Thorac Res Pract. 2025;26(5):231-237 DOI: 10.4274/ThoracResPract.2025.2024-11-3

Original Article

Evaluation of Systemic Inflammatory Indices of Earthquake Victims After the 6 February Kahramanmaraş Earthquake

Merve Erçelik, Önder Öztürk, Tutku Aydın, Hilal Türkmen Kaya

Department of Chest Diseases, Süleyman Demirel University Faculty of Medicine, Isparta, Türkiye

Cite this article as: Erçelik M, Öztürk Ö, Aydın T, Türkmen Kaya H. Evaluation of systemic inflammatory indices of earthquake victims after the 6 February Kahramanmaraş earthquake. *Thorac Res Pract.* 2025;26(5):231-237

Abstract

OBJECTIVE: Earthquakes cause many people to lose their lives, get injured and leave their homes. Earthquakes constitute a serious risk factor for physical and mental diseases primarily due to traumatic environmental experiences. Systemic inflammation indices are used to determine prognosis in many diseases. This study aims to investigate the effects of the distance of earthquake victims from the epicentre of the earthquake, whether trapped under debris, and their psychological distress on the systemic inflammatory indices.

MATERIAL AND METHODS: Systemic inflammatory indices were retrospectively calculated for all earthquake victims. Questionnaires were evaluated prospectively among earthquake victims who volunteered.

RESULTS: The systemic inflammation values were aggregate index of systemic inflammation (AISI) median 351.5, systemic inflammation response index (SIRI) median 1.30, and systemic inflammation index (SII) median 677.4. Although the number of earthquake survivors under rubble was lower than the number of earthquake survivors not under rubble, AISI ($P = 0.001$), SIRI ($P = 0.03$), and SII ($P = 0.002$) were found to be statistically significantly higher in those under rubble. Depression scores (mean, 37.8) and anxiety scores (mean, 43.6) were compatible with moderate and severe categories. There was a significant relationship between AISI ($P = 0.018$) and SIRI values ($P = 0.05$) and depression outcome. Similarly, there was a statistically significant relationship between anxiety outcome and SII values ($P = 0.002$).

CONCLUSION: A significant correlation was found between the physical and psychological trauma experienced by the earthquake victims and the high level of systemic inflammatory indices. Rehabilitation and close follow-up of the earthquake victims are of great importance given that systemic inflammation is one of the long-term health effects of earthquakes.

KEYWORDS: Earthquake, inflammation, depression, anxiety

Received: 05.11.2024 ***Revision Requested:*** 28.05.2025 ***Last Revision Received:*** 15.06.2025

Accepted: 26.06.2025 ***Epub:*** 04.08.2025 ***Publication Date:*** 15.08.2025

INTRODUCTION

On February 6, 2023, a magnitude 7.8 Mw earthquake centered in Kahramanmaraş struck 11 provinces in Türkiye, causing 50,738 deaths and 115,353 injuries.[1] It prompted the organized evacuation of 28,044 persons and the displacement of approximately 3,000,000 individuals to other regions.[2] Of these displaced individuals, 7,500 were accommodated in dormitories, hotels, and boarding houses in Isparta.

Natural disasters cause great damage to nature and affect a large number of people worldwide. Earthquakes, one of the natural disasters, cause a large number of casualties, injuries, and losses, and force people to leave their homes. Considering the effects of earthquakes on public health, acute effects can include being under rubble, injuries, dust exposure as a result of collapsed buildings, and increases in infectious diseases due to post-earthquake weather and living space conditions. When the long-term health effects of earthquakes are analysed, increases in cardiovascular diseases, mental diseases, and frequency of metabolic diseases have been reported.[3]

The complete blood count (hemogram) is one of the laboratory tests routinely performed in hospital admissions. It provides insight into the patient's hemoglobin level, erythrocyte count, platelet count, and various immune system cell subtypes. Today, systemic inflammatory indices derived from hemogram parameters are becoming increasingly important

Corresponding author: Merve Erçelik MD, e-mail: merveercelik8@gmail.com

as prognostic indicators for diseases. Indices such as systemic inflammation index (SII), systemic inflammation response index (SIRI), and aggregate index of systemic inflammation (AISI) are easily measurable, quantitative markers that provide a comprehensive assessment of the immune-inflammatory response. Chronic inflammation is recognized as an early hallmark of many chronic diseases.[4] Systemic inflammatory indices are used to determine prognosis in conditions such as cancer, cardiovascular diseases, acute and chronic respiratory system diseases, metabolic diseases and psychiatric diseases.[5-7]

