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Evaluation of the anxiety level of pregnant earthquake victims

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Abstract

Objective: The study aims to assess anxiety levels among pregnant women affected by the 2023 Kahramanmaraş earthquake and investigate social factors contributing to anxiety, considering factors such as residential instability, financial strain, and bereavement.

Methods: This cross-sectional study was conducted between May 1, 2023, and June 1, 2023 with a total of 171 pregnant women, 107 earthquake victims and 66 non-earthquake victims, during their routine antenatal visits. The exclusion criteria for participation in the study are pregnant women who present with obstetric problems or mental diseases. The socio-demographic information of these pregnant women was recorded, and the Beck Anxiety Inventory (BAI) was used to assess anxiety levels.

Results: Anxiety levels were significantly higher among those who experienced earthquakes, with moderate and severe levels. The study also found that the loss of a relative during an earthquake would significantly increase the level of severe anxiety among pregnant earthquake victims. The study revealed that obstetric characteristics did not have a significant impact on the BAI score. Similarly, the financial position and employment status of the pregnant woman were also found to have no significant effect on the BAI score.

Conclusion: This study illustrated that regardless of financial situation, employment status, or obstetric characteristics, being an earthquake victim causes anxiety, and losing a relative will exacerbate this anxiety. Understanding the correlation between anxiety and bereavement due to an earthquake may provide valuable guidance for healthcare practitioners.

Keywords: Anxiety, Beck Anxiety Inventory, earthquake, pregnancy

Introduction

On February 6, 2023, a seismic event of significant magnitude took place in southeastern Turkey, marking it as one of the most catastrophic earthquakes in the historical records of Anatolia. A seismic event measuring 7.8 on the Richter scale was followed by another earthquake measuring 7.5 in Kahramanmaraş, Turkey. The aforementioned calamity had a profound impact on a population of over 15 million individuals residing in the afflicted region. Furthermore, it led to the displacement of a significant number of 473760 individuals, while tragically claiming the lives of over 50000 people.[1] A total of 226000 pregnant women have been impacted by the earthquake, necessitating the provision of both conventional obstetric care and psychosocial support.[2] Pregnant women, being a distinct demographic group, are susceptible to experiencing both physical and psychological consequences as a result of earthquakes. Furthermore, it has been established that women exhibit greater vulnerability during pregnancy, in addition to experiencing heightened

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susceptibility to the impacts of natural catastrophes compared to males.[3]

Pregnancy is susceptible to the influence of various disasters, which can significantly affect its course and outcome. The earthquake that occurred in Wenchuan, China in 2008 was associated with an increased incidence of low birth weight and early birth among pregnant women who were affected by the seismic event.[4] One of the significant long-term ramifications of stress during pregnancy generated by natural disasters is the alteration of the molecular composition of the placenta, potentially impacting the emotional well-being of the children through enduring modifications.[5]

Anxiety can be described as a psychological condition characterized by feelings of worry and nervousness in response to a situation or event that is accompanied by unpredictable outcomes.[6] The symptoms manifest in around 21% to 25% of pregnancies.[7] The adverse consequences of earthquakes on the economy, diminished familial assistance, and limited healthcare availability pose significant challenges to the mental well-being of expectant mothers. Pregnant women have a significant requirement for residing in a stable environment. Following the occurrence of the Kahramanmaraş Earthquake, a significant expanse of residential neighborhoods underwent demolition, necessitating many days for affected individuals to access secure regions. According to recent reports, pregnant women who have seen a decline in income, face housing challenges, or have suffered the loss of a family member are at a notable risk for developing anxiety.[8] Moreover, it is possible for depression and prenatal anxiety to co-occur, or for prenatal anxiety to serve as a precursor to postnatal depression. The presence of untreated depression in conjunction with undiagnosed anxiety has been found to be associated with adverse outcomes such as fetal growth restriction, hypertensive disorders of pregnancy, and premature birth.[9] In addition to the various stressors encountered during pregnancy, it is noteworthy that separation anxiety may manifest, perhaps giving rise to detrimental attitudes.[10] Additionally, if postpartum depression remains untreated, it can lead to developmental delays in the child.[11]

The main objective of this study is to assess the anxiety levels among pregnant individuals who have been affected by the earthquake. The second aim of this study is to investigate the social factors, such as financial circumstances, employment status and experiences of bereavement, that contribute to the emergence of anxiety.

