



THE COMBINED EFFECT OF THE COVID-19 PANDEMIC AND THE EARTHQUAKE IN ZAGREB ON THE PSYCHOLOGICAL AND SOCIAL LIFE OF PREGNANT WOMEN

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SUMMARY – Background: We investigated the influence of the earthquake that occurred in Zagreb in March 2020 during the COVID-19 pandemic on the mental health of pregnant women.

Aim: The aim of this study was to examine differences and correlations between depression, anxiety and stress levels, as well as the overall quality of life and the four domains of quality of life (physical health, psychological health, social relationships and environment) between pregnant women who experienced the earthquake and pregnant women who did not.

Methods and Results: The study included a total of 122 pregnant women who filled out our questionnaire. Pregnant women who experienced the earthquake had higher levels of anxiety, depression and stress. The overall quality of life of women who did not experience the earthquake was higher. A Mann-Whitney test was performed to examine these differences. Spearman's correlation coefficients were calculated to examine correlations between depression, anxiety, stress, overall quality of life and the four domains of quality of life.

Conclusion: Since pregnant women are a vulnerable group in our society, experiencing major stressful life events like pandemics and earthquakes can contribute to their sensitivity and fragility. We hope that our study leads to a better understanding of the psychological, social and physical health of pregnant women.

Keywords: *stress; pregnancy; mental health; support*

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Introduction

The definition of health by the World Health Organization¹ states that mental and social well-being are crucial for a normal and healthy life. In the uncertain times of the COVID-19 pandemic, mental health, social interactions and personal intimacy were seriously disrupted. The COVID-19 pandemic took its toll on society at the beginning of 2020 and its effects are still visible today. Pandemics cause panic and fear among people, which results in stress in everyday life and symptoms of anxiety and depression². “Coronaphobia”, a fear of COVID-19, or “epidemic of fear” are some of the terms used, only to emphasize the impact that this epidemic had, and still has, on mental health³. Another stressful trigger occurred in Zagreb on March 22, 2020, during the height of the pandemic: a magnitude 5.5 earthquake on the Richter scale. This event contributed to fear and uncertainty of the future amongst citizens of Zagreb and Croatia in general⁴. As pregnant women are a particularly vulnerable and sensitive group of women, who society tries to protect from stress by exempting them from physical labor, some obligations, and by enabling them access to welfare, they could be more sensitive to such stressful events. This study aims to determine the psychological and emotional repercussions of the COVID-19 pandemic and the March 2020 earthquake in Zagreb on pregnant women. We examined differences in depression, anxiety, stress levels, overall quality of life and the four domains of quality of life (physical health, psychological health, social relationships, and environment) between women who experienced the earthquake during pregnancy and those who did not. We also studied correlations between these repercussions and social support that pregnant women received from friends and family. We hope this study contributes to better overall health care of pregnant women, especially in times of major stressful life events.

Methods and materials

The study was designed as a cross-sectional study conducted in the Department of Gynecology and Obstetrics, Sestre milosrdnice University Hospital

Center, Zagreb. Our study included 122 pregnant women who filled out the questionnaire during a follow-up examination in their third trimester (week 27-42 of gestation). All women filled out the questionnaire in the waiting room. The questionnaire contained questions about anthropometric data and questions regarding the subjects' psychological, social, sexual and gynecological state. The inclusion criterion was a singleton pregnancy. Exclusion criteria were multiple pregnancies and high-risk pregnancies, i.e. women put on bed rest. This study was approved by the Ethics Committee of Sestre milosrdnice University Hospital Center.

Subjects

This study included a total of 122 pregnant women, average age $M = 31.13$; $SD = 4.86$. A total of 36 of them were primiparas (29.5%) and 86 (70.5%) had previously had a child. Most had a college degree (67, 54.9%), 48 had a high school degree (39.3%) and 6 completed only primary school (4.9%). One of the participants had no education (0.8%). A total of 111 of the surveyed pregnant women were employed (91%), while 11 (9%) were unemployed. All of them had partners; 98 (80.3 %) were married and 24 (19.7 %) lived in an extramarital union. A total of 68 (55.7%) of the women's partners had a high school degree, 49 (40.2%) a college degree and 4 completed only primary school (3.3%). When filling out the questionnaire, seventy-six women estimated their regular income and lifestyle as average (62.3%), six of them (4.9%) as a little below average, 1 (0.8%) as significantly below average, 37 (30.3%) as a little above average and 2 (1.6%) as significantly above average. Fifty-six (49.5%) women lived in a city with more than 100,000 people, 32 (26.2%) in a city with up to 100,000 people and 32 of them (26.2%) lived in rural areas. A total of 78 (69.3%) of our subjects experienced the earthquake while pregnant, while 44 of them (36.1%) did not.

