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Posttraumatic stress disorder in health-care workers after two major earthquakes centered in Kahramanmaras, Turkey

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Abstract:

OBJECTIVES: Earthquakes are one of the most studied uncontrollable natural conditions that cause negative psychological consequences. Although health-care workers (HCWs) are trained to manage trauma in the out-of-hospital area, uncontrollable tragic events in the earthquake field and exposure to life-threatening situations may cause psychological disorders. This study aimed to investigate the risk of the development of probable posttraumatic stress disorder (PTSD) and the factors affecting it in HCWs working in the region during major earthquakes centered in Kahramanmaras.

METHODS: The questionnaire, which consists of the Turkish version of the 20-item PTSD Checklist for DSM-5 (PCL-5) self-report measure assessing DSM-5 symptoms of PTSD, was applied to HCWs. The Turkish version of the PCL-5 proved validity and reliability, with a cutoff point of ≥47 to diagnose probable PTSD.

RESULTS: In this study, of the 79 HCWs, 62.7% were male. The overall probable PTSD rate was 37.9% (n = 30). Female participants had a significantly higher probable PTSD rate than males ($P < 0.001$). The nurses met probable PTSD criteria statistically significantly more than the doctors ($P = 0.026$). The multiple regression analysis for predictors of probable PTSD revealed that female gender, previously working in a level 1 hospital, and being a nurse were among the independent risk factors.

CONCLUSION: This study showed that the probable PTSD rate was high among HCWs and that female HCWs were at higher risk for PTSD. HCWs, especially females working in the disaster area, should be closely monitored, and more mental health services should be provided to ensure that HCWs receive the necessary support in the postdisaster period.

Keywords:

Earthquakes, Kahramanmaras, nurses, physicians, posttraumatic stress disorder

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Introduction

On February 6, 2023, two major earthquakes centered in Kahramanmaras, measuring 7.7 and 7.6 on the Richter scale, caused devastation so severe that 10 provinces were declared a state of emergency. These earthquakes caused massive loss of life in many districts, resulting in over 42,000 deaths and more than 100,000 serious injuries. Turkey's Disaster Response Plan was activated at level four in response to the earthquake crisis, and all disaster response teams mobilized promptly.[1] Earthquakes are one of the most frequently studied natural disasters that affect people's lives by

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Box-ED section

What is already known on the study topic?

- Although health-care workers (HCWs) have been trained to manage and work in the trauma field in the out-of-hospital area, those who do not have disaster training or who have not previously encountered similar cases experience psychological difficulties due to long working hours, insomnia, and exposure to life-threatening situations
- Previous studies showed that posttraumatic stress disorder (PTSD) symptoms are commonly seen in HCWs working in the earthquake zone.

What is the conflict on the issue? Has it important for readers?

- Risk factors were not sufficiently included, and the most recent diagnostic criteria and scales were not used in most of the previous studies. The heterogeneity among the studies on this subject in the literature is quite high. Furthermore, the sample sizes, instruments used in the studies, and cutoff points differ from each other
- The strengths of this study were using the scale developed for the most recent diagnostic criteria, being a multicenter study, and examining the factors that may affect the probable PTSD rate
- To the best of our knowledge, this is the first study in the literature that evaluated the probable PTSD rate among HCWs after the 2023 Turkey earthquake.

How is this study structured?

- This multicenter study was conducted 2 months after the 2023 Turkey earthquake among all HCWs, including doctors and nurses working in the region. Following an online written informed consent agreement, participants were invited to answer a self-reported Google Form-generated web-based survey. The study included 79 HCWs.

What does this study tell us?

- PTSD has been a serious but neglected problem among HCWs working in disaster areas. This study showed that the probable PTSD rate was high among HCWs who took part in the earthquake response and that female doctors and nurses were at risk for PTSD
- It is crucial to implement protective measures, especially for female HCWs, and to further strengthen the skills that can help HCWs cope with PTSD and other negative psychological conditions in basic disaster training programs.

causing permanent psychological damage due to their occurrence at unexpected times and being uncontrollable situations.[2,3] Previous studies indicated that individuals who have survived traumatic experiences may exhibit varying degrees of posttraumatic stress symptoms.[4,5]

Although health-care workers (HCWs) have been trained to manage and work in the trauma field in the out-of-hospital area, those who do not have disaster training or who have not previously encountered similar cases experience psychological difficulties, uncontrollable suffering of patients and their families, tragic events in the earthquake zone due to long working hours and insomnia, and exposure to life-threatening situations.[6-8] Previous studies showed that posttraumatic stress disorder (PTSD) symptoms are commonly seen in HCWs working in the earthquake zone. If these symptoms are not diagnosed and treated promptly, they can turn into PTSD, resulting in low job satisfaction, absenteeism, and early retirement.[9,10] For this reason, it is crucial to recognize postearthquake psychological stress in HCWs, regardless of whether they are trained or untrained.

