Original Article

Mental Health and Fear of COVID-19 in Iranian Pregnant Women: A Multi-Center Study

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Abstract

Background: The new coronavirus (COVID-19) pandemic has extensive psychological effects on pregnant women. **Objectives:** The aim of this study was to assess mental health, fear of COVID-19, and their association among pregnant women. **Methods:** This cross-sectional study was conducted on 607 pregnant women in Isfahan, Iran, from September 26 to December 20, 2020. The pregnant women were randomly selected from health centers affiliated with Isfahan University of Medical Sciences using a two-stage cluster sampling. A three-part web-based questionnaire (i.e., a demographic questionnaire, the Fear of COVID-19 Scale, and the General Health Questionnaire) was used to collect data. Chi-square test, independent-samples *t*-test, and logistic regression analysis were used for data analysis. **Results:** Most participants (73%) had a high level of fear of COVID-19, while 11% had a history of COVID-19 infection. In the final model, poor financial status (odds ratio [OR] = 3.06, 95% confidence interval [CI]: 1.32–7.10), COVID-19 infection (OR = 2.25, 95% CI: 1.22–4.16), history of mental disorders (OR = 10.11, 95% CI: 2.44–41.75), and number of pregnancies (OR = 2.59, 95% CI: 1.39–4.81) were associated with a significant increase in the chance of mental health disorder. A high COVID-19 fear score resulted in a 29% increase in mental health disorders, although this increase was not statistically significant. **Conclusion:** The prevalence of fear of COVID-19 was high among pregnant women. Poor financial status, number of pregnancies, history of COVID-19 infection, and a history of mental problems were associated with an increased risk of mental health disorders in pregnant women.

Keywords: *COVID-19, Fear, Iran, Mental health, Pregnant women*

Introduction

In late December 2019, a new virus from the coronavirus family (COVID-19) emerged and spread rapidly around the world.[1] Pregnant women are among the most vulnerable groups during the COVID-19 pandemic.[2] They are more susceptible to infection and are at increased risk for severe complications due to their naturally suppressed immune system.[3]

Pregnancy is a life-changing period associated with intense emotions[4] and mental health disorders. About 12% of women experience depression and up to 22% suffer from severe anxiety in late pregnancy.[5,6] A study reported that the COVID-19 pandemic has short- and long-term effects on the mental health of pregnant mothers.[7] During the pandemic, preventive measures such as quarantine, physical distance, remote consultation with physicians and healthcare professionals, and failure to receive enough prenatal care heightened the concern of pregnant mothers.[8]

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The increased stress in pregnant women can cause serious complications such as preeclampsia, hypotension, severe pregnancy-related nausea, and vomiting. It may even result in preterm birth with, low birth weight and low APGAR in the newborn.[8] Pregnant mothers have been shown to be very concerned about their health and the fetus during the COVID-19 pandemic.[9] The COVID-19 pandemic has also increased the prevalence of mental disorders in pregnant women and severely affected their quality of life.[9-12] Research has also shown that a pregnant woman's mental health affects not only her health but also the health of the baby and family members.[9] However, none of the studies have examined the association between fear of COVID-19 and the mental health of pregnant women.[13,14] Therefore, this study was conducted to fill this gap.

Objectives

The aim of this study was to examine the mental health of pregnant women, its risk factors, and its association with the fear of COVID-19.

Methods

Design and participants

This cross-sectional study was conducted on 607 pregnant women in Isfahan city, Iran, from September 26 to December 20, 2020. The sample size was calculated based on the results of a previous study that assessed the general health of people during the COVID-19 pandemic and the mean score of the subjects was reported to be 19.02 ± 2.08.[15] Then, considering a type one error of 0.05, a mean of 19.02 and a standard deviation of 2.08, a measurement error (d) of 0.2, and the design effect of 1.5, the minimum sample size was calculated to be 606. However, considering a possible dropout of 5% (DR), the total sample size was increased to 638 ($N_{adjusted}$ = n (606)/(1-DR).[16,17] First, 18 health centers affiliated with Isfahan University of Medical Sciences were randomly selected based on the $\sqrt{n}/2$ formula.[18] Then, simple random sampling was conducted to recruit pregnant women from each health center.