Methods

The present investigation was designed as a cross-sectional study conducted at the obstetrics outpatient clinic of Mersin University Faculty of Medicine, situated around 350 km from the epicenter of the earthquake. The seismic event that occurred in Kahramanmaraş did not result in any significant material or human losses in the neighboring province of Mersin. Due to this rationale, individuals affected by earthquakes predominantly favored Mersin as a temporary place of abode. During the initial half-year period following the seismic event, our medical facility assumed the role of a tertiary care center, offering obstetric services to pregnant individuals impacted by the earthquake. This study was initiated three months subsequent to the occurrence of the disaster.

As stated in Decision No. 2023/284, the Clinical Research Ethics Committee of Mersin University approved the study. Written informed consent was obtained from all subjects involved in the study. The research was conducted in accordance with ethical guidelines, including adherence to the World Medical Association's (1975) Declaration of Helsinki 2008.

The trial enrolled patients who needed standard obstetric follow-up within the period of May 1, 2023, to June 1, 2023. The study group included earthquake-affected pregnant women who were residing in temporary shelters. During the same time frame, a control group consisting of pregnant women with the same maternal age and gestational week who were not affected by the earthquake was included. The exclusion criteria for the study were obstetric complications and mental health disorders.

The authors created a questionnaire for collecting data on socio-demographic information, obstetric medical history, earthquake-related factors, present residence, employment status, and financial situation. The assessment of anxiety was conducted with the Beck Anxiety Inventory (BAI). BAI is a standardized self-report measure employed to evaluate the intensity and frequency of anxiety-related manifestations.[12] The researchers employed the Turkish-adapted version of the Beck Anxiety Inventory (BAI) in this study.[13] The inventory in question is a survey consisting of 21 items. Each individual item within the dataset corresponds to a prevalent presentation of anxiety and is assessed using a 4-point Likert scale, ranging from 0 (indicating the absence of the symptom) to 3 (indicating a highly pronounced and severe manifestation). A significant cumulative score indicates a substantial degree of anxiety. The scoring system used in this study categorizes anxiety levels into four distinct ranges: normal (0-8), mild (8-15), moderate (16-25), and severe (26-63).

The primary investigator (ŞK) and the research assistant (HNÖ) were responsible for administering all questi-

onnaires. The primary investigator conducted the scoring by examining the responses obtained from the questionnaire.

Statistical analysis

The data analysis in this study was conducted using SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA). The data was assessed for normal distribution using statistical tests such as the Kolmogorov-Smirnov and Shapiro-Wilk tests, as well as visual examination through histograms. The statistical analysis employed independent sample t-tests to compare groups with normally distributed data. The findings are reported in terms of the mean value plus or minus the standard deviation. The data, which deviates from a normal distribution, was subjected to analysis using the Mann-Whitney U test. The resulting statistics are reported as the median value along with the range (minimum to maximum). The analysis of categorical data was conducted using either the chi-square test or Fisher's exact test, and the findings were presented in the form of percentages. A Pearson correlation analysis was conducted to examine the relationship between anxiety levels and demographic variables. The targeted significance threshold was determined to be acceptable at a value of 0.05.

Results

Table 1 provides an overview of the obstetrics and socio-demographic characteristics of the 171 pregnant women who participated in this study. There were no statistically significant differences observed in terms of age, gestational week, gravidity, parity, BMI (body mass index), smoking habits, alcohol use, monthly income, or work status between pregnant women who experienced an earthquake and those who did not. A statistically significant difference was seen between the groups in relation to the type of previous birth (p=0.003). Pregnant individuals affected by earthquakes exhibited a reduced incidence of cesarean section (36.4%) compared to pregnant individuals unaffected by earthquakes (53.1%).

