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Factors associated with prenatal stress and anxiety in pregnant women during COVID-19 in Spain[☆]

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Abstract
Aim of the study: To describe prenatal stress and state anxiety levels in pregnant women living in Spain during the lockdown of the first wave of COVID-19 and its relation with obstetric factors, perception of health care, and concerns about the socio-sanitary situation.

Methods: The present study is an observational, correlational, and cross-sectional quantitative study. The participants in the study were pregnant women recruited through non-probabilistic convenience and snowball sampling during the lockdown. A web link was provided to an online questionnaire designed for this research, which collected socio-demographic and obstetric variables, perceptions of health care received during the pandemic and preoccupations associated with COVID-19. It also included the Prenatal Stress Questionnaire (PDQ) and the State Anxiety Inventory (STAI-S).

Results: Based on the responses of 695 pregnant women, the results showed a mean of 16.98 (SD = 25.20) of prenatal stress and elevated levels of anxiety (M = 25.20/SD = 11.07) in the first wave of the pandemic. Risk factors for prenatal stress and anxiety were the level of preoccupation associated with COVID-19 and previous mental health issues. A specific risk factor for anxiety was having more than one child and a protective factor were perceiving accessibility and availability of health care, with clear and consistent pregnancy care and follow-up protocols.

Conclusions: The lockdown period for COVID-19 was a stressful experience for pregnant women, highlighting the need to address their psychological well-being through clear and coherent protocols in terms of maternal-foetal health control and follow-up.

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Factores asociados al estrés prenatal y la ansiedad en gestantes durante el COVID-19 en España

Resumen

Objetivo: Describir los niveles de estrés prenatal y ansiedad estado en mujeres gestantes residentes en España durante el confinamiento generado por la primera ola de COVID-19, y su asociación con los factores obstétricos, percepción de la atención sanitaria y preocupación provocada por la situación sociosanitaria.

Método: Estudio cuantitativo, observacional, correlacional y de corte transversal. La población de estudio fueron mujeres gestantes confinadas, reclutadas a través de muestreo no probabilístico por conveniencia y de bola de nieve. Se difundió un enlace web de acceso a un cuestionario online diseñado para la investigación, que recogía variables sociodemográficas, obstétricas, sobre la percepción de la atención sanitaria recibida durante la pandemia y preocupaciones asociadas al COVID-19. Se incluyó también el Cuestionario de Preocupaciones Prenatales (PDQ) y el Inventario de Ansiedad Estado (STAI-S).

Resultados: Basados en las respuestas de 695 mujeres gestantes, los resultados indican que durante la primera ola de la pandemia se observó un nivel medio de estrés prenatal de 16,98 (DS = 25,20) y un nivel elevado de ansiedad (M = 25,20/DS = 11,07). Factores de riesgo determinante del estrés prenatal y ansiedad fueron el nivel de preocupación asociada al COVID-19 y tener antecedentes de salud mental. Un factor de riesgo específico para la ansiedad fue tener más de un hijo/a y un factor protector fue percibir accesibilidad y disponibilidad de la atención sanitaria.

Conclusiones: El periodo de confinamiento por COVID-19 significó un estrés adicional para las mujeres gestantes, poniendo en evidencia la necesidad de atender el bienestar psicológico de dicha población a través de protocolos claros y coherentes en cuanto a control y seguimiento de la salud materno-fetal.

What is known?

Pregnancy is a period entailing major changes in a woman's life. Extreme living situations, such as the experience of a pandemic, lead to greater vulnerability to developing stress and anxiety during this life stage.

What does this paper contribute?

It analyses the factors affecting the mental health of pregnant women during the pandemic. It highlights the effect of concerns generated by the socio-health situation, obstetric factors in the development of stress and anxiety and the protective effect of the perception of healthcare accessibility and availability, with protocols of action and clear, consistent follow-up.

Introduction

The healthcare and social crisis caused by the COVID-19 coronavirus disease reported for the first time in December 2019 in the city of Wuhan, China, has affected the population worldwide. Due to the rapid propagation of the virus, on 14th March 2020 the Spanish Government declared a ''state of emergency'' throughout Spain, limiting peoples' freedom of movement, save in exceptional circumstances.[1] This involved mandatory lockdown as a measure of contagion prevention and control,[1] which had an impact on the population's mental health.[2] This became obvious from the beginning of the coronavirus COVID-19 coronavirus pandemic, with anxiety increasing in the general population[3] and the exacerbation of other mental problems in the pregnant population.[4]

