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Psychiatric care after Kahramanmaraş earthquake: Evaluation of children being trapped under rubble and in need of intensive care

¹Yusuf Selman Celik¹, ²Meryem Kasak¹, ³Hande Gunal Okumus²,
⁴Ruken Demirkol Tunca¹, ⁵Yagmur Harputlu Yamak¹, ⁶Yusuf Ozturk¹, ⁷Aysegul Efe¹

¹Etlik City Hospital, Department of Child and Adolescent Psychiatry, Ankara, Türkiye

²Uşak Training and Research Hospital, Department of Child and Adolescent Psychiatry, Uşak, Türkiye

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Abstract

Kahramanmaraş earthquakes occurred on 6 February 2023, and many people died and were trapped under the rubble. The objective of this research was to investigate child victims of the quake, who were most dramatically affected, required intensive care and were trapped under debris/rubble/wreckage in terms of psychiatric status and the disaster-related or personal determinants of psychopathologies. Pediatric patients (n=77) who were hospitalized in intensive care units and inpatient wards within the first month after the earthquake and were consulted to the Child Psychiatry, were examined in terms of psychiatric symptoms, use of psychotropics, duration under debris, loss of relatives, loss of limbs, and intensive care requirement. Anhedonia, loss of appetite, psychosomatic and dissociative symptoms, as well as psychotropic need/use were significantly higher in patients who required intensive care. Dissociative and psychosomatic symptoms were linked with longer durations under debris. The current findings highlight prominent and predominated psychiatric symptoms in child victims of quakes, hospitalized in intensive care units and being prolonged trapped under debris. Prolonged entrapment correlated with increased dissociative and psychosomatic symptoms, emphasizing the need for targeted psychiatric support for vulnerable earthquake survivors.

Keywords: Earthquake, child and adolescent psychiatry, intensive care unit, under the debris

Introduction

Mass trauma, which includes events such as natural disasters, war, and terrorism, is characterized by its direct or indirect impact on a significant number of people, resulting in life-threatening and devastating consequences. On 6 February, a major earthquake with its epicentre in Kahramanmaraş affected 11 provinces with an estimated population of 15 million, resulting in the loss of more than 50.000 lives [1]. This catastrophic event represents a mass trauma that is expected to have a high psychological impact due to its high magnitude, unpreparedness (the earthquake struck at 4.17 a.m.), and the extensive destruction it caused [2]. Experiencing a traumatic event increases the manifestation

of a range of mental health problems, such as acute stress disorder (ASD), post-traumatic stress disorder (PTSD), major depressive disorder (MDD), dissociative symptoms, alcohol/substance abuse disorder, sleep disturbances, irritability which may manifest either independently or concurrently as comorbid presentations [3]. Psychiatric symptoms after trauma have been discussed in many different articles, and the relationship between the presence of different ongoing traumas and poor psychiatric prognosis has been underlined. In various studies conducted after the earthquake, it is emphasized that physical injury, loss of parents, collapse of the house, witnessing injury/death, and parental reaction to trauma increase the risk of ASD and PTSD [4]. The prevalence of post-quake ASD was 12-81% [5-7]. The

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Corresponding Author: Yusuf Selman Celik, Etlik City Hospital, Department of Child and Adolescent Psychiatry, Ankara, Türkiye
Email: yusufselmancelik@gmail.com

wide range of prevalence in the literature could be explained by varied sociodemographic and sociocultural characteristics, the magnitude and type of the traumatic event, national policies, and methodological differences [4-7].

