Mental Health of COVID-19 Pandemic from Pregnancy to Postpartum Period: A Longitudinal Study

COVID-19 Pandemisinde Gebelikten Doğum Sonrasına Ruh Sağlığı: Boylamsal Bir Çalışma

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ABSTRACT

Objective: This study aimed to determine the effect of stress levels of prenatally diagnosed or contacted pregnant women on anxiety and depression symptoms in the postpartum period and compare them with those who had a healthy pregnancy period.

Materials and Methods: This internet-based longitudinal study was conducted with pregnant women with COVID-19(+) (n=91), contact with COVID-19(+) (n=74), and healthy pregnant women (n=220).

Results: Severe anxiety was found in 51.4% of COVID-19(+) pregnant women, and depression was found in 28.7%. NuPDQ and BAI mean scores of positive pregnant women were higher than contact and healthy pregnant women. When the EPDS score averages were compared, it was determined that the postpartum period mean scores of those who were positive during pregnancy and were in contact were higher than those of healthy pregnant women. There is a positive correlation between the psychological effects of pregnant women from COVID-19 and social isolation and NuPDQ (r=0.316, r=0.279), BAI (r=0.337, r=0.293) and EPDS (r=0.333, r=0.311) respectively relationship was determined.

Conclusion: Our results point to the need to provide urgent psychosocial support in the postpartum period to women who were diagnosed and/or had contact with COVID-19 during pregnancy.

Keywords: Anxiety, COVID-19, depression, pregnancy, stress

ÖZ

Amaç: Bu çalışmanın amacı, prenatal dönemde COVID-19 tanısı konmuş veya temaslı gebelerin stres düzeylerinin pastpartum dönemdeki anksiyete ve depresyon semptomlarına etkisini belirleyerek, gebelik sürecini sağlıklı geçirenlerle karşılaştırmaktır.

Materyal ve Metot: İnternet tabanlı longitudinal tipte olan bu çalışma, COVID-19 (+) gebeler (n=91), COVID-19 (+) ile temaslı gebeler (n=74) ve sağlıklı gebelerle (n=220) yürütüldü.

Bulgular: COVID-19 (+) gebelerin %51,4'ünde şiddetli düzeyde anksiyete, %28,7'sinde depresyon varlığı belirlendi. Pozitif gebelerin NuPDQ ve BAI puan ortalamalarının temaslı ve sağlıklı gebelerden daha yüksek olduğu saptandı. EPDS puan ortalamaları karşılaştırıldığında, gebeliğinde pozitif ve temaslı olanların postpartum dönem puan ortalamalarının sağlıklı gebelerden daha yüksek olduğu belirlendi. Gebelerin COVID-19'dan ve sosyal izolasyondan psikolojik etkilenimleri ile NuPDQ (sırasıyla r=0,316, r=0,279), BAI (sırasıyla r=0,337, r=0,293) ve EPDS (sırasıyla r=0,333, r=0,311) arasında pozitif yönde ilişki olduğu belirlendi.

Sonuç: Sonuçlarımız, gebelik süresince COVID-19 tanı almış ve/veya temaslı olmuş kadınlara postpartum dönemde acil psikososyal destek sağlama ihtiyacına işaret ediyor.

Anahtar Kelimeler: Anksiyete, COVID-19, gebelik, depresyon, stres

INTRODUCTION

COVID-19 has negatively affected individuals all over the world. While its physical effects cause destructive consequences in humans, it can also cause severe problems in mental health.[2,3] However, studies mainly focus on the physical effects of the COVID-19 pandemic. Therefore, the data on its effects on mental health are insufficient.[4] Several psychiatric diseases, such as depression, anxiety, panic attacks, psychotic symptoms and even suicide, can be observed in individuals during the pandemic. One study of COVID-19 reports that individuals have depression, anxiety and stress due to moderate or severe psychological changes due to the pandemic.[5]

