OTJHS
Online Turkish Journal of Health Sciences

e-ISSN: 2459-1467

OTSBD
Online Türk Sağlık Bilimleri Dergisi

Online Turkish Journal of Health Sciences 2025;10(1):29-37 *Online Türk Sağlık Bilimleri Dergisi 2025;10(1):29-37*

Post-Traumatic Stress Disorder, Sleep Problems and Nutritional Status after the 7.8 and 7.5 Magnitude Earthquakes in Kahramanmaraş, Türkiye: A Cross-Sectional Study

Kahramanmaraş, Türkiye'de 7.8 ve 7.5 Büyüklüğündeki Depremler Sonrası Travma Sonrası Stres Bozukluğu, Uyku Sorunları ve Beslenme Durumu: Kesitsel Bir Çalışma

[1]Hatice Merve BAYRAM, [1]Rozerin IPEK, [1]Beyza Nur SANCAK, [1]Müzeyyen Sedef EROĞLU

[1]Istanbul Gelisim University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Türkiye

Hatice Merve Bayram: https://orcid.org/0000-0002-7073-2907
Rozerin Ipek: https://orcid.org/0009-0004-2731-4904
Beyza Nur Sancak: https://orcid.org/0009-0008-6755-3052
Müzeyyen Sedef Eroğlu: https://orcid.org/0009-0009-9166-0357

ABSTRACT

Objective: This study aimed to evaluate post-traumatic stress disorder (PTSD), depression, stress, anxiety levels, sleep problems, and nutritional status among earthquake survivors.

Materials and Methods: This cross-sectional study was conducted nine months after the 2023 Kahramanmaraş earthquakes with 201 adult earthquake survivors, including 87 men and 114 women, with a mean age of 29.46 ± 12.19 years. An online questionnaire including demographic characteristics, the Impact of Event Scale (IES-R), Depression Anxiety Stress Scale, the PTSD Symptom-Self Report Scale (PSS-SR), Insomnia Severity Index (ISI), and food frequency questionnaire was performed. Participants self-reported their height and body weight before and after the earthquake. The scales were correlated and compared with gender.

Results: According to the PSS-SR classification, 58.3% of participants had severe and 11.9% had extremely severe PTSD symptoms. Additionally, 51.2% experienced extremely severe anxiety, and 75.6% had insomnia. There was a moderate positive correlation between IES-R and stress (r: 0.634, p<0.001), anxiety (r: 0.589, p<0.001), depression (r: 0.610, p<0.001), ISI (r: 0.492, p<0.001), and PSS-SR (r: 0.696, p<0.001). Nutrient intake was adequate according to the RDA, but there were significant differences in body weight and body mass index before and after the earthquake (p<0.001).

Conclusions: The earthquakes significantly affected survivors, leading to a high burden of psychiatric disorders. It is essential to strengthen public health services in this area.

Keywords: Earthquakes, insomnia, nutritional status, post-traumatic, stress disorders

ÖZ

Amaç: Bu çalışmada depremzedelerde travma sonrası stres bozukluğu (TSSB), depresyon, stres, anksiyete düzeyleri, uyku sorunları ve beslenme durumunun değerlendirilmesi amaçlanmıştır.

Materyal ve Metot: Bu kesitsel çalışma, 2023 Kahramanmaraş depremlerinden dokuz ay sonra, yaş ortalaması 29,46 ± 12,19 yıl olan 87 erkek ve 114 kadın olmak üzere 201 yetişkin depremzede ile gerçekleştirilmiştir. Demografik özellikler, Olay Etkisi Ölçeği (IES-R), Depresyon Anksiyete Stres Ölçeği, TSSB Belirtileri Ölçeği-Kendini Değerlendirme (TSSBÖ-KD), Uykusuzluk Şiddeti İndeksi (UŞİ) ve besin tüketim sıklığını içeren online bir anket uygulanmıştır. Katılımcıların beyanı ile depremden önce ve sonra boy ve vücut ağırlıkları alınmıştır. Ölçekler ilişkilendirilmiş ve cinsiyetler arası karşılaştırılmıştır.

Sonuçlar: TSSBÖ-KD sınıflandırmasına göre, katılımcıların %58,3'ü şiddetli ve %11,9'u çok şiddetli TSSB semptomlarına sahiptir. Ayrıca, %51,2'si çok şiddetli anksiyete ve %75,6'sı uykusuzluk yaşamaktadır. IES-R ile stres (r: 0,634, p<0,001), anksiyete (r: 0,589, p<0,001), depresyon (r: 0,610, p<0,001), UŞİ (r: 0,492, p<0,001) ve TSSBÖ-KD (r: 0,696, p<0,001) arasında orta düzeyde pozitif bir korelasyon bulunmuştur. Besin alımı RDA'ya göre yeterlidir, ancak deprem öncesi ve sonrasında vücut ağırlığı ve beden kütle indeksinde anlamlı farklılıklar vardır (p<0.001).

Sonuç: Depremler hayatta kalanları önemli ölçüde etkilemiş ve yüksek psikiyatrik bozukluk yüküne yol açmıştır. Bu alanda halk sağlığı hizmetlerinin güçlendirilmesi elzemdir.