Inclusion criteria were pregnancy, ability to read and write in Persian, willingness to participate in the study, and having access to the Internet. Initially, the telephone number and national code of all pregnant women were obtained from the local health center. The national codes were then used to create a sampling frame, and subjects were randomly selected from the list. Those with inclusion criteria were contacted and invited to participate in the study.

Data collection instruments

A demographic questionnaire, the General Health Questionnaire (GHQ-28), and the Fear of COVID-19 Scale (FCV-19S) were used to collect data. Demographic questions included questions on age (year), education level (academic degree, high school, primary school), having a job (yes/no), financial status (good, moderate, poor), COVID-19 infection in the past year (yes/no), having COVID-19 infection in the family in the past year (yes/no), history of mental diseases (yes/no), number of pregnancies (one, two, three, and more than three), history of infertility (yes/no), assisted pregnancy (yes/no), the age of pregnancy (first trimester, second trimester, third trimester), hospitalization during pregnancy (yes/no), bed rest (yes/no), a noncommunicable disease (NCD) in pregnancy such as preeclampsia, eclampsia, gestational diabetes and hypertension (yes/no), a chronic NCD before pregnancy such as diabetes, hypertension, and heart disease (yes/no).

The GHQ-28 includes 28 items in four subscales, namely physical symptoms, anxiety and sleep disorders, social dysfunction, and depression. All items are rated on a 4-point Likert scale ranging from 0 to 3. The score of each subscale ranges from 0 to 21 and the total score ranges between 0 and 84. A lower score indicates better mental health. Individuals with a total score of 23 or less are considered as healthy, whereas those with a score of ≥24 are considered to have a mental disorder.[19] Rashidi *et al*. confirmed the validity and reliability of the Persian translation of the GHQ-28 and its Cronbach's alpha was 0.88.[20]

FCV-19S is a seven-item scale, and all items are rated on a 5-point Likert scale ranging from 1: "strongly disagree" to 5: "strongly agree." The total score of the FCV range from 7 to 35, with higher scores indicating greater fear of COVID-19. The validity and reliability of the FCV-19S have already been confirmed in Iran.[21] A score ≥16.5 indicates greater fear of COVID-19.[22] The Cronbach's alpha of the GHQ-28 and the FCV-19S in this study were 0.89 and 0.71, respectively.

The link to the questionnaire was sent to pregnant women via short message service, WhatsApp, or Telegram messengers. A total of 607 subjects completed the study.

Ethical considerations

The study protocol was approved by the Research Ethics Committee of Isfahan University of Medical Sciences, Isfahan, Iran (approval code: IR.MUI.MED.REC.1399.488). The purposes of the study were explained to all pregnant women. Participation in the study was voluntary, data were managed confidentially, and results were reported anonymously. All participants signed a written informed consent before contributing to the study.

Data analysis

Descriptive analyses, including frequency, percentage, mean, and standard deviation, were calculated to describe the variables. The Chi-square test was used to compare the categorical variables. The independent samples *t*-test was used to compare the mean scores between the subgroups of the participants. Logistic regression analysis was used to investigate the relationship between GHQ-28 and FCV-19S scores and other variables. First, all independent variables were entered into univariate logistic regression models using the Enter method. Then, all variables with a $P < 0.2$ were entered into the multivariable logistic regression model using the forward method. Odds ratio (OR), adjusted odds ratio, and 95% confidence interval (95% CI) were reported (AOR). $P < 0.05$ were considered statistically significant. All analyses were conducted using the SPSS software version 16 (SPSS Inc., Chicago, IL, USA).

Results

The mean age of the pregnant women was 28.66 ± 5.41 years. Most of them had academic and high school education (87.2%), were in the second and third trimesters of pregnancy (88.1%), and had their first pregnancy (45.5%), 30% reported pregnancy-related diseases, and 11.5% had a history of COVID-19 infection. However, 73.3% of them reported a high level of fear of COVID-19 [Table 1]. In the univariable models, poor financial status, COVID-19 infection, history of mental disorders, number of pregnancies, and having NCD before pregnancy were associated with general health disorders and entered into the multivariable model. A high FCV-19S score resulted in a 29% increase in general health disorders, but this was not statistically significant [Table 2].

In the multivariable model, poor financial status (OR = 3.06, 95% CI: 1.32–7.10), COVID-19 infection (OR = 2.25, 95% CI: 1.22–4.16), a history of mental disorder (OR = 10.11, 95% CI: 2.44–41.75), and the number of pregnancies were associated with a significant increase in odds of mental health disorders. Furthermore, the second (OR = 1.87, 95% CI: 1.11-3.14) and third pregnancy (OR = 2.59, 95% CI: 1.39–4.81) were associated with a significant increase in the chance of general health disorders [Table 2].

