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Research Article

The Effect of Traumatic Stress on Sleep and Attention in University Students who Experienced the 2023 Kahramanmaras Earthquake

Mine Argali Deniz[1*], Muhammed Furkan Arpaci[2] , Hidir Pekmez[2] , Rukiye Ciftci[3] , Sibel Atesoglu Karabas[4] , Ozlem Akay[5] , Davut Ozbag[6]

[1]*Suleyman Demirel University, Research and Application Hospital, Physical Therapy and Rehabilitation Unit, Isparta, Turkiye.*
[2]*Malatya Turgut Ozal University, Faculty of Medicine, Department of Anatomy, Malatya Turkiye.*
[3]*Gaziantep Islam and Technology University, Faculty of Medicine, Department of Anatomy, Gaziantep, Turkiye.*
[4]*Kahramanmaras Sutcu Imam University Faculty of Medicine, Faculty of Medicine, Department of Anatomy, Kahramanmaras, Turkiye.*
[5]*Gaziantep Islam Science and Technology University Faculty of Medicine, Department of Biostatistics, Gaziantep, Turkiye.*
[6]*Adıyaman University, Faculty of Medicine, Department of Anatomy, Adıyaman, Turkiye.*

Abstract

Aim: *The research was conducted to determine the post-traumatic stress of earthquake-affected medical students and to reveal the effects of this stress on sleep and attention.*
Methods: *458 earthquake-affected medical students were reached through Google Forms. Socio-demographic form, Traumatic Stress Symptom Scale, Richard-Cambell Sleep Scale and Adult Attention Deficit Hyperactivity Self-Report Scale were administered to all participants.*
Results: *More than 80% of the students affected by the earthquake experienced moderate-severe and severe trauma. It was observed that there was a relationship between the students' traumatic stress situations, their sleep quality and the possibility of suffering from attention deficit hyperactivity disorder (p=0.000).*
Conclusion: *We believe that creating psychological and social awareness caused by the earthquake will be effective in minimizing possible negativities. In addition, since lack of sleep and attention caused by stress after the earthquake may negatively affect students studying anatomy, precautions must be taken regarding course duration and methods.*

Key Words: *Attention, Earthquake, Sleep disorder, Student, Traumatic stress.*

* **Corresponding author:** Mine Argali Deniz, e-mail: minedeniz@sdu.edu.tr , ORCID ID: 0000-0001-8055-9530

Introduction

Türkiye experienced two major earthquakes centered in Kahramanmaraş on February 6, 2023. After these severe earthquakes, more than 50,000 people lost their lives, more than 100,000 people were injured, and many people in the region became homeless and unemployed, especially in Kahramanmaraş, Gaziantep, Malatya, Hatay, Adıyaman, Şanlıurfa, Diyarbakır, Adana, Osmaniye and Kilis provinces (1, 2). It is obvious that the large area affected by this earthquake, called the disaster of the century, and the large number of people exposed to the earthquake caused social trauma. Students were also seriously affected by the social trauma (3).

Post-traumatic stress symptoms, usually after trauma are considered the most common negative psychological reactions in social trauma. This situation is usually triggered by the traumatic event with fear and helplessness following direct or indirect exposure (hearing stories or seeing pictures) it presents with symptoms. The traumatic event is relived through flashbacks and uncontrollable dreams. After trauma, shock, fear, anger, sleep problems, intense panic, anxiety, hopelessness, concentration problems, social withdrawal reactions such as withdrawal and feelings of unhappiness may be observed (4) .

In addition to the stress experienced, one of the most important problems is sleep problems due to the fear of being exposed to trauma again and anxiety about the future (5, 6). In order to restore order after the earthquake, allocating dormitories to earthquake victims and providing online education, as the priority is to meet basic needs such as shelter, may affect both students' post-traumatic stress and their attention in education, too (7, 8).

The aim of our study was to determine the post-traumatic stress of volunteer medical students in Kahramanmaraş, Gaziantep, Malatya and Adıyaman provinces, which were among the provinces most affected by the earthquake, and to determine how this stress affects sleep and attention.

