ORIGINAL RESEARCH ARTICLE

Psychological impact and social support in pregnant women during lockdown due to SARS-CoV2 pandemic: A cohort study

Maia Brik[1] 🆔 | Miguel Angel Sandonis[2] 🆔 | Sara Fernández[1] | Anna Suy[1] 🆔 | Gemma Parramon-Puig[2] 🆔 | Nerea Maiz[1] 🆔 | Maria Emilia Dip[2] | Josep Antoni Ramos-Quiroga[2]* 🆔 | Elena Carreras[1]* 🆔

[1]Obstetrics Department, Maternal Fetal Medicine Unit, Vall d'Hebron Hospital Universitari, Barcelona, Spain

[2]Psychiatry Department, Vall d'Hebron Hospital Universitari, Barcelona, Spain

Correspondence
Maia Brik, Obstetrics Department, Maternal Fetal Medicine Unit, Hospital de la Dona, Hospital Universitari Vall d'Hebron, Passeig de la Vall de Hebron 119, 08035 Barcelona, Spain.
Email: mbrik@vhebron.net

Abstract

Introduction: Anxiety and depression during pregnancy can lead to adverse maternal and neonatal outcomes. The SARS CoV-2 pandemic, and the complete lockdown required during the first wave in most countries are stressors for pregnant women and can lead to anxiety and depression during pregnancy. The aim of this study was to explore depression and anxiety symptoms, and social support in pregnant women during the SARS CoV-2 lockdown, as well as to explore demographic risk factors.

Material and methods: A prospective cohort study was performed at Hospital Universitari Vall d'Hebron, Barcelona, including pregnant women attending the antenatal clinic during the SARS-CoV2 lockdown period. Three questionnaires were administered to study depression (EPDS), anxiety (STAI) and Social Support (MOS-SSS). STAI state (STAIs) described the actual state of anxiety and the STAI trait (STAIt) described the trait of anxiety. A cut-off of 10 for EPDS and 40 for STAI was considered to be clinically relevant. The main outcome measures were depression and anxiety symptoms.

Results: A total of 217 women were invited to participate, and 204 accepted (94%). From these, 164 filled in the EPDS, 109 STAI and 159 MOS-SSS questionnaires: 37.8% (95% confidence interval [CI] 30.5%-45.7%) (62/164) of women showed an EPDS result ≥10, 59.6% (95% CI 49.8%-68.8%) (65/109) a STAI state (STAIs) ≥40, and 58.7% (95% CI 48.9%-67.9%) (64/109) a STAI trait (STAIt) ≥40. Regression analysis showed that mental health disorder, Latin American origin and lack of social support were independent risk factors for anxiety symptoms in the STAIs (*P* = .032, *P* = .040 and *P* = .029, respectively). Regarding depressive symptoms, maternal body mass index, mental health disorders and social support were independent factors (*P* = .013, *P* = .015 and *P* = .000, respectively).

Conclusions: A lockdown scenario during the first wave of the SARS-CoV 2 pandemic increased the symptoms of anxiety and depression among pregnant women, particularly affecting those with less social support.

Abbreviations: BMI, body mass index; CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale; IQR, interquartile range; MOS-SSS, Medical Outcomes Study Social Support Survey; STAI, State-Trait Anxiety Inventory; STAIs, STAI state of anxiety; STAIt, STAI trait of anxiety.

*Shared position.

1 | INTRODUCTION

The novel coronavirus SARS-CoV-2 was first detected in Wuhan (Hubei Province, China) in December 2019. From that moment, it began to spread first in China, and all over the world. Direct person-to person transmission is the primary means of transmission of SARS CoV-2. It is thought to occur through close-range contact, mainly via respiratory droplets, when an infected person coughs, sneezes or talks. On 11 March 2020, the World Health Organization declared COVID-19 a global pandemic. Confirmed cases and deaths grew rapidly, with more than 73 000 000 confirmed cases worldwide by 16 December 2020, and more than 1 600 000 deaths from it (Johns Hopkins University & Medicine, 2020). Spain has been one of the worst hit countries, with more than 48 000 deaths by 16 December 2020.