Anahtar Kelimeler: Beslenme durumu, depremler, stres bozuklukları, travma sonrası, uykusuzluk

Sorumlu Yazar / Corresponding Author:
Hatice Merve Bayram
Istanbul Gelisim University, Faculty of Health Sciences, Department of Nutrition and Dietetics, 34310, Istanbul, Türkiye
Tel: +902124227000
E-mail: merve.bayrm@gmail.com

Yayın Bilgisi / Article Info:
Gönderi Tarihi/ Received: 24/09/2024
Kabul Tarihi/ Accepted: 14/01/2025
Online Yayın Tarihi/ Published: 17/03/2025

Atıf / Cited: Bayram HM and et al. Post-Traumatic Stress Disorder, Sleep Problems and Nutritional Status after the 7.8 and 7.5 Magnitude Earthquakes in Kahramanmaraş, Türkiye: A Cross-Sectional Study. *Online Türk Sağlık Bilimleri Dergisi* 2025;10(1):29-37. doi: 10.26453/otjhs.1555533

INTRODUCTION

Türkiye is a significant earthquake zone due to its location.[1] The country is surrounded by seismically active boundaries and interactions with various crustal types and tectonic styles, which contribute to the seismicity in and around Türkiye.[2,3]

An earthquake is a natural phenomenon characterized by the sudden release of energy in the Earth's crust, resulting in seismic waves.[4] While earthquakes cannot be prevented, their impact can be minimized through adequate precautions.

The effects of an earthquake can include acute stress disorder, which may later develop into post-traumatic stress disorder (PTSD). PTSD is characterized by symptoms of reliving the event, blunting, avoidance, and hyperarousal.[5] Chronic depression, generalized anxiety and PTSD have been reported to affect at least 50% of earthquake survivors.[6] Furthermore, anxiety symptoms, ranging from %9 to 57, have been shown to be the most common psychiatric morbidity.[7] The magnitude of the earthquake, household quality, social support and baseline mental health are generally associated with the variation in these estimates.[7,8]

It has also been shown that changes in eating behaviour related to changes in appetite and food preferences, including avoiding eating certain products and food groups, are more frequent in people suffering from depression.[9] Changes in eating behavior related to depression can lead to nutrient deficiencies, affecting overall health, including the nervous system's proper functioning. Research has shown that earthquakes can have a significant impact on nutritional status, particularly among vulnerable populations such as children.[10,11] However, no other study evaluating the nutritional status after large-scale earthquakes was found in the literature.

Two earthquakes with magnitudes of 7.8 and 7.5 occurred in Türkiye on 6 February 2023, nine hours apart, with epicentres in Pazarcık and Ekinözü districts of Kahramanmaraş, respectively.[1]

The earthquake severely affected 8 neighbouring provinces, particularly Kahramanmaraş and Hatay. For this reason, in order to improve the post-disaster coping of earthquake survivors and to improve their mental health, it is important to determine the relationship between variables related to stress, anxiety, depression and sleep status, as well as to identify emotional problems. This study aimed to evaluate PTSD, stress, depression, anxiety levels, sleep problems and nutritional status among earthquake survivors. While these issues are commonly observed following major natural disasters, there is a lack of integrated research exploring the interplay between these factors and their cumulative impact on the well-being of affected individuals. By focusing on this multifaceted approach, the study aims to contribute to the literature by providing a deeper understanding of the complex relationships between mental health, sleep and nutritional status in the context of disaster recovery, identifying potential intervention areas and holistic support strategies for earthquake survivors.

MATERIALS AND METHODS

Ethical Considerations: The ethics committee of Istanbul Gelisim University Ethics Committee (Date: 20.11.2023, decision no: 2023/09) approved the study. The study was carried out following the principles of the Declaration of Helsinki.

Participants and Study Design: This cross-sectional study was conducted on earthquake survivors (aged 18-64 years) approximately 9 months after the 2023 Kahramanmaraş earthquakes.

The G*Power software was used for sample selection. Based on a correlation analysis with a medium effect size (r=0.3), a significance level (α) of 0.05, and a power (1-β) of 0.80, it was determined that at least 174 participants. A total of 201 earthquake survivors completed the study. An online questionnaire including demographic characteristics, questions about nutritional behaviours, the Impact of Event Scale-revised (IES-R), Depression Anxiety Stress Scale, PTSD Symptom-Self Report Scale (PSS-SR), Insomnia Severity Index (ISI) and food consumption frequency was performed. Additionally, height and body weight (before and after the earthquake) were taken with the participants' declaration.

Impact of Event Scale: The Impact of Event Scale-Revised (IES-R) was developed as a measure of PTSD symptoms and is a brief, easy-to-administer self-report questionnaire. The validity and reliability of the Turkish version of the scale were evaluated by Çorapçıoğlu et al., and Cronbach's alpha was found to be 0.960.[12] This scale includes 22 items in which the severity of symptoms in the last 7 days is scored between 0-4. It is interpreted as an increase in the level of being affected by events as the total score on the scale increases.[12] Cronbach's alpha was found to be 0.949 in this study.

Depression, Anxiety, and Stress Scale: The Depression Anxiety and Stress Scale (DASS-21) assesses depressive, anxiety, and stress symptoms. The validity and reliability of the Turkish version of DASS-21 were confirmed by Sarıçam, and Cronbach's alpha internal consistency reliability coefficient α=0.870 for the depression subscale, α=0.850 for the anxiety subscale and α=0.810 for the stress subscale.[13] The questionnaire was designed to assess levels of depression, anxiety and stress levels and consisted of seven items for each of the three scales. Items 3, 5, 10, 13, 16, 17, and 21 represent the depression

score; and according to the total score, 0 to 4 means normal, between 5 and 6 of mild depression, 7 to 10 of moderate depression, 11 to 13 of severe depression, and >13 of extremely severe depression. Items 2, 4, 7, 9, 15, 19, and 20 represent the anxiety score, and total scores between 0 to 3 mean normal, between 4 and 5 of mild anxiety, between 6 and 7 of moderate anxiety, between 8 and 9 of severe anxiety, and >9 of extremely severe anxiety. Additionally, items 1, 6, 8, 11, 12, 14, and 18 represent the stress score, and the total scores between 0 and 7 mean normal, between 8 and 9 of mild stress, 10 and 12 of moderate stress, 13 and 16 of severe stress, and >16 are indicative of extremely severe stress.[13] Cronbach's alpha was found to be α= 0.809 for depression subscale, α= 0.830 for anxiety subscale and α= 0.807 for stress subscale in this study.

