups

		Migraine (N:150)	Control (N:150)	p-value
Gender, n(%)	Female	129(%86)	32(%21.3)	0.096**
	Male	21(%14)	118(%78.7)	
Age		30(18-55)	29(18-62)	0.737*
Body-mass index (kg/m2)		24.4(16.3-35.1)	22,9(15.6-33.7)	0.070*
Educational Level n(%)	Primary school	50(%33.3)	24(%16)	0.**002****
	High school	40(%26.7)	43(%28,7)	
	University	60(%40)	83(%55.3)	
Floor at the time of the earthquake		3(1-14)	4(1-22)	0.060*
Dizziness n(%)		129(%86)	122(%81.3)	0.349**

***** Mann Whitney U, ****** Chi-Square test

Results

The study included 150 migraine patients from Diyarbakır who had experienced significant earthquakes and aftershocks for six months, along with 150 healthy volunteers without a migraine diagnosis. Patients with migraine were classified into two groups based on their levels of post-earthquake trauma: high-level trauma and low-level trauma. Among migraine patients, 96 (64%) were categorized into the high-level trauma group. The study cohort consisted of 96 individuals, including 82 females (85.4%) and 14 males (14.6%), with a mean age of 29 years (range: 18–55 years). There were no significant differences in sociodemographic factors such as body mass index and education level between the groups. However, when comparing migraine characteristics, those in the high-level trauma group had a significantly higher 3-month migraine frequency, longer migraine attack duration, increased osmophobia, allodynia, and dizziness. The MIDAS, HADS-A, HIT-6, and VAS scores were significantly higher in the high -trauma group. Further analysis revealed that patients with elevated post-earthquake trauma levels also exhibited higher rates of anxiety and depression, although the difference in depression levels was not statistically significant. The detailed results are presented in Table 1. A statistically significant difference in educational attainment was observed between the migraine and control groups, with lower education levels more prevalent among patients with migraine (see Table 2).PETL was higher among migraine patients than in the

control group, as illustrated by the box plot in Figure 2.

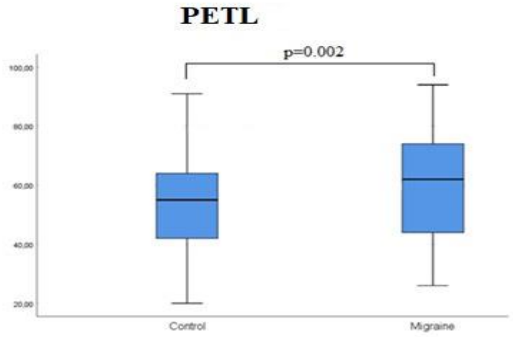

Figure 2: Comparison of PETL scores between the migraine and control groups. The median PETL score was significantly higher in the migraine group compared to controls (p = 0.002; Mann-Whitney U test). **PETL:** Post-Earthquake Trauma Level

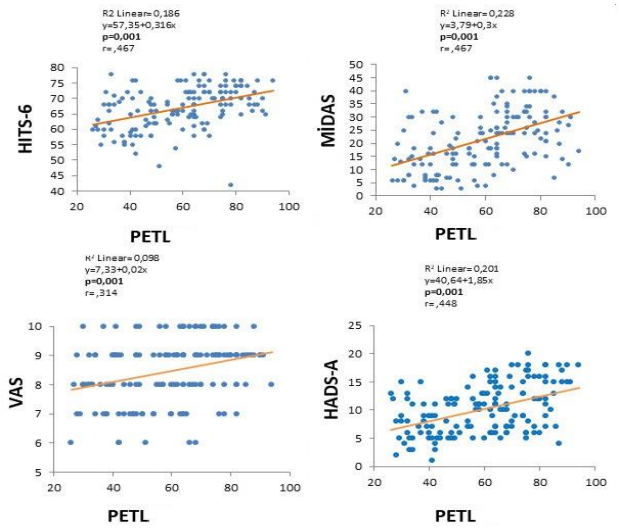

Figure 3: Scatter plot between anxiety, quality of life, migraine disability and Post-Earthquake Trauma Level.
PETL: Post-Earthquake Trauma Level ; **HADS-A:** Hospital Anxiety Scale; **HIT-6:** Headache Impact Test; **MIDAS:** Migraine Disability Assessment Scale; **VAS:** Visual Analogue Scale

Significant scoring parameters were analyzed for correlation with post-earthquake trauma stress levels in the migraine group. Positive correlations were found between PETL and VAS, MIDAS, HADS-A, and HIT-6 scores. These relationships are demonstrated in Figure 3. Specifically, PETL showed a moderate positive correlation with both the HIT-6 and MIDAS (r=0.467, p=0.001 for both). A moderate correlation was also observed between PETL and anxiety levels assessed by the HADS-A (r=0.448, p=0.001). Additionally, PETL had a lower yet statistically significant correlation with pain intensity measured by the VAS (r=0.314, p=0.001).