Pregnancy is a sensitive period in which psychological distress can negatively affect both mother and baby.[6] A pregnancy experiencing uncertainty during the COVID-19 pandemic can cause stress, anxiety and even depression in pregnant women, adversely affecting their psychosocial health.[7,8] Constant and high levels of prenatal stress, anxiety, and depression symptoms increase the risk of postpartum depression as well as the rates of prenatal infection and illness.[7,8] Prenatal stress, anxiety, and depression can cause miscarriage, premature birth, low birth weight, fetal motor inactivity, and cognitive development problems.[9,10] Therefore, mental health problems are as important as physical health problems in pregnant women, and they should not be ignored during the COVID-19 pandemic.[11]

Due to the potential negative psychological sequelae of psychological, health and financial uncertainty and social isolation, it is important to determine the prevalence of psychological problems in pregnant women during this pandemic to activate early intervention methods and implement evidence-based practices. For this reason, it is argued that evaluating and addressing the current mental health symptoms of pregnant women during the pandemic will support the improvement of fetus and newborn health. In addition, identifying risk factors for the diagnosis and prevention of prenatal distress in pregnant women is extremely important in terms of mother-baby health, pregnancy and postpartum period. This study aimed to determine the level of stress, anxiety and depression symptoms in pregnant women diagnosed with COVID-19 or contacted with someone who had a confirmed case of COVID-19 and to compare them with healthy pregnant women.

MATERIALS AND METHODS

Ethical Status: Before starting the study, ethical approval was obtained from the Non-Invasive Clinical Research and Publication Ethics Committee (Date: 01.05.2021, decision no: 2020/1358) and written permission from the provincial health direc-

torate (Number: E-13389845-799). In addition, COVID-19 scientific research permission was received from the Republic of Türkiye Ministry of Health (Form Code: 2020-12-03T23_59_27).

Research Population and Sampling: This study is an internet-based longitudinal study. Study data were collected between December 2021 and May 2022. The first part of the study data was done by retrospectively examining the records of the health directorate in the province. Women in their trimesters were included in the study. According to the polymerase chain reaction (PCR) test, (1) pregnant women with COVID-19 (+), (2) pregnant women who were in contact with COVID-19 (+), and (3) healthy pregnant women in the records of the directorate were included in the sample.

The study examined nine months of COVID-19 records from March to December 2021. According to the records of the health directorate, it was determined that 105 pregnant women were in contact with COVID-19 (+), 96 pregnant women were in contact with COVID-19 (+), and 270 healthy pregnant women (n=471). This work was completed in two stages. The first stage was applied in the prenatal period, and the second stage was applied in the first 6 months postpartum. In this study, all pregnant women who were COVID (+) at the data collection date and in contact with COVID (+) were taken. Randomisation was not performed because all pregnant women were included in the study. The women were invited to fill out a web-based questionnaire. Research questionnaires were developed using the Google Forms app (https://docs.google.com/forms), and links to the questionnaires were sent to women via WhatsApp. The study was completed with the prenatal and postpartum results of 385 women. (Figure 1).

Measures: The questionnaire administered during the prenatal period consisted of three parts, where first part included questions about sociodemographic and obstetric characteristics, the second part included questions about knowledge and attitudes about COVID-19, and the third part included the Revised Prenatal Distress Questionnaire (NuPDQ) and Beck Anxiety Inventory (BAI). The Edinburgh Postpartum Depression Scale (EPDS) was included in the questionnaire administered to the women in the postpartum period. Information about the study was given on the first page of both online questionnaires.

The first part of the questionnaire: This part included questions about the pregnant women's sociodemographic and obstetric characteristics such as age, education level, employment status, income level, number of pregnancies, and gestational week.

