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Research Article

Acute anxiety cases in emergency department following the November 23, 2022 Düzce earthquake

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Abstract

Background and objectives: Human and material losses associated with earthquakes are traumatic enough to trigger serious symptoms of post-traumatic stress disorder (PTSD), depression, anxiety, and other mental health issues. It is expected that after an earthquake, an increased number of patients with acute anxiety symptoms would present to the emergency department (ED) of a hospital. Therefore, this study determined the magnitude of the acute anxiety cases that reported to the ED of a tertiary care hospital within the 48-hour period following the earthquake that occurred in Düzce, Turkey, on November 23, 2022.

Materials and Methods: Patients presenting to the emergency department over a 48-hour period following the earthquake starting from 04:08 on November 23, 2022, and one week before and after the earthquake were included in the study. Socio-demographic and clinical data were collected retrospectively from hospital records. The severity of anxiety symptoms was assessed with the Faces Anxiety Scale.

Results: In the first 48 hours after the earthquake, a total of 224 patients applied to the ED with earthquake-related complaints. Of these patients, 59 (26.34%) presented with acute anxiety symptoms. A significantly ($p < 0.05$) increased number of acute anxiety-related patients (8.4%) visited the ED following the earthquake compared to the 48-hour period one week before and after the earthquake (1.3% and 0.4%).

Conclusion: The study has demonstrated that immediately after the earthquake, as expected, the ED of hospital encounters increased cases with anxiety symptoms along with an increase in trauma cases. Therefore, healthcare professionals should be able to recognize and manage not only trauma but also psychiatric symptoms in earthquake situations.

Introduction

Earthquakes are among the mass events that cause significant loss of life and property [1-3]. Even in the midst of a disaster, the healthcare system must continue to function both to survive and to serve. Emergency departments (ED), as is the case with all

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natural disasters, become the initial point of contact for affected individuals during earthquakes. Catastrophic events like earthquakes notably increase the intensity of patient influx within the first 24-48 hours [4]. Issues stemming from the surge of in-patient admissions, insufficient space to accommodate the influx of patients in the ED, and the documentation of each medical condition have become a paramount load on the healthcare providers during this initial period [5]. Furthermore, due to healthcare personnel being occupied with treating patients in disaster situations, the comprehensive documentation of individual medical cases becomes a lower priority, leading to gaps in data recording [1,2,6].

Turkey is located on the Alpine-Himalayan orogenic belt. Eighty four percent (84%) of our country's territory is situated within earthquake-prone zones, and 71% of the population resides in regions vulnerable to earthquakes [7]. In recent years, catastrophic events such as the 1999 Marmara earthquake, the 1999 Düzce earthquake, the 2011 Van earthquake, the 2020 Elazığ earthquake, the 2020 İzmir earthquake, and the 2023 Kahramanmaraş earthquake have resulted in significant loss of life and property [8]. On November 23, 2022, at 04:08 local time, an earthquake with a magnitude of Ml=6.0 (Mw 6.0) struck Düzce [9]. Since it was a superficial earthquake, its acceleration was quite high [1,12] and it was classified as an VIII (severe-destructive) earthquake according to the Modified Mercalli intensity scale [8]. Almost all houses in the city were damaged, and 800 buildings were demolished due to heavy damage [9]. Following the earthquake in 1999 (this earthquake had a magnitude of 7.5 Mw, Modified Mercalli intensity scale IX-Violent, and an acceleration of 1.49), which resulted in a significant loss of life and injuries, the city of Düzce became highly sensitive to earthquake risks [10]. This heightened sensitivity led to more rigorous urban planning efforts and construction practices aimed at earthquake resilience [9]. As a result, the earthquake in 2022 was weathered with relatively few casualties and injuries [9]. Although the city did not experience extensive destruction and loss of life, from a healthcare perspective, the earthquake had its most significant impact on the ED of the hospital. During the November 2022 earthquake, two patients lost their lives in the ED, one due to an acute myocardial infarction and the other due to intracranial hemorrhage resulting from a fall while trying to escape. While this earthquake did not have a severe impact in terms of loss of life compared to previous earthquakes, it did result in significant property damage and a surge in patient admissions to the ED.