Method

A total of 458 students, 159 (34.7%) males and 299 (65.3%) females, were included in this prospective, cross-sectional and analytical study. In the study, all evaluations were delivered to earthquake-affected students studying at XXXXX University Faculty of Medicine via Google Forms, and surveys were administered to volunteer students. Criteria for inclusion in the study; All volunteer medical faculty students, between the ages of 18-65, who experienced the 2023 Kahramanmaraş-centered earthquake, who spoke Turkish

and did not have a mental or physical disorder that prevented them from understanding the questions, were included.

Permission for the study was received from the rectorates of XXXXX University. The study was started after receiving approval from X University Non-Interventional Clinical Research Ethics Committee (B.177/2023).

All students within the scope of the study were evaluated with a socio-demographic form, as well as Traumatic Stress Symptom Scale, Richard-Cambell Sleep Scale, and Adult Attention Deficit Hyperactivity Self-Report Scale surveys. In the socio-demographic form, age, gender, the distance of the place where the earthquake occurred to the earthquake epicenter, whether they felt the earthquake tremors or not, where they were during the earthquake, whether they were trapped under the rubble or not, whether their family and close circle experienced the earthquake, whether anyone lost their lives, house damage in the earthquake, property loss, post-earthquake status. The place of shelter, satisfaction with the aid provided after the earthquake, whether there was financial distress after the earthquake, whether they received psychological support, the level of fear experienced during the earthquake, fear of a possible earthquake, and the feeling of helplessness related to the control situation in life were questioned.

Post-Traumatic Stress Disorder Symptoms Scale: It is a self-report scale developed by Foa et al. (9) to diagnose Post-traumatic Stress Disorder (PTSD) based on 4 criteria. The lightest value taken from the scale is between 1 and 10, the middle value is between 11 and 20, and the medium and severe value is between 21 and 35. Values of 36 and above indicate severe PTSD.

Richard-Cambell Sleep Scale: The scale was developed by Richards in 1987, and its Turkish validity and reliability study was conducted by Karaman Özlü and Özer [9] in 2015. The scale questions the depth of night sleep, the time before falling asleep, the frequency of waking up, the time spent awake after waking up, the quality of sleep and the noise in the environment. Each item in the scale is evaluated by scoring between 0-100. A score of 0-25 indicates very poor sleep, and 76-100 indicates a very good sleep. In summary, a high score indicates a good sleep quality (10).

Adult Attention Deficit Hyperactivity Self-Report Scale: It is a scale developed by the World Health Organization (WHO). The scale consists of two subsections: section A - attention deficit and section B - hyperactivity\impulsivity. The scale is scored on a five-point Likert scale: 0 for never, 1 for rarely, 2 for sometimes, 3 for often, 4 for very often. A Turkish validity

and reliability study was conducted by Doğan et al. Scale grading: Those with 24 points and above are considered to have "highly likely Attention Deficit Hyperactivity Disorder (ADHD)", those with 17-23 points as "possible ADHD", and those with 0-16 points as not having ADHD (11).

Statistical Analysis: Sample of the study According to the analysis of previous studies using the Gpower 3.1 program. The sleep variable is based on the blind coefficient of 0.70, the effect size is 0.12, the delivery power is 90%, the lowest number of samples is n, with the prediction of type one error level of α: 0.05. Calculated as :368. Descriptive statistics of the variables used in the study are given as frequency and percentage values for qualitative variables, and mean, standard deviation, median, minimum and maximum values for quantitative variables. The suitability of quantitative variables to normal distribution was examined with the Kolmogorov-Smirnov test. One-way analysis of variance (ANOVA) test was used for comparisons of normally distributed variables in more than two groups, and LSD test was used as Post Hoc test. Mann-Whitney U test was used for pairwise group comparisons of variables that did not show normal distribution. Chi-square analysis was performed to examine the relationship between categorical variables. Cronbach's Alpha values were calculated for the traumatic stress symptom scale and the adult hyperactivity self-report scale and were found to be 0.938 and 0.903, respectively. It can be said that the scales are highly reliable. It was observed that the items in both scales were not additive (p<0.05) and that there was a difference between the measurements for both scales (p < 0.000). Analyzes were carried out with the help of IBM SPSS Statistics 25.0 program and the significance level was taken as p<0.05.