On 14 March 2020, the Spanish government declared a national state of alert and population lockdown was imposed as of 16 March, where all the population was confined at home for 98 days, excepting essential activities. This is the first experience of a global emergency due to a virus pandemic in our century, leading to great uncertainty and significant adverse consequences for mental health.[1,2] Quarantine is associated with psychological consequences such as symptoms of posttraumatic stress disorder and depression,[1] but there is no comparable situation to a national lockdown.

Pregnant women are a particularly vulnerable group during the pandemic. In this population, the initial lack of evidence about the possible effects of the virus on pregnancy, the fetus or potential teratogenic effects of antivirals were additional factors increasing the risk for mental health disorders beyond the lockdown itself.

The prevalence of anxiety disorder in the general population is 13.6%,[3] and increases to 15.2% during pregnancy.[4] Regarding major depression, the prevalence rate in the general population is 2.8% and 7.4%-12.8% during pregnancy.[5]

In previous epidemics such as severe acute respiratory syndrome (SARS) in 2003, pregnancy worsened the clinical course and the prognosis of the disease itself.[6] In the Zika outbreak in 2016, central nervous system malformations occurred as a result of vertical infection.[7]

Stressors during pregnancy, such as traumatic psychological events and low socioeconomic status, as well as the presence of depression and anxiety, are associated with poorer obstetric and infant outcomes, including increased risk of preterm birth,[8] delayed early cognitive development,[9] changes in brain structure and connectivity,[10] behavioral and motor differences during early childhood and psychological disorders into adulthood.[11]

Little research has focused on the psychological impact of pandemic during the lockdown suffered by pregnant women. The aim of the present study is to explore depression and anxiety symptoms of pregnant women during lockdown due to SARS CoV-2 pandemic, as well as to detect risk factors for the development of these symptoms that could lead to early healthcare interventions in the future. Secondary objectives were to compare depression and anxiety symptoms according to the lockdown period and the trimester of pregnancy.

Key message

The SARS-CoV-2 lockdown in Spain was associated with increased symptoms of depression and anxiety among pregnant women. Women with increased body mass index and lower social support showed a higher risk for depression and anxiety.

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2 | MATERIAL AND METHODS

A prospective cohort study was performed in Hospital Universitari Vall d'Hebron, Barcelona, Spain with a recruitment period from 27 March to 4 May 2020. As the cases of COVID-19 increased, strict measures for lockdown were imposed by the authorities from 15 March to 4 May 2020, with all non-essential workers being ordered to remain at home and outdoor activities banned. From 4 May to 21 June 2020 workers were allowed to go to work (where essential) and minimal outdoor activities were allowed, restricted to a few hours per day.

In all, 217 pregnant women attending at the Vall d´Hebron University Hospital for their antenatal visits were offered participation in the study. This hospital services a population of 1 200 000 inhabitants and is the reference for tertiary services. It delivers 2900 births per year with a medium to low socioeconomic background population compared with the province of Barcelona. Not being able to understand Spanish was an exclusion criterion.

2.1 | Questionnaires

The Edinburgh Postnatal Depression Scale (EPDS), State-Trait Anxiety Inventory (STAI) and the Medical Outcomes Study Social Support Survey (MOS-SSS) questionnaires were administered on paper, by email or by telephone. For paper questionnaires, our hospital's procedures and policies to prevent SARS-CoV2 infection spread were followed, including the use of hand sanitizer. These three rating scales measure the levels of depression, anxiety and social support, respectively.

The EPDS is a 10-item self-report scale designed as a specific instrument to detect postnatal depression. Each item is rated on

a 4-point scale ranging from 0 to 3, with higher scores indicating greater severity.[12] The best cut-off of the Spanish validation of the EPDS was 10/11 for combined major and minor depression, with a sensitivity of 79% and specificity of 95.5%, with a positive predictive value of 63.2% and a negative predictive value of 97.7%.[13,14]

The STAI is a 40-item self-report scale for state (STAIs) and trait (STAIt) anxiety. It is the most commonly used rating scale for anxiety and has been widely validated.[15] Each item is rated on a 4-point scale ranging from 0 to 3, with higher scores indicating greater severity. For the comparison with international studies, the 4-point scale ranging from 0 to 3 was transformed to 1-4. It has also been validated for use in pregnant women.[16,17] Each sub-test has a range of scores from 20 to 80, the higher score showing greater anxiety. A cut-off point of 39-40 has been identified to detect clinically anxiety.

