

**ORIGINAL ARTICLE**

# Stress in pregnant women during the COVID-19 pandemic

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The authors have declared that no competing interests exist

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**Summary**

**Introduction:** Pregnancy is a vulnerable period in a woman's life when psychological distress can have negative consequences on both the mother and the fetus. Pregnant women and women in labor are at an increased risk of developing a more severe clinical picture of COVID-19 infection compared to non-pregnant women.

**Aim:** Examination of stress in pregnant women in Serbia during the COVID-19 pandemic.

**Material and methods:** Pregnant women were given an anonymous questionnaire during outpatient prenatal care. Socio-demographic characteristics, obstetric factors, COVID-19 history, DASS-21 questionnaire, and PREPS questionnaire were examined.

**Results:** Within the PREPS questionnaire, the average score for the domain “preparedness for childbirth” is  $2.4 \pm 0.9$ , for the domain “infection”  $2.9 \pm 1.0$ , and for the domain “positive appraisal”  $3.7 \pm 0.8$ . A positive, weak, statistically significant correlation was registered between the domains “childbirth preparedness” and the domains “depression” and “anxiety” in the DASS-21 questionnaire. A positive, moderate, statistically significant correlation was found between the domain “childbirth preparedness” and the domain “stress” on the DASS-21 questionnaire. A positive, weak, statistically significant correlation was registered between the domain “infection” and “stress” on the DASS-21 questionnaire.

**Conclusion:** Two years after the pandemic was officially declared, pregnant women had either had a previous COVID-19 infection or had been vaccinated against it, so the scores of the domains “preparation for childbirth” and “infection” were lower than expected, while the score for the domain “positive appraisal” was higher compared to the studies conducted at the beginning of the pandemic. The obtained results strengthen future research on the association of depression, stress, and anxiety with stress in pregnancy caused by the COVID-19 pandemic.

**Keywords:** pregnancy, stress, COVID-19, DASS-21, PREPS



## INTRODUCTION

Pregnant women may be especially vulnerable to the negative impacts of events related to the COVID-19 pandemic and the stress they entail (1). Pregnancy is a sensitive period and can have negative consequences for the mother and the fetus. Throughout the period of COVID-19 pandemic depression and anxiety symptoms were heightened in pregnant women. These symptoms may have lasting effects on their children and relate to a raised risk of preterm birth, postpartum depression, and behavioral difficulties (2).

Throughout COVID-19, pregnant women perceived uplifted problems with mental health and stress, which can be dangerous to the fetus and the parent-child relationship (3). On the other hand, the study showed that the COVID-19 pandemic did not alter levels of observed stress and life pleasure in the tardy stage of pregnancy (4). Moreover, in comparison with pregnant women before the pandemic, pregnant women during the COVID-19 pandemic noticed a significant growth in symptoms of anxiety and depression (5).

The aim of this research was to examine stress among pregnant women in Serbia during the COVID-19 pandemic.

## MATERIAL AND METHODS

A cross-sectional study was conducted in a Community Health Center in Belgrade, Serbia, from January to February 2022. The Ethical Committee approved this study under the license number 28711. An anonymous questionnaire was given to pregnant women to fill out during an outpatient examination. The questionnaire consisted of 5 parts: (1) socio-demographic characteristics (age, level of education, financial and marital status), (2) obstetric factors (gestational age, pregnancy planning, nulliparity, high-risk pregnancy, chronic diseases, infertility treatment), (3) COVID-19 history (whether they had had COVID-19 before and after pregnancy, vaccination status against COVID-19, loss of job due to pandemic, death of loved ones due to COVID-19), 4) DASS-21 questionnaire (21 questions to assess depression, anxiety and stress) and (5) PREPS questionnaire (15 questions to assess stress in pregnant women due to the COVID-19 pandemic in three domains: preparedness for childbirth, infection, positive evaluation).