Dissociation also occupies a prominent position in the trauma literature, as it is widely recognized as a mechanism for coping with overwhelming physical or psychological distress. Numerous studies have shown an increased prevalence of reported dissociative experiences such as emotional detachment, numbness, cognitive intrusions, perceptual distortions, and depersonalization-derealization following trauma [8,9]. Furthermore, peritraumatic dissociation (dissociative symptoms occurring during trauma) is a predictor of future PTSD [10-12]. On the other hand, research on post-earthquake dissociative symptoms is sparse, however, with relatively consistent findings of no relationship between trauma exposure and dissociative symptoms [13-15]. A recent systematic review comprehensively evaluated 53 studies examining the relationship between trauma and dissociation, particularly emphasized the presence of scarce findings in pediatric population. Moreover, dissociative symptoms were often treated as secondary to the main focus of interest in the vast majority of the studies, which primarily revolved around PTSD symptoms. Previous findings strikingly highlighted the difficulty in establishing dissociation as a direct consequence of trauma, mainly due to methodological limitations, including the use of self-report scales to assess dissociative symptoms and associated psychopathology, sampling issues (inability to separate groups with and without trauma exposure), and speculative extrapolation from collected data without sufficient empirical basis [16]. Given these considerations, a comprehensive understanding of the relationship between trauma and dissociation requires overcoming the aforementioned methodological limitations, as well as an increase in studies focusing on populations vulnerable to trauma-related psychopathology, with a particular emphasis on children and adolescents.

A study of earthquake survivors in India screened for a variety of psychopathologies and found at least one psychiatric condition in 64% of cases [17]. A study conducted after the L'Aquila earthquake in Italy reported that being trapped under the rubble may be the situation that most significantly increased the likelihood of ASD [18]. The same study emphasized the need for a comprehensive psychiatric assessment of people being trapped under the rubble and the importance of providing appropriate and prompt psychological support [19]. Consistent with the findings of this study, another study reported that being trapped under rubble was positively and moderately correlated with the severity of PTSD symptoms [20]. Interestingly, different studies revealed that rubble survivors were better off in terms of depression and PTSD symptoms. The authors interpreted this point as an unexpected finding and noted that future studies should be conducted to clarify this relationship [21].

A study conducted with 321 children after the 1999 Marmara

earthquake found that 25.5% of the children had PTSD, 16.5% had ASD, and 38% had adjustment disorder. Psychological issues were more frequent in children aged 7-12 years, particularly among those who had lost loved ones or suffered physical injuries. In contrast, children younger than 80 months were less likely to experience PTSD, ASD, and adjustment disorder [22]. Research about the Kahramanmaraş Earthquake revealed that 81.6% of adolescents seeking help at the Şanlıurfa Mehmet Akif İnan Research and Training Hospital after the Earthquakes were diagnosed with acute stress disorder, with higher symptoms observed in those without physical injuries, highlighting the critical need for mental health evaluation and intervention in this population [5].

The imperative requirement for the intensive care unit (ICU) serves as a compelling indicator of the heightened degree of physical trauma endured by the patient, reflecting the severity of their resultant injuries. It is thought that child quake survivors who had to be separated from their parents and relatives during the ICU may be more psychologically affected. More recent findings demonstrated that psychiatric symptoms were present in 64% of patients hospitalized in pediatric intensive care, and 28% of children who were hospitalized after trauma were diagnosed with PTSD in the follow-up [23]. Another study conducted within the identical timeframe investigated children admitted to the ICU along with their parents and reported that ASD symptoms surpassed the predetermined threshold in 39.8% of the children and 56.8% of their parental figures [24].

There are a limited number of studies on the mental health of children and adolescents after the earthquake. To the best of our knowledge, this is the first study investigating the psychiatric implications of being under rubble in child earthquake survivors. As the impact of earthquakes varies according to many factors, it is valuable to know the effect on different risk groups in terms of how to approach those affected. The current paper presents the first data in the literature on pediatric patients, a group particularly affected by the earthquake, whose homes collapsed and were trapped under rubble. Secondly, data on the psychiatric symptoms of earthquake victims in need of intensive care were obtained. Therefore, we aimed to investigate (i) whether patients requiring intensive care admission have an increased frequency of ASD compared to ward patients, (ii) whether patients who stayed under rubble for a long time (>10 hours) have an increased frequency of ASD compared to patients who stayed under rubble for a short time (<10 hours), and (iii) whether intensive care requirement and duration of stay under rubble are associated with dissociative and psychosomatic symptoms.