This study aimed to investigate the risk of the development of PTSD and the factors affecting it in HCWs working in the region during the 2023 Turkey earthquake by using the PTSD Checklist for DSM-5 (PCL-5) scale.

Methods

This multicenter study was conducted 2 months after the 2023 Turkey earthquake among all HCWs, including doctors and nurses working in the region. Following an online written informed consent agreement, participants were invited to answer a self-reported Google Form-generated web-based survey. The link to the questionnaire was sent through mailing lists and Internet groups. The HCWs who refused to participate (n = 3) and had a history of psychiatric illness (n = 4) were excluded from this study. The final analysis includes data from 79 participants.

The first part of the questionnaire was designed to assess participants' sociodemographic data, occupational groups (physician, nurse), educational level and work experience, previous disaster experiences and disaster training, and tragic events with relatives or close friends. The second part was designed to screen for probable PTSD.

The questionnaire used the Turkish version of the 20-item PCL-5 self-report measure assessing DSM-5 symptoms of PTSD. HCWs responded to items on 5-point Likert-type scales (0 = not at all to 4 = extremely) regarding their working experience in the earthquake zone, with total scores ranging from 0 to 80. The Turkish version of the PCL-5 proved validity and reliability, with a cutoff point of ≥47 to diagnose probable PTSD.

Ethical approval for this study was obtained from the University of Health Sciences Hamidiye Clinical

Researches Ethics Committee on the date of April 07, 2023, with the number: 7/14/23-158. It was conducted in compliance with the principles of the Declaration of Helsinki.

Statistical analyses

All statistical analyses were performed using IBM SPSS Statistics 27.0 (IBM Corp. Armonk, NY, USA). In this study, all continuous data were expressed as a median and interquartile range (IQR). Normality was assessed using the Kolmogorov–Smirnov tests. The Mann–Whitney *U*-test was used to compare continuous variables between two groups, while the Chi-square test was used to compare categorical variables.

Predictors in multivariate logistic regression analysis were chosen using the least absolute shrinkage and selection operator regression technique with corrected Akaike information criterion validation. All predictors in the multivariate model were checked for multicollinearity using correlation matrices and the variance inflation factor, and none were detected. All analyses were evaluated using the 95% confidence interval, and significance was determined at the $P < 0.05$ level.

Results

The study included 79 HCWs, and the median age of the participants was 30 (IQR 12, range 22–53 years). The number of males (n = 44, 55.7%) was higher than females (n = 35, 44.3%). The median PCL-5 score was 39 (IQR 38, range 0–77). The overall probable PTSD rate was 37.9% (n = 30).

The median PCL-5 score of the females was 55 (IQR 27, range 16–77), and it was significantly higher than the males (median 26.5, IQR 27, range 0–63, $P < 0.001$). Female participants had a significantly higher probable PTSD rate than males ($P < 0.001$). The median PCL-5 scores of the doctors and the nurses were 36 (IQR 27, range 2–72) and 44.5 (IQR 39, range 0–77), respectively. The nurses met probable PTSD criteria statistically significantly more than the doctors ($P = 0.026$). Demographic characteristics of the HCWs and survey findings are shown in Table 1.

The multiple regression analysis for predictors of probable PTSD revealed that female gender, previously working in a level 1 hospital, and being a nurse were among the independent risk factors [Table 2].

Discussion

In this study, we aimed to investigate the risk of PTSD development in HCWs working in the earthquake zone by taking into account the risk factors not sufficiently included in previous studies and using the most recent diagnostic criteria and scales. The heterogeneity among the studies on this subject in the literature is quite high. Furthermore, the sample sizes, instruments used in the studies, and cutoff points differ from each other.[9]

Although many screening tools can be used to assess PTSD symptom severity, Adkins *et al*. showed that the PCL scale most strongly differentiated PTSD from depression, social phobia, and anxiety when compared with six other self-administered PTSD scales.[11] In the latest revision of the PCL-5 proposed by Blevins *et al*., the screening tool was expanded to 20 items to correspond to the PTSD symptoms presented in the DSM-5.[12] The Turkish version of the PCL-5 was also validated by Boysan *et al*., and the validated cutoff of 47 was used in this study.[13] The strengths of this study were using the scale developed for the most recent diagnostic criteria, being a multicenter study, and examining the factors that may affect the probable PTSD rate. To the best of our knowledge, this is the first study in the literature to evaluate the probable PTSD rate among HCWs after the 2023 Turkey earthquake.