Discussion

About one-sixth of our participants had a mental disorder. Increased odds of having a mental disorder were associated with poor financial status, COVID-19 infection, a history of mental health problems, number of pregnancies, and having NCD before pregnancy, but none of these variables were associated with high FCV-19S scores. Mental health during pregnancy is a serious public health issue.[23] Contrary to our results, a study in China reported that during the COVID-19 pandemic, pregnant women had less depression, anxiety, insomnia, and posttraumatic stress disorder symptoms than nonpregnant women.[24] Despite the controversies found between the two studies, as the pandemic progresses, pregnant women may experience more anxiety and depression than nonpregnant ones, and pregnancy becomes a risk factor for the development of psychopathological disorders.[25] A study in China found that pregnant women are more prone to depression during the outbreak of COVID-19 disease.[26] The stress caused by COVID-19 may even lead some mothers to request early termination of pregnancy and cesarean section.[8] A study in Iran found that 32.7%, 32.7%, and 43.9% of pregnant women experienced depression, stress, and anxiety symptoms during the COVID-19 pandemic, respectively.[27] A study in Italy also reported that 21.7% and 10.2% of pregnant women experienced anxiety and stress during the COVID-19 pandemic.[28] However, the prevalence of mental disorders during the pandemic was higher among our participants. The prevailing culture, and the type, and the quality of health services in different communities, may justify the differences observed in the prevalence of mental disorders between studies. Nonetheless, the instruments used in the different studies may also affect the reported prevalence.

About three-quarters of our participants reported high levels of fear of COVID-19. Another study from Iran also reported that pregnant women have high levels of fear of COVID-19, which negatively affects their quality of life.[29] Studies in Japan,[30] Pakistan,[31] and Canada[32] also reported that pregnant women suffer from moderate to high levels of fear and concern during the COVID-19 pandemic. A study also suggested that sociodemographic variables, health conditions, and obstetric factors may contribute to the increased fear of COVID-19 and are associated with adverse pregnancy outcomes.[32] Fear is an unpleasant emotional state caused by the perception of threatening stimuli such as COVID-19 epidemics.[33] High levels of fear may negatively affect people's behavior. Therefore, high levels of fear of COVID-19 may cause pregnant women to be less likely to attend routine checkups at health centers,[34] which in turn may negatively affect their health and pregnancy outcomes. In this study, poor financial status, a history of getting COVID-19 infection, a history of mental health problems, and the number of pregnancies were associated with mental health disorders. In line with our results, a study showed that financial problems,