Results

Descriptive statistics of the ages of the male and female students included in the study are median (min-max) values of 20 (16-47), 20 (18-52), respectively, and there is a statistically significant difference in the age of the students according to their gender (p=0.041). The number of people and percentages of the questions asked to students about the earthquake are given in Table 1.

Table 1. Questions asked to students about earthquakes.

		n	%
How far was the place where you experienced the earthquake from the epicenter?	1 = Within 50 km of epicenter	186	40,6
	2 = 50-100 km away	140	30,6
	3 = more than 100km away	132	28,8
Have you felt the earthquake tremors?	1 = Yes	450	98,3
	2= No	8	1,7
Where were you during the earthquake?	1 = In a building	449	98,0
	2 = In the open / on the street	1	0,2
	3 = In a vehicle	3	0,7
	4 = Other	5	1,1
Have you been trapped under debris?	0 = No	452	98,7
	1 = Yes	6	1,3
Did your family or close friends experience the earthquake?	0 = No	22	4,8
	1 = Yes	436	95,2
Has anyone in your family or close friend lost their lives?	0 = No	272	59,4
	1 = Yes	186	40,6
House damage in earthquake?	1 = No damage	107	23,4
	2 = Light	203	44,3
	3 = Medium	50	10,9
	4 = Damaged Ruined	98	21,4
Property loss in an earthquake?	0 = No	234	51,1
	1 = Yes	224	48,9
Where did you stay after the earthquake?	1 = In my own home	201	43,9
	2 = In a new house	35	7,6
	3 = Tent-Container	49	10,7
	5 = Relative-friend side	122	26,6
	6 = Other	51	11,1
Are you satisfied with the help and support you received after the earthquake?	0 = No	259	56,6
	1 = Yes	199	43,4
Did you experience financial difficulties after the earthquake?	0 = No	233	50,9
	1 = Yes	225	49,1
Did you receive psychological support after the earthquake?	0 = No	418	91,3
	1 = Yes	40	8,7
How would you rate the fear you experienced during the earthquake, according to the scale?	0 = I have almost no fear	17	3,7
	1 = A little	38	8,3
	2 = Quite	73	15,9
	3 = Severe	96	21,0
	4 = Very Severe	234	51,1
How much fear/anxiety do you experience thinking about an earthquake that may happen in the near future?	0 = I have almost no fear/anxiety	21	4,6
	1 = A little	82	17,9
	2 = Quite	110	24,0
	3 = Severe	116	25,3
	4 = Very Severe	129	28,2
How much control do you think you have over your life?	0 = I have no control, I feel very helpless	189	41,3
	1 = I have some control, I feel quite helpless	184	40,2
	2 = I have a lot of control, feel a little helpless	66	14,4
	3 = I have complete control, I don't feel helpless at all	19	4,1

n: Number of people, %: Percentage

Questions with many and excessive answers in the evaluation of the number and percentage rates according to the traumatic stress symptom scale: "1. I cannot get some memories/images about the earthquake out of my mind", "2. Sometimes my experiences suddenly flash before my eyes like a film strip and it is as if I am experiencing everything again.", "12. I get startled when there is a sudden sound or movement.","13. I feel uncomfortable when anything reminds me of my experiences with the earthquake." 180 (49.3%), 175 (38.2%), 199 (43%) respectively. .4) and 190 (41.5%). The number and percentage values of the questions "18. I feel guilty" and "22. I feel sad and dejected", to which a high rate of answers are 'never', are 232 (50.7%) and 317 (69.2%) (Table 2).

Table 2. Traumatic Stress Symptom Scale.

