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RESEARCH ARTICLE

THE RELATIONSHIP BETWEEN FEAR OF COVID-19, ANXIETY AND DEPRESSION IN PREGNANT WOMEN

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ABSTRACT

Purpose: The aim of the study was to investigate the relationship between COVID-19 fear, anxiety and depression on pregnant women.
Material and Methods: The cross-sectional, correlational research was conducted with 335 pregnant women from June to October 2020 at the antenatal outpatient clinics of a university hospital. Data were collected using Description Form, Fear of COVID-19 Scale, Beck Anxiety Inventory and Edinburgh Postnatal Depression Scale.
Results: The Fear of COVID-19 Scale, Beck Anxiety Inventory and Edinburgh Postnatal Depression Scale average scores were 21.12±6.56, 6.39±5.48 and 8.13±9.13, respectively, indicating pregnant women' levels of COVID-19 fear were moderately high and their anxiety and depression levels were moderate. Overall, 14.0% of pregnant women had depression risk and 42.4% had symptoms of anxiety (26.3% low level, 10.4% moderate level and 5.7% high level). A positive, significant relationship was found between the COVID-19 fear level and depression ($r=0.207$, $p<0.001$), and anxiety level ($r=0.135$, $p<0.013$). COVID-19 fear and anxiety significantly predicted the risk of depression ($\beta=0.17$, $p<0.001$; $\beta=0.43$, $p<0.001$) and they explain 24% of the variance in depression.
Conclusion: The level of COVID-19 fear increased anxiety and depression risk in pregnant women. In this context, it seems that using effective interventions to decrease of COVID-19 fear may help in reducing anxiety and risk of depression among pregnant women.

Keywords: COVID-19, fear, anxiety, depression, pandemic, pregnant women

INTRODUCTION

The World Health Organization (WHO) in March 2020, declared coronavirus disease-19 (COVID-19) a global pandemic (1). According to WHO reports on COVID-19 for October 2021, there were 241.4 million cases and 4.9 million deaths globally (2). Turkey was officially confirmed the first COVID-19 patient on 11 March 2020. According to the Turkish Ministry of Health (MoH), there were more than 7.3 million cases and more than 65.7 thousand deaths in Turkey by October 2021 (3).

In the literature have been reported due to COVID-19 significant increase in myocarditis and inflammatory symptoms in pregnant women, and miscarriage, stillbirth due to thrombocytopenic purpura, hydrops fetalis and intrauterine fetal death (4-7). Evidence confirm about the vertical transmission of COVID-19 between mother and fetus during pregnancy, although this is likely to be rare (8). In this regard,

pregnant women may be considered vulnerable population under risk for COVID-19 disease due to other coronavirus-related infections including SARS, MERS and the effects on pregnancy (9). American College of Obstetricians and Gynecologists (ACOG) state that COVID-19 outbreak increases the risk of perinatal stress, depression and anxiety at pregnant women (10). Depression and anxiety during pregnancy are known to be associated with risks such as preeclampsia, miscarriage, premature birth, lower birth weight, and lower Apgar score (11,12).

Over the world, governments have taken numerous measures including restriction of travel, closing of schools, giving administrative leave for pregnant women and individuals with chronic disease working at state institutions, and not leaving the house unless necessary (1). The restrictive measures, increased number of cases, and circulating misinformation have led to increased loneliness, stress, fear, anxiety, and depression in individuals, particularly among pregnant women (13-17). Investigating the relationship between fear of COVID-19, anxiety and depression is important in planning interventions to reduce the fear of COVID-19 in pregnant women. The aim of the study was to investigate the relationship between COVID-19 fear, anxiety and depression in non-infected pregnant women during the COVID-19 pandemic in Turkey.

Research Questions

- What is the level of COVID-19 fear, anxiety and depression of pregnant women during COVID-19 pandemic?
- What is the level of COVID-19 fear of pregnant women according to their perceptions about COVID-19?
- Is there a significant relationship between the COVID-19 fear, the anxiety and the depression of pregnant women during COVID-19 pandemic?