Elevated SII values have been associated with a higher prevalence of chronic obstructive pulmonary disease (COPD). Neutrophils, platelets, and lymphocytes are closely related to the biological mechanism of COPD, and it is thought that the increase in the severity of inflammation during exacerbations may be effective in determining prognosis).[8] "This information predicts poor outcomes in patients with solid tumors and constitutes an adverse prognostic factor in small cell lung cancer. It is well known that cancer and inflammation are linked, and the cellular immune system is key to the inflammatory response.[9]" And have been investigated as a marker for identifying moderate to major depression.[10]

Recent evidence has accumulated linking depression with immune function.[11] Inflammation and depression are mutually reinforcing and exert a substantial impact on overall health. Heightened inflammation is a hallmark of many cardiovascular and immunometabolic diseases.

SIRI and SII have been shown to be independent risk factors for all-cause and cardiovascular mortality in obese populations. The underlying mechanism is that accumulated fat cells may overproduce adipokines, which release proinflammatory cytokines that trigger an inflammatory response, resulting in obese individuals remaining in a state of chronic low-grade inflammation.[12]

Main Points

- The depression scale (mean, 37.8; minimum 18-maximum 59) and anxiety scale (mean, 43.6, minimum 20-maximum 61) scores in the earthquake victims were compatible with moderate and severe categories, respectively.
- Analysis showed that depression score (P = 0.000) and anxiety score (P = 0.000) were significantly higher statistically in earthquake victims who were under rubble.
- There was a significant relationship between aggregate index of systemic inflammation, systemic inflammation response index values, and depression inventory results. Similarly, there was a statistically significant relationship between the anxiety inventory result and systemic inflammation index values.
- When earthquake victims with high depression and anxiety scores, were evaluated according to the rubble group, all three inflammation indices were significantly higher in those trapped under rubble. These data support the conclusion that the inflammatory response was much higher in people who were under rubble.

Elevated SII, SIRI, and AISI values have been shown to predict cardiovascular mortality,[13] and are significant for estimating depression risk,[14] and have prognostic value in idiopathic pulmonary fibrosis.[15]

Exposure to natural disasters has been associated with elevated short-, medium-, and long-term hospital admissions for acute and chronic conditions, yet the underlying mechanisms remain poorly defined. Considering the documented links between systemic inflammatory indices and chronic disease, chronic systemic inflammation may be one mechanism contributing to the morbidities observed among earthquake survivors.

Systemic inflammatory indices were retrospectively calculated for all earthquake victims admitted to the hospital. Questionnaires and the status of being trapped under debris were evaluated prospectively in earthquake victims who were admitted to the pulmonary clinic and volunteered to participate in the study.

This study aims to investigate the effects of the distance of earthquake victims from the epicentre of the earthquake, their status of being trapped under debris, and their psychological distress to the systemic inflammatory indices.

MATERIAL AND METHODS

Our study was cross-sectional, and approval was obtained from the Süleyman Demirel University Faculty of Medicine Ethics Committee (date: 29.12.2023, decision no: 2012-KAEK-38). After excluding those who were followed up due to infection, and those with high acute phase reactant values from the earthquake victims who applied to our hospital with code X39 in the first month after the earthquake, the remaining earthquake victims were retrospectively analysed. They were evaluated for age, gender characteristics, the branches they applied to, concomitant chronic diseases, residence addresses, and systemic inflammation parameters obtained from their current hemograms.

In the calculation of systemic inflammatory indices: neutrophil x platelet/lymphocyte count for SII, neutrophil x monocyte/lymphocyte count for SIRI, and neutrophil x platelet x monocyte/lymphocyte count for AISI were used in the formulae (15).

The earthquake victims who applied to the pulmonology outpatient clinic and participated voluntarily in the study were questioned about their respiratory symptoms, whether they had been under rubble and the duration of their stay, whether their houses had been destroyed, and if they lived in a public area, the duration of their stay. Beck Depression Inventory and Beck Anxiety Inventory Scales were applied to evaluate their psychological status (Figure 1).

