

**RESEARCH
ARTICLE**

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Post-Traumatic Stress and Associated Factors among Healthcare Workers in the Early Stage Following the 2020 Malatya-Elazığ Earthquake

ABSTRACT

Objective: An earthquake is a natural disaster that seriously affects individuals physically and psychologically. Although there has been a great deal of research on the psychological effects of earthquakes, few have focused on local health workers and its early effects. In this study, it is aimed to determine the levels and predictors of early post-earthquake trauma of the local health workers working in the affected area in the earthquake that occurred on January 24, 2020, Malatya-Elazığ.

Methods: This cross-sectional descriptive study was carried out on a sample of 201 healthcare workers after three weeks from of the earthquake. In order to determine the factors that may affect the trauma response in the participants, a questionnaire was applied to question demographic variables, previous traumatic experiences, concerns and losses at the time of the earthquake, and institutional and social expectations. Post-Earthquake Trauma Level Determining Scale was used to record post-earthquake trauma levels, and TEMPS-A was used to determine dominant temperament characteristics.

Results: Severe trauma level was detected in 25.8% of the participants. Trauma scores were higher in women, those who were married, those who had children, those who experienced the earthquake for the first time and those who had anxiety about losing their own life or their relatives life during the earthquake. In the logistic regression analysis, it was determined that anxious temperament and fear of losing a loved one during an earthquake increased the severity of trauma, whereas a previous earthquake history decreased it.

Conclusions: Detection of the factors associated with the trauma response is important both in terms of protecting the mental health of health workers and ensuring the continuity of health services in disasters such as earthquakes that affect millions of people.

Keywords: Healthcare Worker, Earthquake, Trauma, Sociodemographic Characteristics, Temperament, Related Factors.

2020 Malatya-Elazığ Depremi Sonrası Erken Dönemde Sağlık Çalışanları Arasında Travma Sonrası Stres ve İlişkili Faktörler

ÖZET

Amaç: Deprem fiziksel ve psikolojik olarak bireyleri ciddi şekilde etkileyen bir doğa felaketidir. Depremi oluşturduğu psikolojik etkiler üzerine yürütülen çok sayıda araştırma olmasına rağmen, bunların çok azı yerel sağlık çalışanlarına ve erken dönem etkilerine odaklanmıştır. Bu çalışmada, 24 Ocak 2020 Malatya-Elazığ depreminde, etkilenen bölgede çalışan yerel sağlık çalışanlarındaki erken dönem travma düzeylerinin ve yordayıcılarının tespit edilmesi amaçlanmıştır.

Gereç ve Yöntem: Kesitsel-tanımlayıcı nitelikteki bu çalışma, depremden üç hafta sonra 201 sağlık çalışanından oluşan bir örneklem üzerinde yürütülmüştür. Katılımcılara travma yanıtını etkileyebilecek faktörleri tespit etmek için demografik değişkenleri, önceki travmatik yaşantıları, deprem anındaki kaygı ve kayıpları, kurumsal ve sosyal beklentileri araştıran bir anket uygulandı. Deprem sonrası travma düzeylerinin belirlenmesinde "Deprem Sonrası Travma Düzey Belirleme Ölçeği" ve baskın mizaç özelliklerinin belirlenmesinde TEMPS-A kullanıldı.

Bulgular: Katılımcıların %25.8'inde şiddetli travma düzeyi tespit edildi. Kadınlarda, evli olanlarda, çocuğu olanlarda, ilk kez deprem yaşamış olanlarda deprem sırasında yakınları ve kendi hayatını kaybetmekle ilgili kaygı yaşayanlarda travma puanları yüksekti. Yapılan lojistik regresyon analizinde anksiyöz mizaç özelliği ve deprem sırasında bir yakını kaybetme korkusu yaşamının travma şiddetini arttırdığı tespit edilirken, daha önce deprem yaşama öyküsünün azalttığı belirlendi.

Sonuç: Travma yanıtıyla ilişkili faktörlerin tespiti hem sağlık çalışanlarının ruhsal sağlığını korumak hem de milyonlarca insanı etkileyen deprem gibi afetlerde sağlık hizmetlerinin devamlılığını sağlamak açısından önemlidir.

Anahtar Kelimeler: Sağlık Çalışanı, Deprem, Travma, Sosyodemografik Özellikler, Mizaç, İlişkili Faktörler.