The second part of the questionnaire: This part was created by the researchers based on previous stud-
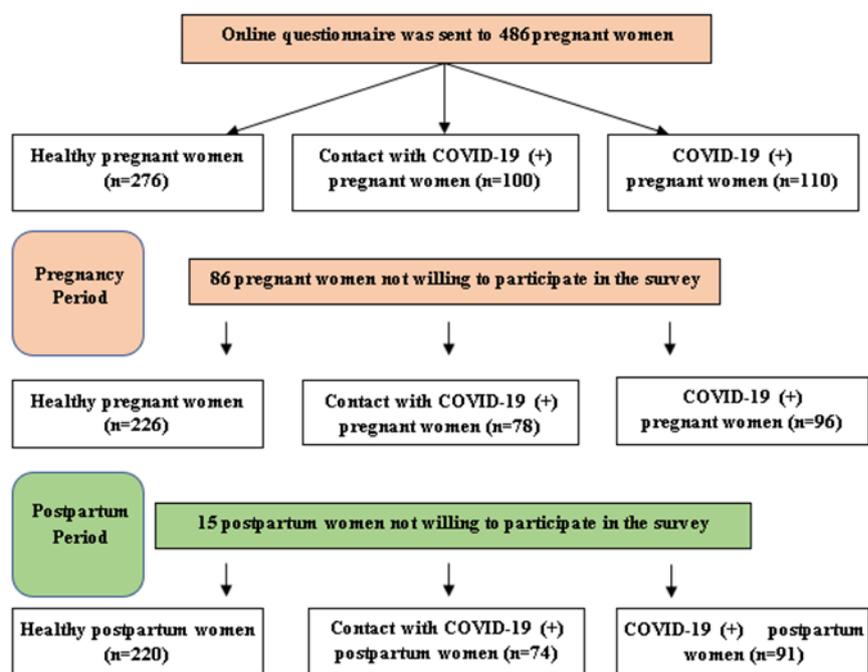
Figure 1. Definition of participation process by flow-chart.

ies.[5,12] Pregnant women were asked the following statements/questions about COVID-19: "Do you think that the COVID-19 pandemic can affect your pregnancy process?" and "Do you think that COVID-19 pandemic can affect your baby's health?". They answered these questions as "yes or no".

Pregnant women answered other questions by scoring from 0 to 10. These questions are:

- Please describe the level of knowledge about the COVID-19 pandemic: 0= "I have no idea," 10 = "My knowledge is perfect."

- Do you think the COVID-19 pandemic has affected your psychological health?: 0 = "no," 10 = "absolutely"

- Do you think that the social isolation due to the pandemic has affected your psychological health: 0 = "no," 10 = "absolutely"

The third part of the questionnaire: NuPDQ, BAI and EPDS

NuPDQ: The 17-item NuPDQ, revised by Lobel et al. (2008), determines the pregnant women's social relationships, physical and emotional symptoms, and anxiety levels about themselves and their babies during pregnancy. The Turkish validity and reliability study of the scale was conducted by Yüksel and Durna (2011), where the Cronbach's alpha internal consistency coefficient was determined as 0.85. The lowest and highest scale scores are 0 and 34, respectively. A higher score indicates a higher level of prenatal distress perceived by pregnant women. The

scale does not have a cut-off score.[13, 14] In this study, the Cronbach's alpha internal consistency coefficient of the scale was found as 0.88.

BAI: The scale was adapted to Turkish by Ulusoy et al. (1998) and is used to determine the level of anxiety experienced by individuals. The scale consists of 21 items in total. The lowest and highest scale scores are 0 and 63, respectively. BAI scores are classified as minimal (0-7), mild anxiety (8-15), moderate anxiety (16-25), and severe anxiety (26-63). The Cronbach's alpha internal consistency coefficient of the scale was found as 0.93.[15] In this study, the Cronbach's alpha internal consistency coefficient was determined as 0.93.

EPDS: The Turkish validity and reliability study of the scale, which is used to screen depressive symptoms in individuals, was performed by Engindeniz et al. (1996). The Cronbach's alpha internal consistency coefficient of the scale was found as 0.79. The EPDS consists of 10 items in total. This is a 4-point Likert-type scale, scoring from 0 (none) to 3 (severe). The lowest and highest scale scores are 0 and 30, respectively. A higher total score indicates a higher risk for depression. The cut-off score on the scale is 12. A score of 12 and above is considered a risk for depression.[16] In this study, the Cronbach's alpha internal consistency coefficient of the scale was found as 0.85.