The MOS-SSS is a 20-item self-administered questionnaire developed by the Rand and Medical Outcomes Study teams to measure social support. The scale measures positive social interaction, as well as tangible, affectionate and emotional/informational support. It has demonstrated good reliability and validity.[18] The Spanish version of MOS-SSS has also been validated, showing satisfactory psychometric properties.[19]

During the data collection, women filled out one or more of the questionnaires. All patients who completed at least one of the three questionnaires were included in the analysis.

Demographic variables collected from the electronic medical records included: maternal age, gestational age, medical conditions, presence of mental health disorders, parity, use of assisted reproductive techniques, ethnicity, body mass index (BMI), use of medication during pregnancy and smoking status. Mental health disorder was defined as a clinical diagnosis made after a clinical interview by a psychiatrist.

Due to the lack of previous data on the proportion of depression or anxiety during the COVID19 pandemic, no formal sample size could be set. We aimed to collect the maximum number of surveys during a period of maximum confinement, taking into account that the exceptional measures would reduce the number of pregnant women attending the hospital.

Study data were collected and managed using REDCap™ electronic data capture tools hosted at [VHIR].[20] Data were entered into the database by three researchers (M.S., S.F. and M.B.) or directly by the women themselves filling out the questionnaires online.

The primary outcomes were depression and anxiety measured by the EPDS and STAI questionnaires, respectively.

Lockdown period was divided into two groups: Lockdown group 1 (27 March-14 April 2020) and Lockdown group 2 (15 April-4 May 2020). In the first lockdown period, 88 and 91 patients answered the STAI and the EPDS questionnaires, respectively, and in the second period, 72 and 74, respectively. The exposure factors were the Lockdown group 1 and 2 periods, trimester of pregnancy age, maternal age, BMI, weight, high-risk pregnancy, mental health disorder, parity, assisted reproduction techniques, ethnic origin, smoking status and social support measured by MOS-SSS questionnaires.

2.2 | Statistical analyses

Continuous variables were expressed as median and interquartile range (IQR) or mean and standard deviation. Categorical variables were expressed as frequency and percentage. Mann-Whitney test was used to compare the levels of anxiety and depression between the two lockdown periods, and Kruskal-Wallis test to compare the anxiety and depression levels among the three trimesters of pregnancy.

A univariate linear regression analysis was used to identify risk factors for depression and anxiety symptoms.

SPSS software, IBM SPSS Statistics for Windows, version 23 (IBM Corp.), and R were used for statistical purposes. All reported probability values were two-tailed, and the criterion for significance was set as $P = .05$.

2.3 | Ethical approval

This study was approved by the Institutional Review Board of Vall d'Hebron Research Institute PR(AMI)186/2020 on 27 March 2020. Informed consent was obtained from all participants.

3 | RESULTS

3.1 | Demographics, anxiety, depression and social questionnaire results

A total of 217 pregnant women attending our hospital during the lockdown period were offered participation in the study; 204 of them accepted (94%) and were included in the study. The sociodemographic and clinical characteristics are summarized in Table 1. From those, 164 (80.4%) filled out the EPDS questionnaire, 109 (53.4%) the STAI questionnaire and 159 (77.9%) the MOS-SSS questionnaire.

Regarding the EPDS questionnaire, 62 of 164 women (37.8%; 95% confidence interval [CI] 30.5%-45.7%) had a result ≥10. Sixty-five of 109 women (59.6%; 95% CI 49.8%-68.8%) showed a STAIs result ≥40; and 64 of 109 (58.7%; 95% CI 48.9%-67.9%) a STAIt result ≥40. Table 2.

3.2 | Depression and anxiety symptoms according to the trimester of pregnancy

When analyzing the impact on EPDS results depending on the trimester of inclusion in the study, with higher results were found in patients enrolled in the first and second trimester than in the third trimester. The median and interquartile range for the EPDS result was 9.0 (IQR 6.0-12.5) in the first trimester, 9.0 (IQR 5.0-11.0) in the second trimester, and 6.0 (IQR 2.0-10.0) in the third trimester ($P = .031$) (Figure 1).