Survey Questions		None n (%)	A little bit n (%)	Quite n (%)	Much and Extreme n (%)
1.	I can't get some memories/images about the earthquake out of my mind.	31 (6,8)	94 (20,5)	153 (33,4)	180 (39,3)
2.	Sometimes my experiences suddenly flash before my eyes like a movie strip and I feel like I'm reliving everything.	39 (8,5)	114 (24,9)	130 (28,4)	175 (38,2)
3.	I often have scary dreams.	129 (28,2)	162 (35,4)	88 (19,2)	79 (17,2)
4.	I cannot do some things easily for fear of another earthquake (for example: entering safe houses, taking a bath, sleeping alone or in the dark).	116 (25,3)	135 (29,05)	111 (24,2)	96 (21,0)
5.	My interest in life has diminished.	72 (15,7)	124 (27,1)	128 (27,9)	134 (29,3)
6.	I feel that I am estranged from people and alienated from them.	91 (19,9)	143 (31,2)	113 (24,7)	111 (24,2)
7.	It feels like my emotions are dead.	100 (21,8)	123 (26,9)	119 (26,0)	116 (25,3)
8.	I'm having trouble sleeping.	100 (21,8)	132 (28,8)	116 (25,3)	110 (24,0)
9.	I get angry or angry more easily.	92 (20,1)	107 (23,4)	121 (26,4)	138 (30,1)
10.	I experience forgetfulness or have difficulty concentrating on what I am doing.	63 (13,8)	92 (20,1)	129 (28,2)	174 (38,0)
11.	I remain alert, worried that an earthquake will occur at any moment.	78 (17,0)	158 (34,5)	125 (27,3)	197 (21,2)
12.	I get startled when there is a sudden sound or movement.	32 (7,0)	106 (23,1)	121 (26,4)	199 (43,4)
13.	I feel uncomfortable when anything reminds me of my experiences with the earthquake.	44 (9,6)	101 (22,1)	123 (26,9)	190 (41,5)
14.	I'm trying to get the thoughts and feelings about the events I experienced during the earthquake out of my mind.	73 (15,9)	109 (23,8)	146 (31,9)	130 (28,4)
15.	I have difficulty remembering some parts of the events I experienced during the earthquake.	130 (28,4)	143 (31,2)	103 (22,5)	82 (17,9)
16.	Since the earthquake made me realize that I could die at any moment, making long-term plans seems pointless to me.	66 (14,4)	95 (20,7)	105 (22,9)	192 (41,9)
17.	When anything reminds me of my experiences with the earthquake, I experience physical symptoms such as palpitations, sweating, dizziness, and tension in my body.	153 (33,4)	138 (30,1)	93 (20,3)	74 (16,2)
18.	I feel guilty.	232 (50,7)	112 (24,5)	62 (13,5)	52 (11,4)
19.	I feel sad.	43 (9,4)	136 (29,7)	138 (30,1)	141 (30,8)
20.	I can't enjoy life like I used to.	58 (12,7)	111 (24,2)	128 (27,9)	161 (35,2)
21.	I am hopeless about the future.	87 (19,0)	121 (26,4)	103 (22,5)	147 (32,1)
22.	From time to time, thoughts of killing myself cross my mind.	317 (69,2)	66 (14,4)	37 (8,1)	38 (8,3)
23.	My strength to do my daily tasks has decreased.	102 (22,3)	145 (31,7)	119 (26,0)	92 (20,1)

Data according to the Richard-Campell sleep scale are given in Table 3, and the highest value is seen in the 'noise level' (65.80±35.16) (Table 3).

Table 3. Richard-Campell scale results.

Sleep scale items	**Mean±Standard Deviation** **Median (Min-Max)**
Depth of sleep	52,81±25,46 50 (0-100)
Falling asleep	44,93±29,35 50,00 (0-100)
Frequency of waking up	54,60±33,80 50,00 (0-100)
Awake time	51,83±31,71 50,00 (0-100)
Sleep quality	53,10±29,66 55,00 (0-100)
Noise level	65,80±35,16 80,00 (0-100)
Scale total score average	323,10±133,36 320,00 (0-600)

Adult Attention Deficit Hyperactivity Self-Report Scale (ADHD) assessment numbers and percentages are given in Table 4.

Table 4. Adult Attention Deficit Hyperactivity Self-Report Scale (ADHD) results.