Statistical Analysis

Statistical analysis of the data: Statistical Package for the Social Sciences (SPSS) software version 21.00 (IBM SPSS Statistics, IBM Corporation, Armonk, NY) was used to analyse the data collected in the study. The conformity of the variables to normal distribution was analyzed using the Kolmogorov-Smirnov test. The one-way ANOVA test was used for the groups conforming to normal distribution and the Kruskal-Wallis test was used for

the groups not conforming to normal distribution. Data were presented as mean and standard deviation or median and range. Tukey's test was used when variances were equal between groups, and Tamhane's T2 test was used when variances were not equal. Demographic percentages and mean measurements were compared between the two groups using the independent t-test and the Mann-Whitney U test. The relationship between the groups was evaluated by a chi-square test. Correlations between parameters were evaluated using Pearson correlation. Receiver operating characteristic (ROC) analysis was used to calculate optimum cut-off values, sensitivity and specificity for systemic inflammatory markers. A 95% confidence interval and significance levels of $P < 0.05$ and $P < 0.001$ were sought in the evaluation of all data.

RESULTS

Two hundred thirty-nine earthquake victims were admitted to our hospital with code X39 in the first month. Of 239 earthquake victims, 35.1% were admitted to the emergency department, 17.1% to the chest diseases department, 7.1% to the dermatology department, 6.2% to the internal medicine department, and 5.8% to the family medicine department. Of the earthquake victims admitted to our hospital, 59.4% were women. The majority were from Hatay (42.8%). Forty-one patients were from Kahramanmaraş, and twenty-eight patients were from Malatya. There were earthquake victims from 9 provinces, excluding Diyarbakır and Kilis.

When the systemic inflammation values obtained from hemogram data of the patients were examined, the median for AISI was 351.5 [standard error of mean (SEM) 40.6], the median for SIRI was 1.30 (SEM 0.23), and the median for SII was 677.4 (SEM 43.7) (Table 1). When the cities were grouped according to the number of collapsed buildings, AISI, SIRI and SII values were found to be higher in the cities with more collapsed buildings (Hatay, Kahramanmaraş, Gaziantep,

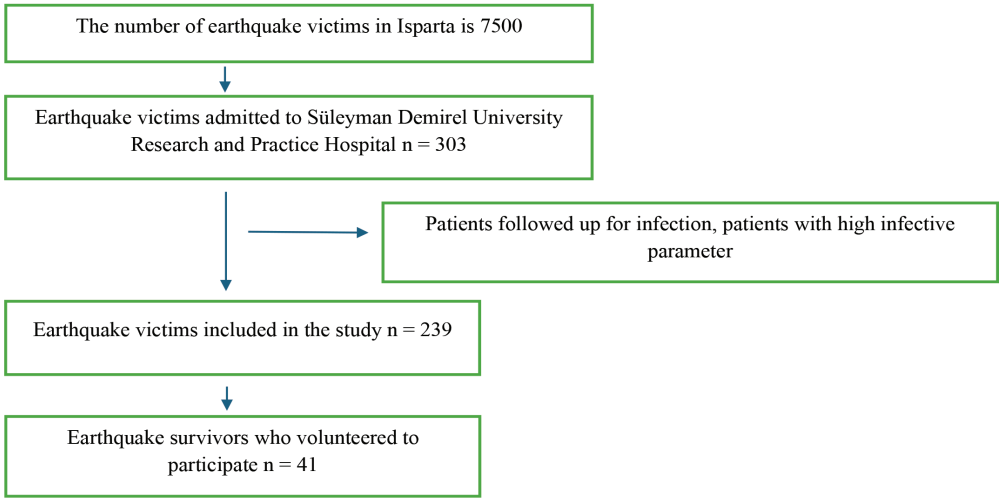

Figure 1. Flow chart of the participants

Table 1. Characteristics of the earthquake victims included in the study

	Earthquake victims admitted to hospital (n = 239)	Earthquake survivors who volunteered to participate in the study (n = 41)
Gender, female	142 (66.4%)	22 (53.6%)
Residence		
Hatay	96	23
Kahramanmaraş	47	8
Malatya	32	5
Gaziantep	16	3
Adıyaman	13	1
Number of people trapped under the rubble	-	14
AISI	Median 351.5 (SEM 40.6)	Median 533.87 (SEM 140.53)
SIRI	Median 1.30 (SEM 0.23)	Median 1.68 (SEM 1.01)
SII	Median 677.4 (SEM 43.7)	Median 760.21 (SEM 138.27)
Beck Depression Score	-	Mean 37.8; min 18-max 59
Beck Anxiety Score	-	Mean 43.6, min 20-max 61

SEM: standard error of mean, SII: systemic inflammatory index, SIRI: systemic inflammatory response index, AISI: aggregate index of systemic inflammation, min: minimum, max: maximum