In this study, the probable PTSD rate was found to be 37.9%, and this rate was among the highest rates according to other studies examining the prevalence of PTSD in HCWs after the earthquake.[7,14,15] In the studies included in the systematic review examining this subject, the prevalence of PTSD ranged between 0.58% and 39% and was found to be 16.37% in the meta-analysis. However, in this meta-analysis, it was also found that there was a decreasing trend in the prevalence of PTSD as the follow-up period increased.[9] One of the reasons for the high prevalence of probable PTSD in this study may be that the participants were included 2 months after they were assigned to the earthquake zone. It is a known fact that measurements made in the 30 days following exposure are not stable and may be confused with transient stress states.[16] For this reason, studies in the literature were conducted after at least 1 month[17] and at most 11 years.[18]

Bahadirli and Sagaltici found the probable PTSD rate in HCWs in the ED in Turkey to be 19.2% during the COVID-19 pandemic.[19] In Turkey, where there are more than 100 million emergency room visits each year and the number of applications per capita is as high as 1.43, negative factors such as intensive working conditions and high rates of violence in the workplace affect HCWs.[20] Factors such as a heavy workload, working in unsafe environments, and burnout are known PTSD risk factors for HCWs.[21] One of the reasons for the high probable PTSD rate in our study may be that HCWs, who were predisposed to show PTSD symptoms due to these unfavorable conditions, were exposed to trauma experienced after such a devastating earthquake.

Table 1: Demographic characteristics and questionnaire findings of the health-care workers

	Total population (*n*=79), *n* (%)	PTSD with a cutoff score <47 (*n*=49), *n* (%)	PTSD with a cutoff score ≥47 (*n*=30), *n* (%)	*P*
Age (years), median (IQR) [minimum–maximum]	30 (12) [22–53]	30 (12) [22–53]	29 (10) [22–47]	0.155*
Sex				
Male	44 (55.7)	35 (71.4)	9 (30.0)	<0.001†
Female	35 (44.3)	14 (28.6)	21 (70.0)	
Profession				
Doctor	39 (49.4)	29 (59.2)	10 (33.3)	0.026†
Nurse	40 (50.6)	20 (40.8)	20 (66.7)	
Previously working in a level 1 hospital	14 (17.7)	6 (12.2)	8 (26.7)	0.103†
Working zone in the field				
Frontline	21 (26.6)	14 (28.6)	7 (23.3)	0.609†
Back zones	58 (73.4)	35 (71.4)	23 (76.7)	
Participated in disaster preparedness training	52 (65.8)	34 (69.4)	18 (60.0)	0.393†
Tragic events with relatives or close friends	31 (39.2)	16 (32.7)	15 (50.0)	0.125†
Tragic events with relatives or close friends in previous earthquakes	14 (17.7)	8 (16.3)	6 (20.0)	0.678†
Years of work experience, median (IQR) [minimum–maximum]	8 (9) [1–29]	9 (10) [1–29]	8 (7) [1–27]	0.609*
Total working days in the field (years), median (IQR) [minimum–maximum]	10 (8) [3–108]	11 (8) [3–100)]	10 (9) [3–108]	0.839*
Working month status				0.678†
First months	65 (82.3)	41 (83.7)	24 (80)	
Last months	14 (17.7)	8 (16.3)	6 (20)	
PCL-5 total score (years), median (IQR) [minimum–maximum]	39 (38) [0–77]	26 (22) [0–46]	61 (14) [47–77]	<0.001*

*Mann–Whitney *U*-test used to compare differences, †Chi-square test used for analysis. IQR: Interquartile range, PTSD: Posttraumatic stress disorder, PCL-5: PTSD checklist for DSM-5

Table 2: Multivariate regression analysis for predictors of probable posttraumatic stress disorder

Variables	*B*	SE	OR	95% CI	*P*
Gender*	2.118	0.621	8.316	2.464–28.066	<0.001
Previously working in a level 1 hospital†	1.851	0.819	6.367	1.279–31.681	0.024
Tragic events with relatives or close friends in the previous earthquakes‡	1.278	0.798	3.588	0.751–17.137	0.109
Work zone in the field§	1.250	0.735	3.489	0.826–14.743	0.089
Profession‖	1.286	0.6	3.617	1.116–11.715	0.032