SECTION A	**Never n (%)**	**Rarely n (%)**	**Sometimes n (%)**	**Frequent n (%)**	**Very often n (%)**
1.Do you have problems collecting the final details of a job/project you are working on and completing the project?	57 (12,4)	94 (20,5)	150 (32,8)	87 (19,0)	70 (15,3)
2. How often do you have difficulty keeping things in order when you have to do a job that requires organization?	53 (11,6)	139 (30,3)	146 (31,9)	74 (16,2)	46 (10,0)
3.How often do you have trouble remembering your obligations and appointments?	82 (17,9)	146 (31,9)	126 (27,5)	60 (13,1)	44 (9,6)
4. If you have to do a job that requires a lot of thinking and concentration, how often do you avoid or delay getting started?	32 (7,0)	81 (17,7)	109 (23,8)	103 (22,5)	133 (29,0)
5. When you have to sit for a long time, how often do you become restless, feel the need to move, or move your hands and feet?	27 (5,9)	68 (14,8)	114 (24,9)	123 (26,9)	126 (27,5)
6. How often do you feel overactive and compelled to do things as if you were stuck on a motor?	62 (13,5)	133 (29,0)	150 (32,8)	61 (13,3)	52 (11,4)
SECTION B					
7.When you have to work on a boring or difficult project, how often do you make careless mistakes?	23 (5,0)	123 (26,9)	157 (34,3)	99 (21,6)	56 (12,2)

Table 4. Adult Attention Deficit Hyperactivity Self-Report Scale (ADHD) results (continued).

8. How often do you have difficulty sustaining attention when doing a monotonous or repetitive task?	20 (4,4)	77 (16,8)	148 (32,3)	118 (25,8)	95 (20,7)
9. How often do you have difficulty concentrating and listening to what people say to you, even if they are speaking directly to you?	46 (10,0)	119 (26,0)	135 (29,5)	95 (20,7)	63 (13,8)
10. How often do you have trouble finding things at home or at work or remembering where you put them?	45 (9,8)	142 (31,0)	118 (25,8)	87 (19,0)	66 (14,4)
11. How often are you distracted by the activity and noise around you?	18 (3,9)	79 (17,2)	133 (29,0)	123 (26,9)	105 (22,9)
12. How often do you leave your seat during a meeting or similar situation when you are expected to remain seated there?	84 (18,3)	143 (31,2)	131 (28,6)	65 (14,2)	35 (7,6)
13. How often do you feel restless or fidgety?	34 (7,4)	105 (22,9)	174 (38,0)	93 (20,3)	52 (11,4)
14. How often do you have difficulty unwinding and relaxing when you have free time of your own?	52 (11,4)	130 (28,4)	130 (28,4)	84 (18,3)	62(13,5)
15. When you are in social situations, how often do you catch yourself talking too much?	56 (12,2)	145 (31,7)	135 (29,7)	84 (18,3)	37 (8,1)
16. In a conversation or meeting, how often do you find yourself finishing a sentence before the other person has finished it?	77 (16,8)	147 (32,1)	129 (28,2)	68 (14,8)	37 (8,1)
17. When it comes to queuing, how often do you have difficulty waiting for your turn?	85 (18,6)	131 (28,6)	124 (27,1)	71 (15,5)	47 (10,3)
18. Do you interrupt and block other people when they are busy doing something else?	197 (43,0)	135 (29,5)	77 (16,8)	31 (6,8)	18 (3,9)

When students' sleep quality was compared according to traumatic stress situations, a statistically significant difference was found. Sleep perceptions of students with severe traumatic stress differ from those with mild, moderate, and moderate and severe traumatic stress (Table 5).

Table 5. Comparison of students' sleep quality according to traumatic stress situations.

	Traumatic Stress Situation				
	Light (N=24)	**Medium (N=57)**	**Medium and Severe (N=141)**	**Severe (N=236)**	
	Mean±Standard Deviation	**Mean±Standard Deviation**	**Mean±Standard Deviation**	**Mean±Standard Deviation**	**P value**
Sleep quality	392,91±136,26	381,22±136,59	353,47±131,23	283,81±121,01	0.000[1]

[1]: One-way Variance Analysis

It has been observed that there is a relationship between students' traumatic

stress situations and their likelihood of having ADHD. Students with severe traumatic stress situations are likely to have ADHD (Table 6).

Table 6. Relationship between students' traumatic stress situations and their likelihood of having ADHD.