TABLE 1 Demographics of pregnant women (n = 204)

	Total (n = 204)
Maternal age (y), mean ± SD	32.3 ± 0.8
BMI pre-pregnancy (kg/m^2), mean ± SD	25.3 ± 5.2
Weight pre-pregnancy (kg), mean ± SD	68.1 ± 19.2
Low-risk pregnancy[a]	132 (65% [58-71])
Mental health disorder[a]	18 (9% [5-14])
Previous depression[a]	9 (4% [2-8])
Reproduction assisted technique	15 (7% [4-12])
Ethnicity	
Caucasian	138 (68% [61-74])
Latin American origin	51 (25% [19-32])
Others	15 (7% [(4-12])
Smokers[a]	13 (6% [4-11])
Trimester of inclusion	
First trimester	56 (27% [22-34])
Second trimester	81 (40% [33-47])
Third trimester	67 (33% [26-40])

[a]Number of women (% [95% CI]).

TABLE 2 EPDS, STAI and MOS-SSS questionnaire results

| EPDS ≥10[a]	62/164 (38% [30-46])
EPDS Questionnaire, mean ± SD (range)	7.87 ± 4.9 (0-23)
STAI state, mean ± SD (range)	41.7 ± 10.6 (20-73)
STAI trait, mean ± SD (range)	40.7 ± 8.6 (22-66)
MOS-SSS questionnaire, mean ± SD (range)	
Emotional/informational support	36 ± 5.9 (12-40)
Tangible support	17.7 ± 3.1 (7-20)
Affectionate support	14.2 ± 1.73 (5-15)
Positive social interaction	18.1 ± 2.91 (4-20)
MOS-SSS questionnaire total	86.22 ± 12.58 (33-95)

Abbreviations: EPDS, Edinburgh Postnatal Depression Scale; STAI, State-Trait Anxiety Inventory; MOS-SSS, Medical Outcomes Study Social Support Survey.
[a]Number/total (% [95% CI]).

When analyzing STAIs and STAIt according to the trimester of the pregnancy, no statistically significant differences were found. Median and IQR were respectively 41 (IQR 34-46) and 50 (IQR 35-44) in the first trimester, 44 (IQR 35-50) and 43 (IQR 36-48) in the second trimester, 40 (IQR 32-45) and 39 (IQR 33-44) and in the third trimester (P = .253 and P = .234, respectively) (Figures 2 and 3).

3.3 | Depression and anxiety symptoms according to the lockdown period

No differences were found in EPDS, STAIs or STAIt according to lockdown period. The median EPDS score was 7.0 (IQR 4.0-10.0)
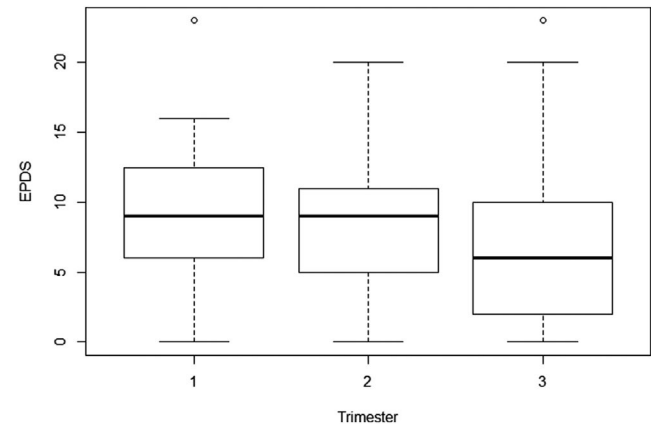
FIGURE 1 Edinburgh Postnatal Depression Scale (EPDS) by trimester

during the first lockdown period and 9.0 (5.0-12.0) during the second lockdown period (P = .097) (Figure 4). The median STAIs in the first and second lockdown periods were 41 (IQR, 35-46) and 42 (IQR, 34-49), respectively (P = .518). The median STAIt in the first and second lockdown periods were 39 (IQR, 33-44) and 43 (IQR, 36-46), respectively (P = .072) (Figures 5 and 6).