The PTSD Symptom-Self Report Scale (PSS-SR): The scale was developed to determine PTSD symptoms and possible negative situations. The validity and reliability of the Turkish version of the scale were evaluated by Aydın et al., and Cronbach's alpha was found to be 0.660.[14] PTSD consists of 17 items scored between 0-3 and 5 of the items in the scale question the symptoms of re-experiencing, 7 of avoidance and 5 of increased arousal. The arithmetic sum of 1-5 items gives the re-experiencing score, the arithmetic sum of 6-12 items gives the avoidance score, and the arithmetic sum of 13-17 items gives the arousal score. Cronbach's alpha was found to be 0.929 in this study.

Insomnia Severity Index: The Insomnia Severity Index (ISI) was developed to assess the severity of insomnia. The validity and reliability of the Turkish version of the scale were evaluated by Boysan et al., and Cronbach's alpha was found to be 0.820.[15] Scale items consisting of seven questions are scored between 0-4. Scores that can be obtained from the scale vary between 0-28. Eight and above is defined as insomnia. Cronbach's alpha was found to be 0.897 in this study.

Food Frequency Questionnaire: The semi-quantitative FFQ included 130 food and beverage items, covering a wide range of foods typically consumed by adults in Türkiye, categorized into major food groups such as grains, fruits, vegetables, dairy, meat, and beverages. Participants were asked to report their usual consumption frequency over the past month, with options ranging from "never" to "every day". Portion sizes were estimated using standard household measurements such as cups, spoons, or visual aids, allowing for semi-quantitative estimates of intake. The FFQ assessed intakes of energy, macronutrients (carbohydrates, protein, and fats), and micronutrients (vitamins and minerals).

We determined the daily energy and nutrient intake taken from FFQ using the Nutrient Database (BeBİS, EBISpro for Windows, Germany; Turkish Version, BeBiS 9). Energy and macro- and micronutrient intake results were compared with the Turkish recommended dietary allowance (RDA) according to age and gender.[16] Nutrient intakes <67% of the RDA were considered "inadequate".

Statistical Analysis: All statistical analyses were conducted using IBM SPSS Statistics 24.0. The distribution of variables was verified using the Kolmogorov–Smirnov test. Data are expressed as numbers or means (SD). To compare measured variables (age, the number of main meals and snacks, IES-R total score, stress score, anxiety score, depression score, PSS-SR score, and ISI score), the Mann–Whitney U-test was used for these variables. The chi-squared test was used for categorical variables—the Wilcoxon test was used for comparing body mass index (BMI) and body weight before and after the earthquake. Spearman correlation was used for the correlation of IES-R total score, stress score, anxiety score, depression score, PSS-SR score, ISI score, age and BMI. The p-value ≤ 0.05 was considered statistically significant for the statistical test.

RESULTS

Table 1 shows the general characteristics of participants. The mean age was 29.46±12.19 years, and 57.7% of participants were not employees (p<0.001). 47.8% of participants had economic losses after the earthquake. Additionally, most of the participants (83.6%) ate their main meal in their own house (p: 0.007).

The mean height was 176.38±20.28 cm in men and 164.83±6.89 in women (data not shown). There was a statistical difference between body weight and BMI before and after the earthquake in both genders (p< 0.001) (Figure 1).

Based on the anxiety classification, 51.2% of participants had extremely severe anxiety. According to the depression classification, 22.9% of the participants were classified as severe and 24.9% as extremely severe. 58.3% of the participants had severe PTSD symptoms, and 11.9% had extremely severe PTSD symptoms according to the PSS-SR classification. Most participants (75.6%) were classified as insomnia. No significant differences were found between men and women in these scales (Table 2).

Table 1. General characteristics (n: 201).

		Men (n: 87) n (%)	Women (n: 114) n (%)	Total (n: 201) n (%)	p-value
Age (Mean± SD)		31.07±12.87	28.24±11.55	29.46±12.19	0.590
Place of Residence	Own House	52 (59.8)	67 (58.8)	119 (59.2)	
	Container	9 (10.3)	20 (17.5)	29 (14.4)	0.459
	Tent	4 (4.6)	5 (4.4)	9 (4.5)	
	House of a relative	22 (25.3)	22 (19.3)	44 (21.9)	
Education Level	Primary school	2 (2.3)	6 (5.3)	8 (4.0)	
	Secondary school	18 (20.7)	21 (18.4)	39 (19.4)	
	High school	38 (43.7)	37 (32.5)	75 (37.3)	0.368
	University	28 (32.2)	48 (42.1)	76 (37.8)	
	Master's degree/doctorate	1 (1.1)	2 (1.8)	3 (1.5)	
Employment Status	Employee	59 (67.8)	26 (22.8)	85 (42.3)	**<0.001****
	Unemployee	28 (32.2)	88 (77.2)	116 (57.7)	
Presence of a chronic disease	No	65 (74.7)	76 (66.7)	141 (70.1)	0.276
	Yes	22 (25.3)	38 (33.3)	60 (29.9)	
Economic loss after the earthquake	No	44 (50.6)	61 (53.5)	105 (52.2)	
	Yes	43 (49.4)	53 (46.5)	96 (47.8)	0.776
Main meal (Mean± SD)		2.40±0.49	2.28±0.52	2.33±0.51	0.121
Snacks (Mean± SD)		1.76±0.70	1.91±0.83	1.87±0.79	0.406
The place where the main meal is eaten	House	80 (92.0)	88 (77.2)	168 (83.6)	
	Prepared food area	7 (8.0)	26 (22.8)	33 (16.4)	**0.007***
Meal skipping status	No	34 (39.1)	35 (30.7)	69 (34.3)	0.233
	Yes	53 (60.9)	79 (69.3)	132 (65.7)	
Meal skipped	Breakfast	26 (49.1)	24 (30.4)	50 (37.9)	
	Lunch	26 (49.1)	51 (64.6)	77 (58.3)	0.079
	Dinner	1 (1.8)	4 (5.0)	5 (3.8)	

*: p<0.05; **: p<0.001; The chi-squared test was used for categorical data. Mann–Whitney U-test was used for age, the number of main meals, and snacks.

