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Research Article

Post-traumatic Stress Disorder Levels in Medical Students who Experienced Türkiye Kahramanmaraş 2023 Earthquake

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Abstract

Objective: Earthquakes have significant effects on both physical and mental health. One of the mental health effects is post-traumatic stress disorder (PTSD). This study aimed to determine the level of PTSD and the variables associated with this level in a group of medical students who experienced the February 6, 2023 earthquake in Türkiye, centered on Kahramanmaraş.

Methods: The study was cross-sectional. Data from 40 medical students were evaluated. A 15-question data collection form and a 20-item scale for determining the level of post-earthquake trauma were used for the study. The scale provides scores ranging from 20 to 100, and an increase in the score indicates an increase in the level of trauma. In this study, the Pearson correlation coefficient and Cohen's d were calculated as effect sizes. Ethics committee approval and institutional approval were obtained for this study.

Results: Twenty-three of the students were male. Of the students, 31 had experienced loss of a loved one and 36 had experienced damage to residential building. The mean score of the students on the scale was 63.5±14.1. Gender (0.639), maternal education level (0.256), pre-earthquake income status (0.211), professional psychological support (0.785), loss of a loved one (0.166), damage to residential building (0.209), loss of property (0.544), and post-earthquake migration (0.399) were identified as variables associated with PTSD.

Conclusion: Most students were negatively affected by the recent earthquake and experienced medium PTSD. It is important to provide community and risk group based mental health support after the earthquake.

Keywords: Earthquake, Post-traumatic Stress Disorder, PTSD, Medical Students, Türkiye

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1. Introduction

Natural disasters, particularly earthquakes, can have significant health consequences for individuals, families, and communities. The main health effects include death, injuries, disabilities, psychological trauma, respiratory problems due to dust, infectious diseases, and displacement or migration (1-4).

Disaster survivors who have experienced natural disasters, which have increased in number and frequency in recent years, may face post-traumatic stress disorder (PTSD), anxiety, depression, and substance abuse (5). PTSD is a common psychological reaction among post-earthquake survivors (5,6). PTSD is a condition characterized by unwanted and recurrent thoughts, avoidance behavior, negative changes in emotions and thoughts, and hyperarousal that may develop after a traumatic event. PTSD is highly disruptive to individuals and may lead to loss of functionality. PTSD may occur one month after the event or develop months or even years later (7,8). The prevalence rate of PTSD among earthquake survivors is 23.7% in a systematic review-meta-analysis study that included 46 studies worldwide (6). The prevalence of PTSD among university students was 34% after the 2009 Haiti earthquake and 14.1% after the 2008 Wenchuan earthquake (9,10). In a study conducted after two devastating earthquakes in

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the Marmara region on 17 August and 12 November 1999, the prevalence of PTSD in adults was 23% (11). After the Kahramanmaraş earthquake of 6 February 2023, the prevalence of probable PTSD was 61.6% in a study of university students (12).

On February 6, 2023, Kahramanmaraş in Türkiye was hit by two devastating earthquakes at 04:17 and 13:24, respectively, with magnitudes of 7.7 and 7.6 on the Richter scale, affecting 11 provinces. More than 9 million people were affected, and over 50 thousand people lost their lives in the earthquake (13). Studies suggest that this earthquake may lead to various mental health issues, particularly PTSD (14,15). There may be an association between PTSD and individuals' sociodemographic characteristics and their experiences during and after the earthquake. This study aimed to assess the levels of PTSD among medical students who experienced the 2023 Türkiye earthquake in Kahramanmaraş and temporarily relocated to the Ankara University Faculty of Medicine for temporary education from affected provinces, as well as to identify the variables associated with these levels.

2. Methods

This cross-sectional study was conducted at the Ankara University Faculty of Medicine. Data were collected from June 20, 2023, to July 20, 2023. Students from 11 provinces affected by the earthquake in Kahramanmaraş, Türkiye, on 6 February 2023 who are temporarily studying at Ankara University Faculty of Medicine were included in the study (52 people in total). These students are 4th, 5th and 6th grade students. Forty-three medical students participated in the study, and the data of 40 students were evaluated after excluding 3 students who did not experience the earthquake. The data of the study were obtained online through a link sent to each student's phone number. Participation in the study was voluntary.

