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Analysis of Gastrointestinal Symptoms and Nutrition in Earthquake Victims After the Major Earthquake on February 6, 2023

6 Şubat 2023 Tarihinde Meydana Gelen Büyük Deprem Sonrası Depremzedelerin Gastrointestinal Semptom ve Beslenme Durumlarının Değerlendirilmesi

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ABSTRACT

In the scope of this study, it has been aimed to evaluate the nutritional status and gastrointestinal symptoms of earthquake victims after the earthquake that occurred in Turkey on February 6, 2023. This descriptive cross-sectional study has been included 118 adult individuals between the ages of 18-65 who lived in the Nurdağı district of Gaziantep, which was affected by the earthquake disaster, and who had never left there since the earthquake. In this study has been shown that adults had difficulty accessing nutrient and significantly weight loss after the earthquake ($p<0.001$), and also experienced some gastrointestinal symptoms such as nausea and loss of appetite during the earthquake. National and global nutrition and health policies should be developed and implemented immediately in settlements that are considered disaster areas, such as Turkey, to minimize the destructive effects of the disaster.

Keywords: Disaster, Earthquake, Gastrointestinal symptoms, Nutrition, Turkey

ÖZ

Bu çalışma kapsamında, 6 Şubat 2023 tarihinde Türkiye'de meydana gelen deprem sonrasında depremzedelerin beslenme durumları ve gastrointestinal semptomlarının değerlendirilmesi amaçlanmıştır. Tanımlayıcı tipte olan bu kesitsel çalışmaya, deprem felaketinden etkilenen Gaziantep'in Nurdağı ilçesinde yaşayan ve depremden bu yana oradan hiç ayrılmamış, 18-65 yaş arası 118 yetişkin birey dâhil edilmiştir. Bu çalışmada yetişkinlerin deprem sonrasında besine erişimde zorluk yaşadıkları ve önemli derecede ağırlık kaybı yaşadıkları ($p<0.001$), ayrıca deprem sırasında bulantı ve iştahsızlık gibi bazı gastrointestinal semptomların da görüldüğü gösterilmiştir. Türkiye gibi afet bölgesinde kalan yerleşim yerlerinde afetin yıkıcı etkilerini en aza indirmek için ulusal ve küresel düzeyde beslenme ve sağlık politikalarının geliştirilmesi ve acilen hayata geçirilmesi gerekmektedir.

Anahtar Kelimeler: Afet, Deprem, Gastrointestinal semptomlar, Beslenme, Türkiye

Ethics committee approval dated 22.06.2023 and numbered 165 was obtained from Agri Ibrahim Cecen University Scientific Research Ethics Committee to conduct the study.

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INTRODUCTION

In 1980, the International Trauma Foundation established a study group to propose medical definitions and classifications related to disasters. This study group defined disasters as sudden destructive events resulting in the death of many people.[1] In broader terms based on this definition, disasters are technological, natural, or anthropogenic events that cause physical, economic, and social losses for people, interrupting their daily lives, and exceeding their capacity to cope using the available resources.[2,3] Any anthropogenic or natural disaster can suddenly cause communities to fall in need of help in a short time and result in many deaths.[4]

All over the world, disasters cause severe damage to living beings, houses, and settlements, leading to epidemics, suspending daily activities, disrupting the economy, adversely affecting social life, and causing psychological traumas to people.[5] The duration of these effects is proportional to the development of the country where the disaster occurred and the measures taken before the disaster. Disaster areas usually try to mitigate the impact of the disaster by getting external help. Especially developing countries require more material and moral aid in case of a disaster than developed countries. These aids are often provided through national and international organizations.