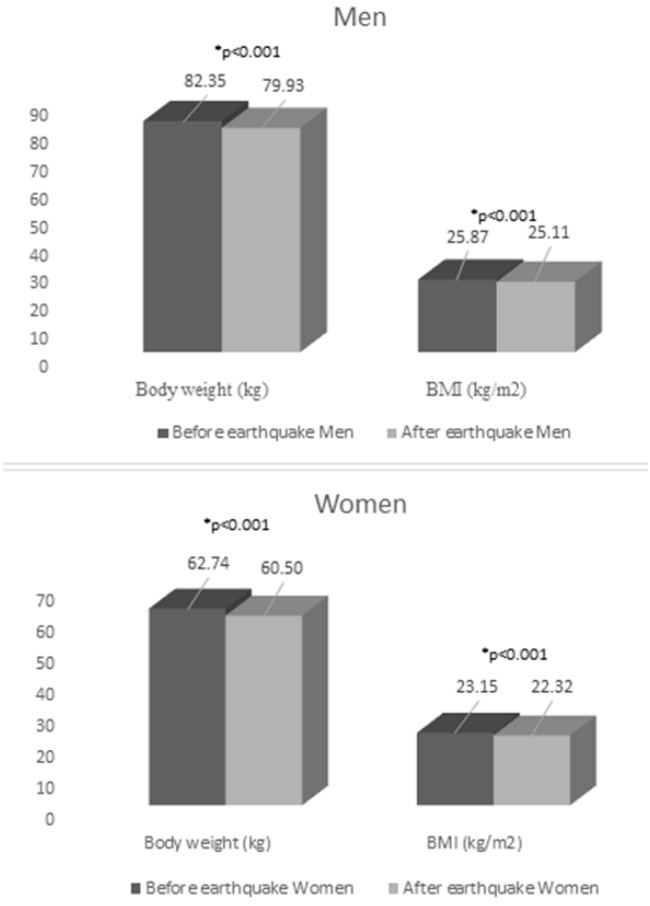

Figure 1. Differences in body weight and BMI before and after earthquake. *: p<0.001; Wilcoxon test.

Table 2. The mean values and classification of IES, DASS-21, PSS-SR, and ISI scales of participants (n: 201).

		Men (n: 87) n (%)	Women (n: 114) n (%)	Total (n: 201) n (%)
IES-R score (Mean ± SD)		43.05±15.59	46.10±16.86	44.78±16.35
Stress score (Mean ± SD)		8.09±3.20	8.29±3.64	8.20±3.45
Stress classification	Normal (0-7 scores)	40 (46.0)	47 (41.2)	87 (43.2)
	Mild (8-9 scores)	21 (24.1)	24 (21.1)	45 (22.4)
	Moderate (10-12 scores)	19 (21.8)	32 (28.0)	51 (25.4)
	Severe (13-16 scores)	7 (8.1)	10 (8.8)	17 (8.5)
	Extremely severe (>16 scores)	-	1 (0.9)	1 (0.5)
Anxiety score (Mean ± SD)		9.29±4.06	9.46±4.45	9.39±4.28
Anxiety classification	Normal (0-3 scores)	8 (9.2)	14 (12.3)	22 (10.9)
	Mild (4-5 scores)	5 (5.7)	7 (6.1)	12 (6.1)
	Moderate (6-7 scores)	18 (20.8)	14 (12.3)	32 (15.9)
	Severe (8-9 scores)	11 (12.6)	21 (18.4)	32 (15.9)
	Extremely severe (>9 scores)	45 (51.7)	58 (50.9)	103 (51.2)
Depression score (Mean ± SD)		10.32±4.25	10.23±4.63	10.27±4.46
Depression classification	Normal (0-4 scores)	5 (5.7)	11 (9.6)	16 (8.0)
	Mild (5-6 scores)	6 (6.9)	9 (7.9)	15 (7.4)
	Moderate (7-10 scores)	37 (42.6)	37 (32.5)	74 (36.8)
	Severe (11-13 scores)	20 (23.0)	26 (22.8)	46 (22.9)
	Extremely severe (>13 scores)	19 (21.8)	31 (27.2)	50 (24.9)
PSS-SR score (Mean ± SD)		24.42±9.15	25.69±11.32	25.14±10.43
PSS-SR classification	Mild PTSD symptoms (<10 scores)	7 (8.0)	14 (12.3)	21 (10.4)
	Moderate PTSD symptoms (11-20 scores)	20 (23.1)	19 (16.6)	39 (19.4)
	Severe PTSD symptoms (21-35 scores)	51 (58.6)	66 (57.9)	117 (58.3)
	Extremely severe PTSD symptoms (>35 scores)	9 (10.3)	15 (13.2)	24 (11.9)
ISI score (Mean ± SD)		11.89±5.51	12.88±5.54	12.45±5.54
ISI classification	Normal	24 (27.6)	25 (21.9)	49 (24.4)
	Insomnia	63 (72.4)	89 (78.1)	152 (75.6)

IES-R: Impact of Event Scale-Revised; PSS-SR: PTSD Symptom-Self Report Scale; ISI: Insomnia Severity Index.

