



Evaluation of post-earthquake late-term trauma levels in dialysis patients and healthcare professionals

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Abstract

Aim: To determine and compare the post-earthquake trauma levels of hemodialysis (HD) patients, healthcare professionals working in the HD unit, and peritoneal dialysis (PD) patients in the 11th month of two earthquakes that occurred approximately nine hours apart on February 6, 2023, and affected the east and southeast regions of Turkey.

Materials and Methods: The study included a total of 162 individuals, including 87 HD and 35 PD patients who had experienced both earthquakes, and 40 healthcare professionals working in the HD unit. The post-earthquake trauma levels of the participants were assessed using the Scale That Determines the Level of the Trauma After the Earthquake (SDLTAE), consisting of a total of 20 items, developed by Tanhan et al. after the 2011 Van earthquake. The individuals with an SDLTAE score of >52 were considered highly traumatized.

Results: The mean age of the participants was 53±16 years, and 79 (49%) were women. The SDLTAE score of the HD patients was found to be higher than that of the PD patients (p=0.006). There were no significant differences between the SDLTAE scores of the healthcare professionals and the HD and PD patients (p=0.419 and p=0.089, respectively). Upon comparing patients with low and high total SDLTAE scores, we observed that the rate of female individuals was higher in all groups (p<0.001 for the HD and PD groups; p=0.017 for healthcare professionals). No correlation was found between the total SDLTAE score and age, dialysis duration, or laboratory parameters between the HD and PD patients (p>0.05).

Conclusion: We found that HD patients had a higher level of trauma than PD patients. Our study showed that women were more traumatized than men in sensitive groups, such as those receiving dialysis and healthcare professionals. Regularly conducting psychological assessments for dialysis patients and healthcare professionals may increase the likelihood of early intervention.



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Introduction

On February 6, 2023, two earthquakes with magnitudes of 7.7 and 7.6 on the Richter scale occurred approximately nine hours apart in the east and southeast of Turkey. The earthquakes resulted in the fatalities and injuries of tens of thousands of people throughout 11 provinces. Earthquakes, unlike other natural catastrophes, often transpire abruptly without any warning and can cause extensive destruction. Thousands of people may suffer sudden death, injury, and property loss. Survivors of a catastrophic event, such as an earthquake, may experience psychological trauma and psychiatric diseases, including post-traumatic stress disorder (PTSD). A previous study

showed that survivors of the 1985 Erzincan earthquake had a higher prevalence of psychological issues compared to a control group [1]. In addition, the prevalence of PTSD was reported to vary between 39% and 63% among the survivors of the 1999 earthquake in Turkey [2-4].

End-stage renal disease (ESRD) is a serious health problem characterized by permanent loss of kidney function. These patients are unable to survive without renal replacement therapy (RRT), i.e., dialysis or kidney transplantation. Patients dependent on dialysis treatment may have an increased vulnerability to developing PTSD after natural disasters like earthquakes due to various factors such as dependence on the hemodialysis (HD) unit and the need for a suitable environment in which peritoneal dialysis (PD) can be performed. While the prevalence of anxiety disorders in hemodialysis (HD) patients varies be-

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tween 12 and 52%, this rate is 8% in primary healthcare institutions [5]. A large-scale study evaluating patients undergoing RRT showed that the frequency of mental illness was higher in patients receiving HD compared to those receiving PD and kidney transplant patients [6]. Furthermore, there have been reports of an association between PTSD and subsequent cardiovascular events and mortality [7, 8]. Given that cardiovascular problems are the most common causes of mortality in dialysis patients, it is crucial to ascertain the post-earthquake trauma levels of this patient group.

Healthcare professionals responding to disasters often encounter distressing circumstances that predispose them to the risk of PTSD, depression, and other psychological disorders. In a study conducted in China following the Wenchuan earthquake, the prevalence of PTSD among nurses was reported to be 30% six to 12 months after the earthquake [9]. Dialysis units play a vital role in managing conditions such as rhabdomyolysis, crush syndrome, and acute kidney injury after earthquakes. In conjunction with the regular care and monitoring of patients with HD, dialysis units operate ceaselessly and with great effort in the aftermath of earthquakes. However, to the best of our knowledge, the post-earthquake trauma levels of physicians and nurses working in dialysis units have not been previously evaluated.