Malatya, Adıyaman), although not statistically significant ($P > 0.05$). Although there was no statistical significance between the groups, when earthquake survivors without chronic diseases were divided into two groups according to the number of collapsed buildings, those from the provinces where the number of collapsed buildings was high and those from the provinces where the number of collapsed buildings was low, all three systemic inflammation markers were relatively higher in earthquake survivors from the provinces where the number of collapsed buildings was high ($P > 0.05$). When we divided the earthquake victims into 3 groups based on their proximity to the epicentre: group 1 (Kahramanmaraş, Gaziantep), group 2 (Adana, Hatay), group 3 (Malatya, Adıyaman), there was no statistically significant difference in terms of systemic inflammation indices.

Forty-one earthquake survivors who volunteered to answer the questionnaire were evaluated among themselves or by the researchers. The variance distribution of this group was homogeneous in terms of gender, with females (n = 22) and males (n = 19). Respiratory symptoms included shortness of breath in 16 patients, cough in 21 patients, sputum in 20 patients, and flu-like complaints in 16 patients. When we divided the earthquake victims into 3 groups according to the distance from the epicentre, we categorized them as follows: group 1 (Kahramanmaraş, Gaziantep), group 2 (Adana, Hatay), group 3 (Malatya, Adıyaman). There was a significant difference between the groups in terms of being in the collective area (one-way ANOVA $P = 0.001$). Group 1 had a higher frequency of staying in the communal area compared to the other two groups.

The number of earthquake victims trapped under the rubble was 14, and the average duration of being trapped under the rubble was 5 hours (minimum range: 0-57). Twenty-three people stayed in the collective living area after the earthquake, while eighteen people stayed outside the collective living area. The average duration of stay in the earthquake zone was 6.5 days (minimum 0, maximum 15).

Earthquake victims were grouped according to their exposure to rubble, and systemic inflammation indices were evaluated. In the ROC analyses performed for systemic inflammation values, the cut-off value for AISI was 674 (sensitivity 78.6%, specificity 81.5%), the cut-off value for SIRI was 1.88 (sensitivity 78.8%, specificity 74.1%), and the cut-off value for SII was 762.68 (sensitivity 92.9%, specificity 77.8%). Although the number of earthquake victims who were under rubble was lower than those who were not under rubble, AISI ($x^2 = 12$, $P = 0.001$), SIRI ($x^2 = 8.88$, $P = 0.03$), and the SII ($x^2 = 16.53$, $P = 0.002$) was statistically significantly higher in those who were under rubble. A statistically significant relationship was found between AISI, SIRI, SII, and being under rubble (Table 1).

The depression scale values (0-16 mild, 17-29 moderate, 30-63 severe; mean 37.8 minimum 18-maximum 59) were compatible with severe depression, and the anxiety scale values (8-15 mild, 16-25 moderate, 26-63 severe; mean 43.6; minimum 20-maximum 61) indicated severe anxiety. According to the Kruskal-Wallis analysis, the depression score ($P < 0.001$) and the anxiety score ($P < 0.001$) were statistically significantly higher in earthquake victims who were under rubble (Table 2).

When the relationship between the results for depression and anxiety and systemic inflammation values was analysed, there was a significant relationship between AISI ($x^2 = 5.5$, $P = 0.018$), SIRI values ($x^2 = 8$, $P = 0.05$), and depression inventory results. Similarly, there was a statistically significant relationship between the anxiety inventory result and SII values ($x^2 = 9.47$, $P = 0.002$).

DISCUSSION

In recent decades, the frequency of natural disasters has increased markedly, leading to dramatic consequences and huge economic losses. Low-income countries are among the most affected countries. Although data on health effects after earthquakes are available in the literature, unfortunately, political and economic constraints often make long-term epidemiological surveillance in these settings impractical. The Sendai Framework for Disaster Risk Reduction, supported by the United Nations, emphasises that accurate monitoring of the health status of populations exposed to disasters is essential to identify priority interventions and restore previous health conditions.[16]

Looking at the studies on earthquakes to date, it was observed that the Great East Japan (20,896 deaths), Kobe/Hanshin-Awaji (5,530), and L'Aquila (295) earthquakes, which caused the highest loss of life, were the most frequently investigated. The majority of the studies were conducted after the 2000 earthquakes, which may be related to the fact that monitoring the chronic effects of earthquakes was not considered a public health priority or that epidemiological studies were