A 15-question data collection form and a 20-item Determination of Post-Earthquake Trauma Level (DPETL) scale were used in the study. The 15-question data collection form asked students about their sociodemographic characteristics and their experiences related to the earthquake and post-earthquake process. The 20-item DPETL scale was developed by Tanhan and Kayri in 2013 and consists of 5 subscales. The subscales of the scale are as follows: Behavioral problems (items 1-4) (Subscale 1), Excitement limitation (items 5-9) (Subscale 2), Affective (items 10-13) (Subscale 3), Cognitive structuring (items 14-17) (Subscale 4), and Sleep problems (items 18-20) (Subscale 5). The Cronbach's alpha reliability coefficient of the scale is 87%, and the explained variance is 54.3%. The scale is a five-point Likert type. The Likert-type statements are "strongly disagree", "slightly agree", "moderately agree", "strongly agree" and "completely agree". Scale items 11 and 12 are reverse-scored. The minimum score is 20 and maximum score is 100. There is no specific cut-off point for the scale, and the increase in scores indicates that the level of individuals affected by the earthquake has increased (16). In this study, the Cronbach's alpha of the scale was calculated to be 89%.

2.1. Statistical analysis

The study was analyzed using SPSS (SPSS for Windows, Version 16.0. Chicago, SPSS Inc.) and G*Power version 3.1.9.7 (17). Mean±standard deviation, median (min-max), number, and percentage were used to summarize the data. Because the group studied in the study was limited and small, analyzes that yielded results based on the p-value, which is affected by sample size, were avoided and effect sizes were calculated using G-Power version 3.1.9.7. The Pearson correlation coefficient (r) and Cohen's d were presented as effect sizes. Pooled standard deviation values were calculated from 'https://www.psychometrica.de/effect_size.html' and entered into the program. The Pearson correlation coefficient was scored as 0.00-0.25 no association/limited association, 0.26-0.50 weak association, 0.51-0.75 moderate association, and 0.76-1.00 strong association. Coefficients with a positive (+) sign indicate that the variables increase or decrease together, whereas coefficients with a negative (-) sign indicate that one of the variables increases when the other decreases or vice versa. For

Cohen's d, an effect size of 0.20 small, 0.50 medium, and 0.80 large in the t-test family; 0.10 small, 0.25 medium, and 0.40 large in the F-test family were accepted.
Ethical approval was obtained from the Ankara University Rectorate Ethics Committee (number: 56786525-050.04.04/950166 date: 06.06.2023), and institutional approval was obtained from the Ankara University Faculty of Medicine Dean's Office. Permission was obtained from the owners of the scale that was part of the data collection.

3. Results

3.1. Sociodemographic characteristics of medical students

The sociodemographic characteristics of 40 medical students included in the study are shown in Table 1. The mean age of the students was 24.1±1.4 (21-27) years, most of the students were in the 6th grade, 23 were male, and 17 were female. For post-earthquake period, 18 (45%) of the students reported that their income decreased compared with that in pre-earthquake period. Only 3 students received professional psychological support in post-earthquake period.

Table 1. Sociodemographic Characteristics of Medical Students (Türkiye, 2023)

Characteristics		n	%
Grade	4	8	20.0
	5	5	12.5
	6	27	67.5
Gender	Female	17	42.5
	Male	23	57.5
Maternal education level	Secondary school and below	18	45.0
	High school and above	22	55.0
Paternal education level	Secondary school and below	12	30.0
	High school and above	28	70.0
Pre-earthquake income status	Income less than expenses	6	15.0
	Income covers expenses	21	52.5
	Income more than expenses	13	32.5
Post-earthquake income status	Decrease compared with pre-earthquake	18	45.0
	Same as pre-earthquake	19	47.5
	Increase compared with pre-earthquake	3	7.5
Professional psychological support	Not receiving	37	92.5
	Receiving	3	7.5

3.2. Experiences of medical students related to earthquake and post-earthquake processes

The experiences of the students participating in the study related to earthquake and post-earthquake processes are shown in Table 2. 31 of the students experienced loss of a loved one, 36 of them suffered damage to residential building, 24 of them suffered loss of property, 19 of them migrated with their families in post-earthquake period, and 36 of them did not receive emotional/social/psychological support.