Material and Methods

Pediatric patients, who were hospitalized as earthquake victim in Ankara Etlik City Hospital due to varied requirements between 6 February and 6 March 2023 and were consulted to evaluate in terms of psychiatric conditions by a child and adolescent psychiatrist during their hospitalization were included to the

analysis. The inclusion criteria were determined as being under 18 years of age, being dispatched from earthquake zone and being hospitalized in Pediatric Departments of Etlik City Hospital just first month after the earthquake, and having a history of being trapped under the rubble. After securing the necessary approval from local ethics committee, the data on inpatient participants were collected by own psychiatrists, who evaluated and followed the patients throughout hospitalization and applied appropriate procedures to each of them. The study conductor child and adolescent psychiatrists of Etlik City Hospital meticulously examined the patient files to gather data for research. It's crucial to emphasize that the data were solely used for research, with the strict condition that the results would be published in a manner that ensured the patients' identities remained undisclosed. The cases monitored in ICU included 14 instances of electrolyte imbalance due to Crush syndrome (n=5) or Compartment syndrome (n=4); 12 cases of limb amputation-related hemodynamic instability; 5 cases of cranial trauma (Glasgow Coma Score<8); 4 hemodynamic instability due to hip fracture, abdominal, or pelvic bleeding; and 2 patients with septic shock and multi-organ failure (In patients with multiple indications, the indication related to the most prominent problem has been specified). Among the patients monitored in the general ward instead of the ICU, those identified included individuals whose hemodynamics did not deteriorate despite having a fracture, those without limb loss, those with a Glasgow Coma Score of 8 or higher, and those without electrolyte imbalances or organ failure.

The study's sample size was determined utilizing the G*Power 3.1 program [25]. A prior investigation into the diagnosis and symptoms of ASD in children younger than 18 following the 1999 Marmara earthquake in Türkiye served as a reference. The findings indicated that 74.5% of the children affected by the earthquake were found to have ASD [5]. In the post hoc analysis conducted after obtaining our sample (n=77), a Type-I error (alpha) was set at 0.05, and the test power was determined to be $1-\beta=0.93$.

Psychiatric interviews were conducted by a child and adolescent psychiatrist based on DSM-5 guidelines. Under the heading of dissociative symptoms, symptoms such as derealization, depersonalization, and dissociative hallucinations are included. Psychosomatic symptoms were assessed as the presence of vegetative psychiatric symptoms not consistent with the patient's physiopathology. Although each of patients was evaluated and followed by different child and adolescent psychiatrists, the team ensured diagnostic agreement through joint assessments. Given the sensitivity of this patient group, treatment and follow-up were conducted by own unique psychiatrist under peer supervision. Treatment was organized as a team, consisting of the child and adolescent psychiatrist providing a detailed initial assessment and further monitoring the patients during hospitalization and other psychiatrists of the clinic as peer supervisors. The inclusion and exclusion process are shown in Figure 1.

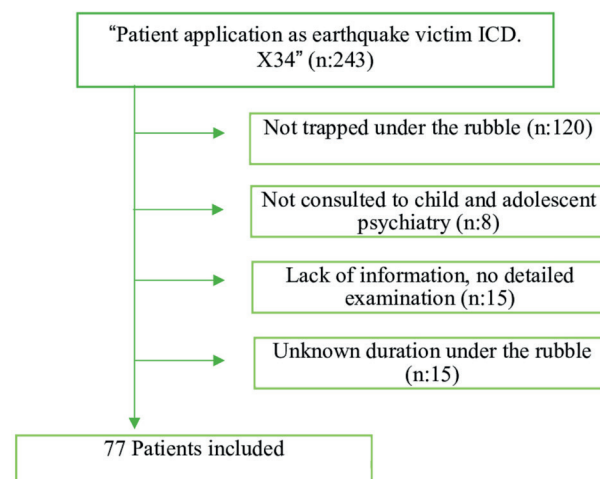


Figure 1. Patient inclusion flow chart

The data screened from the patient records were as follows: sociodemographic data, duration of being trapped under rubble, presence of parent or sibling loss, previous psychiatric diagnosis, requirement of intensive or extensive care, limb amputation, surgery, acute stress symptoms, dissociative symptoms, and prescribed medications. Interviews were conducted only with the presence and voluntary consent of the patients and their parents or legal guardians.