## 3.4 | Regression analysis for depression symptoms

A univariate linear regression analysis was performed to detect demographic variables as risk factors for depression symptoms in the EPDS questionnaire. Increased BMI, presence of mental health disorders and lower social support (MOS-SSS) (P = .013, P = .015 and P = .000, respectively) were identified as independent predictive risk factors (Table 3). There was a positive correlation between maternal BMI and EPDS result (R^2 = .038).

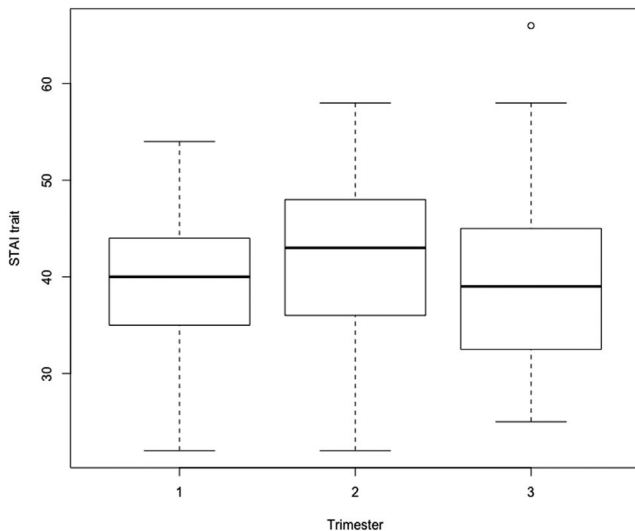## 3.5 | Regression analysis for anxiety symptoms

A univariate linear regression analysis was performed to detect demographic variables as risk factors for anxiety symptoms in the STAIs and STAIt questionnaires. Presence of mental health disorders, Latin American origin and lower social support (MOS-SSS) were predictive factors for a higher STAIs result (P = .032, P = .040 and P = .029, respectively) (Table 4).

4 | DISCUSSION

The present study suggests that a stressful situation such as an infectious pandemic, can lead to an increase in anxiety and depression symptoms among pregnant women.[3,5] The presence of mental health disorders was also predictive for both anxiety and depression symptoms, with maternal BMI being a risk factor for depression symptoms. In addition, a low level of social support had a clear impact on increased levels of anxiety and depression.
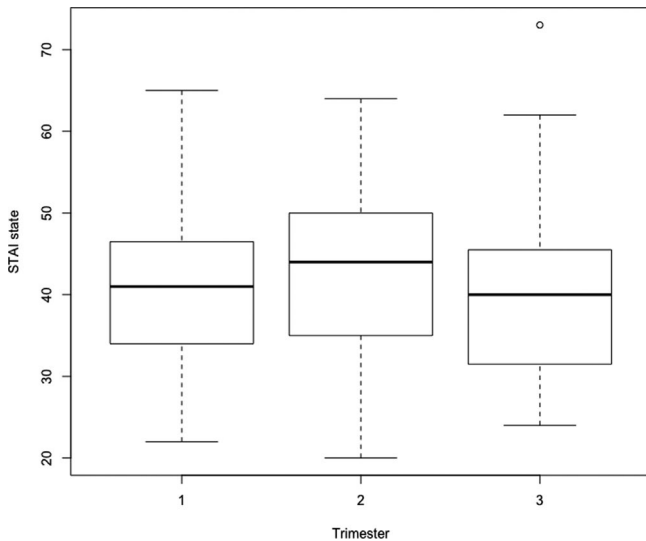
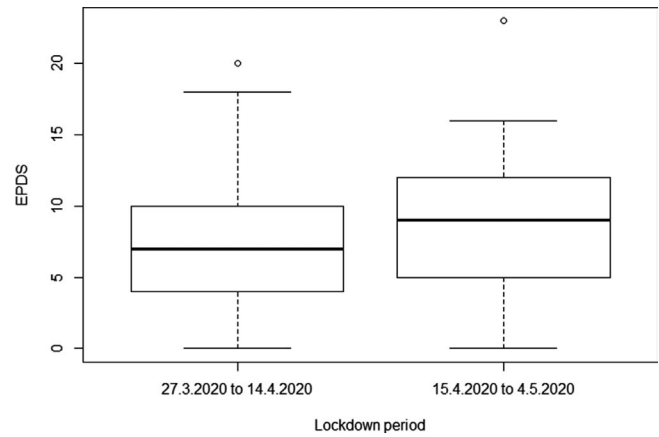FIGURE 2 State-Trait Anxiety Inventory (STAI) state by trimester