The city's experience with earthquakes has not only caused physical but also psychological issues [11,12]. In a study examining psychological problems following the earthquake, using random household samples from two towns affected by the November 1999 earthquake (Bolu and Düzce), it was shown that Düzce, which was closer to the epicenter, had a higher prevalence of post-traumatic stress disorder (PTSD) and depression [12]. Another study conducted in Düzce demonstrated that earthquake-related general uncertainty, ambiguity, chaos, and an insecure environment could trigger intense anxiety, fear, and the development of PTSD, particularly in individuals with obsessive-compulsive and paranoid personality disorders [11]. It has been shown that the human and material losses associated with earthquakes are traumatic enough to trigger serious symptoms of PTSD, depression, anxiety, and other mental health issues [13].

Therefore, the aim of this study was to determine the magnitude of acute anxiety cases that reported to the ED in the 48 hours following the earthquake and their ratio to total patients seeking emergency care at a tertiary care hospital in Düzce – the earthquake-affected area. Also, we investigated whether patients presenting with acute anxiety symptoms to the ED during the earthquake subsequently sought psychiatric outpatient care.

Materials and methods

This study was conducted retrospectively at a Health Research and Application Hospital. Ethical approval for the study was obtained from the local ethics committee (Date: 20.03.2023, Decision No: 2023/46). Patient data were obtained from the hospital's electronic database and the ED records.

Patients presenting with trauma and acute anxiety to the emergency department within a 48-hour

period of the earthquake in Düzcestarting from 04:08 on November 23, 2022, and 1 week before and after the earthquake over 48 hours period were included in the study. The data collected included the date and time of patient admissions, triage codes (green, yellow, red, black), ages, genders, presenting complaints (anxiety, trauma), whether patients presenting with anxiety complaints had a prior psychiatric diagnosis, the presence of accompanying traumas, whether they sought psychiatric outpatient care after the earthquake (within 3 months), the number of patients who developed trauma due to anxiety, and the total number of patients admitted to inpatient services at the hospital.

The triage color codes were assigned according to the START triage system [14]. To determine whether there was a subsequent psychiatric referral after the ED admission, the hospital's automation system was checked, and in some cases, patients were contacted by phone to ascertain this information. Patients with missing records and lacking descriptive information such as name and age were excluded from the study. There were no patients with a black triage code admission.

Patients presenting with acute anxiety symptoms were determined according to their chief complaints and the severity of the complaints. Main symptoms of acute anxiety considered were nausea, feeling light-headed or dizzy, body pins and needles, feeling restless or unable to sit still, headache, backache or other aches and pains, rapid breathing, feeling of fast, strong heartbeat, sweating, or hot flashes. The severity of symptoms was assessed with the Faces Anxiety Scale developed by McKinley et al [15]. Patients scoring 3 or more were considered to have an acute anxiety attack. Patients with any evidence of trauma were excluded from this category.

Statistical Analysis: Descriptive statistics were presented as counts and percentages. For independent categorical variables, the Pearson chi-square test and Fisher's exact test were used as appropriate. Statistical analyses were performed using SPSS software, version 23 (IBM, Chicago, IL, United States), for Windows.

Results

In the first 48-hour period after the earthquake, the total number of patients reported to ED was 701, of which 224 were earthquake-related. Out of these 224 patients, 59 (26.34%) presented with acute anxiety symptoms. A total of 182 (81.25%) patients sought medical attention on the first day. Triage code was yellow for 189 (84.38%) patients. Of the total patients, 120 (53.57%) were female, and majority of those presented with acute anxiety symptoms [n=40 (67.80%)], while the majority of trauma cases [n=85 (51.52%)] were male. The median age of the total cases was 34 (1-92) years, and those presented with acute anxiety symptoms had a median age of 30 (16-84) years. Among all patients, 6 (2.67%) were hospitalized, all of whom had serious trauma (Table-1).

Out of 59 patients presented with acute anxiety, 18 (30.5%) had previously diagnosed psychiatric disorders and only 5 (8.5%) of them experienced physical trauma, but without any associated lesions or complaints. Eleven (18.6%) patients had visited the psychiatric outpatient clinic within 3 months after the earthquake (Table-2). Four of these patients received a psychiatric diagnosis for the first time, and the others had a previously known psychiatric diagnosis.