Instruments

Depression, anxiety, and stress scale

The Depression, anxiety, and stress scale (*Depression Anxiety Stress Scale-21*, DASS-21)⁵ is a shorter version of the original questionnaire which contains 42 items. This scale consists of 21 items and includes 3 subscales, each with 7 items: depression (e.g. *I felt I had nothing to look forward to*), anxiety (e.g. *I felt I was close to panic*), and stress (e.g. *I found it hard to wind down*). Participants must estimate just how much the claim referred to them over the past week by rating it on a 4-point Likert scale (0 – did not apply to me at all, 1 – applied to me to some degree, or some of the time, 2 – applied to me a considerable degree or a good part of the time, 3 – applied to me very much or most of the time). The result is a sum of points of a certain scale multiplied by two, giving a result between 0 and 42. Higher results indicate a higher level of depression, anxiety and stress. This scale shows great reliability of internal consistency. Cronbach alpha values in the Crawford and Henry survey⁶ were $\alpha = 0.90$ for the anxiety subscale, $\alpha = 0.95$ for the depression subscale, $\alpha = 0.93$ for the stress subscale, and $\alpha = 0.97$ for the overall scale. The Cronbach alpha values in this research were $\alpha = 0.88$ for the depression subscale, $\alpha = 0.85$ for the anxiety subscale and $\alpha = 0.92$ for the stress subscale.

Social support scale

The Social Support Scale (Macdonald, 1998; adapted version by Ivanov & Penezić, 2010) was used to assess perceived support from family and friends^{7,8}. The scale examines the perception of received social support from family members and friends, and refers to currently received and available social support. The scale consists of 56 items, 28 of which refer to social support received from family (items 1-28) and 28 to social support received from friends (items 29-56). Each of these two subscales consists of four aspects of social support: emotional, instrumental, informational, and support for self-esteem. Participants express their agreement with a certain item on a 5-degree scale (1 = strongly disagree, 2 = mildly disagree, 3 = neutral, 4 = mildly agree, 5 = strongly agree). Some items are reverse-scored, meaning that for negatively worded statements, a high response is converted into a lower

score so that the overall result accurately reflects the level of perceived support. The total score is calculated as a sum of all items, while taking the reverse scoring into account. It is also possible to analyze the results according to different types of support. Higher scores on the scale and subscales indicate a greater level of perceived social support. This scale allows for a detailed assessment of the subjective perception of social support, which is an important indicator of psychological resilience and overall well-being, particularly in populations exposed to increased stress. The overall score of the Social support scale and the scores from subscales were both observed. The Social Support Scale by Macdonald showed Cronbach's alpha value of internal consistency for the overall score to be 0.87, while the Croatian adapted version by Ivanov & Penezić reported a Cronbach alpha value of 0.96⁸. The results we obtained for Cronbach's alpha value of internal consistency were $\alpha = 0.92$ for overall social support, $\alpha = 0.85$ for support from family and $\alpha = 0.94$ for support from friends.