FIGURE 3 State-Trait Anxiety Inventory (STAI) trait by trimester

FIGURE 4 Edinburgh Postnatal Depression Scale (EPDS) by lockdown period

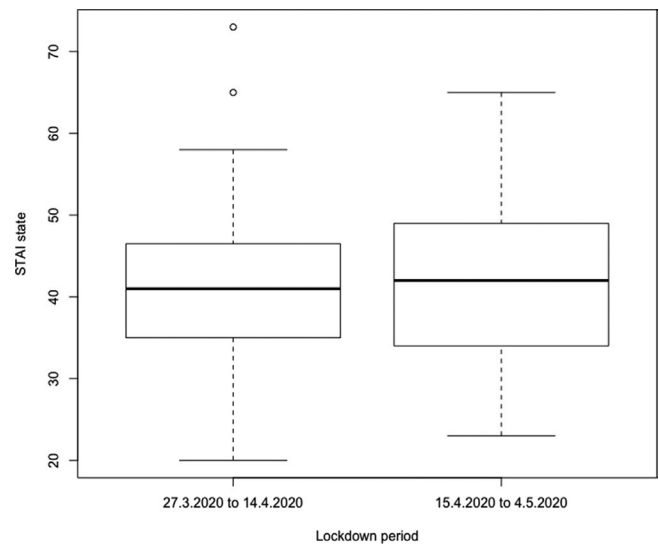FIGURE 5 State-Trait Anxiety Inventory (STAI) state by lockdown period

This research is a unique opportunity to explore the emotional impact of lockdown during pregnancy, and the influence of social support. The main goal of our study was to identify how anxiety and depression can be affected by the lockdown in this particular population.

Social support was included as a potential risk factor for depression and anxiety in this scenario, and was shown to be a determinant factor.

An important limitation of the study was challenges as to participant selection, since only pregnant women attending the hospital were included; this occurred in a period where we observed that many pregnant women failed to come to the hospital, either because of fear of contracting COVID19 or because their visits were conducted using telemedicine tools. For women completing the questionnaires, most did it in writing while attending clinics (88.9%), but 6.7% and 4% did it by email or phone, which could have an impact on the time spent filling out the questionnaires. However, in our study, the fact that all women attending the hospital during the study period who were fluent in Spanish were offered participation, was a strength of the study.

The present study shows that in a stressful situation associated with an infectious pandemic, there is an increase in anxiety and depression symptoms. This phenomenon has already been studied in other pandemics such as the SARS pandemic in 2003[21] and Zika Virus in 2015-2016.[22] However, to our knowledge, no studies on mental health status of pregnant women during lockdown were conducted.

During the 2020 SARS CoV-2 pandemic, the prevalence of symptoms of depression and anxiety in the general population in Spain was 18.7% and 21.6%, respectively.[23]

The depression symptoms results suggest an important increase of depressive symptomatology compared with previous data in pregnant women (EPDS > 10 between 10% and 5%),[14] which could contribute to higher rates of postpartum depression. However, this
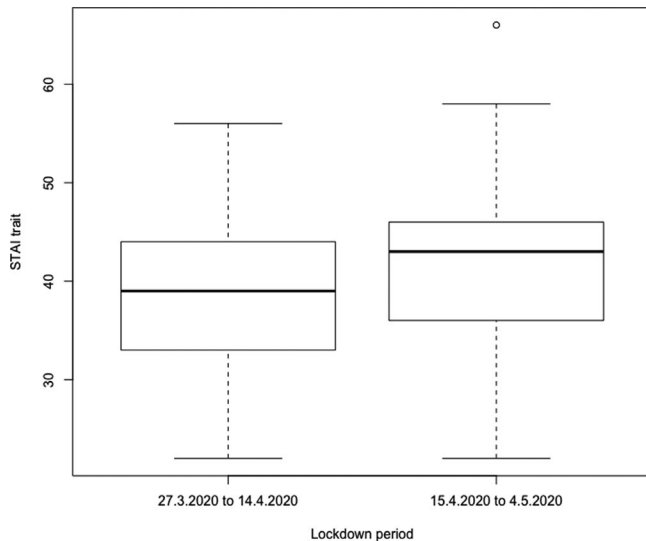
FIGURE 6 State-Trait Anxiety Inventory (STAI) trait by lockdown period