Ethical Statement

The local ethics committee approved the research protocol (ethics committee decision date: 06.09.2023; decision number: AEŞH-EK1-2023-518) and was in line with the Declaration of Helsinki. Interviews were conducted with the patients only in the presence of their parents or legal guardians, ensuring that both parties willingly agreed to take part in the study.

Statistics

The Statistical Package for the Social Sciences (SPSS) version 26.0 was used to analyze the data. The normality of the data distribution was assessed using Kolmogorov-Smirnov. Descriptive statistics were utilized to present demographic and clinical characteristics, reported as numbers and percentages [n (%)] or mean $\pm$ standard deviation (SD). Group differences were explored using the Pearson chi-square test (χ^2) for categorical variables. Statistical significance was determined at $p<0.05$.

Results

Among the 77 cases monitored in the inpatient wards were 40 (51.95%) females and 37 (48.05%) males. The mean age of the patients was $11.77 \text{ years} \pm 4.38 \text{ years}$. Of the patients, 22 (28.5%) lost both parents, 21 (27.2%) lost their mothers, 15 (19.4%) lost their fathers, and 32 (41.5%) experienced the loss of one or more siblings. The patients came from the following provinces: 42.9% (n=33) were from Hatay, 36.4% (n=28) were from Adıyaman, 13% (n=10) were from Kahramanmaraş, 6.5% (n=5) were from Gaziantep, and 1.3% (n=1) was from Malatya. Eleven patients

had previous trauma, and the incidence of ASD was significantly higher in those with a history of previous trauma compared to those without a history of trauma (100% vs. 64.2%; Fischer’s exact: $p=0.025$, effect size= 0.296).

Among the patients, 37 (48.05%) required intensive care, while 40 (%51.95) did not. The prevalence of ASD was 83.8% ($n=31$) among those who required intensive care and 67.5% ($n=27$) among those who did not. The ASD prevalence differed between groups, however, without a statistical significance (χ^2 : 2.742, $p=0.098$). The patients in requirement of intensive care presented with more dissociative symptoms. Psychiatric symptoms of patients with and without intensive care requirements were demonstrated in Table 1.

Table 1. Comparison of psychiatric symptoms of patients according to the requirement for intensive care support

Psychiatric symptoms	Require ICU (n=37)	Not require ICU (n=40)	χ^2	p	Effect size
Anhedonia	20 (69.0%)	6 (27.3%)	8.702	0.003	0.413
Loss of appetite	16 (55.2%)	4 (20.0%)	4.693	0.030	0.352
Sleep disturbances	20 (64.5%)	13 (54.2%)	0.604	0.437	
Pyschosomatic symptoms	15 (51.7%)	3 (15%)	5.38	0.02	0.374
Aggression	12 (42.9%)	5 (23.8%)	1.173	0.279	
Dissociative symptoms	13 (37.1%)	6 (15%)	4.839	0.028	0.254

ICU: intensive care unit; Note: Data presented as the number of clients along with frequencies (n,%); Chi-Square Tests (χ^2) for comparison of groups; $p<.05$: statistically significant and the significant values are in bold

The use of selective serotonin reuptake inhibitors (SSRIs) tended to be higher in patients requiring intensive care, but this was not statistically significant ($p>0.05$). Antipsychotics were significantly higher in these patients ($p=0.012$). Differences between the groups in terms of psychopharmacological aspects are presented in Table 2.