At the start of the pandemic, it was observed that pregnant women who attended prenatal check-ups expressed concerns associated with the lack of information and the limitation of resources for control of the virus in the different health services. They also expressed fear at attending prenatal follow-up check-ups or that they would be cancelled; uncertainty regarding the possible non-compliance of their birth plan; doubts about the possibility of being accompanied by their partner and other family members, and the possible early termination of pregnancy and/or the need for elective caesareans and overly rigorous hygiene measures.[5] The pandemic represented the appearance of additional reasons for uncertainty, contributing to emotional distress during this period.[6,7] These concerns are common in first-time mothers with high risk, unplanned pregnancies.[8,9]

Pregnancy requires adaptation in all areas of life, and this leads to doubts and uncertainty, which may be highly

stressful for the woman.[10] Specific stress is spoken about referring to the prenatal stage, which is associated with the woman's concerns relating to physical symptoms, health of the foetus, the birth, interpersonal relationships, and development during pregnancy.[11] It has been estimated that over 25% of women suffer from prenatal stress.[12] When levels are high and persistent, they may trigger anxiety disorder.[13] Spielberger et al.,[14] define the state of anxiety as an ''immediate, transitory emotional state over time, which involves physiological and cognitive changes characterized by tension, apprehension and nervousness''. During pregnancy, anxiety is a common mental health problem, being observed in 15.2% of the pregnant population.[15] Several studies concluded that women facing stressful events, among which may be included previous pregnancy losses, reproductive problems, fertility treatments, high risk pregnancies, unplanned or unwanted pregnancies, perinatal deaths, a history of psychiatric issues or a previous history of psychopathology, are more likely to experience anxiety during pregnancy.[16] It has become obvious that anxiety is a risk factor for the development of pregnancy, and is associated with a higher risk of pregnancy loss, lower intrauterine growth, premature birth, foetal disturbances in the hypothalamic-pituitary-adrenal axis, low birth weight, and also affective disorders in women, which can have long-lasting effects on offspring.[17,18]

COVID-19 disease has been associated with various maternal and perinatal risks, posing a major challenge for obstetric and gynaecological practice.[19] However, there is still little consideration of the risks of the socio-health situation caused by COVID-19 on women's mental health and its consequences on foetal development. It is essential to focus attention on the pregnant population, especially during the periods of lockdown associated with the pandemic crisis, as pregnancy could be considered a state of greater psychological vulnerability and therefore requires special care in the field of gynaecological-obstetric health.

As a result, the aim of this study was to describe the levels of prenatal stress and state anxiety in pregnant women living in Spain during the lockdown resulting from the first wave of COVID-19, with the focus on specific variables, including the concerns associated with COVID-19, the perception on the accessibility and availability of healthcare, and obstetric factors. This study intended to discover what the risk and protective factors were, from the point of view of healthcare, which contributed to regulating the mental health of the pregnant woman during times of major uncertainty and concern.

Method

Design

An observational, correlational, cross-sectional quantitative study on the factors associated with prenatal stress and anxiety in women living in Spain during the COVID-19 pandemic.

Study population and scope

The study population were pregnant women in lockdown during the first wave of the COVID-19 pandemic. To reach the sample, a non-probabilistic convenience and snow-ball sampling was used. To calculate the same size for a multiple lineal regression with the necessary quantity of predictors for the study, the G*Power programme version 3.1.9.7[20] was used, specifying a small effect size, an alpha of .05 and a power of .9. The N̈ r̈equired for the study was 531 subjects.

Inclusion and exclusion criteria

Inclusion criteria for the analyses in this study were: having completed the questionnaire during lockdown, being over 18 years of age and having been confined to the home for 10 days or more. Exclusion criteria were: not having completed all the questionnaires and being or having been hospitalised for obstetric complications at the time of answering the questionnaires.

Variables

Sociodemographic variables (age, nationality, educational level, civil status), obstetric variables (trimester of gestation, planned pregnancy, fertility treatment pregnancy, previous pregnancy loss, risk pregnancy, number of children), health history (chronic disease) and mental health issue history (previous diagnoses of depression, anxiety or other affective disorders) were collected. Information was also collected on the perceived accessibility and availability of health care during the pandemic, concerns associated with COVID-19. Levels of prenatal stress and state anxiety were measured.

Measurement tools

Following a bibliographic review on the background of the new coronavirus and mental health in previous pandemics, an ad hoc questionnaire was designed which included the proposed variables and this was applied in this study for the first time. The questions associated with sociodemographic, obstetric and health history variables were assessed with single choice questions, dichotomous ÿesänd n̈oq̈uestions and self-completion questions.