INTRODUCTION

Traumatic experiences occur during the normal course of life and disrupt people's adaptation to life by deactivating their coping mechanisms (1). Unlike ordinary adversities, traumatic events involve threat, violence or death risk to the lives or integrity of the individuals (2). Traumatic experiences are generally common, one study showed that more than two-thirds of the general population may experience a significant traumatic event at some point in their lives (3). War, violence, terrorist attack etc. and natural and man-made disasters are among the important traumatic events (4).

Earthquakes are one of the most studied natural disasters because they occur frequently and affect people's lives profoundly and cause significant psychological damage (3,5). Most research studies on the psychological impact of earthquakes concluded that survivors display different levels of post-traumatic stress symptoms (6). If these symptoms are not properly treated promptly, they can develop into depression, post-traumatic stress disorder (PTSD) etc. (7). PTSD is an important disease that is common after an earthquake, causes serious disability and persists for a long time (3,5). For this reason, it is important to recognize the early psychological stress after the earthquake and to determine the related factors in terms of protecting both personal and public health (8-12).

The probability of developing PTSD after an earthquake is related to the magnitude of the earthquake, preparedness, location during the earthquake, injuries or near-death experiences, dead or missing family members, material losses, reactions to the trauma (dissociation, coping and other reactions), work-related stress factors (lack of communication, heavy workload, etc.) and post-traumatic factors (symptoms, social support and other daily-life sources of stress) (13,14). However, exposure to disaster trauma might not be enough on its own to explain how individuals develop PTSD. Sex, age, education, family history, psychiatric disorders, genetic and neuroendocrine factors, temperament traits and early and late-life traumas might increase individual vulnerability to developing PTSD (15,16).

In recent years, although a large number of studies focused on victims and "traditional" first responders such as police officers, firefighters, emergency medical technicians and military personnel (17-22), body of research on general healthcare professionals is rather limited. Most of these studies have focused on the resistance and reaction levels of healthcare professionals and especially on the mild and long-term psychological impacts of earthquakes, neglecting early-term effects (23,24).

Therefore, targeting this gap concerning healthcare professionals is vital. This is because

these individuals, in addition to being survivors of the disaster, play an important role in terms of maintaining the continuation of healthcare services during the earthquake, participating in rescue efforts when necessary, and restoring the psychological health of society (25).

On January 24, 2020, a large earthquake with a magnitude of 6.8 on the Richter scale, where the epicenter is in Sivrice district of Elazığ, occurred in Eastern Turkey, lasting approximately 22 seconds on 20.55 pm. Thousands of people were exposed to a life-threatening situation due to the earthquake and forty one people died while 1607 people were injured. More than 1000 aftershocks that occurred within the weeks following the earthquake in the region, which has not experienced any major earthquakes for nearly 150 years, caused fear and anxiety in the entire population (26).

In this study, it was aimed to determine the levels and predictors of early post-earthquake trauma of the local health workers in the 3rd week after the 2020 Malatya-Elazığ earthquake.

MATERIAL AND METHODS

The study was designed as a cross-sectional study and approved by the Ethical Committee of Malatya İnönü University (2020/499). Three weeks after the earthquake, 201 people selected from the health care workers working in the community health center, family health center, and 112 health centers affiliated to Malatya Provincial Health Directorate were included in the study. Since participation in the study was voluntary, patients who refused to participate and whose data were missing were excluded from the study.

Data Form: The researchers handed out a survey form consisting of four parts to the participants. The first part of the survey included questions on sociodemographic characteristics concerning age, sex, education level, marital status, parental status, family type (nuclear: parents and their children, or extended: parents and their children as well as other relatives) monthly income, history of psychiatric disorders, and history of chronic medical disease (diabetes, malignancy, cardiovascular diseases etc). The second part consisted of questions assessing traumatic incidents occurring during any life stage of the participants (childhood trauma, accident, assault, other natural disasters, etc.). The third part of the survey included questions about the earthquake which were prepared by the authors inspired from previous studies. These questions are given in Table 2. In the fourth part, there were questions about the scales investigating trauma level and temperament characteristics.

The survey forms were given to all participants after the earthquake within two consecutive days to minimize temporal differences in trauma response.