Descriptive and analytical statistics were used in the statistical processing of data. From the methods of descriptive statistics, measures of central tendency (arithmetic mean, median), measures of variability (standard deviation and range), and absolute and relative numbers were used. The T-test (numerical data) and Chi-square test (nominal data) were used to compare statistically significant differences between groups. Pearson's or

Spearman's correlation coefficient was used to examine the relationship, depending on the distribution of the data. Data processing was done using SPSS software, and a p-value <0.05 was considered statistically significant.

## RESULTS

### Sociodemographic characteristics

This research included 65 pregnant women with an average age of 32±4.9 years (23-45 years). **Table 1.** shows the socio-demographic characteristics of pregnant women.

**Table 1.** Sociodemographic characteristics of the examined pregnant women

	n (%)	
Marital status:	married	41 (63.1)
	cohabitation	17 (26.2)
	single	6 (9.2)
	divorced	1 (1.5)
Employment:	employed	59 (90.8)
	unemployed	4 (6.2)
	student	2 (3.1)
Educational background:	college	11 (16.9)
	secondary school	14 (21.5)
	faculty	40 (61.5)
I currently live in	the city	61 (93.8)
	the village	4 (6.2)
How do you assess your financial status?	above average	5 (7.7)
	below average	2 (3.1)
	average	55 (84.6)
	the answer is missing	3 (4.6)

Two-thirds of pregnant women were married, and one third lived in cohabitation. Over 90% of pregnant women were employed, and two-thirds were highly educated. The majority, 85% of pregnant women, assessed their financial status as average, 7.7% above average, 3.1% below average, and 4.6% of pregnant women did not answer this question.

### Obstetric factors

The average gestational age of pregnancy was 23.1±9.6 weeks. A total of 62 (95.4%) pregnant women declared that the current pregnancy had been planned. Previous birth was noted in 34 (52.3%), while 31 (47.7%) participants were primiparous. Of the women who had previous pregnancies, 25 (73.5%) had one birth, while 9 (26.5%) had two births. A total of 6 (9.2%) pregnant women were previously treated for infertility. For up to a year, 53 (81.5%) participants tried to get pregnant, 8 (12.3%) for more than a year, and 4 pregnant women did not answer this question. Eleven (16.9%) pregnant women reported having chronic diseases, while 2 (3.1%) reported having emotional or psychiatric problems.

### COVID-19 history

Out of 65 pregnant women, 19 (29.2%) stated that they had had COVID-19 before the current pregnancy, 36 (55.4%) had never had COVID-19, and 10 (15.4%) pregnant women did not know with certainty whether they had suffered from COVID-19 before the current pregnancy or not. A total of 8 (12.3%) pregnant women had had an infection during the current pregnancy, and two pregnant women (3.1%) did not know for sure. Sixteen (24.6%) participants stated that they had been in contact with a COVID-19-positive person during their pregnancy. A total of 33 (50.8%) pregnant women were vaccinated against COVID-19, of which 27 received two doses and 6 received three doses of the vaccine.

### DASS-21 questionnaire

The results of the DASS-21 questionnaire according to domains are shown in **Table 2**.

Moderate anxiety was present in one fifth of pregnant women, while 5.8% had a more severe form of anxiety. Moderate stress and depression were present in less than 5% of pregnant women. No pregnant women were recorded in the category of “severe depression” and “severe stress.”