The first things that come to mind about disasters are natural disasters, such as earthquakes, floods, and explosions; however, it has been accepted that there are approximately 52 types of disasters worldwide, and about 21 are common in Turkey.[6,7]

In major disasters, failure to supply the nutrient and water needs of disaster victims, provide adequate hygiene and sanitation, and meet their toilet needs can cause acute or chronic stress in disaster victims, leading to severe nutritional problems, gastrointestinal system (GIS) symptoms, and increased infectious diseases.[8]

Today, the most common type of disaster in the world causing the most deaths and property loss is the earthquake. A doublet earthquake of magnitude Mw7.7 (focal depth = 8.6 km) and Mw7.6 (focal depth = 7 km) occurred on February 6, 2023 at 04:17 and 13:24 Turkey time, and eleven provinces (Adana, Adıyaman, Diyarbakır, Elazığ, Gaziantep, Hatay, Malatya, Kahramanmaraş, Kilis, Osmaniye, and Şanlıurfa) were declared disaster areas due to these earthquakes.[9] These earthquakes were also felt in Egypt, Lebanon, the Turkish Republic of Northern Cyprus (TRNC), the Greek Cypriot Administration of Southern Cyprus (Greek Cypriot Administration), Syria, and Iraq.

It was reported that 200 km of fault rupture occurred after the 2023 Kahramanmaraş earthquakes, the doublet earthquakes with the highest destructive power and number of deaths in history of Turkey.[10] There were 2,618,697 buildings in the impact area of the earthquake. The burden of the earthquake on the Turkish economy was approximately 103.6 billion US Dollars.[11] During this period, disaster survivors suffered greatly in terms of nutrition and access to nutrient, some of them faced hunger and thirst for days.

This study was conducted on earthquake victims living in the tent city established in the Nurdağı district of Gaziantep, one of the cities where the earthquake impact was felt the most, to analyze the gastrointestinal symptoms and nutrition in the earthquake victims after the major earthquake occurred on February 6, 2023.

MATERIALS AND METHODS

The study was a descriptive cross-sectional study designed to evaluate the gastrointestinal symptoms and nutrition in earthquake victims after a major earthquake occurred in our country on February 6, 2023.

The study included 118 adults between 18 and 65 years of age who lived in the Nurdağı district of Gaziantep at the time of the major earthquake and never left the area since then. The Informed Consent Form of the Volunteers was read and signed by all individuals who agreed to participate in the study, and they were provided with a copy. The study data were collected using a questionnaire form prepared by the researcher based on the relevant literature review. The form included personal information and information on nutrition and gastrointestinal symptoms of earthquake victims obtained from similar studies.[12]

The body weight before the earthquake was recorded according to the participants' declarations. The body weights at the time of the study, approximately five months after the earthquake, were measured using a scale (ALTUS AL 808 SM) with a sensitivity of 0.1 kg. The participants' heights were measured using a digital display Ultrasonic Harpenden Stadiometer with a precision of 0.1 cm. Body mass index (BMI) values were calculated from the body weight and height measurements of the participants and classified (<18.5 kg/m^2 "Underweight"; 18.5-24.9 kg/m^2 "Normal weight"; 25.0-29.9 kg/m^2 "Overweight"; and ≥30kg/m^2 "Obese").[13]

Ethical Considerations

Ethics committee approval dated 22.06.2023 and numbered 165 was obtained from Agri Ibrahim Cecen University Scientific Research Ethics Committee to conduct the study.

Statistical Analysis Methods

The data obtained were evaluated using the IBM Statistical Package for the Social Sciences (SPSS) 22® software, and the normal distribution assumption for quantitative variables was tested using the Kolmogorov-Smirnov test. Independent samples t-test was used for normally distributed variables and Mann Whitney U test for non-normally distributed variables in two independent group comparisons. Whether categorical variables were independent was determined by the chi-square test. Descriptive statistics for normally distributed variables were presented as mean ± standard deviation, non-normally distributed variables as median (25^{th}-75^{th} percentile), and categorical variables as frequency (%). The statistical significance level was accepted as $p<0.05$.

In our study, post hoc power analysis was performed based on the body weights of the participants (n=118) before and after the earthquake, and the statistical power was found to be 100%, with an effect size of 0.723 and alpha 0.05.