This study aimed to determine and compare the post-earthquake late-term trauma levels of patients with ESRD who underwent HD and PD and those of healthcare professionals working in the HD unit.

Materials and Methods

Selection and description of participants

We calculated the total number of individuals required to be 159 to achieve a power of 0.80 at an effect size of 0.25 and a type 1 error of 0.05 with g-power analysis. The study included a total of 162 individuals, including 87 HD and 35 PD patients followed up by the nephrology clinic of Malatya Training and Research Hospital, who had experienced both Kahramanmaraş earthquakes, and 40 healthcare professionals working in the HD unit. Patients who had been receiving HD and PD treatment for at least three months were included in the sample.

Data collection and measurements

The laboratory results of the HD and PD groups were obtained from routine monthly and three-monthly examinations. After the procedure and objectives of the study were fully explained, written informed consent was obtained from all individuals who agreed to participate in the study. The study protocol was approved by the Clinical Research Ethics Committee of Malatya Turgut Ozal University (approval number: B.230, date: December 4, 2023). Participants' data were collected between December 15, 2023 and January 15, 2024.

The post-earthquake trauma levels of the participants were assessed using the Scale That Determines the Level of the Trauma After the Earthquake (SDLTAE) developed by Tanhan et al. after the 2011 Van earthquake [10]. According to the reliability analysis performed on the scale,

the internal consistency coefficient (Cronbach's alpha) of the scale was determined to be 0.87. The SDLTAE consists of a total of 20 items. In this instrument, PTSD symptoms are scaled on a five-point Likert scale including the following options: "1- strongly disagree", "2- slightly agree", "3- moderately agree", "4- agree", and "5- strongly agree". The lowest score that can be obtained from the scale is 20, and the highest score is 100. The authors who developed the scale determined a score of 52.385 ± 5.051 as the threshold value for trauma. Therefore, in the current study, individuals who scored >52 were considered highly traumatized. The scale was administered to the participants in written form as a survey. Although the survey forms were generally completed by the participants themselves, they were administered under the supervision of the researchers to minimize the occurrence of missing data and any misunderstandings about the items. The participants completed the SDLTAE during the 11th month after the earthquakes.

Statistical analysis

Statistical analyses were conducted using SPSS v. 20. The normality of numerical data was evaluated with the Kolmogorov-Smirnov test. Parametric data were given as mean \pm standard deviation, nonparametric data as median (interquartile range), and categorical data as frequency (percentage). Pearson's chi-square or Fisher's exact test was used to compare categorical variables among the HD, PD and HP groups. Student's t-test was used to compare parametric variables between the HD and PD groups. Mann Whitney U test was used to compare non-parametric variables between the HD and PD groups. Pearson's chi-square or Fisher's exact test was used to compare categorical variables between the low and high score SDLTAE groups in the HD, PD and HP groups. Student's t-test was used to compare parametric variables between the low and high score SDLTAE groups in the HD, PD and HPs groups. Mann Whitney U test was used to compare non-parametric variables between the low and high score SDLTAE groups in the HD, PD and HP groups. Kruskal-Wallis test was used to compare non-parametric variables among the HD, PD, and HP groups. Groups that caused statistical differences were determined with the post-hoc Tukey analysis. A correlation analysis was also conducted between numerical data. $p < 0.05$ was considered statistically significant.

Results

The mean age of the individuals included in the study was 53 ± 16 years, and 79 (49%) were women. The participants had experienced no first-degree relative loss during the earthquakes, nor were they physically injured. Only one individual reported that their building had collapsed. Eight (9%) of the HD patients and one (3%) of the PD patients stated that they had received mental health services after the earthquakes. None of the healthcare professionals had received any mental health services after the earthquakes. Two automated PD patients transitioned to continuous ambulatory PD for one month after the earthquake. While 11 (31%) of the PD patients stated that they had reduced the number of exchanges in the first two weeks after the earthquake, none of the HD patients

Table 1. Comparison of sociodemographic characteristics and clinical and laboratory parameters of dialysis patients and HPs working in the dialysis unit