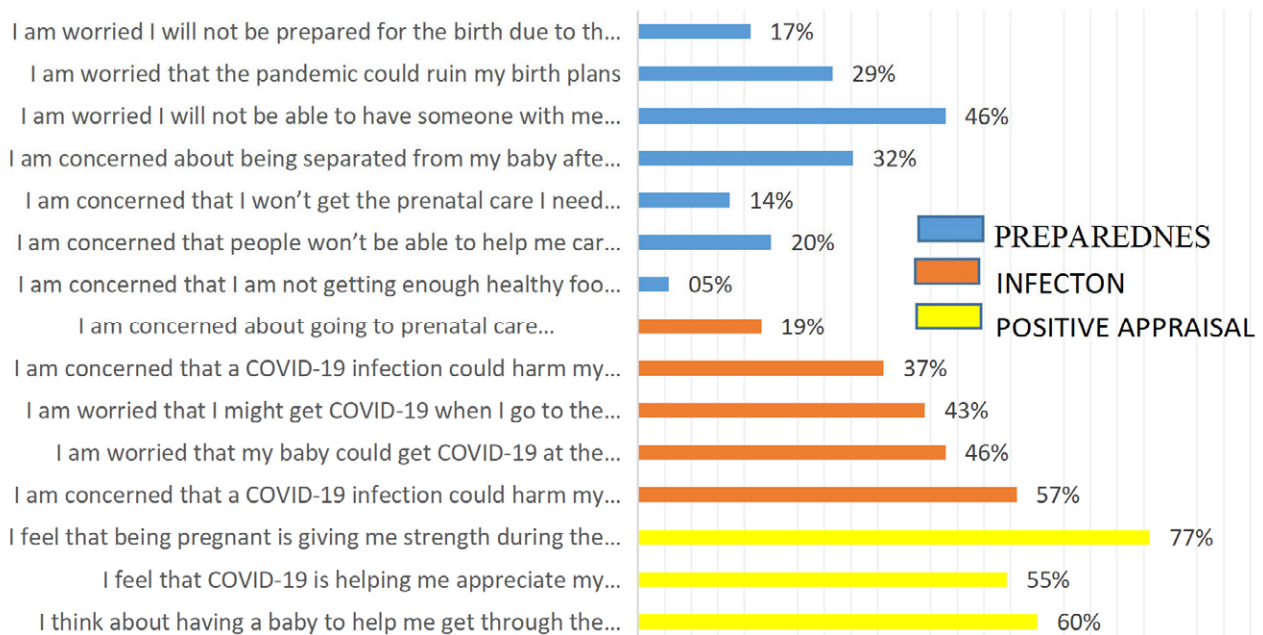
### PREPS questionnaire

Within the PREPS questionnaire, the average score for the domain “preparedness for childbirth” is  $2.4 \pm 0.9$ , for the domain “infection”  $2.9 \pm 1.0$ , and for the domain “positive evaluation of pregnancy”  $3.7 \pm 0.8$ . **Graph 1** shows the percentage of responses  $\geq 4$  on a Likert scale (“agree”, “strongly agree”). In the domain of “preparedness”, 46.2%

**Table 2.** Results of the DASS-21 questionnaire by domains

Domain		n (%)
Anxiety	normal	17 (24.6)
	mild	34 (49.3)
	moderate	14 (20.3)
	difficult	4 (5.8)
Stress	normal	64 (92.8)
	mild	3 (4.3)
	moderate	2 (2.9)
	difficult	0 (0)
Depression	normal	59 (86.8)
	mild	8 (11.8)
	moderate	1 (1.5)
	difficult	0 (0)

of women stated that they were afraid that, due to the pandemic, they would not be able to have their partner present during childbirth. One third of pregnant women said they were worried about being separated from their babies after giving birth due to the COVID-19 pandemic. One-fifth stated that they feared they would not be provided with adequate care after giving birth due to the COVID-19 pandemic. In the domain of “infection,” about half of the surveyed pregnant women stated that they feared COVID-19 could endanger the health of their babies (56.9%), that they were worried that their babies could get COVID-19 in the maternity hospital (46.2%), and that they themselves could get COVID-19 in the maternity hospital (43.1%). Every third participant was afraid that COVID-19 could endanger her pregnancy, and about one fifth of them were worried that they could get sick by going to regular gynecological-obstetrical examinations.



**Graph 1.** Percentage of responses  $\geq 4$  on the Likert scale (“agree”, “strongly agree”)

**Table 3.** Correlation of PREPS questionnaire domains and vaccination status/previous COVID-19 infection

	No previous infection and no vaccine		Previous infection or vaccination		p
	Arithmetic mean	SD	Arithmetic mean	SD	
<b>Infection</b>	2.91	0.90	2.94	1.05	0.919
<b>Preparedness for childbirth</b>	2.30	0.76	2.44	0.97	0.565
<b>Positive valuation</b>	3.95	0.69	3.65	0.90	0.194

The relationship between the PREPS questionnaire and vaccination status/previous COVID-19 infection was examined (Table 3). No statistical significance was observed.