RESULTS

The demographic characteristics of the 118 participants, between 18 and 65 years of age and lived in Nurdağı tent city were presented in Table 1. Among the participants, 49.2% were male, 50.8% were female, and the mean age was 33.81±9.48 years. As regards to the educational status of the participants, 6.8% were illiterate, 33.1% were primary school graduates, 23.6% were secondary school graduates, 26.3% were high school graduates, and 10.2% were university graduates. Among the participants, 71.2% were married, and 28.8% were single. Only 1.7% of the participants lived alone, while the rest lived with other family members.

Table 1. Demographic characteristics of earthquake victims (n=118)

Demographic Characteristics	n	%
Age (year) (Mean±SD)		33.81±9.48
Sex		
Male	58	49.2
Female	60	50.8
Educational Background		
Illiterate	8	6.8
Primary School	39	33.1
Secondary School	28	23.6
High School	31	26.3
University	12	10.2
Marital Status		
Married	84	71.2
Single	34	28.8
Number of Family Members Lived Together		
1	2	1.7
2	3	2.5
3	13	11.0
4	28	23.7
5	26	22.0
6	22	18.7
7 and more	24	20.4

Descriptive statistics were expressed as mean ± standard deviation, frequency (n), and percentage (%).

Data on the chronic disease status, GIS symptoms, and nutrient of earthquake victims were presented in Table 2. According to, 28% of the participants stated that they had at least one chronic disease before the earthquake, and 31% had increased chronic disease symptoms afterward. Among the participants, 33.1% reported that their nutrient intake decreased after the earthquake, and 87.1% suffered from hunger. As a GIS symptom that persisted for two weeks after the disaster, 22% experienced nausea, 20.3% loss of appetite, and 14% severe GI symptoms. Participants mentioned drinking an average of 0.71 liters (lt) of water per day in the first week after the disaster. In the evaluation of the body weights of the disaster victims before and after the earthquake, 30.5% experienced a weight loss of less than <5%, 20.3% between 5% and 10%, and 10.2% more than >10%.

Table 2. Data of earthquake victims on chronic disease, nutrient intake, GIS symptoms, and weight loss (n=118)

	n	%
Chronic Disease Diagnosis Before Disaster		
No	85	72.0
Yes	33	28.0
Change in Chronic Disease Severity After the Disaster		
Increased	9	31.0
Decreased	2	6.9
No Change	18	62.1
Change in Nutrient (Energy) Intake After a Disaster		
Increased	17	14.4
Decreased	39	33.1
No Change	62	52.5
Change in Response to Reduced Nutrient Intake		
Insufficient solids	4	10.3
Full liquid diet	1	2.6
Hunger	34	87.1
GIS Symptoms Persisting Every Day for Two Weeks After the Disaster		
Nause	26	22.0
Loss of appetite)	24	20.3
None	68	57.7
The Severity of Your GIS Disorder		
Severe	7	14.0
Mild	43	86.0
Average Daily Water Intake (lt) during the First Week After the Disaster		0.71 (0.43-0.89)
Usual Body Weight Loss		
None	46	39.0
<5%	36	30.5
5%-10%	24	20.3
>10%	12	10.2

Descriptive statistics were expressed as frequency (n), percentage (%), or median (25^{th}-75^{th} percentile).

Body weights and BMI values of disaster victims were presented in Table 3. The mean body weight and BMI measured after the earthquake were calculated lower than the mean body weight and BMI before the earthquake, and with a statistical significance ($p<0.001$).

Table 3. Comparison of body weight and BMI values of earthquake victims before and after the earthquake (n=118)

	Before Earthquake	After Earthquake	p
Body Weight (kg)	73.4±13.1	70.7±13.6	**<0.001**
BMI (kg/m^2)	26.1±4.2	24.9±4.2	**<0.001**

Descriptive statistics were expressed as mean ± standard deviation.