Post-Earthquake Trauma Level Determining Scale: The scale was developed by Tanhan and Kayri following the Van earthquake in Turkey to measure levels of post-traumatic stress (27). The scale analyzes 5 factors indicating trauma response, namely "Behavior Problems" (appetite loss, becoming more angry/aggressive, nightmares, claustrophobia arising from the fear of another earthquake), "Emotive Limitedness" (loss of hopes for the future, loss of a sense of the meaning of life, decrease in the will to live, feeling helpless/weak), "Affective Response" (feeling abashed because of needing help, increased attention on behaviors/relationships after the earthquake, appreciating life more, becoming more emotional/crying without any reason), "Cognitive Structure" (worries about children/parents/acquaintances/friends, constant anxiety about another earthquake, reliving the instances of the earthquake, worries about the future), and "Sleep Problems" (waking up suddenly, having trouble falling asleep, sleeping less). The lowest score in the scale of 20 items is 20 while the highest possible score is 100. The increase in the scores indicates the rise in the extent to which individuals are affected by the earthquake. As the original scale stated that the score range of 52.385 ± 5.051 (mean \pm SD) indicates a threshold at which individuals are traumatized. Above and below this threshold value points out low and high levels of traumatization. In this study, the threshold value was accepted as 52.385 (27). The measured Cronbach alpha internal consistency coefficient of the scale was 0.66 for the 'Behaviour Problems' sub-category, 0.70 for 'Emotive Limitedness', 0.72 for 'Affective Response', 0.59 for 'Cognitive Structure', 0.89 for 'Sleep Problems' and 0.93 for all items.

Temperament Evaluation of Memphis, Pisa, Paris, San Diego-Auto-Questionnaire (TEMPS-A): Developed by Akiskal and colleagues in 1997 to evaluate the dominant affective temperament (28), the scale was translated into Turkish by Vahip and colleagues in 2005, who then tested its validity and reliability (29). The scale consists of 5 sub-sections and a total of 99 items to identify depressive, hyperthymic, cyclothymic, irritable, and anxious temperaments.

In this study, the Cronbach alpha internal consistency coefficient of the scale was calculated as 0.762 for the depressive subgroup, 0.875 for the cyclothymic, 0.837 for the hyperthymic and 0.870 for the anxious in the reliability analysis of the scale. The internal reliability coefficient, which includes all subgroups of the Temperament Evaluation of Memphis, Pisa, Paris, San Diego-Auto-Questionnaire (TEMPS-A), was 0.910.

Statistical Analysis: In all analyses, the SPSS 23.0 software was used. Continuous variables are expressed as mean \pm standard (mean \pm SD) deviation. Categorical variables were compared

using Chi-square tests and expressed as numbers and percentages. The suitability of the data for normal distribution was determined by the Kolmogorov-Smirnov test. Continuous variables with normal distribution were compared between groups using Student's t-test. Categorical comparisons were made using the chi-square test. One-way ANOVA tests were used to evaluate the difference between more than two independent groups. Multiple comparisons were carried out by Bonferroni test. Pearson correlation test was used in the correlation analysis. Logistic regression analysis was used to identify independent predictors of trauma response severity. A value of $p < 0.05$ was considered statistically significant.

RESULTS

In this study, 201 healthcare workers participated, of whom 143 (71.1%) were female and the remaining 58 (28.9%) were male. The mean age of the participating healthcare professionals was 35.9 ± 8.9 years. Seventy-five (37.4%) of the participating healthcare professionals were physicians, 70 (34.9%) were nurses or midwives, 31 (15.3%) were health clerks and 25 (12.4%) were emergency medical technicians.

The PETS total score was 41.32 ± 16.24 . The sub-scores were as follows: 'Behaviour Problems', 6.27 ± 3.1 ; 'Emotive Limitedness', 8.49 ± 4.72 ; 'Affective', 8.68 ± 3.51 ; 'Cognitive Structures', 10.61 ± 4.63 ; and 'Sleep Problems', 6.80 ± 3.78 .

None of the participants included in the study had a history of earthquake injury. Six participants (3%) had relatives with a history of injury in an earthquake, of whom two (1%) lost one relative in the earthquake. After the earthquake, only one person, who was a health worker, received psychological support.