For the variable of perception on the accessibility and availability of health care, a Likert-type scale was constructed from 0 (S̈trongly disagree) to 4 (S̈trongly agree), with 3 questions: 1) D̈o you think that access to basic needs (food, water, medical care) is guaranteed? 2) D̈o you think that the protocols of action are clear and coherent in terms of avoiding risks of contagion?; 3) Ẅas the information you received from your midwife/gynaecologist/health professional regarding the monitoring and care of the birth clear and satisfactory?: The overall scores obtained by the participants were used, adding the scores of each item, where the higher the score, the better the perception of the accessibility and availability of health care.

For the variable of concerns associated with COVID-19, a Likert-type scale was constructed from 0 (N̈ot at all) to 4 (Ëxtremely), with 9 questions with the same introduction: "How concerned are you about the impact of the COVID-19 pandemic": 1) "...on a social level?"; 2) "...on your job?"; 3) "...on your economic situation? "; 4) "...on the health of your

friends and acquaintances?"; 5) "...on the health of your relatives (parents, grandparents, siblings, aunts and uncles)?"; 6) "...on the health of your partner?"; 7) "...on your own health?"; 8) "...on the health of your baby?"; 9) "Lately, I am more afraid than usual to go for prenatal check-ups". The overall scores obtained by the participants were used, adding up the scores for each item where the higher the score, the greater the concern.

The Prenatal Distress Questionnaire (P DQ),[21] adapted and validated in a Spanish population by Caparros-González et al. al.[22] was used to assess prenatal stress. It is a scale used to provide information on specific concerns and stress during pregnancy, related to physical symptoms, relationships, parenting, medical problems, preparation for labour, delivery and infant health. It consists of 12 items that are structured into 3 factors assessing concerns related to birth, relationships and physical condition. The scale does not establish a specific cut-off point, so in this case the overall scores obtained by the participants were used, adding the scores of each item, where the higher the score, the greater the prenatal stress. In its original format it had a Cronbach's alpha of .80 and .81. The overall scale reliability of the questionnaire for this study had a Cronbach's alpha of .74.

The State-Trait Anxiety Inventory (STAI),[14] adapted and validated in Spanish by Buela-Casal et al.,[23] was used to assess anxiety. It is an inventory that assesses the state of anxiety characterised by consciously perceived subjective feelings that are linked to a precise and identifiable event. The inventory has 20 items for state anxiety (transient) and 20 items for trait anxiety (anxious propensity, relatively stable). Each item is scored on a 4-point scale ranging from 0 to 3, with higher scores indicating greater severity. Each subscale has a range of scores from 20 to 80, with higher scores indicating greater anxiety. In this study only state anxiety was assessed. The cut-off point used was 33/34, equivalent to the 85th percentile, in accordance with the scales established for the Spanish population.[23] The reliability of the state anxiety scale showed a Cronbach's alpha of 0.94 for this study.

Data collection

A flyer-type invitation was sent to institutions and professionals in the perinatal area and to pregnant women through social networks (Instagram®, Facebook®, Linkedin® and Whatsapp®), which included a web link to the online survey. The online survey system LimeSurvey® was used for its implementation. This is an open survey, in which any woman of legal age, fluent in Spanish and pregnant, regardless of gestational age or place of residence, was invited to participate voluntarily. Participants who responded between 27 April and 3 May 2020, the mandatory quarantine period in Spain, were included. No initial contact was made 2 with potential participants.

The first section of the questionnaire included the objectives of the study, information about the study promoters, the supporting institution and the duration of the survey. At the end of this section, informed consent and information on transparency and data protection were provided. The participant's consent was requested by ticking a checkbox, which

was taken as the signature required to give consent to participate and allow the use of data. A cookie was set to avoid repeated participation or changes in responses. At the end of the questionnaire participants were invited to share the questionnaire with other pregnant women.

Data analysis

Descriptive statistics such as frequencies and percentages for categorical variables and mean, standard deviation, maximum, minimum, coefficient of skewness and coefficient of variation for numerical variables were used. To test the hypotheses of the study, multiple linear regressions were used, reporting the adjusted R^2 coefficient of determination, the regression coefficients with their respective hypothesis tests and the Durbin-Watson statistic to evaluate autocorrelation.

Two regression models were performed. In the first one the dependent variable was "prenatal stress" and in the second one the dependent variable was "state anxiety". In both models the possible associated factors incorporated as independent variables were: planned pregnancy, assisted reproduction gestation, number of children, previous pregnancy loss, risky gestation, presence of chronic illness, history of mental health, perception of accessibility and availability of health care and concern associated with COVID-19. The method used for selection of the final predictors was stepwise. The criterion for the rejection of the null hypothesis for the regression coefficients was used as an alpha of .05.