*0: Male (reference); 1: Female, †0: No (reference); 1: Yes, ‡0: No (reference; 1: Yes, §0: Frontline (reference); 1: Backline, ‖0: Doctor (reference); 1: Nurse, Unstandardized coefficients. SE: Standard error of the estimate, CI, confidence interval, OR: Odds ratio

Kang *et al*. reported that occupation was an important factor affecting PTSD prevalence, and nurses had more severe PTSD symptoms.[22] In this study, 66.7% of the HCWs with probable PTSD were nurses, and a statistically significant difference was found between nurses and doctors ($P = 0.026$). In multivariate logistic regression analysis, being a nurse was found to be an independent risk factor for developing PTSD. In addition, the majority of nurses are women, and previous studies found that women are more likely to develop PTSD.[22-24] Another study showed that significant gender differences in developing PTSD may be due to differences in peri-traumatic emotions that affect subsequent PTSD symptoms.[25] In this study, similar to other studies, multiple regression analysis in the nurse subgroup revealed that the female gender ($P = 0.007$) was a risk factor in the development of probable PTSD. We think that this may be because nurses are in closer contact with the victims after an emergency, may experience more identification with their patients, and may feel guilty when faced with a failed outcome. All these findings highlighted that female HCWs should be closely monitored in terms of PTSD, and preventive measures should be taken.

Contrary to the previous studies, no statistically significant difference was found between years of professional experience and the probable PTSD rate in this study ($P = 0.609$).[19-21] This may have been because the magnitude of the earthquake was so high that the HCWs who participated in the study were exposed to the negative psychological effects of recurrent high-magnitude earthquakes and had not encountered such a devastating earthquake before.

In this study, there was no statistically significant difference between the probable PTSD rate and the status

of receiving disaster preparedness training (P = 0.393). This finding indicates that the content that will help HCWs cope with PTSD and other negative psychological states in disasters should be further strengthened in existing disaster training programs.

Limitations

This study had some limitations. First, the nature of online survey studies may have caused response biases that affected the results. Second, although it used a self-administered scale developed using the most current diagnostic criteria, no psychiatric diagnostic examination was performed to confirm the diagnosis of PTSD.

Conclusion

PTSD has been a serious but neglected problem among HCWs working in disaster areas. This study showed that the probable PTSD rate was high among HCWs who took part in the earthquake response and that female doctors and nurses were at risk for PTSD. It is crucial to implement protective measures, especially for female HCWs, and to further strengthen the skills that can help HCWs cope with PTSD and other negative psychological conditions in basic disaster training programs. In terms of the risk of PTSD development and its complications, HCWs working in disaster studies should be closely monitored, and more mental health services and training should be provided to HCWs to ensure that they receive necessary mental health assistance after the disaster.

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We verify and confirm that everyone who contributed to this manuscript is either listed as an author.

Author contributions statement

- Conceptualization – DS, EY
- Data collection – EY
- Data curation – DS, EY
- Formal analysis – EY
- Funding acquisition – Not applicable
- Investigation – Not Applicable
- Methodology – DS, EY, EC
- Project administration – DS
- Resources – DS, EY
- Software – EY
- Supervision – DS, EC
- Visualization – Not Applicable
- Writing – original draft – DS, EY
- Writing – review and editing – DS, EC.

Conflicts of interest

None Declared.

Ethical approval

Approval was obtained from the University of Health Sciences Hamidiye Scientific Research Ethics Committee (7/14/23–158, Date: April 07, 2023) It was conducted in compliance with the principles of the Declaration of Helsinki.