Data Analysis: The data were analysed using the Statistical Package for the Social Sciences 25.0 for Windows (SPSS, Chicago, IL, USA). The chi-square

test was used to compare categorical independent variables, and a one-way analysis of variance was used to compare continuous independent variables. Tukey test was used to determine the difference between groups. Independent samples-t test was used to analyse the data that met the parametric conditions, and the Mann-Whitney-U test to analyse the data that did not meet the parametric conditions. Pearson correlation analysis was used to analyse the relationship between the psychological effects of the COVID-19 pandemic and social isolation on pregnant women and their NuPDQ, BAI, and EPDS mean scores.

RESULTS

There was no statistically significant difference between groups according to age, education level, employment status, number of pregnancies, number of children, gestational week, and presence of chronic disease ($p > 0.05$) (Table 1).

Table 1. Compares the sociodemographic and obstetric characteristics of pregnant women.

Variables		Healthy (n=220) n (%)	Contact with COVID-19 (+) (n=74) n (%)	COVID-19 (+) (n=91) n (%)	X^2 and p-value
Age (Mean ± SD)		30.33±5.36	28.96±4.68	30.02±5.14	-
Age	18-27	69 (52.7)	31(23.7)	31 (23.7)	χ^2=7.332
	28-34	100 (55.9)	36 (20.1)	43 (24.0)	p=0.119
	≥ 35	51 (68.0)	7 (9.3)	17 (22.7)	
Education level	Primary school	17 (42.2)	7 (19.4)	12 (33.3)	χ^2=7.034
	High school	89 (58.9)	35 (23.2)	27 (17.9)	p=0.134
	University	114 (57.6)	32 (16.2)	52 (26.3)	
Employment status	Employed	66 (50.4)	28 (21.4)	37 (28.2)	χ^2=3.851
	Unemployed	154 (60.6)	46 (18.1)	54 (21.3)	p=0.146
Number of pregnancies	Primigravid	68 (52.3)	29 (22.3)	33 (25.4)	χ^2=2.030
	Multigravid	152 (59.6)	45 (17.6)	58 (22.7)	p=0.362
Number of children	1	84 (58.7)	29 (20.3)	30 (21.0)	χ^2=1.488
	2	42 (53.8)	14 (17.9)	22 (28.2)	p=0.829
	≥ 3	94 (57.3)	31 (18.9)	39 (23.8)	
Trimester	1. trimester	62 (68.1)	17 (18.7)	12 (13.2)	χ^2=9.266
	2. trimester	105 (56.1)	34 (18.2)	48 (25.7)	p=0.055
	3. trimester	53 (49.5)	23 (21.5)	31 (29.0)	
Presence of chronic disease	Yes	16 (47.1)	9 (26.5)	9 (26.5)	χ^2=1.810
	No	204 (58.1)	65 (18.5)	82 (23.4)	p=0.405

Table 2 compares the knowledge and attitudes of pregnant women regarding stress, anxiety, depression and COVID-19. Accordingly, 32.1% of the pregnant women diagnosed with COVID-19 reported that COVID-19 affected their pregnancy, while 34.2% reported that it affected their baby. On the other hand, 61.4% of the healthy pregnant women considered that COVID-19 did not affect their pregnancy, while 64.5% considered that it did not affect their baby ($p < 0.05$). In addition, 60.6% of the healthy pregnant women had mild anxiety, 29.0% of the pregnant women who contacted a person with confirmed COVID-19 also had moderate anxiety, and 51.4% of the pregnant women diagnosed with COVID-19 had severe anxiety ($p < 0.001$). While there was no depression in 67.8% of the healthy pregnant women, 27.5% of the pregnant women who contacted a person with confirmed COVID-19, and 28.7% of the pregnant women diagnosed with COVID-19 had depression ($p < 0.001$). The pregnant women diagnosed with COVID-19 had higher BAI and NuPDQ mean scores than both those who contacted a person with confirmed COVID-19 and healthy pregnant women ($p < 0.001$). Moreover, the pregnant women diagnosed with COVID-19 and those who contacted a person with confirmed COVID-19 had higher EPDS mean scores than the healthy pregnant women ($p < 0.001$). The effect of COVID-19 and social isolation on psychological health was higher in the pregnant women diagnosed with COVID-19 and those who contacted a person with confirmed COVID-19 than in the healthy pregnant women ($p < 0.001$) (Table 2).