Table 2. Experiences of Medical Students Related to Earthquake and Post-earthquake Processes (Türkiye, 2023)

Characteristics		n	%
Loss of a loved one	No	9	22.5
	Yes, at least one person from family	7	17.5
	Yes, at least one person from friends	24	60.0
Damage to residential building	No	4	10.0
	Yes, less damage	26	65.0
	Yes, moderate damage	5	12.5
	Yes, much damage	5	12.5
Loss of property	No	16	40.0
	Yes	24	60.0
Post-earthquake migration	No	21	52.5
	Yes	19	47.5
Post-earthquake financial support	No	22	55.0
	Yes, insufficient	15	37.5
	Yes, sufficient	3	7.5
Post-earthquake emotional/social/psychological support	No	36	90.0
	Yes	4	10.0

3.3. Post-traumatic stress disorder levels in medical students

The mean score of the students on the DPETL scale was 63.5±14.1 and the median was 65 (28-91). 21 students (52.2%) scored above the group mean and 35 students (87.5%) scored between 43-80. The mean score for the behavioral problems subscale was 14.0±3.3, the mean score for the excitement limitations subscale was 16.7±5.3, the mean score for the affective subscale was 13.3±3.2, the mean score for the cognitive structuring subscale was 10.0±4.0, and the mean score for the sleep problems subscale was 9.5±2.9 (Table 3).

Table 3. Responses of Medical Students to the Determination of Post-earthquake Trauma Level (Türkiye, 2023)

	Items	Completely agree		Strongly agree		Moderately agree		Slightly agree		Strongly disagree		Subscales of the scale mean±ss median (min-max)
		n	%	n	%	n	%	n	%	n	%	
1	I have lost my appetite.	1	2.5	4	10.0	11	27.5	13	32.5	11	27.5	
2	I have become angrier/more frustrated.	4	10.0	6	15.0	14	35.0	7	17.5	9	22.5	Subscale 1
3	I have nightmares.	4	10.0	10	25.0	11	27.5	8	20.0	7	17.5	14.0±3.3
4	I cannot go indoors for fear of an earthquake.	2	5.0	0	0.0	10	25.0	18	45.0	10	25.0	14 (5-20)
5	I have lost my sense of confidence in the future.	7	17.5	6	15.0	11	27.5	10	25.0	6	15.0	
6	I feel that life has no meaning anymore.	3	7.5	8	20.0	7	17.5	12	30.0	10	25.0	Subscale 2
7	My will to live has diminished after what I experienced.	4	10.0	6	15.0	8	20.0	8	20.0	14	35.0	16.7±5.3
8	After the earthquake, I regret what I have done in my life.	4	10.0	6	15.0	10	25.0	13	32.5	7	17.5	17 (5-25)
9	I feel very helpless/powerless.	7	17.5	4	10.0	8	20.0	13	32.5	8	20.0	
10	I feel humiliated that I need help.	10	25.0	6	15.0	6	15.0	8	20.0	10	25.0	
11	After the earthquake, I have started to pay more attention to my behavior/relationships.	5	12.5	16	40.0	9	22.5	5	12.5	5	12.5	Subscale 3 13.3±3.2
12	I have become more aware of the value of my life.	9	22.5	14	35.0	11	27.5	4	10.0	2	5.0	13,5 (5-20)

13	I have become very emotional/I have cried for no reason.	8	20.0	4	10.0	5	12.5	11	27.5	12	30.0	
14	I worry about my children/parents/acquaintances/friends.	17	42.5	12	30.0	7	17.5	3	7.5	1	2.5	Subscale 4 10.0±4.0 10 (4-20)
15	I feel anxious thinking that there will be an earthquake at any moment.	4	10.0	11	27.5	14	35.0	6	15.0	5	12.5	
16	I visualize images of earthquakes.	10	25.0	13	32.5	8	20.0	7	17.5	2	5.0	
17	I worry about the future.	9	22.5	11	27.5	9	22.5	6	15.0	5	12.5	
18	I wake up suddenly from my sleep.	3	7.5	5	12.5	14	35.0	12	30.0	6	15.0	Subscale 5 9.5±2.9 10 (3-15)
19	I have difficulty falling asleep.	6	15.0	8	20.0	14	35.0	8	20.0	4	10.0	
20	I sleep less.	6	15.0	4	10.0	11	27.5	10	25.0	9	22.5	

3.4. Variables associated with post-traumatic stress disorder levels

Gender (male-medium effect), maternal education level (secondary school and below-low effect), pre-earthquake income status (income less than expenses-medium effect), professional psychological support (not receiving-large effect), loss of a loved one (no-small effect), damage to residential building (much damage-medium effect), loss of property (no-medium effect), and post-earthquake migration (no-medium effect) were the variables that increased the score on the scale, that is, increased the risk of PTSD. No significant effect size was calculated between age (z test family, Pearson r=-0.126), grade, paternal education level, post-earthquake income status, receiving post-earthquake financial and emotional/social/psychological support and scale score. The effect sizes and variables associated with students' scale scores are shown in Table 4.