For both models the possible effects of confusion in the sociodemographic variables were assessed. The bivariate relationship was observed between the sociodemographic variables and the study-dependent variables, being incorporated into the regression models as adjustment variables only those which presented with significant association.

Analyses were performed using the IBM® SPSS programme version 23.

Ethical considerations

This study was approved by the Experimental Research Ethics Committee of the Human Research Ethics Committee of the University of Valencia (registration number 1291254). The processing of personal data complies with Organic Law 3/2018, of 5th December, on the Protection of Personal Data and Guarantee of Digital Rights. All procedures conform to the guidelines of the Declaration of Helsinki and the Good Clinical Practice Directive (Directive 2005/28/EC) of the European Union. The data collected in the study are anonymous and identified by a code.

Results

In total, 1,043 pregnant women completed the questionnaires. Out of these, 894 (85.7%) resided in Spain and 149 in other countries. Of those residing in Spain, 695 met with all the inclusion criteria (N = 695). The age range fell between 21 and 47 years (M = 33.83; SD = 4.102). As observed in Table 1, 96% stated they were of Spanish nationality, had

Table 1 Sociodemographic characteristics of the pregnant women during lockdown (N = 695).

Sociodemographic variables	Categories	Number of subjects	Percentage
What is your nationality?	Spanish	667	96.0
	Other nationalities	28	4.0
Highest level of education	Primary education	8	1.1
	Secondary education	66	9.5
	Technical studies	133	19.1
	University studies	488	70.2
Current civil status	Married	402	57.8
	Unmarried couple	257	37.0
	Single	27	3.9
	Separated/divorced	9	1.3

a high level of education (70.2% stated they had university studies) and had a stable partner (94.8%).

With regard to the dependent study variables, it may be observed that prenatal stress (determined by the PDQ score) presents a mean of 16.98 (SD = 6.53; Min = 2; Max = 41), with a higher spread (CV = .38 > .1) and slight positive skewness (C. skewness = .503). The anxiety state variable (determined by the STAI-S score) presents a mean of 25.20 (DS = 11.07; Min = 0; Max = 57) with a high spread (CV = .44 > .1) and slight positive skewness (C. skewness = .285). According to the scales used for the Spanish population, in our study 67.3% had a low score in anxiety state and 32.6% presented with indicators of anxiety.

With regard to categorical independent variables, Table 2 reveals that most participants in their third trimester of pregnancy (58.4%), state that their pregnancy was planned (84.9%), that the pregnancy was not achieved through assisted reproduction (88.3%), that they had other children (57.1%), that they had not had pregnancy losses prior to their current pregnancy (66.3%), that they had no chronic disease (78.3%), that they did not have a risk pregnancy (80.3%), and they had no history of mental health issues (63.2%).

The perception of health care (determined by the score of the Perception of health care scale) presents a mean of 2.62 (SD = .74; Min = .33; Max = 4.00), quite close to the midpoint of the scale, with a high level of dispersion (CV = .28 > .1) and with a slight negative skewness (C. skewness = -.429). Concern associated with COVID-19 (determined by the COVID-19 Associated Concerns scale score) behaves similarly, presenting a mean of 2.62 (SD = .68; Min = .56; Max = 4.00), a high dispersion (CV = .26 > .1), and a slight negative skewness (C. skewness = -.339).

Regarding the results for regression models (Table 3), for prenatal stress, the factors included in the model for presenting with a significant association with the variable were: concern associated with COVID-19, showing a positive association (β = 3.832; t = 11.549; p < .001); a history of mental health issues, i.e. prior diagnosis of depression, anxiety or other psychological difficulties associated with greater prenatal stress (β = 1.912; t = 4.081; p < .001); number of children which shows a negative association with prenatal stress (β = −.985; t = −2.854; p = .004) and pregnancy through treatment with assisted reproduction which is associated with a lower level of prenatal stress (β = −1.540; t = −2.166; p = .031). The model explains that 18.5% of the variability of prenatal stress (R^2 adj = .185) and there

is no evidence of autocorrelation in the model (Durbin-Watson = 1.813). To sum up, concern for COVID-19 and a history of mental health are shown to be factors of risk for prenatal stress, whilst a protective factor is the number of children and pregnancy through assisted reproduction treatment.