Discussion

Earlier research has provided valuable insights into the link between migraines and earthquakes. To our knowledge, this is the first study to investigate the relationship between post-earthquake trauma levels and migraine-related disability-an area previously unexplored in the literature. Our research highlights two significant findings: First, it demonstrates that increased post-earthquake traumatic levels in migraine sufferers are correlated with greater disability, a decrease in quality of life, more intense headaches, and a higher incidence of anxiety. Second, it reinforces the hypothesis that post-earthquake traumatic levels are elevated in migraine patients compared with healthy individuals. The Migraine Disability Assessment Scale (MIDAS) is a key measure used to assess the level of disability in individuals with migraines (14). A study showed that most, even more than half, of migraine patients had serious disability. This rate was higher in women and low-income individuals (19). It is similar to the results of our study. Although the association between migraine and PTSD has been well documented, the specific influence of PTSD on migraine-related disability has not been adequately studied (20-21). In our study, we documented that stress disorder, especially after an earthquake, is related to migraine disability, and that this relationship is positively correlated. Post-earthquake stress disorders can affect an individual's coping mechanisms. In such cases, the difficulties experienced after a stressful event or trauma can trigger migraine attacks or increase their severity. Therefore, more severe and frequent migraines in individuals who develops post-traumatic stress disorders can increase disability (21-22). The VAS and HIT-6 are parameters that evaluate subjective experiences in patients with migraine. While the VAS focuses on determining and monitoring pain intensity, the HIT-6 evaluates the general effects of migraine on quality of life. The clinical scales used in this study offer robust metrics for evaluating migraine symptoms, treatment efficacy, and overall patient well-being. In one study, patients diagnosed with both migraine and PTSD demonstrated significantly higher VAS scores. (23). Similarly, Peterlin et al. reported elevated HIT-6 scores in migraine patients experiencing PTSD symptoms, reflecting a reduced quality of life. (22). In the above two studies, we found that VAS and HIT-6 values were significantly higher in patients with high PETL diagnosed with migraine, which gave similar results to our current study. In addition, this significant difference was positively

correlated. Our study results are consistent with those of previous studies. Our findings indicate that as PETL scores increased, there was a corresponding rise in pain severity and a decline in quality of life among migraine patients. Many psychiatric disorders have been associated with migraine. Depression and anxiety are common in migraineurs and negatively affect quality of life (24-25). One study found no difference in depression characteristics in migraineurs, particularly before and after an earthquake (26). This study showed that differences in traumatic levels did not affect depression characteristics in migraineurs after an earthquake. These observations align with established literature demonstrating bidirectional links between trauma exposure and migraine pathophysiology. This study showed that migraineurs with higher levels of trauma after an earthquake showed more anxiety symptoms. A study conducted after the Jiuzhaigou earthquake showed a positive correlation between stress disorders and anxiety (27). It is important to note that these conditions can interact and influence each other in various ways. For example, the stress of living with migraine may exacerbate post-earthquake stress symptoms or contribute to the development of anxiety disorders. It is not clear how traumatic stress disorders caused by natural disasters such as earthquakes are related to migraine pathophysiology. Migraineurs are sensitive to biological and environmental stress factors. Both migraine and PTSD have been associated with dysregulation of the autonomic nervous system and the hypothalamic-pituitary-adrenal axis. (28-29). Numerous studies support the comorbidity and interaction between these two conditions (21,23). In our study, we observed significantly higher PETL scores in the migraine group compared to controls. Migraineurs are more likely to develop higher levels of trauma after the earthquake. Some limitations of this study should be noted. First, information such as family loss or injury, property loss, and psychiatric comorbidities affecting post-earthquake mental status was not recorded. Second, the migraine characteristics and the mental and physical conditions of the patients before the earthquake were not assessed. Third, it was assessed using a self-report questionnaire. Additionally, none of the patients were receiving prophylactic migraine treatment (e.g., beta-blockers, tricyclic antidepressants, antiepileptics) at the time of the study, which might have influenced headache severity, anxiety levels, and disability scores. Finally, it should be noted that our study population, which constitutes a single region after the earthquake, does not represent the general population, and may differ among other regions. In future studies, it is critical to investigate the pre-earthquake conditions of patients, psychiatric comorbidities, and conduct multi-center studies in a large region. We also believe that this study will guide future studies investigating the potential mechanism between migraine and earthquakes and in making decisions regarding screening and treatment protocols.