Table 2. Comparison of psychiatric medication requirements of patients according to the requirement for intensive care support

n (%)	Require intensive care unit (ICU) (n=37)	Not require ICU (n=40)	χ^2	p	Effect size
Medication requirement	20 (54.1%)	12 (30%)	4.579	0.032	
SSRI requirement	11 (31.4%)	6 (15.4%)	2.683	0.101	
Antipsychotic requirement	16 (45.7%)	7 (18.4%)	6.289	0.012	0.294

ICU: intensive care unit, SSRI: selective serotonin reuptake inhibitors; Note: Data presented as the number of clients along with frequencies (n,%); Chi-Square Tests (χ^2) for comparison of groups; $p<.05$: statistically significant and the significant values are in bold

Previous reports demonstrated that most of the rubble survivors were rescued by their own efforts, family, or neighbors within the first 24 hours and by search and rescue teams as time passed. 39.4 % ($n=15$) of rescues after 10 hours under rubble were by search and rescue teams. The findings about the rescue of current patients are presented in Figure 2.

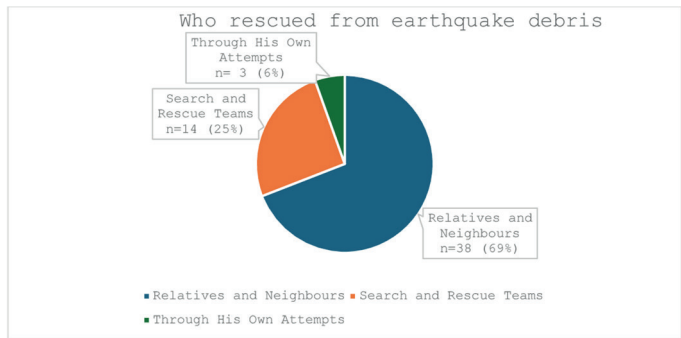


Figure 2. Pie chart illustrating who rescued the patients from under the debris

The median duration under rubble was 10 hours (min-max: 1-98). Since there are no reports in the literature regarding the duration and effects of staying under the wreckage, it was preferred to

evaluate the effects of rubble duration in this study by dividing it into two groups: 10 hours or less and more than 10 hours. Thirty-nine patients (50.6%) stayed in the rubble for 10 hours or less, while thirty-eight (49.4%) stayed more than 10 hours. Intensive care requirements did not differ between groups according to rubble duration (51.3% vs 41%; $p=0.211$). Despite a higher incidence of limb loss among individuals trapped under debris for over 10 hours, the difference was not statistically significant [n : 12 (31.6%); n : 7 (17.9%) p : 0.165; χ^2 : 1.924]. The prevalence of ASD between these groups was not statistically significant [n : 28 (71.8%) vs n : 30 (78.9%), p : 0.467, χ^2 : 0.53].

Regarding treatment requirements, 41 (53.2%) children received psychopharmacological treatment and no significant difference was found between groups by rubble duration ($p>0.05$). SSRIs were used in 17 (23%) patients, while antipsychotics were used in 23 (31.5%). The patients were followed up in the inpatient wards for a mean of 45.4 days, and the reason for SSRI use was PTSD. Patients were evaluated by child and adolescent psychiatrists an average of 3.4 times during their inpatient period. Forty-five patients (58.4%) were followed up weekly by psychologists for supportive psychotherapy.

It was observed that the patients enduring more extended periods under rubble exhibited a significant increase in psychosomatic and dissociative symptoms. A comparison of a variety of psychiatric conditions which significantly affected daily functioning between the groups by rubble duration was demonstrated in Table 3.