Table 2. Comparison of participants' stress, anxiety, postpartum depression levels, knowledge, and attitudes about COVID-19.

Variables		Healthy (n=220) n (%)	Contact with COVID-19 (+) (n=74) n (%)	COVID-19 (+) (n=91) n (%)	χ^2 and p-value
COVID-19 affects pregnancy	Yes	66 (49.3)	25 (18.7)	43 (32.1)	χ^2=8.486
	No	154 (61.4)	49 (19.5)	48 (18.1)	**p=0.014**
COVID-19 affects the fetus	Yes	49 (40.8)	30 (25.0)	41 (34.2)	χ^2=19.324
	No	171 (64.5)	44 (16.6)	50 (18.9)	**p<0.001**
BAI group	Minimal (0-7 scores)	106 (77.4)	17 (12.4)	14 (10.2)	
	Mild (8-15scores)	66 (60.6)	24 (22.0)	19 (17.4)	χ^2=67.236
	Moderate (16-25 scores)	27 (39.1)	20 (29.0)	22 (31.9)	**p<0.001**
	Severe (26-63 scores)	21 (30.0)	13 (18.6)	36 (51.4)	
EPDS group	Yes (≥12 scores)	75 (43.9)	47 (27.5)	49 (28.7)	χ^2=23.710
	No (<12 scores)	145 (67.8)	27 (12.6)	42 (19.6)	**p<0.001**
		Mean ± SD	Mean ± SD	Mean ± SD	
Knowledge of COVID-19 (0-10 scale)		6.17±2.67	6.54±2.57	6.54±2.43	F=0.938 p= 0.392
The effect of COVID-19 on psychology (0-10 scale)		5.55±3.10[a]	7.35±2.85[b]	7.37±2.72[c]	F=17.457 **p<0.001** c,b>a
The effect of social isolation on psychology (0-10 scale)		5.96±2.94[a]	7.24±3.00[b]	7.68±2.45[c]	F=13.997 **p<0.001** c,b>a
BAI Total		10.73±9.19[a]	15.56±10.49[b]	21.21±12.74[c]	F=33.705 **p<0.001** c>b>a
NuPDQ Total		10.04±5.92[a]	12.47±7.03[b]	14.93±7.10[c]	F=19.313 **p<0.001** c>b>a
EPDS Total		9.70±4.77[a]	12.32±5.14[b]	11.61±6.57[c]	F=8.594 **p<0.001** b,c>a

Figure 2a-c presents the relationship between pregnant women's COVID-19 knowledge levels, psychological effects of the COVID-19 pandemic and social isolation on them, and their NuPDQ, BAI and EPDS mean scores. There was no statistically significant relationship between the pregnant women's COVID-19 knowledge levels and their NuPDQ (r=0.007), BAI (r=0.061), and EPDS (r=0.007) mean scores (p>0.05). A weak positive relationship was found between the psychological effects of COVID-19 and social isolation on pregnant women and their NuPDQ (r=0.316, r=0.279, respectively), BAI (r=0.337, r=0.293) and EPDS (r=0.333, r=0.311, respectively) mean scores (p<0.01).