World Health Organization Quality of Life-Bref

The World Health Organization Quality of Life-Bref (*World Health Organization Quality of Life Bref – WHOQOL-BREF*)⁹ is a short version of the WHOQOL-100 questionnaire and it consists of 26 items and two questions associated with satisfaction with the overall quality of life in the past two weeks. Participants also estimate how other people answered the same questions. The perception of quality of life is scored in four domains: physical health, psychological health, social relationships and environment. It is possible to calculate the overall quality of life and estimate quality of life in certain domains. High scores denote a high quality of life. The participants mark their agreement with each specific item on a 5-degree scale; "1" meaning the lowest and "5" the highest level of agreement with an item). The points transform and for each item there is a rank from 4 to 20, so a comparison between domains with different amounts of items can be possible¹⁰. For further comparison between domains, it is possible to transform the points for each domain to numbers on a scale from 0 to 100, where a high score means a better assessment of certain aspects of quality of life. Skevington and associates state how domains of physical health, psychological health and environment

have a high Cronbach's alpha value of internal consistency ($\alpha > 0.75$), while the domain for social relations amounts to 0.68. In this survey, Cronbach's alpha value of internal consistency was: $\alpha = 0.83$ for physical health, $\alpha = 0.81$ for psychological health, $\alpha = 0.52$ for the domain of social relationships and $\alpha = 0.82$ for the domain of environment.

General data questionnaire

Information about age, number of births, marital status, education, the working status of the participants and their partners, asset and income assessment, residential area and earthquake exposure was collected with a general data questionnaire.

Results

Mean values and standard deviations of the observed variables are shown in Table 1. According to the recommended cut-off scores for conventional severity labels, we noticed mild depression, moderate anxiety and severe stress in the group of women who experienced the earthquake during pregnancy. In the group of women who did not experience the earthquake during pregnancy, the levels of depression, anxiety and stress were normal⁵.

A Mann-Whitney test was performed to examine differences in depression, anxiety, stress levels, overall quality of life and four domains of quality of life

Table 1. Means and standard deviations

	Women with earthquake experience Mean; Stand. deviation	Women without earthquake experience Mean; Stand. deviation
Depression	12.31; 15.3	6.48; 9.9
Anxiety	14.65; 16.6	6.0; 9.2
Stress	26.18; 20.1	14.57; 16.2
Family support	115.4; 11.5	118.74; 11.1
Support from friends	106.0; 14.1	107.05; 17.9
Physical health	15.03; 2.9	15.56; 2.6
Psychological health	15.83; 2.2	16.53; 2.5
Social relations	16.05; 2.2	16.71; 2.2
Environment	15.91; 2.3	16.41; 2.6
Overall quality of life	102.17; 12.5	107.0; 12.5

Table 2. Mann-Whitney test for two groups (women with and without earthquake experience) – differences in depression, anxiety, stress, overall quality of life and for four domains of life quality.

	Women with earthquake experience Mean Rank	Women without earthquake experience Mean Rank	Z	Asym. Sig. (2tailed)
Depression	66.39	48.29	-2.801	.005
Anxiety	67.23	46.74	-3.168	.002
Stress	67.38	46.46	-3.184	.001
Overall quality of life	54.34	68.85	-2.208	.027
Physical health	57.15	66.5	-1.418	.156
Psychological health	55.05	70.27	-2.314	.021
Social relations	57.14	66.52	-1.453	.146
Environment	56.81	67.1	-1.559	.119

Table 3. Spearman's correlation coefficients for examined variables

	Depression	Anxiety	Stress	Social support	Social support (family)	Social support (friends)	Quality of life	Physical health	Psychological health	Social relations	Environment
Depression		.763**	.839**	-.370**	-.318**	-.310**	-.532**	-.435**	-.551**	-.332**	-.399**
Anxiety			.747**	-.335**	-.292**	-.290**	-.525**	-.396**	-.534**	-.230*	-.344**
Stress				-.357**	-.326**	-.305**	-.491**	-.412**	-.470**	-.258**	-.338**
Social support					.827**	.865**	.504**	.284**	.534**	.437**	.529**
Social support (family)						.520**	.348**	.169	.397**	.283**	.403**
Social support (friends)							.430**	.248**	.449**	.462**	.426**
Quality of life								.760**	.814**	.671**	.804**
Physical health									.537**	.448**	.369**
Psychological health										.546**	.651**
Social relations											.495**
Environment											

*Correlation is significant at 0.01 (2-tailed)

**Correlation is significant at 0.05 (2-tailed)

between women who experienced the earthquake during pregnancy and those who did not (Table 2).

The results showed a statistically significantly elevated level of depression, anxiety and stress in the group of women who experienced the earthquake during pregnancy than in the group of women who did not. The overall quality of life, as well as psychological health, were statistically significantly higher in the group of pregnant women who did not experience the earthquake during pregnancy than in the group of pregnant women who did.