Table 1. Comparative analysis of demographic characteristics between pregnant women affected by earthquakes and pregnant women unaffected by earthquakes

Parameters		Victims of the earthquake (n=107)	Non- victims of the earthquake (n=64)	p-value
Age (year)		29.7 ± 5.8	28.9 ± 6.0	0.393*
Gestational week		24.6 ± 9.3	27.3 ± 10.7	0.085*
Pregnancy trimester	**First**	20 (18.7%)	11 (17.2%)	0.079**
	Second	43 (40.2%)	16 (25.0%)	
	Third	44 (41.1%)	37 (57.8%)	
BMI (kg/m²)		27.0 ± 3.7	27.3 ± 3.0	0.678*
Gravidity		2 (0 – 9)	2 (0 – 7)	0.632***
Parity		1 (0 – 5)	0.5 (0 – 5)	0.766***
Previous birth (cesarean section)		39 (36.4%)	34 (53.1%)	**0.003****
Smoking		15 (14 %)	5 (7.8 %)	0.222**
Alcohol use		0 (0%)	1 (1.6%)	0.195**
Monthly income amount	**<10 thousand ₺**	37 (34.6%)	25 (39.1%)	0.833**
	10-30 thousand ₺	35 (32.7%)	20 (31.3%)	
	>30 thousand ₺	35 (32.7%)	19 (29.7%)	
Work status	**Employed**	52 (48.6%)	27 (42.2%)	0.416**
	Not working	55 (51.4%)	37 (57.8%)	

* Independent t-test, ** chi-square test, *** Mann-Whitney U test. A value of p<0.05 is significant. Bold p values indicate statistically significant.

Table 2 displays the anxiety scores and anxiety levels of pregnant women. Pregnant individuals who were victims of an earthquake exhibited a mean BAI score of 18.1 ± 10.2, while pregnant individuals who were not victims of an earthquake had a mean score of 10.8 ± 8.7. The observed discrepancy indicated statistical significance (p = 0.001). It was noted that the proportion of pregnant women who did not experience anxiety was lower among those who were impacted by the earthquake (16.8%) in comparison to those who were not affected (50%). The prevalence of anxiety was significantly higher among individuals who experienced earthquakes compared to those who did not, as shown by both moderate (26.2% vs. 10.9%) and severe (28.0% vs. 12.5%) anxiety levels (p = 0.001).

Table 2. BAI scores and the levels of individuals affected by the earthquake, comparing victims and non-victims

Parameters		Victims of the earthquake (n=107)	Non- victims of the earthquake (n=64)	p-value
Beck anxiety score		18.1 ± 10.2	10.8 ± 8.7	**0.001***
Anxiety level	**normal**	18 (16.8%)[a]	32 (50.0%)[b]	**0.001****
	mild	31 (29.0%)[a]	17 (26.6%)[a]	
	moderate	28 (26.2%)[a]	7 (10.9%)[b]	
	severe	30 (28.0%)[a]	8 (12.5%)[b]	

* Independent t-test, ** chi-square test, [a, b] The same letters indicate that there is no statistical difference; different letters indicate that there is a statistical difference. A value of p<0.05 is significant. Bold p values indicate statistically significant.

The earthquake victim pregnant group was divided into two subgroups: those who lost a relative in the earthquake (n = 51) and those who did not lose a relative in the earthquake (n = 56) (Table 3). There were no significant differences observed in terms of age, gravida, parity, prior cesarean section rate, or BMI between individuals who experienced the loss of a relative and those who did not. The average score on the Beck Anxiety Inventory (BAI) was found to be greater among individuals who had lost a relative in the earthquake compared to those who did not experience such a losses (mean score of 21.0 ± 10.2 versus 15.5 ± 9.4, p = 0.005). The percentages for women without anxiety were 9.8% and 23.2% for the groups with and without earthquake-related losses, respectively. Similarly, the percentages for women with severe anxiety were 37.3% and 19.6% for the groups with and without earthquake-related loss, respectively. The significance level of p was found to be 0.034.