DISCUSSION AND CONCLUSION
Although there is a lot of research evidence regarding the clinical consequences of infectious diseases in pregnant women, the psychological effects of pandemics on pregnant women (including non-infected) have been mentioned by very few studies

in the literature. This study revealed that the COVID-19 pandemic has a significant psychological impact on pregnancy stress and postpartum anxiety, and depression. According to the study results, it was determined that the pregnant women who were positive for COVID-19 experienced more stress and anxiety, and the postpartum depression level of the women who were contacted and positive was higher than the healthy pregnant women (Table 2). One study examining the effects of the COVID-19 pandemic on maternal anxiety during pregnancy reported that pregnant women already had high levels of stress and anxiety and that the pandemic doubled their anxiety and stress levels.[7] One study comparing the depression symptoms experienced by mothers before and after the COVID-19 pandemic concluded that the COVID-19 pandemic adversely affected the mothers' mental health, and the symptoms of depression increased significantly.[17] Another study conducted to determine the emotional levels of pregnant women during the COVID-19 pandemic has
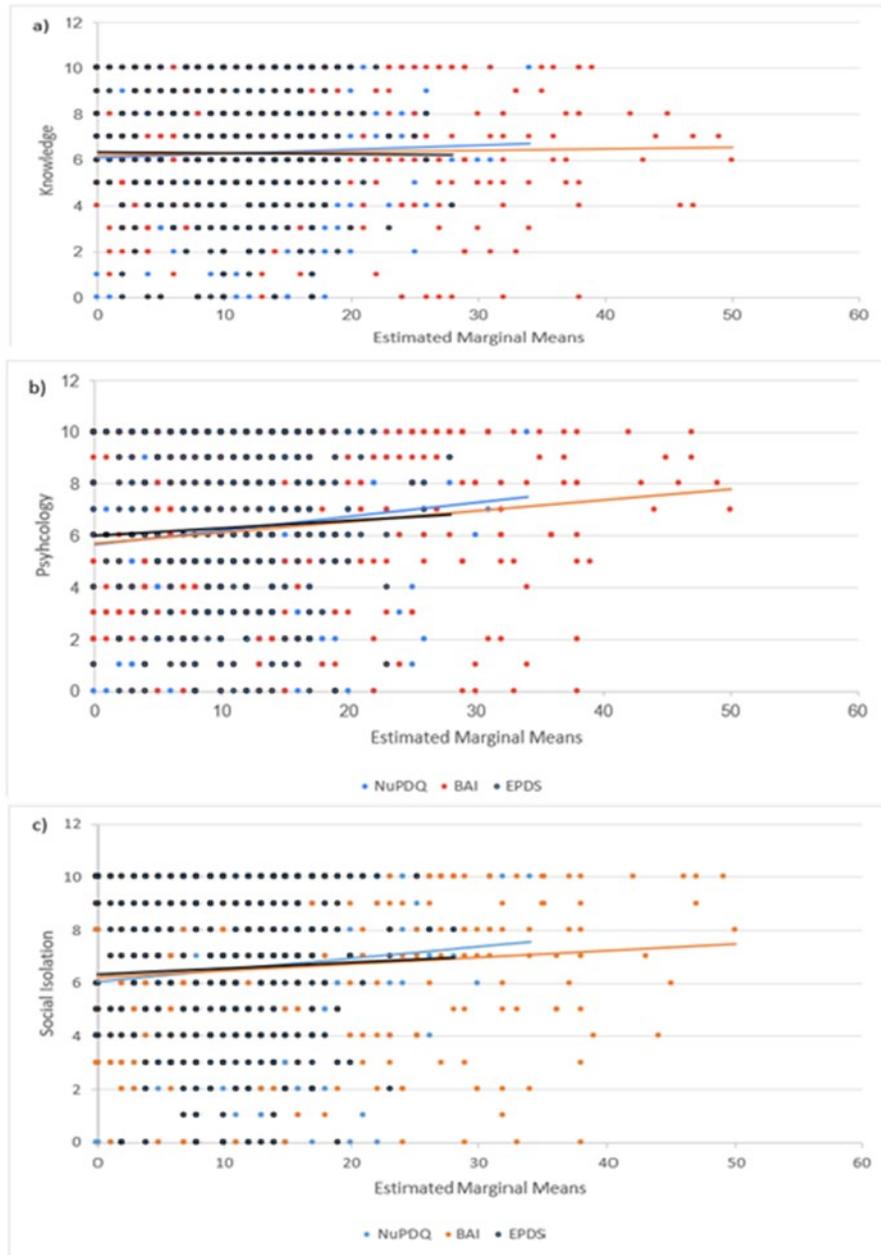
Figure 2. The relationship between a) participants' COVID-19 knowledge levels, b) psychological effects of COVID-19 pandemic on participants, c) psychological effects of social isolation on participants and their NuPDQ, BAI and EPDS mean scores.