Table 2. The relationship between systemic inflammation values, Beck Depression and Anxiety Scores and being trapped under rubble

	Number of people above SIRI cut-off value (1.88)	Number of people above the SII cut-off value (762.68)	Number of people above the AISI cut-off value (674)	Beck Depression Scale	Beck Anxiety Scale
History of being trapped under rubble (14 people)	11 people	13 people	11 people	Mean 49.5 min 28-max 59	Mean 53.5 min 49-max 60
No history of being trapped under rubble (27)	8 people	7 people	6 people	Mean 31.7 points min 18-max 58	Mean 38.5 points min 20-max 61
Statistical significance	$x^2 = 8$, $P = 0.05$	$x^2 = 9{,}47$, $P = 0.002$	$x^2 = 5.5$, $P = 0.01$	$P = 0.000$	$P = 0.000$

SII: systemic inflammatory index, SIRI: systemic inflammatory response index, AISI: aggregate index of systemic inflammation, min: minimum, max: maximum

not published in the preceding period. By presenting the data we obtained after the disaster, we wanted to draw attention to the long-term health problems that may be experienced in earthquake victims.

Some studies have reported an increase in a wide range of psychiatric and mood disorders, especially in cases of repeated or high-intensity exposure to earthquakes.[17]

Earthquakes intensify the occurrence of psychiatric health disorders, including depression, anxiety, post-traumatic stress disorder (PTSD), insomnia and drug addiction.[18]

Factors contributing to this situation include physical trauma, loss of relatives, loss of housing, financial hardship, displacement, women's suffering, and low level of education.[19]

Major depressive disorder has been diagnosed in 5.8-54% of adult, 7.5-44.8% of child, survivors of natural disasters, including earthquakes.[20] In post-earthquake studies in Greece, Armenia, Pakistan, and China, it was shown that more than one-fifth of the survivors experienced significant anxiety symptoms.[21]

In our study, the depression scale scores (0-16 mild, 17-29 moderate, 30-63 severe) had a mean of 37.8 (minimum 18-maximum 59), indicating severe levels, while the anxiety scale scores (8-15 mild, 16-25 moderate, 26-63 severe) had a mean of 43.6 (minimum 20-maximum 61), also indicating severe levels. Similar to the literature, our findings showed that earthquake survivors had high depression and anxiety scores. This may suggest that earthquake survivors have a high risk of psychiatric disorders.

Various studies conducted after major earthquakes have shown that the experience of fear, the level of exposure to material and life losses caused by the earthquake (injury, being in a place where people died, death of family members and friends, loss of home and job, etc.), gender (e.g., being female), previous trauma, traumatic distress, lack of social support, being young and old, and low education level are risk factors associated with PTSD, depression and anxiety symptoms.[22]

In our study, Kruskal-Wallis analysis showed that depression score (P = 0.000) and anxiety score (P = 0.000) were significantly higher in earthquake victims who were under rubble. This supports the conclusion that exposure to trauma (injury, material loss, being in a place where people died) is an increased risk factor for depression and anxiety.

Considering the relationship between systemic inflammatory indices and psychiatric diseases, evidence was presented that high SII and SIRI levels were associated with increased risk of depression in a study including 29,000 individuals. They emphasised the potential value of measuring systemic inflammation biomarkers in determining individuals at risk of depression in the general population, especially in those with obesity.[14]

In our study, we found that the median for AISI was 351.5 (SEM 40.6), the median for SIRI was 1.30 (SEM 0.23), and the median for SII was 677.4 (SEM 43.7), all of which were higher than reported in the literature. In a cohort of 312 patients with depressive disorder, certain patterns were observed. In a cohort of 312 patients with depressive disorders, the mean SII was found to be 462.83; the optimal cut-off point of SII was calculated as 540.78 and high SII was stated as a risk factor for moderate/major depression in patients with depressive disorders.[10] It was observed that the median value calculated for SII in our earthquake victims was above the mean values determined in the literature for the risk of depressive disorders. When the cities were grouped according to the number of collapsed buildings, AISI, SIRI, and SII values were found to be higher in such cities, although not statistically significant (P > 0.05). High SII values are identified as a high risk factor for moderate/major depression in the literature, may be associated with the high depression scores caused by the magnitude of the trauma, which we also showed in our study.

Similarly, when the mental health effects of the earthquake on Syrian earthquake victims were examined, it was found that PTSD and generalised anxiety scale scores were significantly higher in severely and moderately damaged areas, than in less damaged areas.[23] This data support that there is a relationship between changes in systemic inflammation indices and mental health.