Table 3. Comparison of obstetric characteristics, anxiety levels, and scores between pregnant women who didn't experience any loss and those who experienced loss in the earthquake

		Group with loss a relative in the earthquake (n=51)	Group with no loss in the earthquake (n=56)	p value
Age (year)		29.7 ± 6.4	29.7 ± 5.3	0.995*
Gestational week		24.2 ± 9.1	25.1 ± 9.6	0.641*
Gravidity		2 (0 – 9)	2 (0 – 8)	0.252**
Parity		1 (0 – 4)	1 (0 – 5)	0.877**
Previous birth (cesarean section)		21 (37.5%)	18 (35.3%)	0.813***
BMI (kg/m²)		26.7 ± 4.2	27.4 ± 2.9	0.357*
Beck anxiety score		15.5 ± 9.4	21.0 ± 10.2	**0.005***
Anxiety level	**normal**	13 (23.2%)[a]	5 (9.8%)[a]	**0.034*****
	mild	20 (35.7%)[a]	11 (21.6%)[a]	
	moderate	12 (21.4%)[a]	16 (31.4%)[a]	
	severe	11 (19.6%)[a]	19 (37.3%)[b]	

* Independent t-test, ** chi-square test, *** Mann-Whitney U test. [a, b] The same letters indicate that there is no statistical difference; different letters indicate that there is a statistical difference. A value of p<0.05 is significant. Bold p values indicate statistically significant.

Table 4 presents data indicating the absence of a statistically significant association between the BAI score and demographic factors. It means that factors such as age, gestational age, gravidity, parity, and BMI do not have a significant impact on the level of anxiety experienced by pregnant women.

Table 4. Correlation of age, gestational week, gravidity, parity, BMI, and BAI score among pregnant women

		Age (year)	Gestational week	Gravidity	Parity	BMI (kg/m²)	Beck anxiety score
Age (year)	**r**	1					
Gestational week	**r**	-0.109	1				
	p	0.156					
Gravidity	**r**	0.0417*	0.034	1			
	p	0.000	0.656				

Parity	**r**	0.417*	0.080	0.791	1		
	p	0.000	0.298	0.000			
BMI (kg/m²)	**r**	0.103	0.203*	0.132	0.184*	1	
	p	0.179	0.008	0.084	0.016		
Beck anxiety score	**r**	0.030	-0.019	0.001	0.085	-0.125	1
	p	0.701	0.805	0.993	0.267	0.102	

Asterisks (*) indicate the level of significance. p: p values; r: Pearson correlation coefficient.

Discussion

To the best of our present knowledge, this research is the first investigation examining the impact of the 2023 Turkey Earthquake on anxiety levels among pregnant individuals affected by the earthquake. This study provides evidence that maternal anxiety, as measured by the BAI, exhibited a statistically significant increase among pregnant women who were victims of an earthquake. This increase in anxiety was found to be unrelated to factors such as age, number of pregnancies, number of previous births, gestational age, and BMI. It has been determined that, despite relocating to secure locations, the psychological repercussions of the earthquake endured for a period of three months, with pregnant individuals affected by a prevalent sense of anxiety. The findings of this study have the potential to assist researchers and healthcare practitioners in identifying the psychological impact of natural disasters on pregnant women within the immediate and intermediate timeframes. Improving the psychological intervention offered to pregnant individuals who have been impacted by earthquakes and then relocated to safe locations has the potential to deliver favorable results.

In our research, the rate of caesarean section for pregnant women who had experienced an earthquake was lower for their previous birth compared to those who had not been impacted by an earthquake. This trend could be attributed to the fact that pregnant women affected by the earthquake tended to be at low or moderate risk, similar to the general population. Meanwhile, the pregnant women examined in our hospital were primarily high-risk individuals. Similar to Golbaşı et al.'s research, our tertiary clinic has a higher prevalence of cesarean sections than those serving the general population.[14]

Previous research has provided evidence indicating that approximately 54% of pregnant individuals have anxious sensations. Additionally, the simultaneous presence of depressive symptoms and anxiety has been reported to vary between 12% and 16%.[14] This underscores the imperative for heightened attention to the mental health and holistic welfare of pregnant women. ACOG recommends screening for depression and anxiety with a standardized and validated tool at least once in the perinatal period.[15] In the aftermath of a devastating earthquake, pregnant women often face a unique set of challenges, both physically and mentally. This brings attention to the importance of identifying and addressing anxiety disorders among these individuals, ensuring a healthier pregnancy and a positive post-earthquake recovery.