There was a moderate positive correlation between IES-R and stress (r: 0.634, p<0.001), anxiety (r: 0.589, p< 0.001), depression (r: 0.610, p< 0.001), ISI (r: 0.492, p< 0.001) and PSS-SR (r: 0.696, p<0.001). Additionally, PSS-SR showed a strong positive correlation with stress (r: 0.705, p<0.001) for all participants (Table 3).

Table 3. The relationship between age, BMI (after the earthquake), IES-R, stress, anxiety, depression, PTSD, and ISI scores.

		1	2	3	4	5	6	7
Men	1. Age	-						
	2. BMI	**0.480****	-					
	3. IES-R score	0.055	0.043	-				
	4. Stress score	-0.053	-0.075	**0.586****	-			
	5. Anxiety score	-0.056	**0.235***	**0.470****	**0.706****	-		
	6. Depression score	-0.162	**0.282***	**0.534****	**0.617****	**0.605****	-	
	7. ISI score	0.172	-0.054	**0.439****	**0.464****	**0.446****	**0.497****	
	8. PSS-SR score	-0.035	-0.100	**0.618****	**0.576****	**0.522****	**0.587****	**0.499****
Women	1. Age	-						
	2. BMI	**0.281***	-					
	3. IES-R score	0.103	0.013	-				
	4. Stress score	0.053	0.007	**0.570****	-			
	5. Anxiety score	0.153	0.033	**0.602****	**0.760****	-		
	6. Depression score	-0.025	-0.065	**0.583****	**0.801****	**0.707****	-	
	7. ISI score	-0.012	-0.057	**0.483****	**0.527****	**0.467****	**0.522****	-
	8. PSS-SR score	0.049	-0.035	**0.670****	**0.698****	**0.705****	**0.696****	**0.510****
Total	1. Age	-						
	2. BMI	**0.498****	-					
	3. IES-R score	0.017	-0.018	-				
	4. Stress score	-0.023	-0.020	**0.634****	-			
	5. Anxiety score	0.040	-0.057	**0.589****	**0.773****	-		
	6. Depression score	-0.075	-0.104	**0.610****	**0.744****	**0.702****	-	
	7. ISI score	-0.015	-0.098	**0.492****	**0.517****	**0.469****	**0.517****	-
	8. PSS-SR score	-0.018	-0.057	**0.696****	**0.705****	**0.687****	**0.691****	**0.547****

*: p< 0.05; **: p< 0.001; Spearman correlation was used for age, BMI, IESR-R, stress, anxiety, depression, ISI, and PSS-R scores; BMI: Body mass index; IES-R: Impact of Event Scale-Revised; PSS-SR: PTSD Symptom-Self Report Scale; ISI: Insomnia Severity Index.

Table 4 shows the mean daily energy, macro and micronutrient intake of the participants. There were no nutrients below 67% of the RDA for energy and macronutrient (carbohydrate, fat, protein) intake in both men and women. Similarly, fiber, vitamin A, vitamin E, vitamin K, vitamin C, vitamin B_1, vitamin B_2, vitamin B_3, vitamin B_5, vitamin B_6, vitamin B_{12}, biotin, folic acid, potassium, calcium, magnesium, phosphorus, iron and zinc intakes were adequate in both gender compared with the RDA.

Table 4. The mean (minimum-maximum) daily energy, macro- and micronutrient intake of the participants compared to the RDA.

	Men (n: 87)	**RDA (%)**	**<67% of RDA**	**Women (n: 114)**	**RDA (%)**	**<67% of RDA**
Energy (kcal)	2050.61±474.91	79.85±19.85 (115.00-38.73)	No	2066.40±435.26	113.78±26.50 (154.44-61.81)	No
Protein (g)	110.77±27.36	175.56±47.00 (285.91-65.17)	No	104.42±29.93	189.17±56.81 (337.26-58.46)	No
Protein (E %)	20.21±3.48	101.09±20.38 (145.00-60.00)	No	19.25±3.98	96.27±21.78 (155.0-50.00)	No
Fat (g)	86.00±23.37			85.40±25.02		
Fat (E %)	34.08±6.28	97.37±20.66 (140.00-54.29)	No	34.20±6.61	97.72±20.90 (162.86-61.81)	No
Saturated fatty acids (g)	29.08±9.17			28.31±10.20		
MUFA (g)	29.87±9.25			29.72±9.95		
PUFA (g)	19.17±5.51			19.51±5.61		
Omega 3 (g)	2.65±0.76			2.41±0.85		
Omega 6 (g)	16.25±5.14			16.86±5.31		
Cholesterol (mg)	421.23±167.03			402.21±209.46		
Carbohydrate (g)	250.81±62.15	192.93±51.79 (305.05-63.67)	No	249.28±58.86	191.75±48.37 (321.88-109.10)	No
Carbohydrate (% E)	45.68±7.73	76.15±15.17 (108.33-43.33)	No	46.48±7.54	77.47±14.46 (118.33-40.00)	No
Fiber (g)	19.82±6.89	79.32±28.69 (138.32-4.20)	No	21.32±7.84	85.31±32.26 (166.80-21.24)	No
Vitamin A (mcg)	3286.81±1946.74	438.24±262.26 (1047.01-67.41)	No	2935.72±2722.87	451.65±419.18 (1036.15-50.81)	No
Vitamin E (mg)	22.96±5.76	176.65±47.96 (276.69-73.15)	No	23.71±7.36	215.55±69.66 (441.55-35.64)	No
Vitamin K (mcg)	538.94±397.42	449.12±332.74 (457.82-19.40)	No	498.51±414.25	553.91±461.16 (1925.88-30.29)	No
Vitamin C (mg)	220.58±135.98	200.53±124.76 (573.55-18.90)	No	183.95±118.62	193.64±125.62 (508.98-11.89)	No
Vitamin B_1 (mg)	1.72±0.61	143.75±53.60 (350.00-47.50)	No	1.67±0.62	151.99±58.48 (339.09-37.27)	No
Vitamin B_2 (mg)	1.72±0.61	217.26±89.88 (520.77-63.85)	No	1.67±0.62	242.22±110.30 (797.27-50.00)	No
Vitamin B_6 (mg)	2.52±0.84	194.53±68.19 (412.31-56.92)	No	2.42±0.92	186.26±73.26 (353.85-46.15)	No
Vitamin B_{12} (mcg)	5.21±2.73	130.26±69.31 (252.50-27.75)	No	5.30±3.02	134.64±76.38 (550.00-6.00)	No
Vitamin B_3 (mcg)	5.89±1.99	87.54±15.31 (744.19-117.44)	No	5.94±1.98	88.67±16.21 (327.29-97.79)	No
Vitamin B_5 (mcg)	10.70±5.95	81.83±67.72 (226.40-20.53)	No	10.13±5.52	81.81±68.64 (349.07-7.40)	No
Biotin (mcg)	19.08±9.79	102.43±54.56 (617.60-100.33)	No	14.03±7.36	85.43±32.19 (236.27-71.03)	No
Folic acid (mcg)	678.96±308.73	205.75±95.57 (489.63-54.75)	No	649.07±334.42	196.69±102.55 (532.33-46.35)	No
Potassium (mcg)	4563.98±1699.74	101.42±39.08 (197.63-2.32)	No	4358.10±1882.72	92.73±40.81 (245.30-22.57)	No
Calcium (mg)	923.45±317.79	92.35±33.09 (171.73-46.77)	No	902.03±357.62	90.20±36.59 (179.95-24.96)	No