Table-3 shows the visits of anxiety related patients to ED following the occurrence of earthquake compared to 1 week before and after the earthquake over 48 hours period. In the 48-hour period before and after one week of the earthquake, the total number of patients visiting ED was 715, and 544, of which 9 (1.3%) and 2 (0.4%) patients respectively presented with acute anxiety. In the 48-hour period following earthquake, the total number of patients was 701, of which 224 were earthquake-related and 59 (8.4%) of total admissions presented with acute anxiety ($p<0.05$, Pearson Chi-Square test).

Table-1: *Descriptive data of patients arriving in the first 48 hours after the earthquake*

Parameters	Total n=224 (100%)	Anxiety n=59 (26.34%)	Trauma n=165 (73.66%)
Application days			
Day 1	182 (81.25%)	48 (81.36%)	134 (81.21%)
Day 2	42 (18.75%)	11 (18.64%)	31 (18.79%)
Total	224	59 (26.34)	165 (73.66)
Triage code			
Green	29 (12.95%)	19 (32.20%)	12 (7.27%)
Yellow	189 (84.38%)	40 (67.80%)	149 (90.30%)
Red	6 (2.67%)	0	4 (2.43%)
Gender			
Male	104(46.43%)	19 (32.20%)	85 (51.52%)
Female	120(53.57%)	40 (67.80%)	80 (48.48%)
Age (years)			
Median (min-max)	34(1-92)	30 (16-84)	36 (1-92)
Outcome			
Admission	6 (2.67%)	0 (0%)	6 (3.64%)
Discharge	218(97.33%)	59 (100%)	159 (96.36%)

Table-2: *Profile of patients presenting with acute anxiety (n=59)*

Parameters	Number (%)
Previous psychiatric diagnosis	
Yes	18(30.5)
No	41(69.5)
Concomitant trauma	
Yes	5(8.5)
No	54(91.5)
Visit to Psychiatry Clinic after emergency visit	
Yes	11(18.6)
No	48(81.4)

Table-3: *Visit of anxiety-related patients to ED over 48 hour's period 1 week before and after earthquake compared to 48 hours following earthquake*

Patients' visits to ED over 48 hours period	Total number of patients	Anxiety-related patients n (%)
1 week before the earthquake	715	9 (1.3)
Following the occurrence of earthquake	701	59 (8.4)
1 week after the earthquake	544	2 (0.4)
p value		<0.001

Note: Pearson Chi-Square test

Discussion

The present study evaluated acute emergency department visits following the severe earthquake that occurred in Düzce on November 23, 2022. Despite the high destructive power of the earthquake, there were not many casualties and physical injuries due to the city's preparedness [9]. Most patients did not experience any physical

injuries. Additionally, about one-third had a known psychiatric disorder.