MATERIAL AND METHODS

Study Design and Sample

The cross-sectional, correlational study was conducted between June and October 2020. The population of the research comprised pregnant women who were followed up in antenatal outpatient clinics of a University Research and Practice Hospital in Turkey. G*Power (version 3.1.9.7) software was used to determine the size of sample (18). A priori power analysis was performed based on a point biserial model correlation test (power=80%, alpha significance=0.05 (two tailed) and Cohen's effect size=0.20) (19). Based on the power analysis, the minimum number of pregnant women to be included in the study sample was calculated as 191. To increase the representation power of the population, the sample consisted of 335 women who met the inclusion criteria and agreed to take part. Post-hoc power analysis show that the power of the present study sample size was over 95% to detect an effect size of 0.2 for the population. The inclusion criteria included: (a) being primary school graduate or over, (b) to be aged over 18, (c) having completed the 6th gestational week, (d) having a healthy single fetus, (e) not having been diagnosed with high risk pregnancy, (f) not having diagnosed psychiatric disorders and (g) having no communication problems.

Data Collection

Data were collected using Description Form, Fear of COVID-19 Scale (FCV-19S), Beck Anxiety Inventory (BAI), and Edinburgh Postnatal Depression Scale (EPDS). The questionnaire forms were filled through face-to-face interviews with women who applied to antenatal outpatient by a researcher taking into account the COVID-19 social distancing measures in outpatient clinics. The completion time of data collection forms were about 15 minutes.

Description Form

Form was designed based on relevant literature by the researchers, and the form included three section with fifteen questions about the sociodemographic (age, and education and income status etc.) and obstetric characteristics (gestational age, parity, and planned pregnancy status etc.) of pregnant women and their COVID-19 perceptions (views about risk of the COVID-19 due to pregnancy, and transmission of COVID-19 between mother and fetus etc.) (13-15,17,20).

Fear of COVID-19 Scale

The FCV-19S was developed by Ahorsu et al. (17) to explore the fear of COVID-19. The scale was adapted for Turkish by Satici et al. (20). The FCV-19S consists of one-dimensional 7-items that are answered using a five-point scale. The total score of the scale obtained from 7 to 35 points, and high scores indicate severe fear of COVID-19. Cronbach's alpha of the scale was 0.84 (20), in the present study, it was 0.85.

Beck Anxiety Inventory

The BAI was developed by Beck et al. (21) to explore

the level of anxiety symptoms. The Turkish validity and reliability of the scale was tested by Ulusoy et al. (22). The scale consists of one-dimensional 21-item that are answered using a four-point scale. The total score of the scale obtained from 0 to 63 points and higher scores indicate a high level of anxiety symptoms (0-7; minimal anxiety, 8-15; mild anxiety, 16-25; moderate anxiety, and 26-63 severe anxiety). Cronbach's alpha of the scale was 0.93 (22), in the present study, it was 0.91.

Edinburgh Postnatal Depression Scale

The EPDS was developed by Cox et al. (23) and validated by Murray and Cox (24) for use in pregnancy period to explore the risk of depression. The Turkish validity and reliability of the scale was tested by Engindeniz et al. (25). The scale consists of one-dimensional 10 item that are answered using a four-point scale. In order to avoid bias, 7 of the 10 items (5, 6, 7, 8, 9, and 10) are reversely scored. The total score of the scale obtained from 0 to 30 points, and scores of 13 and above indicate severe level of depressive symptom. Cronbach's alpha of the scale was 0.79 (25), in the present study, it was 0.83.

Statistical Analysis

Data were analyzed using IBM SPSS, version 23.0 statistic software (Armonk, NY: IBM Corp). Numbers, percentages, mean, standard deviation, and maximum-minimum values was used at descriptive-statistics. Independent sample t-test was used to compare of FCV-19S means according to some perceptions about COVID-19 of women. Pearson's correlation analysis was used to explore the relationship between pregnant women' FCV-19S and EPDS, FCV-19S and BAI, and BAI and EPDS total scores. Linear logistic regression analysis was used to identify the predictors of being exposed to pregnancy depression symptoms. Statistical significance-value was $p \leq 0.05$.