The analysis of the relationship between sociodemographic variables and trauma scores of healthcare professionals revealed that female participants had statistically higher total scores and sub-scores on the PETS scale compared to their male colleagues ($p < 0.001$ for all domains). In terms of marital status, married participants had statistically higher PETS sub-scores for the cognitive dimension of the scale ($p = 0.048$) with no significant differences for other sub-scores ($p > 0.05$). The PETS total, emotional, affective and cognitive scores were significantly higher in those with at least one child compared to those without children ($p = 0.002$, $p = 0.001$, $p = 0.015$, $p = 0.002$, respectively). The participants living within a nuclear family had higher cognitive PETS sub-scores ($p = 0.028$) with no other differences when compared to those living alone or within an extended family. Those with a history of psychiatric disorders had a higher emotive PETS sub-score than those without such a history ($p = 0.047$) (Table 1).

Table 1. The relationship between the socio-demographic characteristics and the scores of the PETS of healthcare professionals

Socio-demographic characteristics	n (%)	PETS total score mean±SD	p value	Behavior Problems score mean±SD	p value	Emotive Limitedness score mean±SD	p value	Affective score mean±SD	p value	Cognitive Structures score mean±SD	p value	Sleep Problems score mean±SD	p value
Gender													
Male	143(71.1)	44.7±16.5	<0.001**	6.8±3.3	<0.001**	9.1±4.9	<0.001**	11.6±4.4	<0.001**	9.3±3.3	<0.001**	7.6±3.7	<0.001**
Female	58(28.9)	32.8±11.7		4.9±1.6		7.1±3.3		8.1±3.6		7.3±3		5 ±2.9	
Marital Status													
Married	152(75.6)	42.4±16.4	0.064	6.4±3	0,187	8.8±4.7	0.161	11±4.5	0.137	8.9±3.4	0.048*	7±3.8	0.278
Single/Widow/Divorced	49(24.4)	37.7±15.1		5.9±3.2		7.6±4		9.6±4.5		8.1±3.2		6.3±3.3	
Having Children													
Yes	133(66.1)	43.7±16.5	0.002*	6.5±3.1	0.05	9.2±4.8	0.001*	11.3±4.5	0.015*	9.2±3.3	0.002*	7.1±3.9	0.192
No	68(33.9)	36.6±14.6		5.7±2.8		7.2±3.7		9.2±4.3		8±3.2		6.3±3.2	
Family Type													
Nuclear family	153(76.1)	42.6±16.3		6.4±3.0		8.8±4.7		9.0±3.4		11.0±4.4		7.0±3.9	
Extended family	29(14.4)	36.2±14.2	0.110	5.2±2.3	0.139	6.7±3.7	0.077	7.5±3.3	0.050	9.6±5.1	0.028*	5.7±3.3	0.262
Alone	19(9.5)	38.5±17.1		6.5±3.4		8.0±5.3		7.7±3.9		8.4±4.7		6.7±3.7	
History of psychiatric disorder													
Yes	7(3.5)	45.7±17.7	0.500	6.4±2.5	0.721	13±7	0.047*	11±3.9	0.487	7.8±3.2	0.796	7±3.9	0.885
No	194(96.5)	41.1±16.2		6.3±3		8.4±4.4		10.6±4.5		8.8±3.3		6.8±3.7	
History of chronic medical disease													
Yes	28 (14)	39.8±14.6	0.734	5.6±2.2	0.349	7.9±4	0.483	11.1±4.4	0.720	8.4±3.1	0.561	6.5±3.7	0.675
No	173 (86)	41.5±16.5		6.4±3.1		8.6±4.7		10.5±4.5		8.8±3.4		6.9±3.7	
Family history of psychiatric disorder													
Yes	14 (7)	45±17.1	0.363	6.9±3	0.239	10.3±6.4	0.330	11±3.8	0.739	9±3	0.718	7.7±3.8	0.357
No	187 (93)	41±16.1		6.2±3.0		8.4±4.4		10.6±4.6		8.7±3.4		6.8±3.7	