*: Values are presented as mean (minimum-maximum). Comparisons were made against the Turkish Recommended Dietary Allowances (RDA); MUFA: Monounsaturated fatty acids; PUFA: Polyunsaturated fatty acids; RDA: Recommended daily (or dietary) allowance.

Table 4. Continue.

Magnesium (mg)	532.47±162.84	152.14±49.02 (289.88-46.77)	No	521.10±157.04	173.70±54.58 (311.93-67.59)	No
Phosphorus (mg)	666.63±325.65	121.21±60.27 (339.55-47.73)	No	628.08±371.03	114.20±68.00 (335.67-19.89)	No
Iron (mg)	17.29±6.63	157.19±62.28 (384.46-34.42)	No	17.54±6.52	134.93±51.51 (282.46-34.46)	No
Zinc (mg)	16.00±3.90	98.20±26.04 (155.46-34.42)	No	15.62±4.68	123.04±38.48 (201.65-41.42)	No
Alcohol (mL)	0.04 ±0.04	-		0.06 ±0.07	-	

*: Values are presented as mean (minimum-maximum). Comparisons were made against the Turkish Recommended Dietary Allowances (RDA); MUFA: Monounsaturated fatty acids; PUFA: Polyunsaturated fatty acids; RDA: Recommended daily (or dietary) allowance.

DISCUSSION AND CONCLUSION

This study is the first to evaluate PTSD, stress, depression, anxiety levels, sleep problems and nutritional status of earthquake survivors in Türkiye. We found that 51.2% of participants had extremely severe anxiety. 22.9% of the participants were classified as severe depression, and 24.9% as extremely severe depression. 58.3% of the participants had severe PTSD symptoms, and 11.9% had extremely severe PTSD symptoms according to the PSS-SR classification. Most participants (75.6%) were classified as insomnia. There were statistical differences between body weight and BMI before and after the earthquake in both genders. Furthermore, there was a moderate positive correlation between IES-R and stress, anxiety, depression, ISI, and PSS-SR scores. PSS-SR scores showed a strong positive correlation with stress scores. No nutrient intake was below the RDA and was found to be adequate in both genders.

Following catastrophic events or unusual threats, PTSD is the most common type of psychiatric disorder.[17] The severity of exposure has also been found to be positively associated with the risk of subsequent PTSD and other mental disorders.[17,18] In 2017, 3 months after the 7.0 magnitude earthquake that occurred in the Jiuzhaigou region, it was determined that 52.7% of the earthquake victims in the earthquake zone showed symptoms of PTSD, 53.8% of anxiety and 69.6% of depression.[19] The prevalence of PTSD was found to be 20.3% after the 6.1 magnitude earthquake in Piura in 2021.[20] PTSD was found to be 58.3%, depression 16.8% and anxiety 32.1% in adolescents after the 6.5 magnitude earthquake in Indonesia in 2016.[21] We found that 58.3% of the participants had severe, and 11.9% had extremely severe PTSD symptoms. Additionally, 51.2% of participants had extremely severe anxiety. According to depression classification, 22.9% of the participants were classified as severe and 24.9% as extremely severe. Kahramanmaraş is a seismically active area and the whole of the region is subject to frequent earthquakes and tremors. The type of event may influence the association between PTSD and related factors.[22] Two high-magnitude earthquakes nine hours apart may have led to a higher likelihood of triggering PTSD in the local population.

Earthquakes can indeed have a significant impact on sleep quality and overall sleep situation among individuals affected by such natural disasters. For instance, research conducted after earthquakes in Syria-Türkiye revealed higher rates of poor sleep quality and major depressive episodes, particularly among women.[23] It was indicated a decline in sleep quality from before to after an earthquake, with a significant decrease observed even 24 months post-earthquake.[24] In this study, most participants (75.6%) were classified as having insomnia. The psychological impact of earthquakes on sleep may persist over the long term.[25] Therefore, emphasising the importance of recognising and managing disrupted sleep after earthquakes is important to understand the long-term impact of natural disasters on sleep.

