

## Our experience in managing pregnancies during the Great Hatay Earthquake

Earthquake and pregnancy

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### Abstract

**Aim:** This study aims to present information on the management and clinical outcomes of pregnant women following the major earthquake in Hatay.

**Material and Methods:** Data from 920 pregnant women who visited the obstetrics and gynecology clinic of the private Reyhanlı MMT American Hospital after the earthquake were retrospectively obtained from the electronic system. International diagnosis codes (ICD) X34 and Z-33 were used. SPSS was utilized to perform the data analysis.

**Results:** The average blood pressure of the pregnant women was 110/80 mmHg, with approximately 20 women (2.1%) having >140/90 mmHg. A total of 740 births (80.4%) were recorded. Of these births, 120 were normal vaginal deliveries and 620 were cesarean sections. Eighteen women (1.9%) underwent orthopedic, neurosurgical, and general surgical interventions. Five women experienced preterm births following these interventions. Seven women (0.94%) were diagnosed with and treated for post-traumatic stress disorder.

**Discussion:** Health institutions in Hatay, located in the earthquake fault zone, should develop strategies and programs to be prepared for earthquakes. These should be updated annually, and healthcare workers should be trained accordingly.

### Keywords

Earthquake, Pregnancy, Cesarean

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This study was approved by the Ethics Committee of Adana City Education and Research Hospital (Date: 2024-05-30, No: 4)

**Introduction**

On February 6, 2023, a highly severe earthquake centered in Kahramanmaraş affected 11 provinces. With a magnitude of 7.7, this natural disaster is one of the most devastating earthquakes in Turkish history. The earthquake resulted in over 50,000 deaths and more than 100,000 injuries. Many public and private hospitals either collapsed or became non-operational in terms of healthcare services [1].

As we know, our country is situated on active earthquake fault lines. In this geography, severe earthquakes occur in various regions every 10-15 years, leading to loss of life and injuries. Following these earthquakes, children and women are the most affected groups, with pregnant women being the most vulnerable among them [2].

Pregnancy is a distinctive period with its unique physiology and psychology. The changes brought about by pregnancy can lead to unpredictable situations during natural disasters like earthquakes. We face severe clinical conditions in pregnant women due to both the earthquake itself and the stress it induces. The most significant of these include spontaneous abortion, preterm birth with associated low birth weight infants, antenatal and postnatal infections, and postpartum post-traumatic stress disorder [3-5]. Managing these clinical conditions in earthquake-stricken areas with already compromised healthcare infrastructure is very challenging. A study indicated that the difficulty in managing the clinical conditions of earthquake victims is due to the failure to implement pre-established measures and deficiencies in early intervention rather than the severity of the earthquake itself.

The research seeks to analyze the management and clinical outcomes of pregnant women who presented to our clinic after the earthquake and provide information on the measures that can be taken and the strategies that need to be implemented in future natural disasters.

**Material and Methods**

The study took place in the obstetrics and gynecology clinic of the private Reyhanlı MMT American Hospital, and the data of pregnant women who presented to this clinic were obtained through a retrospective archive search. Pregnant women who presented between February 6, 2023, and June 6, 2023, and were diagnosed with ‘X34 – Earthquake victim’ and ‘Z33’ according to the International Classification of Diseases-10 (ICD-10) were included in the study. The data form created included demographic characteristics of the pregnant women, delivery types, antenatal and postnatal obstetric complications, presence of trauma-related injuries, and types of surgeries performed.

Using SPSS 21 software, the data were analyzed and reported as frequency (n) and percentage (%). A significant threshold p-value of <0.05 was considered.

**Ethical Approval**

This study was approved by the Ethics Committee of Adana City Education and Research Hospital (Date: 2024-05-30, No: 4).

**Results**

A total of 920 pregnant women who presented to our clinic in the four months following the earthquake were included in the

study. The average age of the pregnant women was 29.7 ± 5.3 years.

The average blood pressure of the pregnant women was 110/80 mmHg, with approximately 20 women (n=20, 2.1%) having >140/90 mmHg. A total of 740 births (n=740, 80.4%) were recorded. Of these births, 120 (16.2%) were normal vaginal deliveries, and 620 (83.8%) were cesarean sections. The number of twin births was observed to be 3 (n=3, 0.4%).