reported that pregnant women have high levels of depression, anxiety and stress during the pandemic.[18] These results support the results of this study. The present study examined the knowledge levels of pregnant women about COVID-19, the psychological effects of the COVID-19 pandemic and social isolation on them, and the relationship between these disease-related variables and their NuPDQ, BAI, and EPDS mean scores. There was a positive correlation between the psychological effects of the COVID-19 pandemic and social isolation on pregnant women

and their NuPDQ, BAI and EPDS mean scores (Figure 2b-c), but the relationship between their knowledge levels and NuPDQ, BAI and EPDS mean scores was not statistically significant (Figure 2a). Accordingly, the study revealed that pregnant women were psychologically affected by the COVID-19 pandemic and social isolation, but found no significant relationship between the stress, anxiety, and depression levels of those with high levels of knowledge. There are studies with results similar to those of the present study.

A meta-analysis study of the psychological effects of the COVID-19 pandemic on pregnant women reported that the prevalence of depression and anxiety increased significantly among pregnant women and suggested providing them with social support to reduce this situation.[19] Another study conducted for similar purposes stated that the COVID-19 pandemic had moderate to severe negative psychological effects on pregnant women.[24] A case-control study on the anxiety and depressive symptoms of pregnant women during the COVID-19 pandemic revealed that pregnant women had high levels of anxiety and depression during the pandemic and found that psychological and social isolation brought about by the disease had a significant effect on their anxiety and depression levels.[12] Another study on the effect of social isolation during the COVID-19 pandemic has stated that social isolation leads to loneliness, which is considered a risk factor for many mental disorders such as stress, anxiety, depression and even dementia later in life.[20]

In the study, a significantly high number of pregnant women who were diagnosed with COVID-19 reported that COVID-19 affected their pregnancy and baby (Table 2). Accordingly, pregnant women diagnosed with COVID-19 are more concerned about both themselves and their babies during the pandemic. This result may be due to the lack of clear evidence about the consequences of the disease in pregnant women and babies. As a matter of fact, the American College of Obstetricians and Gynecologists (ACOG) states that the effects of COVID-19 on pregnancy are still being investigated, whereby current studies have reported that pregnant women have a more severe risk of COVID-19 than non-pregnant women.[21]

In conclusion, this study revealed that pregnant women experience stress and anxiety during the COVID-19 pandemic, significantly related to COVID-19-specific concerns about risks to their own lives, their babies' health, and social isolation. However, it has been determined that these intense psychological problems experienced during pregnancy also affect the postpartum period, and women exhibit higher levels of postpartum depression symptoms than before COVID-19. In addition, the study findings show that pregnant women are vulnerable to mental status changes during the COVID-19 pandemic and deserve special care to deal with the high levels of anxiety and associated high postpartum depression caused by a period of uncertainty and stress. However, how long the effect of postpartum depression symptoms caused by COVID-19 last is an important point that requires extra attention, which is not yet known. Early detection of mental health problems is important in the perinatal period. Healthcare professionals should be aware of the ten-dency of pregnant women to have anxiety during pandemics and consider the potential impact of pandemic-related symptoms on their physical and mental health. By prioritising effective screening strategies for depression and anxiety symptoms during the pandemic, early detection of health problems may allow obstetricians to make appropriate treatment plans with mental health professionals and provide public health education and mental health services, especially for pregnant women.

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