To examine the correlations between depression, anxiety, stress levels, total social support, social support received from family and friends, overall quality of life, as well the four domains of quality of life, Spearman's correlation coefficients were calculated (Table 3).

Pregnant women with a higher level of depression had a statistically significantly higher level of anxiety and stress. They also had statistically significantly lower levels of overall social support, as well as lower levels of social support from family and friends, a lower overall

quality of life and lower levels of the four domains of quality of life.

Pregnant women with a higher level of anxiety had a statistically significantly higher level of stress. They also had statistically significantly lower levels of overall social support, as well as lower levels of social support from family and friends, lower overall quality of life and lower levels of the four domains of quality of life.

Pregnant women with a higher level of stress had statistically significantly lower overall social support, as well as lower social support from family and friends and lower overall quality of life, and lower level of four domains of quality of life.

Pregnant women with a higher level of overall social support had a statistically significantly higher level of social support from family and friends, as well as a higher overall quality of life and a higher level of the four domains of quality of life.

Pregnant women with a higher level of social support from family statistically had a significantly higher level of social support from friends, as well as higher

overall quality of life and higher levels of three of the four domains of life quality (psychological health, social relations and environment).

Pregnant women with a higher level of social support from friends had statistically significantly higher overall quality of life and higher levels of the four domains of quality of life.

All domains of quality of life, as well as the overall quality of life, were statistically significantly correlated.

Discussion

During pandemics, the whole of society carries a burden of fear and uncertainty, which are even greater for pregnant women, because they care about the safety of their pregnancy and future child. Studies have shown^{11,12} that parents, especially mothers and pregnant women, are the most anxious groups in society during pandemic outbreaks¹³. They are exposed to higher levels of stress and are more likely to experience anxiety and depression¹⁴. There has been some evidence^{15,16} that pregnant women who were exposed to major stressful life events have a greater risk of pre-term birth and low birth weight infants.

The mental health of individuals is often unintentionally neglected during pandemics, as most clinicians are mainly focused on the clinical aspect of the infected persons and the disease. In the January of 2020, in the initial phase of the COVID-19 pandemic, the National Health Commission of China issued a series of recommendations¹⁷ for emergency psychological crisis interventions. Considering there was little information on the impact of the COVID-19 pandemic on mental health in the initial phase, in March 2020 Wang and associates¹⁸ published a study on the psychological impact of COVID-19. Their survey included over 1200 participants. More than half of them rated the psychological impact as moderate-to-severe and about one-third reported moderate-to-severe anxiety. Pandemics raise fear and uncertainty about the future, which elevates levels of anxiety, depression and stress amongst people^{18,19}. Another finding in the Wang study was that the female sex was associated with greater psychological impact. Considering that, it follows that pregnant women are at an even higher risk of negative psychological outcomes, such as higher levels of depression,

anxiety and stress. In our group of participants, we observed the effects of the 2020 Zagreb earthquake as an additional stressful factor, which emphasized the negative psychological impact of the added stress of the earthquake on pregnant women. Earthquakes can lead to acute distress and also to chronic stress²⁰. A study²¹ conducted after the 2015 Nepal earthquakes showed a high prevalence of common mental disorders, such as anxiety, depressive symptoms, adjustment and somatoform disorders, in pregnant women.

Furthermore, studies have already shown increased stress and anxiety levels in patients waiting for non-urgent gynecological surgery post-earthquake exposure in Zagreb, during the COVID-19 pandemic²² and in infertile couples during the COVID-19 pandemic²³.

Our results show that the group of women who experienced the 2020 Zagreb earthquake during pregnancy exhibited mild depression, moderate anxiety and severe stress. In the group of women who did not experience the earthquake, depression, anxiety and stress levels were normal. Both groups were observed during the pandemic²⁴. An interesting study²⁵ conducted in Zagreb showed that the number of people infected with SARS-CoV-2 did not increase during the earthquake and 14 days after it, raising an interesting question about the concepts of vulnerability and resilience. Analyzing our results, it seems that pregnant women managed to cope quite well with the issue of the pandemic.