TABLE 3 Univariate linear regression analysis for depressive symptoms (EPDS) and maternal demographics, between 27 March and 4 May 2020 (n = 164)

Maternal demographics	b	95% CI	P
Maternal age	0.045	−0.06 to 0.157	.425
BMI	0.184	0.036 to 0.332	.015
Weight	0.014	−0.027 to 0.055	.488
High-risk pregnancy	−0.788	−0.2382 to 0.806	.331
Mental health disorder	−0.3189	−5.707 to −0.672	.013
Psychiatric drugs	−2.425	−6.462 to 1.613	.237
Parity	0.359	−1.168 to 1.886	.643
Assisted reproductive technique	0.611	−2.969 to 4.191	.736
Caucasian	−1.579	−5.953 to 2.795	.477
Latin American	−0.795	−5.342 to 3.752	.730
Tobacco	−0.940	−4.140 to 2.260	.563
MOS-SSS	−0.149	−0.211 to −0.087	.000

Abbreviations: BMI, body mass index; CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale; MOS-SSS, Medical Outcomes Study Social Support Survey.

is not yet been established for the current SARS CoV2 pandemic, and warrants further research.

The prevalence of anxiety in the general population is about 13.6%.[3] The prevalence of clinical anxiety during pregnancy in non-pandemic conditions is about 15.2%.[4,17,24] In contrast, our study showed that the prevalence of pregnant women with anxiety symptoms was 59% during COVID19 pandemic lockdown. Table 5 shows the prevalence rates of depression and anxiety in general and pregnant population in non-pandemic and during SARS CoV2 pandemic, in comparison with our study results.

Situations that increase stress, such as a global pandemic situation, are additional factors that may predispose to anxiety, and this explains the higher results in the STAI questionnaire results in our study population.[21]

Regarding the influence of the lockdown occurring early or late during pregnancy, a prevalence of clinical anxiety of 18%, 15.2% and 15.4% during the first, second and third trimesters, respectively, has been reported during non-complicated pregnancies.[24] In our study, no differences were found according to the trimester of pregnancy in the STAIs or STAIt results. However, differences were found in the EPDS results during the lockdown. The prevalence of depression during pregnancy has been reported to be 7.4%, 12.8% and 12.0% for the first, second and third trimesters, respectively.[5] Our study also found that the prevalence of symptoms of depression was higher for women during the first and second trimesters than during the third trimester, probably related to higher risks of fetal loss during the beginning of the pregnancy.

The period of lockdown appeared to have no impact based on the EPDS and STAI questionnaires. During the lockdown, the first period was associated with greater uncertainty about the pandemic and less available data; accordingly, anxiety in the general population during this period was higher. However, our study could not identify such an effect on anxiety or depression symptoms in pregnant women, which could be related to the reduced sample size in our study.

Moreover, our study found that women with previous mental health disorders showed better scores in both depression and anxiety symptoms. The explanation for these results could be that those patients who had a previous history mental health disorders could develop increased resilience and thus, its presence may act as a protective factor.[25] In addition, the fact that one-third of women with mental health disorders were receiving pharmacological treatment could also explain this result.

High BMI has been identified as an independent factor for depression. Women with obesity are especially vulnerable to antenatal depression.[26] This is in line with findings in the general population that show a positive association between obesity and depression, particularly among women.[27] However, in a recent SARS-CoV2 pandemic research on pregnancy, women underweight before pregnancy were at increased risk for developing depressive and anxiety symptoms during the pandemic,[28] but not those with overweight.