Study limitations: This study has several limitations that should be acknowledged. First, it did not account for key factors such as the loss of family members, personal injury, property damage, or the presence of psychiatric comorbidities, all of which could significantly influence individuals' post-earthquake psychological status. Second, baseline information regarding migraine characteristics, as well as the physical and mental health status of participants prior to the earthquake, was not available, which limits the ability to draw causal inferences. Third, the use of self-reported questionnaires may introduce recall bias and subjective variability in the assessment of symptoms. Lastly, since the study population was limited to a single geographic region affected by the earthquake, the findings may not be generalizable to broader populations or other earthquake-affected regions.

Conclusion

In summary, migraine scores such as MIDAS, HIT-6, VAS, and HADS-A were significantly higher in patients with high post-earthquake trauma levels. Furthermore, PETL scores were positively correlated with VAS, MIDAS, HADS-A, and HIT-6 scores, suggesting that greater post-earthquake trauma is associated with more severe migraine symptoms and disability. This study revealed that migraine patients are seriously affected by devastating natural disasters, such as earthquakes, and that precautions should be taken in this direction.

Ethics committee approval: This study gained ethical committee approval from the Clinical Research Ethics Committee of Diyarbakır Gazi Yaşargil Training and Research Hospital. The approval was granted on July 14, 2023 and was given the reference number 464.

Conflict of interest declaration: The authors declare that there are no disclosed conflicts of interest.

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Author contributions: The authors contributed equally to the article.

References

1. Steiner TJ, Stovner LJ, Jensen R, Uluduz D, Katsarava Z. Migraine remains second among the world's causes of disability, and first among young women: findings from GBD2019. J Headache Pain. 2020;21(1):1-4.
2. Arnold M. Headache Classification Committee of the International Headache Society, The International Classification of Headache Disorders, 3rd Edition. Cephalalgia. 2018;38(1):1–211.
3. Shimizu T, Sakai F, Miyake H, Sone T, Sato M, Tanabe S, et al. Disability, quality of life, productivity impairment and employer costs of migraine in the workplace. J Headache Pain. 2021;22(1):29.
4. Lipton RB, Lee L, Saikali NP, Bell J, Cohen JM. Effect of Headache-Free Days on Disability, Productivity, Quality of Life, and Costs Among Individuals with Migraine. J Manag Care Spec Pharm. 2020;26(10):1344-1352.
5. Pradeep R, Nemichandra SC, Harsha S, Radhika K. Migraine Disability, Quality of Life, and Its Predictors. Ann Neurosci. 2020;27(1):18-23.
6. Hutchinson S, Lipton RB, Ailani J, Reed ML, Fanning KM, Adams AM, et al. Characterization of Acute Prescription Migraine Medication Use: Results From the CaMEO Study. Mayo Clin Proc. 2020;95(4):709-718.
7. AFAD. 06 February 2023 Pazarcık-Elbistan (Kahramanmaraş) Mw: 7.7 – Mw: 7.6 Earthquakes Report 2023. 140.
8. Stroebe K, Kanis B, Richardson J, Oldersma F, Broer J, Greven F, et al. Chronic disaster impact: the long-term psychological and physical health consequences of housing damage due to induced earthquakes. BMJ Open. 2021;11(5):e040710.
9. Beaglehole B, Mulder RT, Frampton CM, Boden JM, Newton-Howes G, Bell CJ. Psychological distress and psychiatric disorder after natural disasters: systematic review and meta-analysis. Br J Psychiatry. 2018;213(6):716-722.
10. Farooqui M, Quadri SA, Suriya SS, Khan MA, Ovais M, Sohail Z, et al. Posttraumatic stress disorder: a serious post-earthquake complication. Trends Psychiatry Psychother. 2017 Apr-Jun;39(2):135-143.
11. Matsumori Y, Fujiwara S. Influence of Tohoku-Pacific ocean earthquake on headache cases in the affected area. J Headache Pain. 2013. 14(Suppl 1):P22.
12. Houts CR, Wirth RJ, McGinley JS, Gwaltney C, Kassel E, Snapinn S, et al. Content Validity of HIT-6 as a Measure of Headache Impact in People With Migraine: A Narrative Review. Headache. 2020;60(1):28-39.
13. Dikmen PY, Bozdag M, Guneş M, Koşak S, Taşdelen B, Uluduz D, et al. Reliability and Validity of Turkish Version of Headache Impact Test (HIT-6) in Patients with Migraine. Noro Psikiyatr Ars. 2020;58(4):300-307.
14. Stewart WF, Lipton RB, Whyte J, Dowson A, Kolodner K, Liberman JN, et al. An international study to assess reliability of the Migraine Disability Assessment (MIDAS) score. Neurology. 1999 Sep 22;53(5):988-94.
15. Ertaş M, Siva A, Dalkara T, Uzuner N, Dora B, Inan L, et al. Turkish MIDAS group. Validity and reliability of the Turkish Migraine Disability Assessment (MIDAS) questionnaire. Headache. 2004;44(8):786-793.
16. Aydemir O, Guvenir T, Kuey L, Kultur, S. Reliability and Validity of the Turkish Version of Hospital Anxiety and Depression Scale. Turk Psikiyatri Derg. 1997;8(4):280-287.
17. Snaith RP. The Hospital Anxiety And Depression Scale. Health Qual Life Outcomes. 2003 Aug 1;1:29.
18. Tanhan F, Kayri M. The Validity and Reliability Work of the Scale That Determines the Level of the Trauma after the Earthquake. Educ Sci Theory Pract. 2013;13(2):1021-1025.
19. Pradeep R, Nemichandra SC, Harsha S, Radhika K. Migraine disability, quality of life, and its predictors. Ann Neurosci. 2020 Jan;27(1):18-23.
20. Gasperi M, Panizzon M, Goldberg J, Buchwald D, Afari N. Posttraumatic stress disorder and chronic pain conditions in men: a twin study. Psychosom. Med. 2021 Feb-Mar 01;83(2):109-117.
21. Peterlin BL, Tietjen GE, Brandes JL, Rubin SM, Drexler E, Lidicker JR, et al. Posttraumatic stress disorder in migraine. Headache. 2009;49(4):541-551.
22. Arcaya MC, Lowe SR, Asad AL, Subramanian SV, Waters MC, Rhodes J.