	HD group (n = 87)	PD group (n = 35)	HP group (n = 40)	95% Confidence Interval	p
Age, years, median, [IQR] *	61.0 [48.0-70.0]	57.0 [46.0-67.0]	42.0 [26.0-45.0]	0.000-0.000	<0.001
Gender, male, n (%) &	44 (51)	25 (71)	14 (34)	-	0.007
I was in the HD unit during the earthquakes, n (%) &	35 (40)	-	23 (58)	-	0.105
I continued using my medications regularly after the earthquakes, n (%) &	16 (18)	8 (23)	-	-	0.757
I can meet my needs independently, n (%) &	47 (54)	19 (54)	-	-	1.000
Time spent outside home after the earthquakes, day, median [IQR] *	30.0 [15.0-56.0]	10.0 [4.0-28.0]	83.0 [60.0-120.0]	0.000-0.000	<0.001
Economic status, n (%) &					
Poor	54 (62)	16 (51)	-	-	
Moderate	31 (36)	16 (46)	-	-	0.557
Good	2 (2)	1 (3)	-	-	
Educational status, n (%) &					
Illiterate	29 (33)	6 (17)	-	-	
Literate	17 (20)	7 (20)	-	-	
Primary school	22 (25)	16 (45)	-	-	0.207
Secondary school	16 (18)	5 (14)	-	-	
Higher education	3 (3)	1 (3)	-	-	
Marital status, married, n (%) &	77 (89)	33 (94)	29 (73)	-	0.015
Dialysis duration, months, median, [IQR] †	60.0 [26.0-97.0]	34.0 [13.0-62.0]	-	0.022-0.028	0.026
Vascular access, arteriovenous fistula, n (%)	44 (51)	-	-	-	-
PD method, n (%)					
Continuous ambulatory	-	33 (94)	-	-	-
Automated	-	2 (6)	-	-	-
Laboratory parameters					
Urea (mg/dl), median, [IQR] ‡	131.9 [110.8-167.5]	114.4 [90.0-157.2]	-	0.035-0.042	0.036
Creatinine (mg/dl), mean±SD €	8.9 ± 3.1	9.1 ± 3.4	-	-1.369-1.133	0.852
Hemoglobin (g/dl), mean±SD €	10.7 ± 1.9	10.4 ± 1.7	-	-0.456-1.042	0.440
Albumin (g/dl), mean±SD €	3.2 ± 0.5	3.1 ± 0.5	-	-0.104-0.265	0.390
Ferritin (ml/ng), median, [IQR] †	419.0 [161.0-734.0]	297.0 [129.0-467.0]	-	0.031-0.038	0.035
Intact parathormone (pg/ml), median, [IQR] †	355.0 [212.0-773.0]	249.0 [158.0-547.0]	-	0.072-0.083	0.075

HD: hemodialysis; PD: peritoneal dialysis; HP: healthcare professional; SD: standard deviation, IQR: interquartile range.

* Kruskal-Wallis test was used to compare non-parametric variables among the HD, PD, and HP groups. $p < 0.05$ was considered statistically significant.

& Pearson's chi-square or Fisher's exact test was used to compare categorical variables among the HD, PD and HP groups. $p < 0.05$ was statistically considered significant.

€ Student's t-test was used to compare parametric variables between the HD and PD groups. $p < 0.05$ was considered statistically significant.

† Mann Whitney U test was used to compare non-parametric variables between the HD and PD groups. $p < 0.05$ was considered statistically significant.

missed a hemodialysis session. Table 1 summarizes the clinical, demographic, and laboratory parameters of the individuals and their comparative results.

The SDLTAE scale items, participants' responses to the scale items, and the results of the intergroup comparisons are shown in Table 2.

No correlation was detected between the total SDLTAE score and age, dialysis duration, or laboratory parameters in the HD and PD groups ($p > 0.05$). There was also no correlation between age and the total SDLTAE score among the healthcare professionals ($p > 0.05$).

The total SDLTAE score was determined to be high in 64 (74%) of the HD patients, 17 (49%) of the PD patients, and 23 (58%) of the healthcare professionals ($p = 0.020$). Table 3 presents the results of the comparison between the individuals with low and high total SDLTAE scores among the three groups. This comparison revealed that the rate of female individuals was higher in all groups.

Discussion

This study assessed the post-earthquake trauma levels of HD and PD patients, as well as healthcare professionals working in the dialysis unit. This assessment was con-

Table 2. Comparison of the SDLTAE scores between the study groups.