Table 4. Effect Sizes and Variables Associated with Medical Students' Scores on the Determination of Post-earthquake Trauma Level (Türkiye, 2023)

Grouping Variables		Scale scores according to the grouping variable		Cohen's d effect size	The test family for the effect size
		Mean	SD		
Grade	4	65.13	14.38	0.064	F
	5	64.00	8.15		
	6	62.85	15.14		
Gender	Female	58.47	12.78	0.639*	t
	Male	67.13	14.08		
Maternal education level	Secondary school and below	65.44	11.26	0.256*	t
	High school and above	61.82	16.07		
Paternal education level	Secondary school and below	63.75	9.99	0.030	t
	High school and above	63.32	15.65		
Pre-earthquake income status	Income less than expenses	68.33	23.14	0.211*	F
	Income covers expenses	64.43	11.44		
	Income more than expenses	59.62	13.11		
Post-earthquake income status	Decrease compared with pre-earthquake	63.00	18.43	0.030	F
	Same as pre-earthquake	63.74	10.05		
	Increase compared with pre-earthquake	64.33	7.37		
Professional psychological support	Not receiving	64.27	13.90	0.785*	t
	Receiving	53.33	14.57		
Loss of a loved one	No	67.56	18.48	0.166*	F
	Yes, at least one person from the family	64.00	12.58		
	Yes, at least one person from friends	61.75	12.86		
Damage to residential building	No	67.75	10.08	0.209*	F
	Yes, less damage	61.69	14.30		
	Yes, moderate damage	62.80	17.33		
	Yes, much damage	69.80	13.57		

Loss of property	No	67.94	10.17	0.544*	t
	Yes	60.46	15.63		
Post-earthquake migration	No	66.10	13.90	0.399*	t
	Yes	60.53	14.02		
Post-earthquake financial support	No	63.95	14.55	0.040	t
	Yes, insufficient	62.73	15.01		
	Yes, sufficient	63.33	7.02		
Post-earthquake emotional/social/psychological support	No	63.44	14.48	0.004	t
	Yes	63.50	11.09		

*It indicates a significant effect size related to the scale score.

4. Discussion

In this study, the mean score of medical students on the DPETL scale was 63.5 and the median score was 65. Since the majority of the students scored between 43-80 points, a medium level of effect can be said. In two different studies using the same scale, the mean scores obtained from the scale were 23.1 and 64.6 (18,19). Compared with the Van-2011 earthquake, the recent devastating earthquake had a greater effect on students in terms of trauma and stress. In studies conducted in Türkiye after the Kahramanmaraş 2023 earthquake, the prevalence of PTSD was found to be 51.4% and 54.1% (20,21). In a study of medical students following the Kahramanmaraş 2023 earthquake, the prevalence of PTSD was found to be 43.5% (22). In a systematic review and meta-analysis study, the prevalence of PTSD in earthquake survivors was 23.7%, 38.7% in a study conducted 12 years after the Iran Bam 2003 earthquake, 21.5% after the China Wenchuan 2008 earthquake, and 23.9% after the Mexico Puebla 2017 earthquake (6, 23-25). The prevalence of post-earthquake PTSD in students was found to be between 10% and 39.3% (10,26-30). The prevalence of post-earthquake PTSD reported in these studies is mostly high. Although the prevalence varies, earthquakes can cause trauma and stress to the people who experience them. It is understandable and expected that the two recent major earthquakes in Türkiye have negatively affected medical students and that some of these students may be at risk for PTSD.