Finally, our study demonstrated the impact of the lack of social support on the development of anxiety and depression symptoms during pregnancy. We therefore hypothesize that the implementation of programs that offer additional social support during pregnancy, may be helpful in reducing anxiety and depression symptoms, as well as the likelihood of cesarean birth and antenatal hospital admission.[29] Also, social support during pregnancy may itself provide a buffering mechanism between stress and preterm birth.[30] In our

TABLE 4 Univariate linear regression analysis for anxiety symptoms (STAIs/STAIt) and maternal demographics between 27 March and 4 May 2020 (n = 109)

	STAIs			STAIt		
Maternal demographics	b	95% CI	P	b	95% CI	P
Maternal age	0.198	−0.047 to 0.444	.113	0.069	−0.167 to 0.304	.565
BMI	0.210	−0.137 to 0.157	.234	0.165	−0.146 to 0.476	.296
Weight	0.042	−0.059 to 0.143	.411	−0.007	−0.108 to 0.094	.894
High-risk pregnancy	−1.757	−5.261 to 1.748	.324	1.517	−1.899 to 4.933	.381
Mental health disorder	−5.997	−11.481 to −0.512	.032	−7.022	−12.334 to −1.710	.010
Psychiatric drugs	0.791	−8.911 to 10.493	.872	−3.419	−11.237 to 4.398	.388
Parity	0.551	−2.878 to 3.980	.751	0.766	−2.552 to 4.085	.648
Assisted reproductive technique	2.816	−5.527 to 11.160	.506	5.751	−2.147 to 13.649	.152
Caucasian	−7.288	−16.943 to 2.367	.138	−3.000	−11.954 to 5.954	.508
Latin American	−10.578	−20.647 to −0.510	.040	−2.094	−11.337 to 7.150	.654
Asian	−9.20	−32.348 to 13.948	.434	–	–	–
Afro-American	−16.20	−39.348 to 6.948	.169	−1.500	−20.987 to 17.987	.879
Other ethnic origin	−13.20	−30.880 to 4.480	.142	−4.500	−19.595 to 10.595	.556
Tobacco	−5.769	−12.649 to 1.111	.100	−3.119	−9.826 to 3.588	.359
MOS-SSS	−0.180	−0.348 to −0.013	.035	−0.249	−0.394 to −0.105	.001

Abbreviations: STAI, State-Trait Anxiety Inventory; STAIs, STAI state of anxiety; STAIt, STAI trait of anxiety; MOS-SSS, Medical Outcomes Study Social Support Survey.

TABLE 5 Prevalence rate of depression and anxiety in general and pregnant population, and in general and pregnant population during SARS-CoV2 pandemic

	General population	Pregnant population	General population SARS-CoV2 pandemic	Pregnant population SARS-CoV2 pandemic during lockdown
Depression	12.8%[3]	7.4%-12.8%[5]	18.7%[23]	38% (EPDS >10)
Anxiety	13.6%[3]	15.2%[24]	21.6%[23,32]	59% (STAIs >40 STAIt >40)

Abbreviations: EPDS, Edinburgh Postnatal Depression Scale; STAI, State-Trait Anxiety Inventory; STAIs, STAI state of anxiety; STAIt, STAI trait of anxiety.

study, lower social support was a risk factor for both anxiety and depression symptoms and this is precisely the population that should be the target of new interventional strategies to prevent the emotional impact in a new possible viral pandemic.

5 | CONCLUSION

A lockdown scenario during a pandemic situation increases symptoms of anxiety and depression among pregnant women. Also, pregnant women with low social support are at increased of developing anxiety and depression symptoms.

These results highlight the need to improve mental healthcare during pregnancy, especially in exceptional circumstances such as the global pandemic situation or lockdown, as these can cause added stress and increased anxiety and depression symptoms, resulting in undesirable consequences for pregnancy and the future newborn.

CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

ORCID

Maia Brik https://orcid.org/0000-0002-1840-5087
Miguel Angel Sandonis https://orcid.org/0000-0002-2001-2717
Anna Suy https://orcid.org/0000-0003-2987-6105
Gemma Parramon-Puig https://orcid.org/0000-0002-6861-7678
Nerea Maiz https://orcid.org/0000-0001-8261-6383
Josep Antoni Ramos-Quiroga https://orcid.org/0000-0003-1622-0350
Elena Carreras https://orcid.org/0000-0003-3471-7248

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