	HD group (n = 87)	PD group (n = 35)	HP group (n = 40)	95% Confidence Interval	p
I am experiencing loss of appetite.	3.0 [2.0-3.0]	2.0 [2.0-3.0]	2.0 [1.0-4.0]	0.492-0.511	0.501
I have become an angry person.	2.0 [1.0-2.0]	2.0 [1.0-2.0]	2.0 [1.0-3.0]	0.756-0.772	0.764
I have nightmares.	2.0 [1.0-3.0]	1.0 [1.0-2.0]	2.0 [1.0-3.0]	0.017-0.022	0.019
I can't go into enclosed spaces because I'm frightened of an earthquake.	5.0 [4.0-5.0]	5.0 [4.0-5.0]	3.5 [3.0-5.0]	0.000-0.001	0.001
I've lost my sense of confidence about the future.	4.0 [3.0-5.0]	3.0 [2.0-4.0]	4.0 [3.0-5.0]	0.002-0.004	0.003
It feels like life has no meaning anymore.	3.0 [2.0-5.0]	2.0 [2.0-3.0]	3.0 [2.0-4.0]	0.019-0.024	0.021
After what I experienced, my desire to live has diminished.	3.0 [2.0-4.0]	2.0 [1.0-3.0]	3.0 [2.0-4.0]	0.028-0.035	0.032
After the earthquakes, my regrets about the choices I made in my life increased.	3.0 [2.0-4.0]	2.0 [1.0-3.0]	4.0 [3.0-4.0]	0.000-0.000	<0.001
I feel very helpless/powerless.	4.0 [3.0-5.0]	3.0 [3.0-5.0]	3.0 [3.0-4.0]	0.175-0.190	0.183
It offends my dignity to be in need.	4.0 [3.0-5.0]	5.0 [4.0-5.0]	3.0 [3.0-5.0]	0.035-0.042	0.039
After the earthquakes, I pay more attention to my relationships/behaviors.	3.0 [2.0-3.0]	2.0 [1.0-3.0]	3.0 [3.0-4.0]	0.000-0.000	<0.001
I've come to appreciate the value of my life more.	4.0 [3.0-5.0]	3.0 [2.0-4.0]	4.0 [4.0-5.0]	0.000-0.000	<0.001
I've become so emotional/I cry for no reason.	3.0 [1.0-3.0]	1.0 [1.0-3.0]	2.0 [1.0-3.0]	0.004-0.006	0.005
I'm worried about my children/parents/acquaintances/friends.	5.0 [4.0-5.0]	5.0 [4.0-5.0]	5.0 [4.0-5.0]	0.452-0.471	0.461
I'm nervous because I think there may be an earthquake at any moment.	3.0 [3.0-4.0]	3.0 [2.0-4.0]	4.0 [3.0-4.0]	0.051-0.060	0.056
Images of earthquake flash through my mind.	3.0 [2.0-3.0]	2.0 [2.0-3.0]	3.0 [2.0-4.0]	0.080-0.091	0.086
I'm worried about the future.	4.0 [3.0-5.0]	3.0 [2.0-4.0]	3.0 [3.0-5.0]	0.004-0.008	0.006
I suddenly wake up from sleep.	2.0 [2.0-3.0]	2.0 [1.0-3.0]	2.0 [1.0-2.0]	0.000-0.000	<0.001
I have difficulty falling asleep.	3.0 [2.0-4.0]	2.0 [2.0-3.0]	2.0 [1.0-3.0]	0.000-0.000	<0.001
I sleep less.	3.0 [2.0-4.0]	3.0 [2.0-3.0]	2.0 [1.0-3.0]	0.000-0.000	<0.001
Total score*	64.0 [50.0-74.0]	52.0 [42.0-67.0]	57.0 [48.0-71.8]	0.021-0.027	0.024

SDLTAE: Scale That Determines the Level of the Trauma after the Earthquake; HD: hemodialysis; PD: peritoneal dialysis; HP: healthcare professional.

Kruskal-Wallis test was used to compare non-parametric variables among the HD, PD, and HP groups. p<0.05 was considered statistically significant.