In the second regression model, referring to state anxiety, the factors included in the model as presenting a significant association with the variable were: concern associated with COVID-19, where there is a positive association (β = 4.798; t = 8.786; p < .001); a history of mental health isssues, associated with a higher state anxiety (β = 4.504; t = 5.885; p < .001); number of children which shows a positive association with anxiety (β = 3.246; t = −5.856; p < .001); perception of healthcare, which shows a negative association (β = −2.679; t = −5.312; p < .001); and that the pregnancy was planned, which is associated with a lower state anxiety (β = −2.703; t = −2.653; p = .008). The model explains the 24.6% variability of state anxiety (R^2 adj = .246) and there is no evidence of autocorrelation in the model (Durbin-Watson = 1.990). To sum up, during the first wave of the pandemic, risk factors for state anxiety were concern associated with COVID-19, having a history of mental health problems and having more than one child, whilst the protective factors were the perception of available healthcare and planned pregnancy.

Discussion

This study focused on describing levels of prenatal stress and state anxiety and their association with obstetric factors, perception of health care and concern about the socio-sanitary situation generated by the first wave of COVID-19 in a sample of 695 pregnant women living in Spain during lockdown.

As observed in the present study, the socio-health restrictions and the consequent lockdown resulted in the emergence of significant concerns from the pregnant population. The participants in this study have a mean score on the prenatal stress scale (PDQ) of 16.98 out of 48 points (SD = 6.53). This result is similar to that reported by Ibrahim and Lobel[17] in their systematic review prior to the pandemic, where they identify a mean prenatal stress score (PDQ) of 16.21 (SD = 6.22). It also coincides with the results reported by Romero-González et al.[24] during the pandemic in Spain,

Table 2 Frequencies and percentages for independent categorical variables.

Variable	Categories	Frequency	Percentage
Pregnancy trimester	1st trimester	49	7.1
	2nd trimester	240	34.5
	3rd trimester	406	58.4
Planned pregnancy	Yes	509	84.9
	No	105	15.1
Assisted reproduction pregnancy	Yes	81	11.7
	No	614	88.3
Number of living children (not including current pregnancy)	Has no other children	298	42.9
	Has more children	397	57.1
Have you had any pregnancy losses?	Yes	234	33.7
	No	461	66.3
Have you had any medical complications during your pregnancy?	Yes	137	19.7
	No	558	80.3
Have you had any complications or do you suffer from any chronic disease?	Yes	151	21.7
	No	544	78.3
Throughout your life. have you had any mental health issues? (e.g., symptoms of depression, anxiety or other psychological issues?)	Yes	256	36.8
	No	439	63.2

Table 3 Multiple regression models for prenatal stress and state anxiety stress.

Dependent variable	Factors	β	SE	T	p value
Prenatal stress	Constant	6.925	.917	7.550	< .001
	COVID-19 associated concern	3.832	.332	11.549	< .001
	History of mental health issue	1.912	.468	4.081	< .001
	Number of children	−.985	.345	−2.854	.004
	Fertility treatment	−1.540	.711	−2.166	.031
	R^2 adjusted = .185				
	Durbin-Watson = 1.813				
State anxiety	Constant	18.650	2.333	7.995	< .001
	COVID-19 associated concern	4.798	.546	8.786	< .001
	History of mental health issue	4.504	.765	5.885	< .001
	Number of children	3.246	.554	5.856	< .001
	Perception of healthcare	−2.679	.504	−5.312	< .001
	Planned pregnancy	−2.703	1.019	−2.653	.008
	R^2 adjusted = .246				
	Durbin-Watson = 1.990				

β = regression coefficient p = p value/sig; SE = standard error for regression coefficient; T = t for regression coefficient.

where they identify a mean prenatal stress (PDQ) of 16.87 (6.71). That is, women's specific concerns and stress related to gestational development remain at similar levels to those observed before the pandemic.

With regard to state anxiety, referring to subjective feelings of anxiety perceived to be linked to a specific event,[14] which in this case was the pandemic, the study participants had a mean score of 25.20 (SD = 11.07). Anxiety indicators are observed in 32.6% of pregnant women, when the value reported in the literature prior to the pandemic period was 15.2%[15]. This data contrasts with the results reported in other studies carried out during the pandemic in Spain in the same period of lockdown, where the mean anxiety (STAI-S) varies from 41.7 (SD = 10.6)[25] to 43.07 (SD = 11. 73).[26] It is important to note that for the aforementioned studies[25,26] the sample was recruited in the hospital setting, unlike our study where they were recruited online. In a study

conducted in Israel, it was observed that one of the most important sources of anxiety during the COVID-19 pandemic in pregnant women was attending pregnancy check-ups and being in public places.[27] It is possible that women recruited in hospital settings felt more exposed to the virus than those who completed online questionnaires.