Considering that chronic diseases may have an effect on systemic inflammatory indices, when the earthquake victims without chronic diseases were divided into two groups according to the number of destroyed buildings—those coming from provinces where the number of destroyed buildings was high and those from provinces where it was low—there was no statistical significance between the groups. However, all three systemic inflammation markers were relatively higher in the earthquake victims from provinces where the number of destroyed buildings was high (P > 0.05).This is important for demonstrating changes in the characteristics of the region, where the earthquake occurred, as reflected on these markers.

When the systemic inflammation indices were evaluated by grouping the earthquake victims according to whether they were under rubble although the number of earthquake victims who were under rubble was lower than the number of earthquake victims who were not under debris, AISI (x^2 = 12, P = 0.001), SIRI (x^2 = 8.88, P = 0.03), SII value (x^2 = 16.53, P = 0.002) were statistically significantly higher in those who were under rubble. When the relationship between depression and anxiety inventory results and systemic inflammation values was analysed, there was a significant relationship between AISI (x^2 = 5.5, P = 0.018), SIRI values, and depression inventory results (x^2 = 8, P = 0.05) (Table 2). Similarly, there was a statistically significant relationship between the anxiety inventory result and SII values (x^2 = 9.47, P = 0.002). This suggests that the psychological stress caused by the earthquake may be related to the increase in systemic inflammatory indices.

When earthquake victims with high depression and anxiety scores were evaluated according to the rubble group, all three inflammation indices were significantly higher in those trapped under rubble. These data supported the finding that the inflammatory response was much higher in people who were under rubble (Table 3).

Table 3. Systemic inflammation indexes of earthquake victims with high depression and anxiety scale scores according to their trapped under rubble

	Earthquake victims trapped under rubble (n = 14)	Earthquake victims not trapped under the rubble (n = 27)	Statistical significance
High Depression Score	SII mean 1820,8 SEM 297.5	SII mean 963.2 SEM 203.8	*P* = 0.028
	SIRI mean 9.17 SEM 2.7	SIRI mean 2.29 SEM 0.60	*P* = 0.026
	AISI mean 1641,4 SEM 311.3	AISI mean 575,3 SEM 169.0	*P* = 0.007
High Anxiety Score	SII mean 1661,1 SEM 307.7	SII mean 800.8 SEM 115.3	*P* = 0.04
	SIRI mean 6.88 SEM 2.11	SIRI mean 2.02 SEM 0.40	*P* = 0.06
	AISI mean 1492,0 SEM 330.8	AISI mean 497.3 SEM 96.9	*P* = 0.01

SEM: standard error of mean, SII: systemic inflammatory index, SIRI: systemic inflammatory response index, AISI: aggregate index of systemic inflammation

In a meta-analysis examining the health effects of earthquakes, there was strong evidence ($P < 0.001$) that mortality from myocardial infarction was 36% higher [95% confidence interval (CI), 19% to 57%] after an earthquake compared with pre-earthquake measurements. Higher mean glycated haemoglobin levels (0.16 percentage points; 95% CI, 0.07 to 0.25) were found in earthquake-exposed people than in non-exposed people. Previous studies have shown that higher rates of diabetes were observed in disaster-exposed individuals concerning the metabolic effects of earthquakes.[3]

Evidence of an overall increase in incidence rates of haemorrhagic gastric ulcers was shown among people exposed to the Kobe earthquake (Japan, 1995).[24]

Examination of studies on the role of systemic inflammatory indices in chronic and immunological diseases has revealed that SII may serve as an important prognostic marker in various tumour types, including small cell lung cancer, metastatic castration-resistant prostate cancer, squamous cell carcinoma of the oesophagus.[9] Furthermore, SII may have potential utility in diagnosing immunological diseases and the presence of active disease.[25] In the general population, SII has been shown to be significantly associated with all-cause cardiovascular mortality, independent of established risk factors (with a cut-off value of 18,284 for SII),[26] and is positively associated with diabetes (with a cut-off value of 588 for SII).[27] Additionally, AISI is effective in predicting the prognosis of idiopathic pulmonary fibrosis.[15] A total of 13 studies involving 152,996 participants showed that higher SII was significantly associated with an increased risk of cardiovascular disease [heart rate (HR) = 1.39, 95% CI: 1.20-1.61, $P < 0.001$]. This increased risk was associated with ischaemic stroke (HR = 1.31, 95% CI: 1.06-1.63, $P = 0.013$), haemorrhagic stroke (HR = 1.22, 95% CI: 1.10-1.37, $P < 0.001$), myocardial infarction (HR = 1.11, 95% CI: 1.01-1.23, $P = 0.027$), and almost all cardiovascular disease subtypes, including peripheral arterial disease (HR = 1.51, 95% CI: 1.18-1.93, $P = 0.001$).[28]