* p<0.05, **p<0.001

Table 2. Relationship between the history of past traumas/earthquake experiences and the data on the Elazığ-Malatya earthquake and PETS scores

	n (%)	PETS total score mean±SD	p value	Behavior Problems score mean±SD	p value	Emotive Limitedness score mean±SD	p value	Affective score mean±SD	p value	Cognitive Structures mean ±SD	p value	Sleep Problems score mean±SD	p value
History of traumatic experience													
Yes	21 (10.5)	40.1±11.7	0.780	6.1±1.9	0.546	7.5±3.9	0.257	10.8±3.9	0.273	7.7±2.7	0.625	7.8±3.4	0.140
No	180(89.5)	41.4±16.5		6.3±3.1		8.6±4.6		10.6±4.6		8.8±3.4		6.8±3.7	
History of experience of Earthquake													
Yes	75 (37.4)	36.2±12.2	0.002*	5.3±1.9	0.005*	7.3±3	0.016*	9.6±4.3	0.001*	7.7±3	0.014*	6.1±3.1	0.061
No	126(62.6)	44.2±17.6		6.8±3.4		9.3±5.2		11.2±4.6		9.3±3.4		7.3±3.9	
Which province were you in during the earthquake?													
Elazığ/Malatya	181(90)	42±16.5	0.069	6.3±3.1	0.356	8.7±4.7	0.137	10.9±4.5	0.031*	8.9±3.4	0.016*	6.9±3.7	0.234
Other	20(10)	34.8(±11.6)		5.8±2.4		7.3±3.4		8.3±3.4		7.3±2.7		6±3.3	
Were you alone during the earthquake?													
Yes	12(6)	40.8±15.9	0.961	6±2.8	0.840	7.3±4.7	0.126	9.3±2.8	0.457	11±4.7	0.847	7±3.6	0.783
No	189 (94)	41.3±16.3		6.3±3		8.6±4.6		8.7±3.4		10.6(±4.5)		6.8±3.7	
Did you ever think that you would die during the earthquake?													
Yes	105(52.2)	46.8±17.1	<0.001**	7.1±3.5	<0.001**	9.5±5.1	0.001*	9.7±3.3	<0.001**	11.9±4.4	<0.001**	8.2±3.8	<0.001**
No	96(47.8)	35.3±12.7		5.4±2.1		7.5±3.7		7.7±3.1		9.2±4.2		5.3±2.9	
Did you ever think that a family member of you would die during the earthquake?													
Yes	124(61.6)	45.5±16.8	<0.001**	6.8±3.3	0.001*	9.2±5	0.021*	9.5±3.3	<0.001**	11.8±4.5	<0.001**	7.8±3.8	<0.001**
No	77(38.4)	34.4±12.6		5.4±2.3		7.5±3.5		7.5±2.9		8.8±3.9		5.2±2.8	
Have you ever seen someone died or injured during the earthquake?													
Yes	29(14.5)	41.4±16.8	0.986	6.6±3.3	0.764	7.6±3.6	0.462	9.1±3.5	0.621	10.9±4.8	0.756	7.1±4.2	0.950
No	172(85.5)	41.2±16.1		6.2±3		8.7±4.7		8.7±3.3		10.6±4.5		6.8(±3.6)	
Was your home damaged?													
Yes	33(16.5)	43.2±16.4	0.455	6.2±3.2	0.665	9.3±5.2	0.435	8.6±3.2	0.867	11.8±4.8	0.125	7±4	0.877
No	168(83.5)	40.9±16.2		6.3±3		8.4±4.4		8.8±3.4		10.4±4.4		6.8±3.6	
Have you experienced material loss?													
Yes	22(11)	42.1±17.5	0.941	7.3±3.6	0.115	9.2±4.8	0.486	8.7±4.1	0.792	10.5±4.5	0.943	6.2±3.6	0.391
No	179(89)	41.2±16.1		6.1±2.9		8.5±4.6		8.8±3.2		10.6±4.5		6.9±3.7	
Have you received help from official institutions after the earthquake?													
Yes	19(9.5)	43±17.4	0.729	6.8±3.8	0.656	8.5±4.2	0.951	9.4±3.7	0.349	11.1±5.2	0.754	6.9±4.1	0.878
No	182(90.5)	41.1±16.1		6.2±2.9		8.5±4.6		8.7±3.3		10.6±4.4		6.8±3.6	
Have you received support from your family or friends, after the earthquake?													
Yes	128(63.6)	41.7±16.3	0.568	6.4±3.2	0.791	8.7±4.5	0.286	8.8±3.2	0.808	10.7±4.5	0.563	6.8±3.6	0.924
No	73(36.4)	40.5±16.1		6±2.6		8.3±4.7		8.6±3.5		10.4±4.6		6.9±3.7	
Can anything be done in order to be prepared and decrease the damages of the earthquake?													
Many things can be done	108(53.7)	41.7±17.7	0.835	6.4±3.4	0.471	8.8±4.9	0.587	8.8±3.4	0.999	10.7±4.7	0.969	6.9±3.9	0.829
Some/A little things can be done	93(46.3)	40.8±14.4		6.2±2.6		8.2±4.2		8.7±3.3		10.5±4.2		6.8±3.4	