*Groups that caused statistical differences were determined with the post-hoc Tukey analysis. **HD vs. PD: 0.006**, HP vs. PD: 0.089, HD vs. HP: 0.419.

ducted in the 11th month of the two earthquakes, with epicenters in Kahramanmaraş and magnitudes of 7.7 and 7.6, respectively, which occurred nine hours apart on February 6, 2023, resulting in the death and injury of thousands of individuals. Our findings revealed that HD patients experienced more trauma, as indicated by a higher SDLTAE score, than PD patients. We also determined that women had higher SDLTAE scores in all three groups.

An epidemiological review showed that the prevalence of PTSD ranged from 5% to 60% between the first nine months and two years after disasters [11]. In Turkey, two earthquakes of magnitude 7.4 and 7.2 occurred in Marmara region, three months apart, on August 17 and November 12, 1999. In studies conducted among survivors after the August 17 earthquake, the PTSD rates were found to be 43% within eight to 10 months after the first earthquake, 63% in the 14th month, and 39% in the 20th month [2-4]. A meta-analysis revealed that the global prevalence of PTSD after disasters was 23.66% [12]. In the current study, 74% of the HD patients, 49% of the PD patients, and 58% of the healthcare professionals were found to have high trauma levels at the 11th month. Previous research has demonstrated that having any chronic disease is a pre-traumatic risk factor for PTSD [13]. Therefore, the presence of chronic diseases in HD and PD patients can ex-

plain their high SDLTAE scores. In addition, in a study conducted by Yuan et al. after earthquakes of magnitude 6.1 and 6.2 that occurred three months apart in China, it was shown that exposure to both earthquakes increased the risk of PTSD [14]. The high post-earthquake trauma levels observed in our study can similarly be explained by the participants' exposure to two very severe earthquakes nine hours apart.

Previous studies on earthquakes have shown that women have a higher risk of developing earthquake-related PTSD [2, 15]. Basoglu et al. reported that the PTSD rate of women was higher than that of men after the 1999 earthquake in Turkey [2]. In another study, it was determined that the risk of PTSD after the Chi-Chi earthquake in Taiwan was 2.9 times higher in women than in men [16]. Similarly, a meta-analysis showed that women were 41.38% more likely to experience severe PTSD symptoms than men [17]. In our study, post-earthquake trauma levels were found to be higher in women in all groups. Men may have underreported their symptoms due to societal expectations that they should be in better health and stronger than women. There is a need for comprehensive studies with a larger sample size to determine the effect of gender on post-earthquake trauma levels in dialysis patients and healthcare professionals.

Table 3. Comparison of the sociodemographic characteristics and clinical and laboratory parameters of the participants with high and low SDLTAE scores according to the groups.