The correlation of the domains of the PREPS questionnaire with the domains of the DASS-21 questionnaire was examined (Table 4). A positive, weak statistically significant correlation was registered between the domain of readiness for childbirth and the domains of depression and anxiety in the DASS-21 questionnaire. A positive, moderately statistically significant correlation was registered between the domain of preparedness for childbirth and the domain of stress in the DASS-21 questionnaire. A positive, weak statistically significant association was registered between the domains of infection and stress in the DASS-21 questionnaire. No statistically significant association of the domain of infections with the domain of depression and anxiety in the DASS-21 questionnaire was found. There was no statistically significant correlation between the positive valuation domain and the DASS-21 questionnaire.

**Table 4.** Correlation of PREPS questionnaire domains with DASS-21 questionnaire domains

		Depression	Stress	Anxiety
Preparedness for childbirth	r	0.284 <sup>*</sup>	0.337 <sup>**</sup>	0.276 <sup>*</sup>
	p	0.024	0.006	0.028
Infection	r	0.142	0.249 <sup>*</sup>	0.223
	p	0.266	0.046	0.079
Positive valuation	r	-0.068	0.157	-0.001
	p	0.598	0.211	0.993

## DISCUSSION

Like other studies (6, 7), this study’s participants were surveyed by filling out questionnaires during outpatient examinations at gynecological-obstetrical clinics. In a study conducted in the USA by Preis et al. (8), as well as in studies conducted in Germany and Poland, pregnant women completed an anonymous survey online (9, 10).

The average age of pregnant women examined in Serbia coincides with the age of pregnant women examined in previous studies – 30 to 32 years of age (6-10). In this study, 89.3% of the surveyed women were married or cohabiting, which is relatively lower compared to previous studies. In Italy 99.2% and in Spain 92,7% of pregnant women stated they were in a stable relationship. (6,7,9,10).

The largest number of participants in Serbia (90.8%) were employed, which is about 15% more than the results

obtained in other studies. Studies conducted in Spain and Poland showed that the number of employed participants was lower, around 75% (7,10).

The percentage of highly educated participants in Serbia was relatively high. The Polish study showed a similar level of education, while the Spanish study showed a 20% lower frequency of highly educated pregnant women (7, 10).

The frequency of primiparous women in our study was similar to studies from Italy, Spain, Germany and Poland. About half of the pregnant women were primiparous (7-10). The frequency of chronic diseases is similar to the results of a study conducted in Italy, less than a fifth of pregnant women had associated diseases (6). A 1.2-1.6% higher percentage of couples treated for infertility was observed in Serbia compared to similar studies in other countries (9,10). The frequency of emotional and psychiatric diseases among pregnant women was about 3%, as in the study conducted by Colli et al. (6). There is notable variation in PREPS questionnaire scores among currently existing studies. By comparing the average score of the “preparedness for childbirth” domain obtained by this study, a lower value is determined compared to all previous studies - in Spain (value 3.51), the USA (value 3-4), Poland (value 2.99±1.14) and Germany (2.93±0.94). By comparing the average score of the domain “infections” obtained by this study, a lower value is determined compared to most previous studies - in Poland (value 3.46±0.95), Spain (value 3.10) and the USA (value 3-4), while only in the German study (2.60±1.03) was this value lower. By comparing the average score of the domain “positive evaluation of pregnancy” obtained by this study, the highest value is determined in relation to all previous studies - in Poland (value 1.85±0.87), Germany (2.05±0.91), the USA (value 2-3) and Spain (value 3.10). One of the main reasons for such results could be the fact that all the compared studies (7-10) were conducted in 2020, i.e., the same year when the COVID-19 pandemic was declared and when there was not enough knowledge about SARS-CoV-2 as a new virus. Also, two years had passed since the beginning of the pandemic, and a large number of pregnant women had been hospitalized for COVID-19 or had been vaccinated.