Among those who delivered by cesarean section, 5 cases experienced uterine atony, and 3 (0.4%) underwent hysterectomy. All 5 patients received erythrocyte transfusions. (Table-1)

Postpartum infections were observed in 7 patients (n=7, 0.94%). During the first 10 days, patients stayed in the hospital for an average of 12 hours, with 1 day being the subsequent days.

The number of pregnant women who experienced preterm labor was 18 (n=18, 2.4%). Every baby was taken to the neonatal intensive care unit.

The number of pregnancies that resulted in spontaneous abortion was 11 (n=11, 1.4%).

Eighteen pregnant women underwent orthopedic, neurosurgical, and general surgical interventions. Five of these women experienced preterm labor after these interventions.

Twelve pregnant women who underwent trauma surgery received physical therapy and rehabilitation in the later period. The number of pregnant women diagnosed with and treated for post-traumatic stress disorder was 7 (n=7, 0.94%).

**Discussion**

This study is designed to evaluate the impact of the earthquake on pregnant women in the context of existing literature. Our hospital was almost the only fully operational institution remaining in the Amik Plain immediately after the earthquake. From the initial hours of the disaster, all affected individuals, either by their own means or through emergency services (112), were brought to our hospital. A large number of patients received their initial medical care. Trauma surgeries were performed, with some patients treated in our hospital and others referred to different provinces.

Earthquakes, as natural disasters, affect everyone. Nevertheless, the younger population, the elderly, and women are more significantly impacted [6]. Among women, pregnant women are the most affected due to physiological changes. Many studies published following earthquakes from various parts of the world report that pregnant women and children are the most affected groups. Similar to children, pregnant women are in this high-risk group due to their different physiology and the incomplete development of their immune systems [7].

The United Nations Fund reported that there were approximately

**Table 1.** Data of giving birth women affected by the earthquake

	n	%
Birth	740	80.4
Cesarean	620	83.8
Vaginal delivery	120	16.2
Uterin atony	5	0.67
Underwent hysterectomy	3	0.4
Received erythrocyte transfusions	5	0.67

250,000 pregnant women in the earthquake zone, with 25,000 to 30,000 expected to deliver in the initial month after the earthquake [1].

A significant group of patients presenting to emergency services after the earthquake consisted of pregnant women. In the first 10 days, approximately 250 pregnant women sought medical help, either as walk-ins or through emergency services. Of these pregnant women, 18 underwent non-obstetric surgical interventions. Despite effective medical treatment, preterm births occurred in about five of these cases. All of these newborns required neonatal intensive care, with some being treated in our unit and others transferred to different facilities. The number of births within the first 10 days was 25, with 22 of these being cesarean sections. Additionally, 12 pregnant women who underwent non-obstetric surgeries received long-term physical therapy rehabilitation programs.

The most significant clinical problem in crush syndrome, which emerges from the earthquake, is acute kidney failure. The primary treatment method for kidney failure due to muscle breakdown is dialysis. The presence of necessary equipment and adequate personnel to perform dialysis saved many lives. Observations post-earthquake revealed a significant lack of dialysis machines and essential equipment. Our hospital provided dialysis to many patients, including three pregnant women, all of whom survived the procedure.

The mandatory and non-deferrable follow-up of pregnancies under normal conditions was severely disrupted in our region due to the earthquake. One contributing factor was the limited availability of operational healthcare facilities, and another was the reluctance of pregnant women to visit health centers due to ongoing aftershocks.

In our clinic, approximately 920 pregnant women were followed up in the first four months after the earthquake. Routine blood pressure measurements during pregnancy follow-ups showed that the average blood pressure was higher compared to pre-earthquake levels. A significant increase in the number of pre-eclampsia cases was observed compared to before the earthquake. This was likely due to the intense anxiety caused by the earthquake. All patients diagnosed with pre-eclampsia received antihypertensive medical treatment. However, in five cases, severe pre-eclampsia led to the necessity of delivery. None of the postpartum patients experienced pre-eclamptic complications. All mothers were referred to the cardiology clinic for follow-up after discharge. Analysis of cardiology follow-ups indicated that as anxiety decreased over time, blood pressure levels returned to normal.

Deteriorating socioeconomic conditions, problems with food and shelter, and increased anxiety from frequent aftershocks led to a rise in the number of abortions, preterm births, and low birth weight infants among some of the pregnant women under follow-up [8-10]. The most significant reason for this was the widespread anxiety brought on by the frequent aftershocks [11-13].