Natural disasters trigger anxiety and worry in everyone at the outset, which is a natural response. Therefore, in addition to trauma, another common complain during natural disasters such as earthquakes is anxiety disorders (especially panic disorder). These feelings can turn into serious psychiatric disorders if they do not decrease over time. Due to individual factors such as the severity of the destruction and personal losses such as losing loved ones, individuals are affected to varying degrees, leading to the development of psychiatric symptoms in some people [16]. Earthquakes invite a wide range of psychiatric conditions such as anxiety, depression, suicide, and PTSD [17]. It is known that high-trauma events like earthquakes can cause acute exacerbations of psychiatric symptoms in individuals who already have psychiatric diagnoses [18]. Furthermore, it has been shown that emotional stress can lead to ischemic heart diseases and acute myocardial infarctions [19], and respiratory diseases may increase due to changes in housing conditions [20].Sometimes, traumatic injuries have been reported to occur as a result of panic within the home, due to collisions with objects [21]. In most people, the impact of a traumatic event is known to decrease over time. A study has shown that approximately 90% of individuals experience a significant psychological trauma in their lifetime, and about 11.2% of people develop long-term psychiatric disorders such as PTSD after exposure to trauma [22]. Individuals who develop PTSD, when exposed to even an ordinary situation associated with the traumatic event, develop 'fear conditioning' and their bodies respond as if they are reliving the trauma [23]. The most common anxiety disorders seen after an earthquake are panic disorder and generalized anxiety disorder [24]. While the diagnosis of these disorders is made by psychiatrists according to DSM-5, most patients experiencing an anxiety crisis as a result of a triggering event seek emergency care [25]. Patients experiencing an anxiety crisis often complain of symptoms such as palpitations, difficulty in breathing, restlessness, irritability, tension, inability to sit still, chest pain, syncope, and headache [26]. These findings may be observed in patients presenting to the ED [26]. In the acute phase, almost half of children over 8 years of age exhibit acute stress-related psychological effects [27]. Due to its rich symptomology, panic attacks have been shown to receive a misdiagnosis rate of nearly 85% in one study [28]. In most cases, the symptoms of a panic attack are resolved spontaneously over time. What reassures patients the most is realizing that the situation they are anxious about is not actually happening [29]. During a disaster, it is expected that the most affected patients would seek help primarily for the physical effects of the disaster. However, Beaglehole et al. reported that a significant portion of patients sought care for acute anxiety symptoms following the earthquake in Christchurch, New Zealand, in February 2011. However, daily admissions to inpatient mental health services decreased, and bed occupancy rates decreased over time [30]. Also, the experience of the earthquake in Düzce in 1999, and the extensive destruction it caused, indicate that despite the population's physical and structural preparedness, they are emotionally quite vulnerable. Satıcı et al. conducted a study following the earthquake in Turkey on February 6, 2023, and showed that earthquake fear increased psychological problems and decreased overall well-being in our country [31]. Almeida et al. [32] examined non-trauma hospital admissions after the earthquake in Kathmandu, the capital of Nepal, on April 25, 2015. Although the number of admissions for mental and behavioral disorders decreased numerically in 40 days following the earthquake, there was a slight proportional increase (less than 3% of all admissions). However, this was not statistically significant. Another study conducted during the same earthquake showed that only 0.8% of admissions in the acute phase were related to mental illnesses [33]. In Turkey, after the earthquake in the Aegean Sea in 2020, out of 154 patients who visited the ED, one had symptoms of anxiety disorder, such as palpitations, and one had symptoms of headache and syncope [34]. After the 2010 Yushu earthquake in China, 1.3% (n=9) of patients admitted in the acute phase had mental illnesses [35]. In our study, during the acute phase, which we defined as the first 48 hours, 26.34% of patients presented with symptoms of acute anxiety. This rate was considerably higher than in many studies in the literature.

However, our study has some limitations. There are two hospitals in the city with similar capacities, and the data of this study belong to a single center. In this study, anxiety diagnoses at the time of the earthquake were evaluated according to symptoms and the Faces Anxiety Scale, and it was not possible to use any other scales due to the high number of visits to the emergency room.

For a standard disaster plan, priority is expected to be given to trauma patients. However, despite the high destructive power, and due to the city's preparedness [9], there were not many casualties and injuries in the earthquake that occurred in Düzce on November 23, 2022. On the other hand, a good number of patients presented with symptoms of anxiety disorder, and the majority of these patients had no previously known psychiatric illness. The findings of our study indicate that in the case of a natural calamity like an earthquake, disaster preparedness should include plans for both trauma and psychiatric case. Emergency medicine physicians and trauma surgeons, as healthcare professionals, should be capable of recognizing and managing not only trauma but also psychological issues. It should be taken into consideration that even with minimal destruction, an increase in psychiatric problems may be observed.

Authors' Contributions

KS, MB contributed to conception; SK, KS, MB contributed to design; MCD, MB contributed to supervision; KS,ÖK contributed to data collection and processing; AAA, AKFK, KS contributed to analysis and interpretation; KS, MB, contributed to literature review; AAA, SK, MB, KS contributed to writing; KS, MCD, MB contributed to critical review.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

Ethical statement

Ethics committee approval was obtained from the local ethics committee (Date: 20.03.2023, Decision No: 2023/46).

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