Table 3. Comparison of psychiatric symptoms of patients according to the duration of stay under rubble

n (%)	>10 hours under the rubble (n=38)	<=10 hours under the rubble (n=39)	χ ²	p	Effect size
Anhedonia	14 (51.9%)	12 (50%)	0.017	0.895	
Loss of appetite	9 (34.6%)	11 (47.8%)	0.882	0.348	
Sleep disturbances	17 (58.6%)	16 (61.5%)	0.049	0.825	
Pyschosomatic symptoms	13 (50%)	5 (21.7%)	4.194	0.041	0.293
Aggression	10 (37%)	7 (31.8%)	0.146	0.703	
Dissociative symptoms	13 (%36.1)	6 (15.4%)	4.251	0.039	0.238

Note: Data presented as the number of clients along with frequencies (n,%); Chi-Square Tests (χ²) for comparison of groups. p<.05: statistically significant and the significant values are in bold

Discussion

This study aims to investigate the psychological symptoms of children who were trapped under the rubble and needed intensive care after the earthquake. To our knowledge, only one study was previously conducted on earthquake survivors trapped under rubble. Therefore, the results of the current study are expected to make a valuable contribution to the existing literature. We found that the frequency of ASD did not increase significantly in children who needed intensive care and stayed under rubble for a long time (>10 hours). However, the need for intensive care and increased duration of stay under rubble were associated with an increase in dissociative and psychosomatic symptoms.

The current findings revealed a significant increase in the incidence of ASD among patients with a history of previous trauma. A few studies have shown that a history of trauma correlates with symptoms of ASD [26]. Stressful life events have a disruptive effect on the information processing system of the brain, with long-term neural consequences. A review of studies assessing the neurocognitive effect of trauma reveals recurrent findings such as information processing biases (particularly attentional deficits in processing emotional stimuli), data-driven processing, and heightened arousal [27]. Consistent with neuropsychological findings, neuroimaging studies have consistently demonstrated alterations in both volume and activity in the medial prefrontal cortex, hippocampus, corpus callosum, and amygdala, which are stress-sensitive brain regions [28]. Based on this information, it is possible to say that having a history of previous trauma predisposes one to develop symptoms of ASD. In our investigation, the prevalence of ASD was found to be significantly elevated in patients possessing a history of trauma when compared to those without such a history. On the other hand, studies have shown that interpersonal relational trauma and mass trauma, such as earthquakes, are more likely to cause ASD symptoms in children and adolescents than other traumas (such as illness and injury) [29]. In addition to the nature of the traumatic event, empirical evidence highlights the central

role of peritraumatic factors, such as being trapped under rubble, witnessing injury/death, and physical harm, in precipitating the onset of ASD [30,31]. It would not be surprising to find that symptoms of ASD are more common in people who are already prone to a traumatic stress response, given factors such as a major earthquake with devastating consequences, a history of being trapped under rubble, and a high rate of witnessing the death and injury of their family/relatives. This study found that staying under rubble for a long time increased the frequency of ASD, but this was not statistically significant. This may be due to the small sample size.

Consistent with our hypothesis, current findings reveal a positive and moderately significant correlation between the duration of being trapped under the rubble and dissociative/psychosomatic symptoms. A few studies have shown that being trapped under the rubble is a significant risk factor for the onset of dissociative symptoms [19,32]. Dissociation acts as an automatic, primitive, and protective psychobiological defense mechanism in the early stages of trauma to limit distress in a short term. It protects the child from the emotional difficulties caused by the trauma and increases mental and physical survival. At the same time, some studies suggest that dissociation increases physiological survival by reducing autonomic activity [33]. Children are considered more vulnerable to dissociation because of their ability to alter and/or redefine reality according to their needs, to assign themselves variable roles in a fantasy world, and their inability to physically defense themselves or escape trauma [34]. From this point of view, the relationship between the duration of being trapped under the rubble and dissociative symptoms seems to be understandable.

To our knowledge, there is no study on the relationship between the duration of being trapped under the rubble and psychosomatic symptoms, so this study presents the first data on this subject. Consistent with our findings, many studies have shown that trauma and psychosomatic symptoms are closely related in childhood [35,36]. Loss of family members, witnessing death/injury/being