	HD group				PD group			
	Low score (n = 23)	High score (n = 64)	%95 Confidence Interval	p	Low score (n = 18)	High score (n = 17)	%95 Confidence Interval	p
Age, years, median, [IQR] [€]	60 ± 12	59 ± 15	-6.111-7.984	0.792	59 ± 12	54 ± 13	-2.836-14.136	0.186
Gender, male, n (%) ^{&}	3 (13)	40 (62)	-	<0.001	0 (0)	10 (59)	-	<0.001
Dialysis duration, months, median, [IQR] [¿]	51 [28-75]	62 [26-99]	0.670-0.688	0.679	29 [13-59]	38 [17-65]	0.606-0.626	0.609
I was in the HD unit during the earthquakes, n (%) ^{&}	15 (65)	20 (31)	-	0.009	-	-	-	-
I continued using my medications regularly after the earthquakes, n (%) ^{&}	10 (44)	6 (9)	-	0.001	5 (28)	3 (18)	-	0.756
I can meet my needs independently, n (%) ^{&}	14 (61)	33 (52)	-	0.600	9 (50)	10 (59)	-	0.854
Time spent outside home after the earthquakes, day, median [IQR] [¿]	19 [12-48]	35 [15-58]	0.119-0.132	0.121	9 [3-26]	15 [8-31]	0.275-0.292	0.284
Economic status, n (%) ^{&}								
Poor	14 (61)	40 (63)	-	1.000	10 (56)	8 (47)	-	0.869
Moderate	9 (39)	22 (34)	-	0.877	8 (44)	8 (47)	-	1.000
Good	0 (0)	2 (3.1)	-	0.963	0 (0)	1 (6)	-	0.977
Educational status, n (%) ^{&}								
Illiterate	4 (17)	25 (39)	-	0.102	1 (6)	5 (29)	-	0.155
Literate	11 (48)	6 (9)	-	<0.001	4 (22)	3 (18)	-	0.735
Primary school	4 (17)	18 (28)	-	0.462	11 (61)	5 (29)	-	0.123
Secondary school	4 (17)	12(19)	-	0.885	2 (11)	3 (18)	-	0.581
Higher education	0 (0)	3 (5)	-	0.666	0 (0)	1 (6)	-	0.977
Marital status, married, n (%) ^{&}	22 (96)	55 (86)	-	0.196	18 (100)	15 (88)	-	0.229
Catheter use, n (%) ^{&}	14 (61)	30 (47)	-	0.364	-	-	-	-
Laboratory parameters								
Urea (mg/dl), median, [IQR] [¿]	129 [120-168]	133 [106-169]	0.566-0.586	0.577	113 [87-128]	124 [94-171]	0.457-0.476	0.468
Creatinine (mg/dl), mean±SD [€]	10.1 ± 3.1	8.5 ± 2.9	0.208-3.074	0.025	9.3 ± 4.2	8.7 ± 2.6	-1.807-2.993	0.619
Hemoglobin (g/dl), mean±SD [€]	10.8 ± 1.8	10.6 ± 2.0	-0.826-1.068	0.800	10.1 ± 1.7	10.6 ± 1.8	-1.659-0.746	0.446
Albumin (g/dl), mean±SD [€]	3.3 ± 0.4	3.2 ± 0.5	-0.072-0.370	0.184	3.0 ± 0.3	3.3 ± 0.6	-0.579-0.071	0.122
Ferritin (ml/ng), median, [IQR] [¿]	337 [144-675]	447 [181-775]	0.309-0.328	0.319	334 [124-460]	256 [135-497]	0.986-0.990	0.988
Intact parathormone (pg/ml), median, [IQR] [¿]	367 [217-551]	351 [209-785]	0.729-0.746	0.736	180 [123-251]	376 [238-740]	0.013-0.017	0.015
HP group								
	Low score (n = 17)	High score (n = 23)	%95 Confidence Interval	p				
Age, years, mean±SD [€]	39 ± 10	37 ± 9	-3.674-8.379	0.434				
Gender, male, n (%) ^{&}	7 (41)	19 (82)	-	0.017				
Marital status, married, n (%) ^{&}	13 (76)	16 (70)	-	0.730				
Time spent outside home after the earthquakes, day, median [IQR] [¿]	75 [43-120]	120 [60-150]	0.224-0.240	0.231				
I was in the HD unit during the earthquakes, n (%) ^{&}	8 (47)	15 (65)	-	0.409				

SDLTAE: Scale That Determines the Level of the Trauma after the Earthquake; HD: hemodialysis; PD: peritoneal dialysis, IQR: interquartile range; SD: standard deviation; HP: healthcare professional.

[&] Pearson's chi-square or Fisher's exact test was used to compare categorical variables between the low and high score SDLTAE groups in the HD, PD and HPs groups. p<0.05 was considered statistically significant.

[€] Student's t-test was used to compare parametric variables between the low and high score SDLTAE groups in the HD, PD and HPs groups. p<0.05 was considered statistically significant.

[¿] Mann Whitney U test was used to compare non-parametric variables between the low and high score SDLTAE groups in the HD, PD and HPs groups. p<0.05 was considered statistically significant.