Another interesting study²⁶ evaluated the connection between the psychological stress during the COVID-19 pandemic and the Zagreb earthquake, and its potentially predictive factors. The study included adults who experienced the Zagreb earthquake during the pandemic mitigation measures. Results from this study showed that around 16% of the participants experienced severe to extreme depression, around 11% experienced severe to extreme anxiety and around 27% experienced severe to extreme stress. These results suggest that promoting active coping styles and social interactions may be preventative and potentially therapeutic in the general population. As expected, our study also showed that quality of life and psychological health were statistically significantly higher in women who did not experience the earthquake during pregnancy than in women who did.

In recent times, it has become possible to assist patients during pandemics through online therapy and

telephone communication, which has proven to give positive results, especially during the distresses examined in our study²⁷. Society seems to be more supportive of vulnerable groups, such as children and pregnant women, and these groups are the first to be provided with help on a psychological and social level. According to our results, pregnant women with higher levels of depression had statistically significantly higher levels of anxiety and stress, as well as lower overall social support, lower social support from family and friends, and lower overall quality of life. Associated stressful events do not necessarily have a cumulative effect on people, but are likely to result in complex interactions^{4,28-31}.

As shown in our results, social support from friends or family members was important to our participants, because it increased quality of life and reduced negative impacts on psychological health. This is in line with the results of a study by Elsenbruch *et al.*, which indicated that pregnant women with low social support had more depressive symptomatology than pregnant women with medium and high social support³². The same study also showed that pregnant women with low social support had a reduced quality of life compared to a medium and high social support group, and that those with low and medium social support had a lower psychological quality of life than women with high social support.

Our study had several limitations. The sample of respondents was quite small and only pregnant women from our hospital were included. The two groups of pregnant women, the group that experienced the earthquake (which is the larger group) and the group that did not experience it, were not uniform and no generalizations could be made. This being a cross-sectional study, we did not have information about depression, anxiety and stress levels before the triggering events. Also, not all variables that may affect the onset of symptoms or personality traits have been controlled.

Conclusion

Since pregnant women are a vulnerable group of our society, experiencing major stressful life events like pandemics and earthquakes can contribute to their sensitivity and fragility. We hope that our study leads to a better understanding of the psychological, social and physical

health of pregnant women during major stressful life events and to finding ways for health professionals to improve the overall health care of pregnant women.

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Sažetak

KOMBINIRANI UTJECAJ PANDEMIJE VIRUSA COVID-19 I POTRESA U ZAGREBU NA PSIHOLOŠKO ZDRAVLJE I DRUŠTVENI ŽIVOT TRUDNICA

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Uvod: Istraživali smo utjecaj potresa koji se dogodio u Zagrebu u ožujku 2020. tijekom pandemije virusa COVID-19 na mentalno zdravlje trudnica. Cilj ovog istraživanja bio je ispitati razlike i korelacije između razine depresije, anksioznosti i stresa, kao i ukupne kvalitete života i četiri domene kvalitete života (tjelesno zdravlje, psihičko zdravlje, društveni odnosi i okolina) između trudnica koje su doživjele potres tijekom trudnoće i trudnica koje nisu.

Metode i rezultati: Naše istraživanje obuhvatilo je ukupno 122 trudnice koje su ispunile upitnik. Trudnice koje su doživjele potres imale su višu razinu anksioznosti, depresije i stresa. Ukupna kvaliteta života žena koje nisu doživjele potres bila je viša. Proveden je Mann-Whitney test kako bi se ispitalo te razlike. Spearmanovi koeficijenti korelacije izračunati su kako bi se ispitalo korelacije između depresije, anksioznosti, stresa, ukupne kvalitete života i četiri domene kvalitete života.

Zaključak: Budući da su trudnice ranjiva skupina našeg društva, doživljavanje velikih stresnih životnih događaja poput pandemija i potresa može pridonijeti njihovoj osjetljivosti i delikatnosti. Nadamo se da će naše istraživanje dovesti do boljeg razumijevanja psihičkog, socijalnog i fizičkog zdravlja trudnica.

Ključne riječi: *stres; trudnoća; mentalno zdravlje; podrška*