In order to analyse the factors associated with the levels of prenatal stress and anxiety presented by pregnant women between May and April 2020, two predictive analyses were carried out that considered 3 groups of independent variables (obstetric variables, variable of concerns associated with COVID-19 and variable of perception of accessibility and availability of health care). Both regression analyses, both for antenatal stress and state anxiety, indicate that the main predictor was the COVID-19 concern. That is, both specific gestational stress and anxiety related to the subjective perception of feelings of anxiety about the pandemic situa-

tion are associated with concerns generated by the fear of personal contagion, of the foetus, of relatives or friends, of attending prenatal check-ups and its consequences at the social and occupational levels. This is consistent with studies carried out in pregnant women in other countries, such as the USA,[6] Israel[27] and Italy,[28] highlighting the concern for the health of the mother and foetus and its association with higher levels of anxiety and stress.

Both analyses also identified that women who reported a history of mental health problems were at increased risk of presenting symptoms of prenatal stress and anxiety during pregnancy in times of pandemic. This finding is consistent with the study by Ravaldi et al.,[28] which found that the presence of prior psychopathology predicted high levels of anxiety and post-traumatic stress in pregnant women during the pandemic in Italy.

With regard to the variables specifically associated with prenatal stress, two variables were identified as being associated with lower levels of prenatal stress. A first variable is achieving pregnancy through assisted reproduction treatments. This is an initially counter-intuitive result that is not related to the results of other studies.[10] Studies conducted before the pandemic show that having undergone assisted reproduction treatments is accompanied by high levels of psychological stress[29] and that anxiety symptoms resolve after successful treatments.[30] Possibly, women who are pregnant after successful assisted reproduction treatment have found in lockdown the possibility to get away from the stressors they have previously faced during treatment and spend more time taking care of food, sleep and healthy practices that have a positive impact on the reduction of specific stress related to pregnancy.[17,31] However, there are no studies indicating an explanation for this either, and no studies have been found that speak to these outcomes in times of pandemic.

A second variable associated with prenatal stress in this study is the number of children, where the more children the woman has, the lower the prenatal stress levels. A study in iran,[32] found that women who were pregnant for the first time were at greater risk of experiencing concerns during the pandemic. This could be explained by the fact that women who have more sons and daughters have already previously experienced concerns associated with motherhood. However, in terms of variables specific to state anxiety, the present study shows that having more children is a risk factor. This is consistent with the results from the study by Balluerka et al.,[33] where emotional distress was found to be associated with the role of motherhood and the increased burden of household chores during the pandemic, since school closures meant that the children were in the home 24 hours a day.

Notwithstanding, a protective factor of state anxiety is associated with having a planned or wanted pregnancy, which is consistent with the majority of research studies in the pregnant population.[16,34]

Also of note as a protective factor specific to state anxiety is the perceived accessibility and availability of health care. That is, pregnant women who perceive that they have access to health care, who perceive clear and coherent protocols for action in terms of avoiding the risk of infection and who are satisfied with the care and follow-up provided by gynaecological-obstetric professionals, have lower levels of anxiety. Since the beginning of the pandemic, lack of information, as well as the difficulty in accessing prenatal check-ups, has been a major concern for pregnant women,[5] which has translated into additional reasons for uncertainty. The results of the present study are consistent with those reported in pre-pandemic studies, which indicate that lack of clear and timely information regarding the health situation may exacerbate the risk of psychological and psychosocial distress.[2] In addition, a study conducted during the first wave in a pregnant population in Turkey indicates, in this regard, that lack of information during the pandemic is associated with higher levels of anxiety.[35]

This study has some limitations. Firstly, it presents selection biases, as it is a non-probabilistic sampling, when for this type of study with large samples a random probability sampling strategy would be more appropriate. Secondly, it is possible to identify certain information biases, as the online questionnaire does not ensure that the questionnaire is administered in a standardised manner. In addition to the above, the obstetric and health variables were not collected through a medical report to ensure that the participant really had such a history (either risky pregnancy, history of mental health or chronic illness) and that the questionnaire used to collect information regarding concerns and perceptions in relation to COVID-19 was developed on purpose for the study, without being validated beforehand, since no similar situation had been experienced before. Thirdly, there are limitations in terms of internal validity, as the study is cross-sectional, so it is not appropriate to refer to predictors per se. However, there are variables that are prior to the appearance of the dependent variables in terms of time, such as number of children, planned pregnancy, assisted reproduction treatments and perception of accessibility and availability of health care. Fourthly, in the present analysis, other variables such as social support or employment status, among others, which could have an impact on prenatal anxiety and stress, were not incorporated into the regression model.