Ethical Statement

The study was approved by the MoH in Turkey Scientific Research Platform on COVID-19 (2020-06-09T15_13_00). Ethical approval was obtained from Duzce University Non-Interventional Health Researches Ethic Committee (Approval number: 2020/120; Approval date: 15.06.2020). Written permissions were obtained from the hospital where the research was conducted. Furthermore, permissions to use the scales were obtained by e-mail. Pregnant women were informed about the study at the beginning of the study and, verbal and written informed consent was obtained from women who volunteered to participate in the study. Data collection forms were evaluated immediately after the data collection and, pregnant women who were determined to be at risk of depression were directed to a health institution. The study was carried out consistent with the Helsinki Declaration.

RESULTS

A total of 335 pregnant women were involved in the study. The mean age of the pregnant women was 27.65±5.53 years (min=19 max=43), and their mean gestational age and parity were 29.64±7.83 weeks (min=12, max=40) (4.2% in the first, 28.4% in the second and 67.5% in the third trimester) and 2.11±1.27 (min=1, max=6), respectively. Of the women, 39.7% graduated from primary school, and 38.2% graduated from high school. Most women (70.4%) had middle income, and majority (70.7%) had planned pregnancy. Almost all the women (98.8%) had no COVID-19 symptoms until then, the majority (56.7%) decreased frequency of perinatal follow-ups during the COVID-19, and almost all was at home except perinatal follow-ups and unless necessary (47.8% and 45.7%, respectively).

The mean FCV-19S score of the pregnant women was 21.12±6.56. The mean scores of the each item was between 3.63 and 2.24. The high scores indicated more fear about COVID-19. The main fears regarding COVID-19 were: feeling uncomfortable to think about COVID-19 (item-2, 3.63±1.15) and watching news and stories about COVID-19 on social media (item-5, 3.58±1.24). Least fears regarding COVID-19 were: clamming in hands while thinking of COVID-19 (item-3, 2.32±1.17) and not sleeping due to the worry for getting COVID-19 (item-6, 2.24±1.09). The items for the FCV-19S are scored from 1 to 5, so the neutral midpoint of the Likert scale is 3. The average scores on the item 2, 5, 1 and 4 were 3.63±1.15, 3.58±1.24, 3.53±1.24 and 3.22±1.29, respectively. The mean score of those four items of scale was above the midpoint of 3 for the Likert scale. The average scores on the item 7, item 3 and item 6 were 2.49±1.17, 2.32±1.17, and 2.24±1.09, respectively. These three items of scale had a mean of below the midpoint of 3 for the Likert scale (Table 1).

Almost all women stated that they felt discomfort (86.6%) during their visit to hospital for perinatal

Table 1. The mean scores of the FCV-19S of pregnant women (n=335)

	Items	Mean	SD	min-max
1	I am most afraid of coronavirus-19	3.53	1.24	1-5
2	It makes me uncomfortable to think about coronavirus-19	3.63	1.15	1-5
3	My hands become clammy when I think about coronavirus-19	2.32	1.17	1-5
4	I am afraid of losing my life because of coronavirus-19	3.22	1.29	1-5
5	When watching news and stories about coronavirus-19 on social media, I become nervous or anxious	3.58	1.24	1-6
6	I cannot sleep because I'm worrying about getting coronavirus-19	2.24	1.09	1-5
7	My heart races or palpitates when I think about getting coronavirus-19	2.49	1.17	1-5
	Total mean FCV-19S	21.12	6.56	7-35

FCV-19S: Fear of COVID-19 scale

follow-up and 80.0% stated that they thought pregnancy increased the risk of COVID-19. Almost all women (86.0%) stated that COVID-19 could be transmitted from mother to baby during pregnancy. In addition, 86.6% of women said that COVID-19 might infect them and similarly 86.9% expressed that they thought COVID-19 might infect their baby during the delivery at hospital. The ones feeling discomfort at their visit to hospital for perinatal follow-up and the ones thinking that the possibility of being infected by COVID-19 increased with pregnancy and their baby and the mothers might be infected at the hospital during delivery had statistically higher FCV-19S scores (Table 2).