Due to the fact that a significant number of pregnant women were afraid that COVID-19 could threaten the existing pregnancy, childbirth, and the health of the newborn, health institutions at all levels of healthcare should be empowered to design or improve programs to reduce the fear of pregnant women caused by the COVID-19 pandemic.

In the second part of this study, the DASS-21 questionnaire was used to examine depression, stress and anxiety. Compared to studies conducted in Canada, Iran, and Malaysia, anxiety among pregnant women in Serbia during the COVID-19 pandemic is 1.3-5.4 times higher, but depression is 2.5-2.8 times less common. The exception are the results obtained in Malaysia, which are three times lower than the results of this study. The frequency of stress among pregnant women is 4.5 times higher compared to the study in Iran and 1.2 times lower than the study in Malaysia. In this study, there was no recorded case of severe depression or severe anxiety, while in other studies, they are present with a frequency of 0.5% to 9.3% for severe depression, i.e. 9.3% for severe stress (2, 11, 12).

## CONCLUSION

Two years upon the start of the pandemic, pregnant women had already suffered from COVID-19 infection or had been vaccinated, so the scores obtained for the domains “preparation for childbirth” and “infection” were

expectedly lower, while the score for the domain “positive evaluation of pregnancy” was higher compared to studies that were carried out at the beginning of the pandemic. The obtained results strengthen future research on the association of depression, stress and anxiety with stress in pregnancy caused by the COVID-19 pandemic.

## CONFLICT OF INTEREST

None to declare.

## AUTHOR CONTRIBUTIONS

Conception and design: KK, JML, AK

Data collection: AK, KK

Statistical analysis: JML

Writing the article: KK, NB, JML

Critical revision of the article: JML, AK

Final approval of the article: KK, AK, NB, JML

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## STRES KOD TRUDNICA TOKOM COVID-19 PANDEMIJE

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### Sažetak

**Uvod:** Trudnoća je osetljiv period u životu žene kada psihološki distress može imati negativne posledice po majku i plod. Trudnice i porodilje su pod povećanim rizikom za oboljevanje težom kliničkom slikom od infekcije izazvane kovidom 19 u poređenju sa ženama koje nisu trudne.

**Cilj rada:** Ispitivanje stresa kod trudnica u Srbiji tokom pandemije kovida 19.

**Materijal i metode:** Anonimni upitnik dat je na popunjavanje trudnicama prilikom ambulantnog pregleda. Ispitivane su socijalno-demografske karakteristike, akušerski faktori, istorija oboljevanja od kovida 19, DASS-21 upitnik i PREPS upitnik.

**Rezultati:** U okviru PREPS upitnika, prosečna ocena za domen „pripremljenosti za porođaj“ je  $2,4 \pm 0,9$ , za domen „infekcija“  $2,9 \pm 1,0$ , a za domen „pozitivno vrednovanje trudnoće“  $3,7 \pm 0,8$ . Pozitivna, slaba statistički

**Ključne reči:** trudnoća, stres, COVID-19, DASS-21, PREPS

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značajna povezanost registrovana je između domena pripremljenost za porođaj sa domenima depresija i anksioznost na DASS-21 upitniku. Pozitivna, umerena statistički značajna povezanost registrovana je između domena pripremljenost za porođaj sa domenom stres na DASS-21 upitniku. Pozitivna, slaba statistički značajna povezanost je registrovana između domena infekcija i stres na DASS-21 upitniku.

**Zaključak:** Dve godine od početka pandemije trudnice su preležale infekciju izazvanu kovidom 19 ili su vakcinisane, pa su dobijeni skorovi domena „pripremljenosti za porođaj“ i „infekcija“ očekivano niži, dok je skor za domen „pozitivno vrednovanje trudnoće“ viši u poređenju sa studijama koje su sprvedene na početku pandemije. Dobijeni rezultati osnažuju buduća istraživanja o povezanosti depresije, stresa i anksioznosti sa stresom u trudnoći prouzrokovanim pandemijom kovida 19.