For future research, it would be interesting to investigate the relationship between childbearing after assisted reproduction treatment and prenatal stress. On the other hand, considering the protective nature of the perception of access and availability of health care in our results, it would be interesting to collect information on the type (public or private care) or quality of care received. The evaluation of coping strategies of the pregnant woman could also be pertinent, in order to identify specific factors for the promotion of resilience during gestational follow-up in times of crisis in prenatal care settings.

Cross-sectional studies of pregnant women during the pandemic are a starting point for further studies to assess the possible consequences of stress and anxiety levels on maternal mental health, the impact on maternal-infant bonding and neonatal development. Given the risks associated with high levels of stress and anxiety during the prenatal period, it is essential to pay attention to the stress experienced by pregnant women in two ways: in relation to the uncertainty and concerns associated with pregnancy itself and to the concerns associated with the pandemic. This study demonstrates the importance of paying attention during these times of crisis to the most vulnerable pregnant women, such as those who report having suffered mental

health disorders, and the need to attend to the psychological well-being of this population through clear and coherent protocols for the control and monitoring of maternal and foetal health.

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Conflict of interests

The authors have no conflict of interests to declare.

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References

1. BOE.es - BOE-A-2020-3692 Real Decreto 463/2020, de 14 de marzo, por el que se declara el estado de alarma para la gestión de la situación de crisis sanitaria ocasionada por el COVID-19. Boe.es. [accessed 6 Jun 2020]. Available from: https://www.boe.es/diario_boe/txt., php?id=BOE-A-2020-3692.

2. Becerra-García J, Ballesta GG, Sánchez-Gutiérrez T, Barbeito-Resa S, Calvo-Calvo A. Síntomas psicopatológicos durante la cuarentena por COVID-19 en población general española: Un análisis preliminar en función de variables sociodemográficas y ambientales-ocupacionales. Revista Española de Salud Pública. 2020;94:e1–11.

3. Salari N, Hosseinian-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. Global Health. 2020;16(1):57.

4. Shorey SY, Ng ED, Chee CYI. Anxiety and depressive symptoms of women in the perinatal period during the COVID-19 pandemic: A systematic review and meta-analysis. Scand J Public Health. 2021;49:730–40, http://dx.doi.org/10.1177/14034948211011793.

5. Rashidi Fakari F, Simbar M. Coronavirus pandemic and worries during pregnancy. Arch Acad Emerg Med. 2020;8:e21.

6. Preis H, Mahaffey B, Lobel M. Psychometric properties of the pandemic-Related Pregnancy Stress Scale (PREPS). J Psychosom Obstet Gynaecol. 2020;41:191–7.

7. Suwalska J, Napierała M, Bogdański P, Łojko D, Wszołek K, Suchowiak S, et al. Perinatal mental health during COVID-19 pandemic: An integrative review and implications for clinical practice. J Clin Med. 2021;10:2406.

8. Preis H, Mahaffey B, Heiselman C, Lobel M. Vulnerability and resilience to pandemic-related stress among U.S. women pregnant at the start of the COVID-19 pandemic. Soc Sci Med. 2020;266:113348.

9. Tsakiridis I, Dagklis T, Mamopoulos A, Athanasiadis A, Pearson R, Papazisis G. Antenatal depression and anxiety during the COVID-19 pandemic: A cross-sectional study in pregnant women from routine health care contact in Greece. J Perinat Med. 2021, http://dx.doi.org/10.1515/jpm-2020-0473.

10. Gourounti K. Psychological stress and adjustment in pregnancy following assisted reproductive technology and spontaneous conception: A systematic review. Women Health. 2016;56:98–118.

11. Alderdice F, Lynn F, Lobel M. A review and psychometric evaluation of pregnancy-specific stress measures. J Psychosom Obstet Gynaecol. 2012;33:62–77.

12. Matvienko-Sikar K, Dockray S. Effects of a novel positive psychological intervention on prenatal stress and well-being: A pilot randomised controlled trial. Women Birth. 2017;30:e111–8.

13. Sierra JC. Ansiedad, angustia y estrés: tres conceptos a diferenciar. Bvsalud.org. [accessed 20 Jun 2021] Available from: http://pepsic.bvsalud.org/pdf/malestar/v3n1/02.pdf.

14. Spielberger CD, Gorsuch RL, Lushene R, Vagg PR, Jacobs GA. Manual for the State-Trait Anxiety Inventory. Consulting Psychologists Press; 1983.

15. Dennis C-L, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. Br J Psychiatry. 2017;210:315–23.

16. Biaggi A, Conroy S, Pawlby S, Pariante CM. Identifying the women at risk of antenatal anxiety and depression: A systematic review. J Affect Disord. 2016;191:62–77.