The mean EPDS score of the pregnant women was 6.39±5.48, and 14.0% (n=47) met the cut off score for risk of depression (**≥**13). In addition, the mean BAI score of pregnant women was 8.13±9.13 and that women experienced anxiety 26.3% at a low level, 10.4% at a moderate level and 5.7 % at a high level (Table 3).

A positive, significant relationship was found between mean scores of FCV-19S and EPDS (r=0.207, p<0.001) and, between FCV-19S and BAI (r=0.135, p<0.013). This result shows that as the mean scores of FCV-19S increased the EDS mean scores and BAI also increased. In addition, positive significant relationship was found between EPDS and BAI mean scores (r=0.460, p<0.001) (Table 4).

According to the results of the simple linear regression analysis, COVID-19 fear and anxiety significantly and positively predicted the level of pregnancy depression (β=0.17, p<0.001; β=0.43, p<0.001). Anxiety and COVID-19 fear explain a total variance of 24% of pregnancy depression (R=0.492, R^2=0.242, p<0.001) (Table 5).

DISCUSSION

Pregnant women had moderately high (21.12±6.56) fear for COVID-19 in the study. In the studies conducted in Turkey, among the infertile women, women in the postpartum period and in the general population, it was found that the fear for COVID-19 among the participants was lower than the fear level of participants in the present study (16.7±5.3, 19.76±6.76, and 20.03±7.51, respectively) (14,20,21). We think that the fact that the present study group is a more vulnerable population and that the studies were conducted at different pandemic periods which influenced the difference in the levels of COVID-19 fear. In a study conducted in the general population in Iran, it was found that the fear level of COVID-19 was higher than (27.39±6.39) the present study (17). It is thought that this difference may be due to the differences in the epidemiology of the countries during the COVID-19 pandemic. In addition, the main COVID-19 fears of pregnant women in this study were as follows: feeling discomfort while thinking of COVID-19 (item:2), having anxiety while reading or watching COVID-19 news in social media and stories (item:5), and being afraid of COVID-19 (item:1). The present study finding is compatible with the literature (20,26,27). As a result of social isolation

Table 2. Comparison of the mean Fear of Covid-19 scale scores of pregnant women according to their perceptions about COVID-19 (n=335)

Perceptions about COVID-19	n (%)	Mean±SD	Analyses[a]
Do you worry about hospital visiting for your perinatal follow-up?			
Yes	290(86.6)	21.63±5.77	t=5.046
No	45(13.4)	16.91±6.04	p<.001**
Do you think you are at increased risk of the COVID-19 due to pregnancy?			
Yes	268(80.0)	21.58±6.03	t=3.584
No	67(20.0)	18.67±5.63	p<.001**
Do you think COVID-19 can be transmitted from mother to baby during pregnancy?			
Yes	288(86.0)	21.40±6.03	t=3.027
No	47(14.0)	18.55±5.62	p=0.003*
Do you think COVID-19 can be transmitted to mother during the process of birth?			
Yes	290(86.6)	21.54±5.90	t=4.033
No	45(13.4)	17.51±5.88	p<.001**
Do you think COVID-19 can be transmitted to baby during the process of birth?			
Yes	291(86.9)	21.45±6.00	t=3.563
No	44(13.1)	18.02±5.61	p<.001**

*p<0.05.
**p<0.001.
[a]Independent t-test.

during the pandemic period, social media is most frequently used tool to obtain information about COVID-19 (22). However, it is one of the striking findings of the present study that the social media posts were revealed as the main cause of COVID-19 fears of pregnant women, one of the vulnerable populations during the pandemic period, while the effects of COVID-19 were not sufficiently known. This finding is especially important in terms of demonstrating the importance of raising awareness of health literacy by establishing control mechanisms on social media.