Association of posttraumatic stress disorder symptoms with migraine and headache after a natural disaster. Health Psychol. 2017;36(5):411-418.
23. Karsikaya S, Kavakci Ö, Kugu N, Guler AS. Post-Traumatic Stress Disorder in Migraine Patients: Migraine, Trauma and Alexithymia. Noro Psikiyatr Ars. 2013;50(3):263-268.
24. Dresler T, Caratozzolo S, Guldolf K, Huhn JI, Loiacono C, Niiberg-Pikksööt T, et al; European Headache Federation School of Advanced Studies (EHF-SAS). Understanding the nature of psychiatric comorbidity in migraine: a systematic review focused on interactions and treatment implications. J Headache Pain. 2019;20(1):51.
25. Yalınay Dikmen P, Onur Aysevener E, Kosak S, Ilgaz Aydınlar E, Sagduyu Kocaman A. Relationship between MIDAS, depression, anxiety and alexithymia in migraine patients. Acta Neurol Belg. 2020;120(4):837-844.
26. Ishii M, Katoh H, Takagi M, Kawamura M, Shimizu S. Influence of the Tohoku-Pacific Ocean earthquake and its aftershocks on the response to prophylactic therapy with lomerizine in patients with migraine in Tokyo: a retrospective study. Eur Neurol. 2014;71(5-6):252-258.
27. Xi Y, Yu H, Yao Y, Peng K, Wang Y, Chen R. Post-traumatic stress disorder and the role of resilience, social support, anxiety and depression after the Jiuzhaigou earthquake: A structural equation model. Asian J Psychiatr. 2020 Mar;49:101958.
28. Van Oosterhout WPJ, van Opstal AM, Schoonman GG, van der Grond J, Terwindt GM, Ferrari MD, et al. Hypothalamic functional MRI activity in the initiation phase of spontaneous and glyceryl trinitrate-induced migraine attacks. Eur J Neurosci. 2021;54(3):5189-5202.
29. Engel S, Laufer S, Klusmann H, Schulze L, Schumacher S, Knaevelsrud C. Cortisol response to traumatic stress to predict PTSD symptom development - a systematic review and meta-analysis of experimental studies. Eur J Psychotraumatol. 2023;14(2):2225153.