Many previous studies have reported that earthquakes clearly cause preterm births and an increase in the number of low-birth-weight infants. For instance, a study by Tan et al. after an earthquake in China showed a significant increase in preterm births and low birth weight infants. Similarly, Kyojuka

et al. found a significant increase in preterm births and low birth weight infants following the 2011 Great East Japan Earthquake, attributing this to problems with food, shelter, and intense anxiety [8].

In our clinic, a significant increase was observed in the number of spontaneous abortions, preterm births, and low-birth-weight infants. Eleven pregnant women experienced spontaneous abortions, with five undergoing revision curettage. Despite medical treatment, 18 pregnant women experienced preterm labor. All babies were admitted to the neonatal intensive care unit due to low birth weight and insufficient lung development. The rate of cesarean sections significantly increased compared to pre-earthquake levels, while the length of hospital stay post-delivery, especially in the first 10 days after the earthquake, was less than 24 hours. The primary reason for this was the pregnant women's desire to minimize their hospital stay due to aftershocks and their request for quick discharge once postoperative mobilization was achieved. The cesarean section rate was recorded at 83.8%, with the normal delivery rate at 16.2%. In the first 10 days, the postoperative stay was 12 hours on average, dropping to as low as 8 hours for some patients.

There was no significant increase in the rates of uterine atony compared to pre-earthquake levels. Despite the short postoperative hospital stay, the lack of increase in uterine atony rates was attributed to the effective and strong uterotonic medical treatment applied in the first six hours. Uterine atony occurred in five patients. Two benefited from medical and balloon treatment, while three underwent hysterectomy despite effective treatment. No perioperative complications occurred. All patients with uterine atony received erythrocyte transfusions, with no transfusion-related complications.

Postpartum infections increased as expected due to shelter problems brought on by the earthquake. Patients could not stay in hygienic environments and faced issues with food and shelter due to staying in tents or containers during the postpartum period [14]. This led to an expected increase in infections, but quick and effective intervention yielded successful results. All seven patients who developed postpartum infections received appropriate antibiotic therapy and wound care, and all were discharged in good health.

Stress from psychological changes during a normal pregnancy cycle was exacerbated by intense fear, and food and shelter problems post-earthquake [15-17]. To manage increased stress, both public and many private organizations provided significant psychosocial support after the earthquake. However, the difficulty in delivering this support promptly and the increased predisposition to depression before the earthquake led to post-traumatic stress disorder (PTSD) in many pregnant women.

Many studies have found that a significant number of pregnant women experienced antenatal and postnatal PTSD after earthquakes. Watanabe et al. reported that pregnant women experienced intense PTSD during the postpartum period after the Great East Japan Earthquake, with effects lasting for years [18]. Similarly, a study by Qu et al. following a major destructive earthquake in China found that PTSD lasted for 1-2 years in pregnant women [19]. Seven pregnant women who presented to our clinic were diagnosed with PTSD and followed up with appropriate treatments by the psychiatry clinic.

### Limitations of study

The most important limitation of this article is its retrospective nature. Additionally, the small number of GDM patients and the single-center study are significant limitations.

### Conclusion

Our country is situated on active fault lines and faces devastating earthquakes every 10-15 years. To minimize the negative impacts of earthquakes, healthcare institutions should prepare strategies and programs specifically for earthquake response. These programs should be routinely updated. Special teams from various regions of the country should be established and kept ready to reach the affected area immediately after an earthquake. One of our primary goals should be to minimize and manage obstetric and non-obstetric complications in pregnant women through pre-prepared programs.

### Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

### Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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### Conflict of Interest

The authors declare that there is no conflict of interest.