The reported prevalence of anxiety in the whole population of Pakistan was documented at 34%.[16] However, subsequent to the 2005 Pakistan earthquake, this percentage escalated to 64%, particularly among female individuals affected by the calamity.[17] The occurrence of an earthquake possesses the capacity to inflict substantial injury upon individuals and result in enormous damage to property. As a result, it has the potential to significantly influence the mental health of pregnant women. The current investigation unveiled an elevated incidence of anxiety among pregnant women impacted by earthquakes, aligning with prior searches in this area of study.

The occurrence of financial challenges subsequent to natural catastrophes has the potential to impact the levels of anxiety experienced by pregnant individuals. Several years following Hurricane Katrina, pregnant women expressed concerns about their financial stability, which contributed to their feelings of anxiety.[18] A research investigation was undertaken to examine the impact of economic factors on the manifestation of post-disaster anxiety among pregnant women affected by the Great East Japan earthquake. The findings revealed a significant association between economic considerations and the development of anxiety symptoms during the 36th and 48th months following the disaster.[19] A research investigates the phenomenon of pregnancy anxiety in the context of the COVID-19 pandemic, revealing that although low socioeconomic status did not exhibit a significant correlation with prenatal anxiety, it did manifest as a contributing factor to postpartum anxiety.[20] The findings of our study indicate that there was no statistically significant association between the monthly income level and the anxiety level of pregnant women impacted by earthquakes. The rationale for this phenomenon can be attributed to the temporal proximity of our study to the occurrence of the earthquake tragedy, as well as the effective outreach of social services to individuals with low socioeconomic status.

Following the 2005 Pakistan earthquake, Anwar et al conducted a study that revealed an increase in anxiety and depression among women who lost their income.[17] However, our study did not identify any significant effect of monthly income on anxiety levels. Hocaoglu et al. showed that one of the predictors of the development of anxiety during pregnancy after the COVID-19 disaster was the employment status of the husband.[21] We attribute this to the effective provision of economic support after the earthquake.

The aftermath of an earthquake has been subject to various interpretations in relation to the consequences of losing a friend or relative. A study conducted after the Lushan earthquake demonstrated a heightened risk of depression during pregnancy for those who had a relative injured or killed in the earthquake.[22] Our study revealed a significant increase in anxiety scores among individuals who experienced the loss of a relative in the earthquake victim group. The prevalence of mild, moderate, and severe anxiety was notably elevated among pregnant women who encountered the loss of a relative in the earthquake, based on anxiety levels. There exists a lack of mental health research related to the impact of post-earthquake loss on the anxiety levels of pregnant women. One notable aspect of our work is its examination of this particular issue.

One of the limitations of our study is the restricted sample size of pregnant women affected by the earthquake. One significant element that contributes to this phenomenon is the intentional exclusion of individuals who have obstetric and mental health complications. In addition, as a tertiary care facility, we have found an increased incidence of pregnant individuals impacted by earthquakes who were subsequently sent to our hospital for management of obstetric complications. Another limitation arises from the inherent unpredictability of earthquakes, which prevents the capacity to pre-allocate individuals into discrete time groups for the sake of comparison.

Another restriction of our study was that we could not include maternal-fetal outcomes. Pregnant earthquake victims were followed up during temporary accommodation in our clinic. Due to technically inadequate maternal-fetal outcomes data, we did not establish a relationship between anxiety level and maternal-fetal outcomes. However, we were able to collect data on the anxiety levels of the pregnant earthquake victims through various validated scales. This allowed us to analyze the impact of anxiety on other aspects of their well-being, such as mental health and overall quality of life. Additionally, future studies could focus on improving data collection methods to further investigate the potential relationship between anxiety levels and maternal-fetal outcomes in similar situations.

Conclusion

In conclusion, our results pointed out that pregnant women who were victims of earthquakes had statistically significantly higher anxiety scores than the control group, as assessed by the Becks Anxiety Inventory. In terms of level of anxiety, moderate and severe levels of anxiety were found to be more common in pregnant earthquake victims. The findings suggest that the experience of earthquakes can have adverse psychological effects on pregnant women and that the impact on the emotional well-being of pregnant women in the months following a disaster is independent of factors such as financial issues, employment status, BMI, gestational age, and parity. Pregnancy is a unique time in a woman's life and in times of disaster, such as earthquakes, comprehensive support, especially for bereaved pregnant women, should go beyond medical intervention and include psychological support.

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