* p<0.05, **p<0.001

The analysis of the relationship between the history of past traumas and earthquake experiences and the trauma levels of healthcare professionals in Elazığ-Malatya earthquake showed no statistically significant differences between participants with and without a history of past traumas ($p=0.780$). Those experiencing a fear of death during the earthquake had higher trauma scores when compared to those who did not have such experience ($p<0.001$). Individuals experiencing the fear of losing loved ones during the earthquake had higher trauma score when compared to those who did not feel such a fear ($p<0.001$). (Table 2)

To analyze the factors underlying severe trauma response of healthcare professionals, the participants were divided into two groups according to trauma response severity. One group consisted of 52 subjects (25.8%) who displayed severe trauma response and another group consisted of the remaining 149 subjects (74.2%) who demonstrated low trauma

response. Of the men and women, 10.6% and 89.4% displayed severe trauma response, respectively ($p=0.02$). The analysis of the TEMPS scores revealed significantly higher cyclothymic ($p<0.035$), depressive ($p<0.007$) and anxious temperament ($p<0.001$) levels among those with a severer trauma level.

Upon examining the relationship between trauma levels and sociodemographic variables, we found that being female, being married, having children, not having a history of earthquake experience, being at the epicenter during the earthquake, experiencing the fear of dying and having the fear of losing a relative during earthquake were the most frequent factors among those with higher trauma levels ($p=0.002$, $p=0.034$, $p=0.015$, $p<0.001$, $p=0.028$, $p<0.001$ and $p<0.001$, respectively). No correlation was found between the other variables and trauma levels ($p > 0.05$). (Table3)

Table 3. The factors determining trauma levels among healthcare professionals.

Variable		High level n(%)	Low level n(%)	p value
Gender	Female	42(89.4)	101(65.6)	0.002*
	Male	5(10.6)	53(34.4)	
Marital status	Married	41(87.2)	111(72.1)	0.034*
	Single/Widow/Divorced	6(12.8)	43(27.9)	
Having children	Yes	38(80.9)	95(61.7)	0.015*
	No	9(19.1)	59(38.3)	
History of earthquake experience	No	40(85.1)	87(56.5)	<0.001**
	Yes	7(14.9)	67(43.5)	
Which province were you in during the earthquake?	Elazığ/Malatya	46(97.9)	135(87.7)	0.028*
	Other	1(2.1)	19(12.3)	
Did you ever think that you would die during the earthquake?	No	11(23.4)	85(55.2)	<0.001**
	Yes	36(76.6)	69(44.8)	
Did you ever think that a family member of you would die during the earthquake?	No	7(14.9)	70(45.5)	<0.001**
	Yes	40(85.1)	84(55.5)	
TEMPS-A	Depressive	6.2±3.4	4.6±3	0.007*
	Cyclothymic	5.7±3.9	4.5±3.9	0.035*
	Anxious	8±5.4	4.5±4.4	<0.001**

* $p<0.05$, ** $p<0.001$ (Only significant correlations are listed on the table)

According to the logistic regression analysis, a significant relationship was found between the previous earthquake experience, the fear of death of a family member, and the level of anxiety and trauma. It was observed that the previous earthquake experience was protective from the high

trauma response, and the fear of losing a relative during an earthquake was 3.383 (1.081-10.591) times more risky. It was determined that a one-point increase in the anxiety score caused a 1.137 (1.030-1.254) fold increase in the trauma level. (Table 4)

Table 4. Logistic regression analysis results of factors affecting trauma severity

Variables		OR (95% C.I.)	p
Gender	Female	1	0.091
	Male	2.591 (0.859-7.814)	
Marital status	Married	1	0.846
	Single/Widow/Divorced	1.153 (0.276-4.807)	
Having children	Yes	1	0.162
	No	2.377 (0.705-8.015)	
History of earthquake experience	No	1	0.002*
	Yes	0.190 (0.067-0.537)	
Did you ever think that you would die during the earthquake?	No	1	0.427
	Yes	1.518 (0.542-4.249)	
Did you ever think that a family member of you would die during the earthquake?	No	1	0.036*
	Yes	3.383 (1.081-10.591)	
Depressive		1.098 (0.938-1.286)	0.246
Cyclothymic		0.950 (0.842-1.073)	0.410
Anxious		1.137 (1.030-1.254)	0.011*

* $p<0.05$

In the correlation analysis between the TEMPS and PETS subgroups and total scores, a significant positive correlation was found between the PETS total score and depressive, cyclothymic,

irritable and anxious sub-scores and a negative correlation was found between hyperthymic and depressive temperaments (Table 5).