Weight loss and GI symptoms were presented by sex in Table 4. There was no statistically significant difference between male and female participants regarding weight loss ($p=0.136$). Similarly, no statistically significant difference was found in gastrointestinal symptoms that continued every day for two weeks after the disaster according to sex ($p=0.228$).

Table 4. Distribution of weight loss and GI symptoms of earthquake victims by sex (n=118)

		Sex		
		Female (n=60)	**Male (n=58)**	**p**
Body Weight Loss (%)		2.3 (0-7.5)	1.2 (0-3.9)	0.136
Gastrointestinal Symptoms Persisting Every Day for Two Weeks After the Disaster	Nausea	17 (28.3)	9 (15.5)	0.228
	Loss of appetite	12 (20.0)	12 (20.7)	
	None	31 (51.7)	37 (63.8)	

Descriptive statistics were expressed as median (25^{th}-75^{th} percentile) or frequency (%)

The question "Write down the names of five nutrients you consumed the most within the first month after the earthquake." was responded to by the earthquake victims as they consumed more energy-dense and carbohydrate-weighted nutrients, such as tea, pasta, cake, rice (bulgur, rice), bread, soup, legumes (dry beans, chickpeas), cookies, potatoes, and ready-made fruit juice. They responded to the question, "Write down the names of five nutrients you would like to consume the most (to be delivered to the disaster area by the Turkish Red Crescent or other aid institutions) within the first month after the earthquake." by stating that they would like to consume nutrients containing vitamins, minerals and quality protein such as fruits, vegetables, meat, chicken, yogurt, gluten-free nutrients, cheese, eggs, milk, and dairy products within the first month after the disaster. The disaster victims were asked, "If the nutrients you would like to be delivered to the area had been delivered, would you have consumed them during the earthquake period?", and they mentioned that they were not concerned with what they ate then. The most important thing for them at that moment was to satisfy their hunger, and their main goal was to survive and protect their relatives. In addition, the participants stated that they tried to meet their water needs by melting the snow in the containers in their hands since the earthquake happened during the winter and there was snowfall.

DISCUSSION

The 6 February 2023 earthquake has shown us that we can face disasters such as earthquakes at any time. Although there are no detailed studies in the literature, especially on nutrition and GIS problems experienced by disaster victims, this issue needs to be further emphasised and preparations should be made. The aim of this study was to evaluate the gastrointestinal symptoms and nutritional status of earthquake victims after the earthquake that occurred on 6 February 2023.

In a study on the nutrition of disaster victims approximately 18 months after the 19 August 1999 and 12 November 1999 Düzce Earthquake happened in our country, the nutrient consumption records of 285 disaster victims were examined, and it was reported that the overall macro and micronutrient intake of disaster victims was insufficient.[14] The study on the gastrointestinal symptoms and nutrition of disaster victims after the 9.1 magnitude earthquake that occurred in the Pacific Ocean of Japan on March 11, 2011, reported that 23% of 236 disaster victims aged between 9 and 88 lost weight, 28% had decreased nutrient intake one month after the earthquake, and 25% experienced nausea, constipation, vomiting, and loss of appetite. The disaster victims mentioned that they wanted to consume fruit and vegetables; however, they usually fed on nutrient aids, such as rice balls and bread.[12] Another study evaluating the same earthquake reported that a large manufacturer of industrial nutritional supplements for the Japanese market could not provide an enteral nutrition formula, and the vitamin C intake was low despite the high sodium intake of the disaster victims.[15] A study evaluating the nutrition and growth of preschool children after the earthquake in Nepal in 2015 concluded that the prevalence of stunting, an indicator of chronic malnutrition, increased in children after the earthquake.[16] In a study examining the