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References

1. Koç M, Yalçın S. Crisis intervention in disasters: The work of the ministry of family and social services in the Kahramanmaraş earthquake. Int J Soc Work Res 2023;3:93-105.
2. Alexander DA, Klein S. First responders after disasters: A review of stress reactions, at-risk, vulnerability, and resilience factors. Prehosp Disaster Med 2009;24:87-94.
3. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. Psychiatry 2002;65:207-39.
4. Cansel N, Ucuz I. Post-traumatic stress and associated factors among healthcare workers in the early stage following the 2020 Malatya-Elazig earthquake. Konuralp Med J 2022;14:81-91.
5. Palm KM, Polusny MA, Follette VM. Vicarious traumatization: Potential hazards and interventions for disaster and trauma workers. Prehosp Disaster Med 2004;19:73-8.
6. Huggard P. Caring for the carers: The emotional effects of disasters on health care professionals. Australas J Disaster Trauma Stud 2011;2011:60-2.
7. Shrestha R. Post-traumatic stress disorder among medical personnel after Nepal earthquake, 2015. J Nepal Health Res Counc 2015;13:144-8.
8. Yılmaz S, Karakayali O, Yilmaz S, Çetin M, Eroglu SE, Dikme O, *et al*. Emergency medicine association of turkey disaster committee summary of field observations of February 6th Kahramanmaraş earthquakes. Prehosp Disaster Med 2023;38:415-8.
9. Tahernejad S, Ghaffari S, Ariza-Montes A, Wesemann U, Farahmandnia H, Sahebi A. Post-traumatic stress disorder in medical workers involved in earthquake response: A systematic review and meta-analysis. Heliyon 2023;9:e12794.
10. Ma IC, Chang WH, Wu CL, Lin CH. Risks of post-traumatic stress disorder among emergency medical technicians who responded to the 2016 Taiwan earthquake. J Formos Med Assoc 2020;119:1360-71.
11. Adkins JW, Weathers FW, McDevitt-Murphy M, Daniels JB. Psychometric properties of seven self-report measures of posttraumatic stress disorder in college students with mixed civilian trauma exposure. J Anxiety Disord 2008;22:1393-402.
12. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The posttraumatic stress disorder checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. J Trauma Stress 2015;28:489-98.
13. Boysan M, Guzel Ozdemir P, Ozdemir O, Selvi Y, Yilmaz E, Kaya N. Psychometric properties of the Turkish version of the PTSD checklist for diagnostic and statistical manual of mental disorders, fifth edition (PCL-5). Psychiatry Clin Psychopharmacol 2017;27:300-10. [doi: 10.1080/24750573.2017.1342769].
14. Ozen S, Sir A. Frequency of PTSD in a group of search and rescue workers two months after 2003 Bingol (Turkey) earthquake. J Nerv Ment Dis 2004;192:573-5.
15. Wang L, Zhang J, Zhou M, Shi Z, Liu P. Symptoms of posttraumatic stress disorder among health care workers in earthquake-affected areas in Southwest China. Psychol Rep 2010;106:555-61.
16. Caramello V, Bertuzzi L, Ricceri F, Albert U, Maina G, Boccuzzi A, *et al*. The mass casualty incident in Turin, 2017: A case study of disaster responders' mental health in an Italian level I hospital. Disaster Med Public Health Prep 2019;13:880-8.
17. Nieh JH, Hsu TH, Cheng HC, Chong KC, Lai PF. 2018 Taiwan Hualien earthquake-disaster lessons we learned in the emergency department of a tertiary hospital. J Acute Med 2020;10:149-55.
18. Li S, Guo C, Chan SS. ICD-11 posttraumatic stress disorder and complex PTSD among hospital medical workers in China: Impacts of Wenchuan earthquake exposure, workplaces, and sociodemographic factors. Front Psychiatry 2021;12:735861.

19. Bahadirli S, Sagaltici E. Post-traumatic stress disorder in healthcare workers of emergency departments during the pandemic: A cross-sectional study. Am J Emerg Med 2021;50:251-5.
20. Bayram B, Çetin M, Çolak Oray N, Can İÖ. Workplace violence against physicians in Turkey's emergency departments: A cross-sectional survey. BMJ Open 2017;7:e013568.
21. d'Ettorre G, Ceccarelli G, Santinelli L, Vassalini P, Innocenti GP, Alessandri F, *et al.* Post-traumatic stress symptoms in healthcare workers dealing with the COVID-19 pandemic: A systematic review. Int J Environ Res Public Health 2021;18:601.
22. Kang P, Lv Y, Hao L, Tang B, Liu Z, Liu X, *et al*. Psychological consequences and quality of life among medical rescuers who responded to the 2010 Yushu earthquake: A neglected problem. Psychiatry Res 2015;230:517-23.
23. Trudgill DI, Gorey KM, Donnelly EA. Prevalent posttraumatic stress disorder among emergency department personnel: Rapid systematic review. Humanit Soc Sci Commun 2020;7:89.
24. Zhen Y, Huang ZQ, Jin J, Deng XY, Zhang LP, Wang JG. Posttraumatic stress disorder of Red Cross nurses in the aftermath of the 2008 Wenchuan China earthquake. Arch Psychiatr Nurs 2012;26:63-70.
25. Lilly MM, Pole N, Best SR, Metzler T, Marmar CR. Gender and PTSD: What can we learn from female police officers? J Anxiety Disord 2009;23:767-74.