Table 5. Correlation between TEMPS and PETS scores

	Behavior prob.	1	2	3	4	5	6	7	8	9
1. Emotive Limitedness	,638**									
2. Affective Score	,625**	,561**								
3. Cognitive Structures	,666**	,615**	,697**							
4. Sleep Problems	,717**	,511**	,614**	,695**						
5. PETS Total Score	,847**	,809**	,816**	,879**	,835**					
6. Depressive	,125	,227**	,166*	,183**	,165*	,212**				
7. Cyclothymic	,232**	,189**	,193**	,234**	,213**	,252**	,584**			
8. Hyperthymic	-,038	,016	,096	,025	-,073	,009	-,238**	-,038		
9. Irritable	,116	,158*	,035	,146*	,084	,142*	,316**	,360**	,152*	
10. Anxious	,332**	,349**	,245**	,379**	,375**	,408**	,536**	,443**	-,087	,530**

*p<0.05, **p<0.01

DISCUSSION

In the present study, early-stage trauma levels in healthcare professionals in Malatya on the third week following the earthquake and the risk factors that might be effective in the consequent trauma response were identified.

High trauma response rate was found in one-fourth of the sampled healthcare workers. This result supported earlier studies on health workers in other traumatic settings, such as war and local earthquakes (24, 30-32).

In the literature, it has been emphasized that both demographic variables such as gender, marital status, occupation, age, and comorbid mental illness affect the trauma response (15,16,33). In terms of these factors, our results did not provide different data to distinguish healthcare professionals from the general public. Similar to previous studies (32,34), our study detected a marked correlation between the increase in the PETS scores and being female. This result was not surprising since women more easily express their emotions. On the other hand, the high stress levels in women can be attributed to gender differences in neuroendocrine response or excessive threat perceptions and concerns about losing control (35,36).

Some studies that examined the correlations between marital status and stress response claimed that being married reduces the risk, whereas other studies indicated the opposite (4,37). Nonetheless, the present study reported equal trauma scores among married and unmarried persons. However, the cognitive sub-score of the PETS scale (worries about children/parents/acquaintances/friends, worry about a sudden earthquake, reliving the earthquake experience and worries about the future) was higher among the married subjects. This result was probably due to the cognitive effects created by the sense of responsibility towards family members. The higher trauma scores of participants with children compared to those without supported this view. This impact could also be inferred from being

parents who fear losing their children. Changes in psychological and biological mechanisms caused by being a parent may also have caused these people to internalize the fear their children have experienced and thus became more affected (38-40). With a similar thought, the lower trauma scores of the unmarried participants and those living alone or living with elders can be attributed to the less responsibility and alleviation of the fear by sharing it with older family members.

In the regression analysis, it was also found that the thought of losing a family member was a particular factor determining trauma severity than one's own fear of death. Within the traditional structure of Turkish society, this result was not surprising. In Turkish culture, the family is considered as an important source of social support and emotional development for both parents and children (41). Therefore, worrying more about losing this structure than dying seems to be a response against the erosion of many values. This result may be a reason why the participants who were not at the epicenter of the earthquake also experienced post-traumatic symptoms. Although far away, these people may have been traumatized by learning that their families had been exposed to a traumatic event (42). In this context, our study proposes the view that disasters affect not only those who are exposed to them directly but also other people for different reasons.

This study found a linear correlation between the history of psychiatric disorders and trauma response, similar to previous research (43,44). This was especially significant for the sub-score of emotive limitedness indicating that the individual may be more depressive. Increasing depressive symptoms may lead to weakened coping mechanism, aggravation of the existing psychiatric disease and, perhaps, to the development of other psychiatric diseases such as PTSD in the future. Therefore, providing post-disaster support to

individuals with existing psychiatric disorders can provide significant benefits.