trapped under rubble, trait anxiety, and family psychopathology are strong predictors of both PTSD and psychosomatic symptoms following natural disaster-related trauma in children and adolescents [35]. From a neurobiological perspective, prolonged activation of the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis leads to abnormal cortisol release, which disrupts neuroimmunoendocrine homeostasis by initiating the inflammatory cascade. It has been suggested that this increased inflammation may play a role in developing or aggravating physical symptoms. On the other hand, structural and functional alterations in glucocorticoid-sensitive brain regions, particularly the hippocampus and amygdala, may disrupt the regulation of the HPA axis, leading to arousal symptoms and anxiety sensitivity [37]. For all of these reasons, it is not surprising that psychosomatic symptoms are common among children and young people who are trapped under the rubble. At the same time, Eastern cultures are known to discourage the direct expression of emotions, and somatic manifestations are an important way of expressing emotions [38]. When considered from a cultural perspective, this finding becomes even more comprehensible.

In our study, we found a statistically significant increase in psychiatric symptoms and a higher prevalence of dopamine receptor blocker use in children with a history of intensive care unit admission. Children are exposed to many psychological and physical stressors in the intensive care unit. Children usually have to face a difficult period of hospitalization, during which they are exposed to long periods of hospitalization and painful procedures. On the other hand, the separation from their parents, the lack of companionship in an unfamiliar environment and the interruption of the usual daily routine lead to a sense of uncertainty and insecurity in the child. They may also witness the trauma or death of other patients or be negatively affected by staff attitudes (due to fatigue or frequent exposure to patient deaths) [39,40]. These reasons may increase the likelihood of psychiatric symptoms and lead to a high rate of use of medical treatment in children and adolescents who are admitted to an intensive care unit. It is important to provide detailed psychiatric assessment and screening to children and their families before, during, and after intensive care unit admission.

The current findings should be interpreted with caution due to several limitations. Firstly, the absence of standardized scales or structured psychiatric assessments is notable, although diagnosis were made for each patient by clinical interview of qualified child and adolescent psychiatrists. Another limitation of the study is the small sample size, despite being conducted on a large scale across different cities. The third limitation of the study is that the lack of detailed medication records made it impossible to accurately track which drugs were administered at what dosages and for how long. Patients were evaluated in intensive care units or inpatient wards within one month after the earthquake, potentially skewing results towards the most severely affected individuals by the earthquake and limiting

generalizability. Future research with community-based samples would provide more comprehensive insights into earthquake-related psychopathology in children. While the investigation focused on specific psychiatric symptoms, broader assessments could yield a deeper understanding. Utilizing standardized scales and structured assessments in future research is imperative. Follow-up studies are necessary to evaluate medication efficacy. Lastly, the cross-sectional design captures a single snapshot of participants' experiences, overlooking potential longitudinal changes. In addition to these limitations, our study also has some strengths. The group most severely affected by the earthquake, those trapped under rubble and patients needing intensive care, were evaluated. In the literature, this is the first study investigating the relationship between the duration of being under rubble and psychiatric symptoms. Psychopharmacological agents started in post-earthquake studies have rarely been examined in studies since they are usually used during the disaster period. In our study, we investigated which psychotropic agents the patients needed.

Conclusion

This research has added to the existing body of literature concerning psychiatric symptoms, diagnoses, and treatments among children and adolescents who were hospitalized in intensive care units and trapped beneath the rubble following a significant earthquake. The findings showed that anhedonia, loss of appetite, psychosomatic symptoms and dissociative symptoms were statistically significantly higher in children requiring intensive care compared to the non-intensive care group. In the subset necessitating intensive care, anhedonia emerged as the predominant psychiatric symptom. The need for antipsychotic medication was found to be significantly higher in the group requiring intensive care. The research identified a notably higher occurrence of dissociative and psychosomatic symptoms in individuals who endured more than 10 hours trapped under rubble. This study concentrated on two vulnerable groups most profoundly impacted by the earthquake. It was determined that these two vulnerable groups should receive closer and more intensive psychiatric support after the disaster.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declared that this study has received no financial support.

Ethical Approval

The local ethics committee approved the research protocol (ethics committee decision date: 06.09.2023; decision number: AEŞH-EK1-2023-518) and was in line with the Declaration of Helsinki.

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