### References

1. Kaya V, Erçelik HC, Çamlıca T, Uysal BA, Taşcıoğlu E, Bülbül F, et al. 2023 Kahramanmaraş Depremi Sonrası Süleyman Demirel Üniversitesi Hastanesine Başvuran Depremzede Hastaların Analizi [Analysis of earthquake survivors admitted to Suleyman Demirel University Hospital after the Kahramanmaraş earthquake in 2023: A retrospective study]. *Med J SDU*. 2023;30(3):444-53.
2. Fatema SR, Islam MS, East L, Usher K. Women's health-related vulnerabilities in natural disasters: a systematic review protocol. *BMJ Open*. 2019;9(12).
3. Stephens JH, Lassa JA. Sexual and reproductive health during disasters: A scoping review of the evidence. *Int J Disaster Risk Reduct*. 2020;50:101-06.
4. Sohrabizadeh S, Tourani Ph DS, Khankeh HR. Women and health consequences of natural disasters: Challenge or opportunity? *Women Health*. 2016;56(8):977-93.
5. Hawkins G, Gullam J, Belluscio L. The effect of a major earthquake experienced during the first trimester of pregnancy on the risk of preterm birth. *Aust N Z J Obstet Gynaecol*. 2019;59(1):82-88.
6. Khosravi B, Xosravi T, Ziapour A, Fattahi E, Chaboksavar F, Yosefi Lebni J. Challenges and Problems Facing 2017 Kermanshah Earthquake Survivors: A Qualitative Study. *Community Ment Health J*. 2021;57(2):340-48.
7. Morioka H, Watanabe H, Iwasa T, Kagami S, Irahara M. Prospects for maternal and child health in Japan. *J Med Invest*. 2022;69(3-4):159-64.
8. Kyozuka H, Murata T, Yasuda S, Ishii K, Fujimori K, Goto A, et al. The Effects of the Great East Japan Earthquake on Perinatal Outcomes: Results of the Pregnancy and Birth Survey in the Fukushima Health Management Survey. *J Epidemiol*. 2022;32(12):57-63.
9. Inoue Y, Ohno Y, Sobue T, Fujimaki T, Zha L, Nomura Y, et al. Impact of the Great East Japan Earthquake on spontaneous abortion and induced abortion: A population-based cross-sectional and longitudinal study in the Fukushima Prefecture based on the census survey of the Fukushima maternity care facility and vital statistics. *J Obstet Gynaecol Res*. 2023;49(3):812-27.
10. Bloem CM, Miller AC. Disasters and women's health: reflections from the 2010 earthquake in Haiti. *Prehosp Disaster Med*. 2013;28(2):150-54.
11. Suzuki K, Goto A, Fujimori K. Effect of medical institution change on gestational duration after the Great East Japan Earthquake: The Fukushima Health Management Survey. *J Obstet Gynaecol Res*. 2016;42(12):1704-11.
12. Yasuda S, Kyozuka H, Nomura Y, Fujimori K, Goto A, Yasumura S, et al. Influence of the Great East Japan Earthquake and the Fukushima Daiichi nuclear disaster on the birth weight of newborns in Fukushima Prefecture: Fukushima Health Management Survey. *J Matern Fetal Neonatal Med*. 2017;30(24):2900-04.
13. Kyozuka H, Ohira T, Murata T, Yasuda S, Ishii K, Fujimori K, et al. Eight-year trends in the effect of the Great East Japan Earthquake on obstetrics outcomes using the Fukushima Health Management Survey. *Life*. 2023;13:1-12.
14. Kıpıy SS. Deprem gerçeği ve kadın sağlığı üzerine etkileri [The reality of earthquakes and its' effects on women's health]. *Izmir Katip Celebi Univ Fac*

*Health Sci J*. 2023;8(2):855-60.

15. Menclova AK, Stillman S. Maternal stress and birth outcomes: Evidence from an unexpected earthquake swarm. *Health Econ*. 2020;29(12):1705-20.

16. Dancause KN, Laplante DP, Oremus C, Fraser S, Brunet A, King S. Disaster-related prenatal maternal stress influences birth outcomes: Project Ice Storm. *Early Hum Dev*. 2011;87(12):813-20.

17. Chang HL, Chang TC, Lin TY, Kuo SS. Psychiatric morbidity and pregnancy outcome in a disaster area of Taiwan 921 earthquake. *Psychiatry Clin Neurosci*. 2002;56(2):139-44.

18. Watanabe Z, Iwama N, Nishigori H, Nishigori T, Mizuno S, Sakurai K, et al. Psychological distress during pregnancy in Miyagi after the Great East Japan Earthquake: The Japan Environment and Children's Study. *J Affect Disord*. 2016;190:341-48.

19. Qu Z, Tian D, Zhang Q, Wang X, He H, Zhang X, et al. The impact of the catastrophic earthquake in China's Sichuan province on the mental health of pregnant women. *J Affect Disord*. 2012;136(1):117-23.

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