	Likelihood of having ADHD			
Traumatic stress situation	**Not ADHD**	**Possible ADHD**	**Highly likely ADHD**	**P value**
Light	9 (37,5)	6 (25,0)	9 (37,5)	0.000[2]
Middle	7 (12,3)	14(24,6)	36 (63,2)	
Medium ad severe	8 (5,7)	25 (17,7)	108 (76,6)	
Severe	6 (2,5)	8 (3,4)	222 (94,1)	

[2]: Pearson Chi-Square

Discussion

Our study started approximately 4 months after the Kahramanmaraş earthquake and showed that the post-traumatic stress of the 458 earthquake victims participating was mild (N=24), moderate (N=57), medium-severe (141), and severe (N=236). As a result, over 80% of people experience severe trauma. Wang et al. showed that the prevalence of PTSD was 62.8% one month after the China-Wenchuan earthquake, 43% two months after the earthquake, and 37.8% three months after the earthquake (12). Boztas et al. reported the PTSD rate as 35% 9 months after the Türkiye-Van earthquake (13). In the study conducted by Eksi and Braun, PTSD was recorded as 18.9% 18-20 months after the 1999 Turkey-Marmara earthquake (14). Bedirli reported that the PTSD rate was 12.4% 14 years after the Marmara earthquake (15). Experts report that the Kahramanmaras earthquake was the most severe and destructive earthquake that occurred on land in the world after the 1939 Erzincan earthquake. According to the literature, we think that the reason why the PTSD rate was over 80% in our study may be due to the large number of individuals living in a building that experienced an earthquake and very close to the earthquake epicenter. In addition, experts emphasize that the Kahramanmaras earthquake was the most severe and destructive earthquake that occurred on land in the world after the 1939 Erzincan earthquake (16), which supports the fact that the trauma experienced after this earthquake can be severe.

Studies have shown that sleep disorders may occur after large-scale natural disasters such as earthquakes (17, 18). Sleep relieves the emotional burden of memories, processes and stores emotional experiences. When sleep is affected, the mechanism is disrupted and the emotional parts of

memories undergo hyperconsolidation (19). It has been reported that after large-scale disasters, sleep problems increase by two or three times, subsequently increasing earthquake-related stress, without any uncertainty. In our study, a greater decrease in sleep quality was detected in earthquake victims who experienced severe post-earthquake traumatic stress (0.0001). Not only was the intensity of the earthquake much higher than the earthquakes experienced in recent years, but also the constant aftershocks that occurred even after months had also triggered people's sleep problems.

Although the relationship between Post-Traumatic Stress Disorder (PTSD) and attention deficit hyperactivity disorder (ADHD) has been a topic of interest lately, not enough studies on the subject have been found in literature searches. Therefore, the evidence that can support the hypothesis that ADHD may be a risk factor for the emergence of PTSD is weak (8). In their study of 317 undergraduate students after the 2011 Van earthquake, Ozdemir et al concluded that ADHD comorbidity is not a dominant predisposing factor in the post-traumatic stress response, but if the person has PTSD, it will cause symptoms to worsen (8). In our study, it was observed that there was a relationship between students' traumatic stress situations and their probability of having ADHD (0.0002). It was concluded that individuals with poor traumatic stress situations are likely to have ADHD. We think that this result may be due to the fact that the aftershocks after the Kahramanmaras earthquake are still continuing and that people have not been able to enter their homes for months and there have been problems in meeting their basic needs.

Conclusion

In the earthquake that affected 11 provinces centered in Kahramanmaras, the study population included students in the provinces of Kahramanmaras, Adıyaman, Malatya and Gaziantep; the situation in other provinces could not be evaluated, and the distribution was not similar among the provinces are among limitations of this study. Another limitation of the study is that collecting the study data 6 months after the earthquake may affect the findings differently. We also think that there is a need for studies investigating the effects of long-term traumatic stress of the earthquake on sleep and attention in earthquake-affected students.

It is very important for individuals' mental health and public health to obtain preliminary information about the potential psychological effects of the earthquake and educate individuals on the subject. We believe that being prepared for the

psychological problems caused by the earthquake and creating psychological and social awareness about natural disasters will be effective in overcoming these negativities.

Conflict of Interest

There is no conflict of interest regarding the research.

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