Although the previous studies indicate that past traumatic experiences increase trauma response level (4,14,44,45), this study did not support this outcome. In our study, neither being nor not being traumatized before did not show an effect on the level of trauma, except for previous earthquake experiences. A lower PETS score was found among those with a previous earthquake experience than those who did not. The results of the regression analysis showed that one of the three basic independent variables that influenced the PETS score was the history of earthquake experiences. This outcome is consistent with the finding underlined in the study by Nishi et al. claiming that individuals who have experienced natural disasters at some point in their lives were less affected by later disasters (46). Although this study did not focus on these factors, we can assume that survivors might be less traumatized because of developing some coping strategies and taking precautions as a result of their disaster experiences when the earthquake occurred (12,47,48).

Unlike society-based studies that found correlation between trauma level and many various variables such as seeing someone dead or injured in the earthquake, having one's house damaged, material losses, receiving assistance and support from official institutions, family and/or friends, the belief in the possibility of reducing earthquake damages and being prepared for potential earthquakes (19-49), this study did not detect any. This result may be related to participants' low material damages, as well as a reflection of witnessing and intervening in many traumatic events due to their profession. Perhaps, these experiences may have contributed to their ability to accept possible environmental changes more easily and show fewer symptoms after the earthquake (50).

Temperament is best described as the trait emotional reactivity of an individual which appears to be stable across life and has strong genetic underpinnings (51,52). Recently, increasing evidence suggests that temperament plays a role in predisposing individuals to many mental disorders (53). In a few studies conducted independently of the nature of the traumatic event, especially anxious temperament was reported to be a predisposing factor to the development of PTSD, while hyperthymic temperament was a protective factor. In a study conducted by Fauerbach et al. in burn-injured patients, a positive relationship was found between anxious temperament and the development of PTSD, while a negative relationship was reported with extraversion (54). In a meta-analysis that examined the relationship between PTSD and temperament, all the temperament characteristics were found to have a moderate-to-weak relationship

with PTSD symptoms, regardless of sex, trauma type and time elapsed after trauma (55).

The present study also showed that there was a linear relationship between depressive, cyclothymic, and anxious temperament characteristics and trauma levels. Especially anxious temperament has been identified as one of the main determining factors of trauma severity. Indeed, it was not surprising that people with an anxious temperament exhibited an exaggerated tendency to distressing events, had difficulty adapting to daily changes, and had a more severe trauma response, given that they chose less effective coping strategies (56,57). On the other hand, unlike previous studies, there was no relationship between hyperthymic temperament and trauma level. This difference can be attributed to the fact that these people with hyperthymic temperament tend to show themselves better as a characteristic of their temperament and claim that they are not affected by trauma for the same reason (51).

The examination of the relationship between trauma response and temperament may provide important benefits in determining the recruitment of people at high risk of exposure to trauma and in adjusting the appropriate therapy process for those exposed to trauma especially when trauma-focused therapies are considered ineffective in people with high emotional reactivity. Determining the decisions in job recruitment or distribution of duties according to the temperament profiles of individuals will reduce the development of psychiatric problems (55,58).

Even though this study presents important data concerning the factors determining trauma responses, it has certain limitations. First of all, the exclusion of healthcare workers in other provinces prevents the generalization of outcomes to all healthcare professionals affected by the earthquake. Second, the lack of a sub-analysis regarding the duties of healthcare professionals prevented the researchers from identifying the potential impact of the earthquake among different professional groups. The use of a self-report questionnaire in the study might have reduced reliability of the data. But, despite all these limitations, to our knowledge this study is the first to investigate temperament traits and early trauma response in healthcare professionals. These results regarding the early trauma response could provide pilot data for future studies investigating PTSD prevalence.

CONCLUSION

This study showed that one-fourth of the health workers had severe trauma levels in the early stages of the earthquake. The trauma scores of women, those who were married and/or had children, those who were worried about losing their own life or their relatives life during the earthquake

were higher. There was a positive correlation between trauma severity and anxious temperament and fear of losing a family member, and a negative correlation between the presence of a previous earthquake experience. As healthcare professionals are an important part of the activities to combat

disaster, recognition of the risky groups may be beneficial in the direction of the assistance to be provided and in the planning of future services. In this way, the prevalence of long-lasting and debilitating mental illnesses can be reduced.

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