17. Ibrahim SM, Lobel M. Conceptualization, measurement, and effects of pregnancy-specific stress: review of research using the original and revised Prenatal Distress Questionnaire. J Behav Med. 2020;43:16–33.

18. Caparros-Gonzalez RA, de la Torre-Luque A, Romero-Gonzalez B, Quesada-Soto JM, Alderdice F, Peralta-Ramírez MI. Stress during pregnancy and the development of diseases in the offspring: A systematic-review and meta-analysis. Midwifery. 2021;97:102939.

19. López OP, Pantoja ML, Mella GM, Utreras LM, Vergara MC. Revisión de los riesgos maternos y perinatales en tiempos de COVID-19. Desafíos para el rol de la Matronería. Rev Chil Obstet Ginecol. 2020;85:S131–47.

20. G*Power. Apponic.com. 2020 [accessed 7 Ago 2021]. Available from: https://g-power.apponic.com/.

21. Yali AM, Lobel M. Coping and distress in pregnancy: An investigation of medically high risk women. J Psychosom Obstet Gynaecol. 1999;20:39–52.

22. Caparros-Gonzalez RA, Perra O, Alderdice F, Lynn F, Lobel M, García-García I, et al. Psychometric validation of the Prenatal Distress Questionnaire (PDQ) in pregnant women in Spain. Women Health. 2019;59:937–52.

23. Buela-Casal G, Guillén-Riquelme A, Seisdedos N. Cuestionario de Ansiedad Estado-Rasgo. TEA Ediciones; 2011.

24. Romero-Gonzalez B, Puertas-Gonzalez JA, Mariño-Narvaez C, Peralta-Ramirez MI. Confinement variables by COVID-19 predictors of anxious and depressive symptoms in pregnant women. Med Clín (Engl Ed). 2021;156:172–6.

25. Brik M, Sandonis MA, Fernández S, Suy A, Parramon-Puig G, Maiz N, et al. Psychological impact and social support in pregnant women during lockdown due to SARS-CoV2 pandemic: A cohort study. Acta Obstet Gynecol Scand. 2021;100:1026–33.

26. Lubián López DM, Butrón Hinojo CA, Arjona Bernal JE, Fasero Laiz M, Alcolea Santiago J, Guerra Vilches V, et al. Resilience and psychological distress in pregnant women during quarantine due to the COVID-19 outbreak in Spain: A multicentre cross-sectional online survey. J Psychosom Obstet Gynaecol. 2021;42:115–22.

27. Taubman-Ben-Ari O, Chasson M, Abu Sharkia S, Weiss E. Distress and anxiety associated with COVID-19 among Jewish and Arab pregnant women in Israel. J Reprod Infant Psychol. 2020;38:340–8.

28. Ravaldi C, Ricca V, Wilson A, Homer C, Vannacci A. Previous psychopathology predicted severe COVID-19 concern, anxiety, and PTSD symptoms in pregnant women during ''lockdown'' in Italy. Arch Womens Ment Health. 2020;23:783–6.

29. Bailey A, Ellis-Caird H, Croft C. Living through unsuccessful conception attempts: a grounded theory of resilience among women undergoing fertility treatment. J Reprod Infant Psychol. 2017;35:324–33.

30. Poikkeus P, Saisto T, Unkila-Kallio L, Punamaki R-L, Repokari L, Vilska S, et al. Fear of childbirth and pregnancy-related anxiety in women conceiving with assisted reproduction. Obstet Gynecol. 2006;108:70–6.

31. Auerbach MV, Lobel M, Cannella DT. Psychosocial correlates of health-promoting and health-impairing behaviors in pregnancy. J Psychosom Obstet Gynaecol. 2014;35:76–83.

32. Mortazavi F, Mehrabadi M, KiaeeTabar R. Pregnant women's well-being and worry during the COVID-19 pandemic: a cross-sectional study. BMC Pregnancy Childbirth. 2021;21:59.

33. Balluerka N, Gómez J, Hidalgo D, Gorostiaga D, Espada JP, Padilla JP, Santed MA. Las consecuencias psicológicas de la COVID-19 y el confinamiento. Servicio de Publicaciones de la Universidad del País Vasco; 2020. p. 1–210.

34. Bayrampour H, Vinturache A, Hetherington E, Lorenzetti DL, Tough S. Risk factors for antenatal anxiety: A systematic review of the literature. J Reprod Infant Psychol. 2018;36:476–503.

35. Kahyaoglu Sut H, Kucukkaya B. Anxiety, depression, and related factors in pregnant women during the COVID-19 pandemic in Turkey: A web-based cross-sectional study. Perspect Psychiatr Care. 2021;57:860–8.