In our study, the finding of median values above the mean values, which are thought to pose a risk for diseases in the literature (588[22] for diabetes, 391[24] for cardiovascular diseases, 390[19] in malignancy), suggests that the inflammatory processes experienced in earthquake victims may pose a risk for cardiovascular, metabolic, immunological, and malignant diseases in the future. Therefore, we think that the long-term health status of earthquake victims should be closely monitored.

The low number of earthquake survivors who volunteered to participate in our study is a limitation. However, the limited data on earthquakes in the literature make each observation valuable.

CONCLUSION

In the light of the data obtained, a relationship was found between the physical and psychological trauma experienced in earthquake victims and the high level of systemic inflammatory indices. Considering the possibility that this inflammation may be effective in the long-term health effects of earthquakes, rehabilitation and close follow-up of earthquake victims are of great importance. We believe that our study will contribute to the literature in terms of psychological rehabilitation and long-term follow-up of earthquake victims after the Kahramanmaraş-centred earthquakes that caused great destruction, and will guide the measures to be taken after possible earthquakes because we live in an earthquake zone.

Ethics

Ethics Committee Approval: Our study was cross-sectional, and approval was obtained from the Süleyman Demirel University Faculty of Medicine Ethics Committee (date: 29.12.2023, decision no: 2012-KAEK-38).

Informed Consent: Retrospective study.

Present in: Presented as an oral presentation at the 27th annual congress of the Turkish Thoracic Society in 2024.