One of the most important findings of our study is that HD patients had higher SDLTAE scores than PD patients. Once ESRD is diagnosed, patients are exposed to many stress factors, such as dependence on dialysis, dietary and lifestyle modifications, consultation with other departments, the use of substantial amounts of medication, and transportation to the dialysis unit. According to a previous report, 38.1% of dialysis patients experience symptoms such as anxiety and depression, and 57.1% have stress [18]. Therefore, this patient population may be more susceptible to developing PTSD. In a study evaluating HD patients, the lifetime prevalence of PTSD was reported to be 17%, regardless of the type of trauma [19]. In the same study, it was shown that women had a greater perception of life-threatening situations than men and that anxiety was associated with PTSD symptoms [19]. Another study found that one year after Hurricane Katrina, 23.8% of dialysis patients reported symptoms consistent with PTSD [20]. In a study conducted with 42 patients six months after an explosion in Lebanon, PTSD was detected at a rate of 33% in patients receiving HD treatment [21]. HD patients generally spend an average of four hours three times a week in the dialysis unit, connected to the HD machine in an enclosed building, while PD patients can continue dialysis independently of the hospital if they have an adequate supply of fluids and necessary equipment. HD patients may experience various fears related to death, vascular access or complications, deterioration of their condition, and loss of autonomy, as well as concerns about the future [22]. A previous study evaluating 70,079 patients revealed that the frequency of mental illness was higher in HD patients than in both PD and kidney transplant patients [6]. In another study conducted in Turkey, it was shown that the fear of death was higher in HD patients than in PD patients [23]. A study conducted with HD and PD patients to evaluate psychological factors related to COVID-19 reported that HD patients had more post-traumatic stress symptoms [24]. In the literature, it has also been shown that there is a relationship between PTSD and cardiovascular events and mortality [7, 8]. In addition, in a study evaluating 687 chronic dialysis patients, somatic anxiety symptoms were associated with an increased risk of hospitalization and death [25]. Given its relationship with mortality and hospitalization, it is crucial to assess the extent of the post-earthquake trauma level in dialysis patients who have survived an earthquake. When monitoring dialysis patients after an earthquake, psychological evaluations should be undertaken, and these patients should also be evaluated for treatment if necessary.

Dialysis units are of utmost importance in post-earthquake management, particularly during the initial stages after earthquakes, considering the presence of scheduled HD sessions 24 hours a day and HD treatment being additionally required for many traumatized patients due to acute kidney injury. The HD unit, in which we conducted the current study, has been working intensively since the first hours of the Kahramanmaraş earthquake. Subsequent to the initial earthquake, a second earthquake transpired nine hours later, at which time all personnel who were able to reach the unit were in the dialysis unit. While the healthcare professionals working in the dialysis unit were car-

ing for traumatized patients, they were also victims of the earthquake. As a result, they were exposed to even more stressful events compared to typical earthquake victims. Furthermore, prior studies have demonstrated that hospital personnel who participate in disaster relief and witness damage caused by a natural disaster are at increased risk of experiencing symptoms of PTSD [26, 27]. The majority of studies on healthcare professionals have focused on those working in rescue operations. In a meta-analysis, the prevalence of PTSD was found to be 16% in healthcare personnel engaged in earthquake response efforts [28]. However, in our study, we found that 58% of the healthcare professionals working in the dialysis unit had a high post-earthquake trauma level. In another study, the prevalence of PTSD among nurses, who were exclusively women living and working in the earthquake area, was determined to be 30% six to 12 months after the Wenchuan earthquake [9]. In a meta-analysis, Golitaleb et al. found the prevalence of PTSD among emergency department personnel to be 50% [29]. It has also been reported that healthcare professionals residing in the earthquake area are more prone to developing PTSD [30]. The higher post-earthquake trauma level among the healthcare professionals in our study compared to previous research can be attributed to all staff members residing in the earthquake zone and the occurrence of two very severe earthquakes consecutively.

One of the limitations of our study is the relatively small sample size. Another limitation concerns the cross-sectional design. Furthermore, due to the temporal variability of post-earthquake trauma levels, our findings cannot be generalized to all times and warrant follow-up investigations. Another limitation is that the level of trauma was determined through a survey rather than a clinical evaluation. The strength of our study is the evaluation and comparison of the post-earthquake trauma levels of HD patients, PD patients, and healthcare professionals working in the dialysis unit.

Conclusion

In this study, we found that HD patients had a higher level of trauma than PD patients. Our results revealed that women were more traumatized than men in sensitive populations, such as dialysis patients and healthcare professionals. Performing regular psychological assessments on dialysis patients and healthcare personnel may provide an opportunity for timely intervention, if needed, in these groups. In addition, given the ongoing seismic activity in the area, identifying individuals with high trauma levels in advance and treating them if necessary can significantly enhance our ability to achieve favorable outcomes during and after other possible earthquakes. In order to meet the needs of individuals affected by the earthquake, it is crucial to acknowledge the high level of post-earthquake trauma and prioritize these issues.

Ethical approval

The study protocol was approved by the Clinical Research Ethics Committee of Malatya Turgut Ozal University (approval number: B.230, date: December 4, 2023).

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