Almost all (86.6%) pregnant women of the present study stated that they were anxious about the visits to hospital for perinatal follow-up during the pandemic period. Similarly, the studies conducted in Israel and Nigeria showed that pregnant women in those countries were also very anxious for visiting the hospitals for perinatal follow-ups (28,29). When the infection speed of COVID-19 and infecting ways were considered during the pandemic period which required social isolation, going to a risky area like hospital naturally increases the anxieties. Royal College of Obstetricians & Gynecologists (RCOG) recommends that measures should be implemented to decrease the risk of transmission during the pandemic, such as limiting antenatal controls as much as possible (a minimum of six in-person antenatal consultations) or monitoring from home (30). In this context, it is important for pregnant women to plan their antenatal follow-up frequency with healthcare professionals and to inform them about applying personal and social hygiene rules while maintaining social distance as much as possible during necessary hospital visits.

In this study, the majority of pregnant women (80.0%) stated that they thought that pregnancy would increase the risk of getting COVID-19 and almost all (86.6%) of them could be infected with COVID-19 at delivery. There is no sufficient evidence in the literature that pregnancy increases the risk of COVID-19 infection. However, pregnant women are considered to be a risky group as the physiological changes experienced during pregnancy may increase the rates of infection, mortality and morbidity (4,5). An MMWR study showed that pregnant women were at higher risk of being admitted to intensive care unit (ICU) and receive invasive-ventilation (IV), and die compared to non-pregnant women (31). Similarly, during the H1N1 influenza virus and SARS 2009 pandemics, the rate of admission, ICU admission, receive IV and mortality was higher for pregnant women compared to the general population (32,33).

Table 3. The mean scores of the Beck Anxiety Inventory and the Edinburgh Postnatal Depression Scale of participants (n=335)

Scales	n	%
BAI *(Mean, SD)*	8.13	9.13
No anxiety	193	57.6
Low levels of anxiety	88	26.3
Moderate levels of anxiety	35	10.4
High levels of anxiety	19	5.7
EPDS *(Mean, SD)*	6.39	5.48
None risk Depression	288	86.0
Risk Depression	47	14.0

BAI: Beck anxiety inventory, EPDS: Edinburgh postnatal depression scale

During pandemic influenza, the mortality of general population was 2-6%, while this rate was %37 among the pregnant women (34). Newly emerging infections cause significant negative effects on pregnant women and fetus which is also revealed in other pandemics. For this reason, it is very important to protect pregnant women against COVID-19 infection as well as from all infections.

In the present study, almost all pregnant women stated that they thought COVID-19 could infect their babies during pregnancy (86.0%) or during delivery (86.9%). Similarly, in a study conducted in India, half (50.6%) of pregnant women stated that they were concerned that COVID-19 could be transmitted from mother to baby during delivery or pregnancy (35). In the studies conducted on the transmission of COVID-19 to the fetus during pregnancy, COVID-19 was not found in any of the cord blood, amniotic fluid, newborn throat swab and breast-milk samples, and also no fetal or neonatal death and neonatal asphyxia due to COVID-19 was identified (36,37). These findings are important in terms of revealing the need for adequate and accurate information to pregnant women regarding COVID-19 transmission during pregnancy and delivery. This study also determined that FCV-19S mean scores was high for pregnant women who experienced discomfort during hospital visits for perinatal follow-up, who thought that pregnancy increased the risk of COVID-19 infection, who thought that COVID-19 could be transmitted from mother to baby during pregnancy, and who stated that COVID-19 could be transmitted to themselves or their babies at delivery ($p<0.001$). These results are important in terms of reflecting the consistency of the present study findings.