Insomnia is estimated that 70-91% of individuals with PTSD have difficulty initiating or maintaining sleep.[26,27] It was observed that a bidirectional relationship was found between insomnia, PTSD and depressive symptoms among adolescents who survived the 2008 Wenchuan earthquake in China.[28] In a study conducted 9 months after the 7.8 magnitude earthquake in Ecuador in 2016, high levels of depression, anxiety and stress were observed in adolescents.[29] We found that there was a moderate positive correlation between IES-R and stress, anxiety, depression, ISI, and PSS-SR scores. The psychological effects of earthquakes on sleep and the bidirectional relationship between insomnia, PTSD, and depression are significant. This suggests that insomnia, PTSD and depression may be linked in the long term.

There are very few studies evaluating the effect of earthquakes on nutritional status. Studies show that earthquakes can have a significant impact on BMI, especially among vulnerable populations such as children, and emphasise the importance of understanding and addressing the effects of such disasters

on nutrition and health.[10,11] Although no nutrient intake was below the RDA, body weight and BMI showed significant decreases after the earthquake in this study. This may be due to the fact that the FFQ asked about food consumption in the last month. If the FFQ had not focused on the last month's food consumption, the results might have indicated greater variability in nutrient intake. This could have included evidence of more pronounced deficiencies or surpluses in specific nutrients over time, reflecting the potential long-term effects of the earthquake on survivors' dietary habits. Additionally, a broader time frame might have captured fluctuations in food availability and access, which are common challenges in post-disaster settings. Such data could have provided a deeper understanding of the nutritional adjustments survivors made during different phases of recovery.

The study has several strengths and limitations. First, the study was cross-sectional and a cause-and-effect relationship cannot be established. Secondly, although the study was conducted on adults, most of the participants were young adult women. Therefore, the results cannot be generalized. Third, participants self-reported their body weight and height, which may have led to errors. Fourth, the FFQ covers only the last month, which may lead to an underestimation of the longer-term effects of the earthquake. The strengths of our study are that it analyzed multiple variables such as PTSD, anxiety, depression, sleep problems and nutritional status in detail and that physical effects such as nutritional status and changes in body weight were also examined along with psychological status.

In conclusion, most of the participants had severe PTSD symptoms and suffered from insomnia. While nutrient intake was adequate, significant decreases in body weight and BMI were observed. These findings emphasize the need to address both mental health and nutritional status in the aftermath of natural disasters. The earthquake affected earthquake survivors in different ways, and the burden of psychiatric disorders can have detrimental consequences in their lives. Therefore, strengthening public health services in this area is crucial.

Ethics Committee Approval: The ethics committee of Istanbul Gelisim University Ethics Committee (Date: 20.11.2023, decision no: 2023/09) approved the study, which followed the principles of the Declaration of Helsinki.

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept – HMB, Rİ, BNS, MS; Supervision – HMB; Materials – HMB, Rİ, BNS, MS; Data Collection and/or Processing – Rİ, BNS, MS; Analysis and/or Interpretation – HMB, Rİ, BNS, MS; Writing – HMB, Rİ, BNS, MS.

Peer-review: Externally peer-reviewed.

Financial Support: This work was supported by the TUBITAK 2209-A Research Project Support Programme for Undergraduate Students under Project Number 1919B012307489.

Other Information: This study was presented as an oral presentation at the 7th International Health Science and Life Congress.

REFERENCES

1. Fotiou K, Argyriou AV, Alatza S, et al. Impact assessment of the catastrophic earthquakes of 6 February 2023 in Türkiye and Syria via the exploitation of satellite datasets. In Ninth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2023). 2023;12786:475-487.
2. Cambaz MD, Turhan F, Yılmazer M, Kekovalı K, Necmioğlu Ö, Kalafat D. An Investigation on the Evaluation of Regional Earthquake Tsunami Monitoring Center (RETMC) Seismic Network and Catalogue. Yerbilimleri. 2019;40(1):110-135. doi:10.17824/yerbilimleri.500472
3. Kalafat D, Zülfikar AC, Akcan SO. Seismicity of Türkiye and real-time seismology applications in determining earthquake hazard. Academic Platform Journal of Natural Hazards and Disaster Management. 2021;2(2):96-111. doi: 10.52114/apjhad.1039670
4. Halpaap F, Rondenay S, Liu Q, Millet F, Ottemöller L. Toward Waveform-Based Characterization of Slab & Mantle Wedge (SAM) Earthquakes. J Geophys Res Solid Earth. 2021;126(9):e2020JB021573. doi: 10.1029/2020JB021573
5. Radell ML, Hamza EA, Moustafa AA. Depression in post-traumatic stress disorder. Rev Neurosci. 2020;31(7):703-722. doi: 10.1515/revneuro-2020-0006
6. Jia Z, Tian W, Liu W, Cao Y, Yan J, Shun Z. Are the Elderly More Vulnerable to Psychological Impact of Natural Disaster? A Population-Based Survey of Adult Survivors of the 2008 Sichuan Earthquake. BMC Public Health. 2010;10:172. doi: 10.1186/1471-2458-10-172
7. Neria Y, Nandi A, Galea S. Post-Traumatic Stress Disorder Following Disasters: A Systematic Review. Psychol Med. 2008;38:467-480. doi: 10.1017/S0033291707001353
8. Flores EC, Carnero AM, Bayer AM. Social Capital and Chronic Post-Traumatic Stress Disorder among Survivors of the 2007 Earthquake in Pisco, Peru. Soc Sci Med. 2014;101:9-17. doi: 10.1016/j.socscimed.2013.11.012
9. Stefańska E, Wendołowicz A, Kowzan U, Konarzewska B, Szulc A, Ostrowska L. Does the