Footnotes

Authorship Contributions

Surgical and Medical Practices: M.E., Concept: M.E., Design: M.E., Ö.Ö., Data Collection or Processing: M.E., T.A., H.T.K., Analysis or Interpretation: M.E., Ö.Ö., Literature Search: M.E., Writing: M.E.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Afet ve Acil Durum Yönetimi Başkanlığı (AFAD). 06 Şubat 2023 Pazarcık-Elbistan (Kahramanmaraş) depremleri ön değerlendirme raporu. Yayınlanma tarihi: 02.06.2023. Son erişim tarihi: 21.01.2024. [Crossref]
2. Temporary Settlement Support Sector (TSS). Türkiye Earthquake Response: T-Weekly Update – 25 March 2023. International Organization for Migration; March 25, 2023. Accessed January 21, 2024.
3. Ripoll Gallardo A, Pacelli B, Alesina M, et al. Medium- and long-term health effects of earthquakes in high-income countries: a systematic review and meta-analysis. *Int J Epidemiol*. 2018;47(4):1317-1332. [Crossref]
4. Yin X, Zou J, Yang J. The association between the aggregate index of systemic inflammation and risk of rheumatoid arthritis: retrospective analysis of NHANES 1999-2018. *Front Med (Lausanne)*. 2024;11:1446160. [Crossref]
5. Peng F, Hu D, Lin X, et al. The monocyte to red blood cell count ratio is a strong predictor of postoperative survival in colorectal cancer patients: the Fujian prospective investigation of cancer (FIESTA) study. *J Cancer*. 2017;8(6):967-975. [Crossref]
6. Fan W, Wei C, Liu Y, et al. The prognostic value of hematologic inflammatory markers in patients with acute coronary syndrome undergoing percutaneous coronary intervention. *Clin Appl Thromb Hemost*. 2022;28:10760296221146183. [Crossref]
7. Yamanouchi K, Maeda S. The efficacy of inflammatory and immune markers for predicting the prognosis of patients with stage IV breast cancer. *Acta Med Okayama*. 2023;77(1):37-43. [Crossref]
8. Ye C, Yuan L, Wu K, Shen B, Zhu C. Association between systemic immune-inflammation index and chronic obstructive pulmonary disease: a population-based study. *BMC Pulm Med*. 2023;23(1):295. [Crossref]
9. Li C, Tian W, Zhao F, et al. Systemic immune-inflammation index, SII, for prognosis of elderly patients with newly diagnosed tumors. *Oncotarget*. 2018;9(82):35293-35299. [Crossref]
10. Cui S, Li J, Liu Y, et al. Correlation of systemic immune-inflammation index and moderate/major depression in patients with depressive disorders: a large sample cross-sectional study. *Front Psychiatry*. 2023;14:1159889. [Crossref]
11. Beurel E, Toups M, Nemeroff CB. The bidirectional relationship of depression and inflammation: double trouble. *Neuron*. 2020;107(2):234-256. [Crossref]
12. Kong F, Huang J, Xu C, Huang T, Wen G, Cheng W. System inflammation response index: a novel inflammatory indicator to predict all-cause and cardiovascular disease mortality in the obese population. *Diabetol Metab Syndr*. 2023;15(1):195. [Crossref]
13. Xiu J, Lin X, Chen Q, et al. The aggregate index of systemic inflammation (AISI): a novel predictor for hypertension. *Front Cardiovasc Med*. 2023;10:1163900. [Crossref]
14. Li X, Huan J, Lin L, Hu Y. Association of systemic inflammatory biomarkers with depression risk: results from National Health and Nutrition Examination Survey 2005-2018 analyses. *Front Psychiatry*. 2023;14:1097196. [Crossref]
15. Zinellu A, Collu C, Nasser M, et al. The aggregate index of systemic inflammation (AISI): a novel prognostic biomarker in idiopathic pulmonary fibrosis. *J Clin Med*. 2021;10(18):4134. [Crossref]
16. United Nations International Strategy for Disaster Reduction. Sendai Framework for Disaster Risk Reduction 2015-2030. United Nations; 2015. [Crossref]
17. Tempesta D, Curcio G, De Gennaro L, Ferrara M. Long-term impact of earthquakes on sleep quality. *PLoS One*. 2013;8(2):e55936. [Crossref]
18. Kovess-Masfety V, Keyes K, Karam E, Sabawoon A, Sarwari BA. A national survey on depressive and anxiety disorders in Afghanistan: a highly traumatized population. *BMC Psychiatry*. 2021;21(1):314. [Crossref]
19. Nakajima S, Ito M, Shirai A, Konishi T. Complicated grief in those bereaved by violent death: the effects of post-traumatic stress disorder on complicated grief. *Dialogues Clin Neurosci*. 2012;14(2):210-214. [Crossref]
20. Tang B, Liu X, Liu Y, Xue C, Zhang L. A meta-analysis of risk factors for depression in adults and children after natural disasters. *BMC Public Health*. 2014;14:623. [Crossref]
21. Ehring T, Razik S, Emmelkamp PM. Prevalence and predictors of posttraumatic stress disorder, anxiety, depression, and burnout in Pakistani earthquake recovery workers. *Psychiatry Res*. 2011;185(1-2):161-166. [Crossref]
22. Cénat JM, McIntee SE, Blais-Rochette C. Symptoms of posttraumatic stress disorder, depression, anxiety and other mental health problems following the 2010 earthquake in Haiti: a systematic review and meta-analysis. *J Affect Disord*. 2020;273:55-85. [Crossref]
23. Soqia J, Ghareeb A, Hadakie R, et al. The mental health impact of the 2023 earthquakes on the Syrian population: cross-sectional study. *BJPsych Open*. 2023;10(1):e1. [Crossref]
24. Aoyama N, Kinoshita Y, Fujimoto S, et al. Peptic ulcers after the Hanshin-Awaji earthquake: increased incidence of bleeding gastric ulcers. *Am J Gastroenterol*. 1998;93(3):311-316. [Crossref]
25. Mangoni AA, Zinellu A. The diagnostic role of the systemic inflammation index in patients with immunological diseases: a systematic review and meta-analysis. *Clin Exp Med*. 2024;24(1):27. [Crossref]
26. Wang H, Nie H, Bu G, Tong X, Bai X. Systemic immune-inflammation index (SII) and the risk of all-cause, cardiovascular, and cardio-cerebrovascular mortality in the general population. *Eur J Med Res*. 2023;28(1):575. [Crossref]
27. Aljuraiban GS, Alharbi FJ, Aljohi AO, et al. Systemic immune-inflammation index in relation to diabetes markers in saudi adults: a retrospective study. *Medicina (Kaunas)*. 2024;60(3):442. [Crossref]
28. Ye Z, Hu T, Wang J, et al. Systemic immune-inflammation index as a potential biomarker of cardiovascular diseases: a systematic review and meta-analysis. *Front Cardiovasc Med*. 2022;9:933913. [Crossref]