In the present study, male gender, low maternal education level, low pre-earthquake income status, and not receiving professional psychological support were recorded as sociodemographic variables that increased the score obtained from the scale. In studies conducted after the Türkiye Kahramanmaraş 2023 earthquake, younger age, female gender, low income status, and having a mental illness before the earthquake were identified as related variables (19-22). In a systematic review and meta-analysis study by Dai et al., including 46 studies, female gender and low education level were recorded as sociodemographic variables associated with PTSD (6). In a study conducted 10 years after the China Wenchuan 2008 earthquake, low income status was found to be associated with PTSD (31). In a study conducted after the Mexico Puebla 2017 earthquake, female gender was associated with PTSD (25). In two different studies conducted with students 1 month and 8 years after the Türkiye Van 2011 earthquake, female gender was found to be associated with PTSD (30,29). In a study conducted with students after the China Wenchuan 2008 earthquake, male gender and not receiving psychological support were found to be associated with PTSD (10). In the literature, there are studies that do not determine a relationship between PTSD and gender, as well as studies that mostly find a relationship with female gender. In the current study, male gender was found related. This may be because the group studied was students. Low maternal education and low income status can put individuals in a disadvantaged and vulnerable position in many situations. Not receiving professional psychological support may lead to an inability to cope with problems and manage the current situation.

In our study, it was determined that earthquake-related characteristics such as no loss of a loved one, much damage to residential building, no loss of property and no post-earthquake migration caused an increase in the scale scores. In studies conducted after the Türkiye Kahramanmaraş 2023 earthquake, being injured, being trapped under rubble, injury and/or death of a loved one, witnessing buildings

collapse, witnessing someone being seriously injured, destruction of the home, living in temporary housing, losing a large amount of property/money, and migrating to another city were found to be associated with PTSD (19-22). In a systematic review and meta-analysis by Dai et al. that examined PTSD in earthquake survivors, it was determined that damage to residential building increased the prevalence of PTSD (6). In a study conducted 10 years after the China Wenchuan 2008 earthquake, loss of a loved one was associated with PTSD (31). In a study conducted with students after the China Wenchuan 2008 earthquake, it was reported that loss of a loved one increased the prevalence of PTSD (10). In a study conducted with university students after the Türkiye Van 2011 earthquake, loss of a loved one and damage to residential building increased the prevalence of PTSD (30). In a study conducted with high school students 8 years after the Türkiye Van 2011 earthquake, loss of a loved one increased PTSD (29). Both in the literature and the current study, it is seen that similar earthquake-related characteristics are found to be effective on PTSD, in contrast to sociodemographic characteristics. In the current study, it was determined that situations opposite to the literature findings, such as no loss of a loved one (small effect) and no loss of property (medium effect) increased the risk of PTSD. Because the Türkiye Kahramanmaraş 2023 earthquake was a devastating earthquake that affected a large area and a large number of people, people who have already experienced loss of a loved one and loss of property may not experience PTSD or may experience it less than people who have not experienced these experiences by being affected by the atmosphere of this earthquake, thinking and feeling that they have already faced the worst possibilities. This may be related to the very small number of students in this study who did not experience loss of life or property. The presence of much damage to residential building may increase the probability of PTSD by increasing the perceived risk and bringing additional difficulties such as finding a new place to live. No post-earthquake migration may increase PTSD scale scores because staying in the same environment may require constant reminders of earthquake-related events and coping with new challenges.

5. Conclusion and Recommendations

The medical students scored between 28 and 91 on the DPETL scale, with a mean of 63.5 and a median of 65. The recent devastating earthquake caused students to experience trauma and stress. In our study, it was determined that variables that can be supported by existing studies in the literature, such as being male, low maternal education level, low pre-earthquake income status, not receiving professional psychological support, much damage to residential building, and no post-earthquake migration caused an increase in scale scores.

In Türkiye, which is a high-risk country in terms of earthquakes, it is important to raise earthquake awareness in the community and to make the structures and the community resilient to the destructive effects of earthquakes. In addition, it is necessary to provide both community-based and risk group-based mental health support after major earthquakes. To this end, legal arrangements should be made and multisectoral public health programmes prepared by multidisciplinary teams should be implemented.

Limitations

The study was conducted at a single center. Since this study was conducted with students who had come to the faculty for studying due to the earthquake, the sample was relatively small. These are the limitations of this study.

This study is one of the first conducted following a recent and devastating earthquake. PTSD and related variables in medical students in post-earthquake period is a rarely studied topic. A scale was used in this study. The effect sizes were calculated and presented in the analyzes. These are the highlights of the study.

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