Table 4. The correlation between the FCV-19S, BAI and EPDS scores

	Analyses	FCV-19S	EPDS	BAI
FCV-19S				
	r	-	0.207	0.135
	p	-	0.000**	0.013*
BAI				
	r	0.135	0.460	-
	p	0.013*	0.000**	-
EPDS				
	r	0.207	-	0.460
	p	0.000**	-	0.000**

FCV-19S: Fear of COVID-19 scale, BAI: Beck anxiety inventory, EPDS: Edinburgh postnatal depression scale
*p<0.05, **p<0.001

In the present study, it was also determined that 14.0% of pregnant women had depression risk (mean≥13) and 42.4% of them experienced anxiety (26.3% low, 10.4% moderate and %5.7 high level). In the studies evaluating the risk of depression in pregnancy during the COVID-19 period, it was found that 26.7% of pregnant women in China had EPDS score of ≥10 (38), and 40.7% of pregnant women in Australia had depression risk (39). In the studies evaluating the level of anxiety in pregnancy during the COVID-19 period, it was found that 24% of pregnant women in China experienced high level of anxiety (40) and 72.0% of pregnant women in Australia experienced anxiety above moderate level (39). It is thought that the reason for the differences in the results of these studies evaluating depression and anxiety levels on pregnant women during the COVID-19 pandemic process were conducted in different populations, the study groups had different cultural and socioeconomic characteristics, the scales used in determining depression and anxiety were different, and the cut-off points of the scales were evaluated differently. In that sense, it is important to explore the psychological status of pregnant women in order to reveal the psychological impacts of the pandemic during pregnancy and to provide early psychological support, when emotional and physiological vulnerability increases. The ACOG recommends screening pregnant women for depression and anxiety using a measurement tool standardized at least once in the perinatal period by obstetric caregivers to reduce the risk of postpartum depression, one of the causes of maternal mortality

Table 5. Fear of COVID-19 and anxiety, as a predictor of pregnancy depression

	B	Std.E	Std.β	t	p
Constant				0.984	0.326
FCV-19S	0.160	0.044	0.177	3.649	0.000*
BAI	0.259	0.029	0.431	8.906	0.000*
$R = 0.492$, $R^2 = 0.242$, Adjusted $R^2 = 0.238$, $F = 53.084$, *p<0.001					

Abbreviations: FCV-19S, Fear of Covid-19 Scale; BAI, Beck Anxiety Inventory; EPDS, Edinburgh Postnatal Depression Scale. *p<.001

(41). Unfortunately, while concerns about mental health increased during the pandemic, face-to-face clinical screenings for depression in the prenatal period decreased (39,42,43). In the present study, revealing the mental state of pregnant women by face-to-face evaluation with valid measurement tools during the COVID-19 pandemic reflects the strength of the present research.

The negative maternal mental health during pregnancy are known to be associated with risks such as preeclampsia, miscarriage, premature birth, lower birth weight, and lower Apgar score. In the present study, the COVID-19 fear and anxiety among pregnant women were indicated to have a positive and significant correlation. In addition, COVID-19 fear and anxiety are a significant predictor of depression and explain the variance of 24% for depression. In this regard, the fact that fear of COVID-19 causes negative changes in maternal mental health indicators is another striking finding of the present study.

Study Strengths and Limitations

The strength of the present study is that the questionnaire forms are filled through face-to-face interviews with women who applied to antenatal outpatient. The fact that most research data was collected through online platforms during COVID-19 period limit accessing women at different socio-economic levels and answering questionnaires without the physical presence of the interviewer could affect the answers of the participants. There are also several limitations in the present study. One of the limitation of the research is the use of a convenience-sample which would limit representativeness of results. Another limitation is that the research was performed as a single-centered study.

CONCLUSION

The results of the study indicate that fear of COVID-19 has a significant potential for creating anxiety and depression, which has a negative effect on pregnant women. The level of COVID-19 fear was moderately high in pregnant women. Almost one fifth of the pregnant women had risk of depression and almost half had symptoms of anxiety. Fear of COVID-19 negatively affect the level of anxiety and depression ($p<0.001$). In addition, COVID-19 fear and anxiety was a significant predictor of depression and explain the variance rate of 24% in depression ($p<0.001$). Decreasing the COVID-19 fear, may be an important to prevent anxiety and depression during the pandemic. In this regard, this study highlights the need to increase the awareness among health professionals regarding negative effects of the COVID-19 fear, anxiety and depression in pregnant women, and to use effective strategies to reduce the fear of COVID-19 of pregnant women. In addition, multi-center studies covering postnatal follow-up should be conducted.

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