nutritional status of mothers and children under five years of age living in the rural area of the La Punta district after the earthquake that occurred in Ecuador on April 16, 2016, it was stated that most individuals had a significant decrease in nutrient intake, the nutrients they consumed the most had poor nutritional value, such as rice, soft drinks, and oils, and they consumed less whole grains, fruits, and vegetables.[17] Various problems related to nutrition were reported in most studies conducted on earthquake survivors after the earthquake.[18,19] Acute malnutrition and micronutrient deficiency are frequently observed in major disasters.[20] Nutritional deficiency in the disaster area is a primary public health problem.[21] Similar results were observed in our study. Participants had insufficient nutrient intake, lost weight, and experienced GIS problems, such as nausea and loss of appetite. The earthquake victims would suffer malnutrition unless the conditions were improved soon.

A study examining the clinical conditions of earthquake victims with heart failure after the earthquake occurred in the Aso region of Japan on April 14, 2016, concluded that the prognosis of individuals with heart failure worsened, and the prevalence of malnutrition increased.[22] In a study examining the chronic diseases and associated risk factors of adults living in Puerto Rico after Hurricane Maria in September 2017, it was reported that the prevalence of chronic diseases (hypertension, arthritis, high cholesterol, high triglycerides, eye disease, fatty liver disease, and osteoporosis) was higher among adults after disaster victim adults, while the participants exhibited less depressive symptoms after the hurricane.[23] Another study examining individuals with acute myocardial infarction after Hurricane Katrina in August 2005 reported that admissions to health institutions due to myocardial infarction attacks increased three times during the six years after the hurricane, and more severe psychiatric disorders were accompanied by increased smoking and unemployment in disaster victims compared to before the hurricane.[24] In another study evaluating the same hurricane, more than half of the individuals who survived one year after were reported to experience post-traumatic stress disorder, and many victims suffered anxiety and depression.[25] Besides the disasters that affect the psychological state, psychological problems caused by nutritional disorders may cause the trauma to become more challenging. Similarly, it was observed in our study that disease symptoms increased after the earthquake in most earthquake victims who had chronic diseases before.

Clean drinking water to be distributed to disaster victims in disasters is essential for preventing dehydration, and an average of 15 lt of clean drinking water should be provided daily for each individual.[26] On the other hand, our study concluded that the average amount of water that disaster victims could obtain was 0.71 lt/day, far below the daily requirements of individuals. It was reported that there were water cuts due to freezing in the tent cities established after the earthquake in the Erciş district of Van on October 23, 2011,[27] and city water networks were damaged after the earthquake in Nepal in 2015.[16] It should be noted that water is especially essential for human life. When disaster victims cannot obtain clean water, they may drink any water they find, which may cause sudden and widespread epidemics.

CONCLUSION AND RECOMMENDATIONS

Our country is prone to all kinds of disasters due to its location. The increase in the frequency of disasters causes material and moral damage decreasing the quality of life of people. The higher the level of disaster preparedness, the easier it will be to reduce or eliminate the effects of the disaster. Failure to ensure nutrient safety and security in major disasters causes insufficient and unbalanced nutrition in disaster victims. This can cause malnutrition and GIS problems in disaster victims, increasing the frequency and severity of infectious diseases in society and prolonging the recovery time of individuals.

Our study found that disaster victims did not have a priority in healthy nutrition during the earthquake period, and they only tended to relieve their hunger. Therefore, nutritionists should make efficient planning for healthy nutrition, prepare balanced provisions in terms of carbohydrate, protein, fat, and micronutrients before the disaster, and deliver them to the relevant regions immediately at the time of the disaster.

Protective strategies and policies should be implemented within the healthcare system to minimize or eliminate the devastating effects of disasters. Accordingly, national and global health policies should be developed. Supportive policies before, during, and after disasters can also reduce the destructive impacts of disasters. Specific preparedness and response plans for the health system should be designed and developed for disasters. Therefore, it is vital to establish professional disaster teams, including nutritionists, physicians, and other healthcare professionals, and to ensure adequate and balanced nutrition in disaster situations.

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