usual dietary intake of patients with depression require vitamin-mineral supplementation? Psychiatr Pol. 2014;48:75-88.
10. Yokomichi H, Matsubara H, Ishikuro M, et al. Impact of the Great East Japan Earthquake on body mass index, weight, and height of infants and toddlers: an infant survey. J Epidemiol. 2018;28(5):237-244. doi: 10.2188/jea.JE20170006
11. Raut NK, Pokhrel K. Impact of Natural Disaster on Health of Children: Empirical Evidence from Nepal's Earthquake. Economic Journal of Nepal. 2022;45(3-4):1-22. doi: 10.3126/ejon.v45i3-4.63145
12. Çorapçıoğlu A, Yargıç İ, Geyran P, Kocabaşoğlu N. Olayların etkisi ölçeği (IES-R) Türkçe versiyonunun geçerlik ve güvenirliği. New/Yeni Symposium Journal. 2006;44:14-22.
13. Sarıçam H. The psychometric properties of Turkish version of Depression Anxiety Stress Scale-21 (DASS-21) in health control and clinical samples. JCBPR. 2018;7(1):19-30. doi: 10.5455/JCBPR.274847
14. Aydın A, Barut Y, Kalafat T, Boysan M, Beşiroğlu L. Travma Sonrası Stres Bozukluğu Belirtileri Ölçeği-kendini değerlendirme (TSSBÖ-KD) Türkçe formunun psikometrik özellikleri. Anadolu Psikiyatri Dergisi. 2012;13:125-130.
15. Boysan M, Güleç M, Beşiroğlu L, Kalafat T. Uykusuzluk Şiddeti İndeksi'nin Türk örneklemindeki psikometrik özellikleri. Anadolu Psikiyatri Dergisi. 2010;11:248-252.
16. T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü, Sağlıklı Beslenme ve Hareketli Hayat Dairesi Başkanlığı. Türkiye Beslenme Rehberi 2022. 1st ed. Ankara, Türkiye; 2022:324-325.
17. Dai W, Chen L, Lai Z, Li Y, Wang J, Liu A. The Incidence of Post-Traumatic Stress Disorder among Survivors after Earthquakes: A Systematic Review and Meta-Analysis. BMC Psychiatry. 2016;16:188. doi: 10.1186/s12888-016-0891-9
18. Cairo JB, Dutta S, Nawaz H, Hashmi S, Kasl S, Bellido E. The Prevalence of Posttraumatic Stress Disorder among Adult Earthquake Survivors in Peru. Disaster Med. Public Health Prep. 2010;4:39-46.
19. 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;49:101958. doi: 10.1016/j.ajp.2020.101958
20. Valladares-Garrido MJ, Zapata-Castro LE, Peralta CI, et al. Post-traumatic stress disorder after the 6.1 magnitude earthquake in Piura, Peru: a cross-sectional study. Int J Environ Res Public Health. 2022;19(17):11035. doi: 10.3390/ijerph191711035
21. Marthoenis M, Ilyas A, Sofyan H, Schouler-Ocak M. Prevalence, comorbidity and predictors of post-traumatic stress disorder, depression, and anxiety in adolescents following an earthquake. Asian J Psychiatr. 2019;43:154-159. doi: 10.1016/j.ajp.2019.05.030
22. Duan W, Guo P, Gan P. Relationships among trait resilience, virtues, post-traumatic stress disorder, and post-traumatic growth. PloS One. 2015;10(5):e0125707. doi: 10.1371/journal.pone.0125707
23. Ataya J, Soqia J, Ataya J, et al. Sleep quality and mental health differences following Syria-Türkiye earthquakes: A cross-sectional study. Int J Soc Psychiatry. 2024;70(4):700-708. doi: 10.1177/00207640231223432
24. Yabe Y, Hagiwara Y, Sekiguchi T, et al. Sleep Disturbance Is Associated with New Onset and Continuation of Lower Back Pain: A Longitudinal Study among Survivors of the Great East Japan Earthquake. Tohoku J Exp Med. 2018;246(1):9-14. doi: 10.1620/tjem.246.9
25. Tempesta D, Curcio G, De Gennaro L, Ferrara M. Long-term impact of earthquakes on sleep quality. PLoS One. 2013;8(2):e55936. doi: 10.1371/journal.pone.0055936
26. Colvonen PJ, Straus LD, Stepnowsky C, McCarthy MJ, Goldstein LA, Norman SB. Recent advancements in treating sleep disorders in co-occurring PTSD. Curr Psychiatry Rep. 2018;20(7):48. doi: 10.1007/s11920-018-0916-9
27. Ohayon MM, Shapiro CM. Sleep disturbances and psychiatric disorders associated with posttraumatic stress disorder in the general population. Compr Psychiatry. 2000;41(6):469-478. doi: 10.1053/comp.2000.16568
28. Geng F, Liang Y, Li Y, et al. Bidirectional associations between insomnia, posttraumatic stress disorder, and depressive symptoms among adolescent earthquake survivors: a longitudinal multiwave cohort study. Sleep. 2019;42(11):zsz162. doi: 10.1093/sleep/zsz162
29. Gerstner RM, Lara-Lara F, Vasconez E, Viscor G, Jarrin JD, Ortiz-Prado E. Earthquake-related stressors associated with suicidality, depression, anxiety and post-traumatic stress in adolescents from Muisne after the earthquake 2016 in Ecuador. BMC Psychiatry. 2020;20(1):347. doi: 10.1186/s12888-020-02759-x