Table 1: Characteristics of the study participants

Variables	Total, *n* (%)	GHQ-28		*P*	FCV-19S		*P*
		Disorder, *n* (%)	No disorder, *n* (%)		High, *n* (%)	Low, *n* (%)	
Number of the participants	607 (100)	106 (17.5)	501 (82.5)	-	445 (73.3)	162 (26.7)	-
Age	28.66 ± 5.41	28.60 ± 5.34	28.93 ± 5.71	0.572[a]	28.64 ± 5.28	28.70 ± 5.76	0.913[a]
Education							
Academic	264 (43.5)	53 (50.0)	211 (42.1)	0.366	184 (41.3)	80 (49.4)	0.351
High school	265 (43.7)	39 (36.8)	226 (45.1)		203 (45.6)	62 (38.3)	
Primary school	78 (12.8)	14 (13.2)	64 (12.8)		58 (13.0)	20 (12.3)	
Having a job							
Yes	74 (12.2)	11 (10.4)	63 (12.6)	0.530	47 (10.6)	27 (16.7)	0.042[c]
No	533 (87.8)	95 (89.6)	438 (87.4)		398 (89.4)	135 (83.3)	
Financial situation							
Good	62 (10.2)	12 (11.3)	50 (10.0)	< 0.001[c]	43 (9.7)	19 (11.7)	0.599
Moderate	439 (72.3)	58 (54.7)	381 (76.0)		321 (72.1)	118 (72.8)	
Poor	106 (17.5)	36 (34.0)	70 (14.0)		81 (18.2)	25 (15.5)	
COVID-19 infection							
Yes	70 (11.5)	20 (18.9)	50 (10.0)	0.009[c]	56 (12.6)	14 (8.6)	0.179
No	537 (88.5)	86 (81.1)	451 (90.0)		389 (87.4)	148 (91.4)	
COVID-19 infection in their family							
Yes	100 (16.5)	21 (19.8)	79 (15.8)	0.308	77 (17.3)	23 (14.2)	0.362
No	507 (83.5)	85 (80.2)	422 (84.2)		368 (82.7)	139 (85.8)	
History of mental disorder							
Yes	11 (1.8)	8 (7.5)	3 (0.6)	< 0.001[b]	8 (1.8)	3 (1.9)	1.000[b]
No	596 (98.2)	98 (92.5)	498 (99.4)		437 (98.2)	159 (98.1)	
Number of pregnancies							
First	276 (45.5)	33 (31.1)	243 (48.5)	0.006[c]	199 (44.7)	77 (47.5)	0.389
Second	211 (34.8)	43 (40.6)	168 (33.5)		151 (33.9)	60 (37.0)	
Third	95 (15.7)	25 (23.6)	70 (14.0)		74 (16.6)	21 (13.0)	
More than third	25 (4.1)	5 (4.7)	20 (4.0)		21 (4.8)	4 (2.5)	
History of infertility							
Yes	47 (7.7)	9 (8.5)	38 (7.6)	0.751	33 (7.4)	14 (8.6)	0.617
No	560 (92.3)	97 (91.5)	463 (92.4)		412 (92.6)	148 (91.4)	
Assisted pregnancy							
Yes	50 (8.2)	9 (8.5)	41 (8.2)	0.917	35 (7.9)	15 (9.3)	0.581
No	557 (91.8)	97 (91.5)	460 (91.8)		410 (92.1)	147 (90.7)	
Month of pregnancy							
First trimester	72 (11.9)	12 (11.3)	60 (12.0)	0.942	59 (13.3)	13 (8.1)	0.176
Second trimester	269 (44.3)	46 (43.4)	223 (44.5)		191 (42.9)	78 (48.1)	
Third trimester	266 (43.8)	48 (45.3)	218 (43.5)		195 (43.8)	71 (43.8)	
History of hospitalization during pregnancy							
Yes	25 (4.1)	5 (4.7)	20 (4.0)	0.787[b]	16 (3.6)	9 (5.6)	0.282
No	582 (95.9)	101 (95.3)	481 (96.0)		429 (96.4)	153 (94.4)	
Bed rest during pregnancy							
Yes	149 (24.5)	29 (27.4)	120 (24.0)	0.459	101 (22.7)	48 (29.6)	0.079
No	458 (75.5)	77 (72.6)	381 (76.0)		344 (77.3)	114 (70.4)	
Pregnancy-related diseases							
Yes	184 (30.3)	39 (36.8)	145 (28.9)	0.110	138 (31.0)	46 (28.4)	0.535
No	423 (69.7)	67 (63.2)	356 (71.1)		307 (96.0)	116 (71.6)	
History of chronic diseases before pregnancy							
Yes	132 (21.7)	32 (30.2)	100 (20.0)	0.020[c]	104 (23.4)	28 (17.3)	0.108
No	475 (78.3)	74 (69.8)	401 (80.0)		341 (76.6)	134 (82.7)	

[a]*T*-test *P* value, [b]Exact test *P* value, [c]Statistically significant at 5% level confidence. GHQ: General Health Questionnaire, FCV-19S: Fear of COVID-19 Scale

Table 2: Univariable and multivariable logistic regression analysis for the association between general health with fear of COVID-19 and other variables

Variables	Univariable		Multivariable	
	OR (95% CI)	*P*	AOR (95% CI)	*P*
Age	1.01 (0.97, 1.05)	0.572	-	-
Education				
Academic	1.14 (.059, 2.40)	0.678	-	-
High school	0.78 (0.40, 1.54)	0.488	-	-
Primary school	1	1	-	-
Having a job				
No	1.24 (0.63, 2.44)	0.531	-	-
Yes	1	1	-	-
Financial situation				
Poor	2.14 (1.01, 4.51)	0.046	3.06 (1.32, 7.10)	0.009
Moderate	0.63 (0.31, 1.26)	0.195	0.88 (0.41, 1.91)	0.762
Good	1	1	1	1
Infection to COVID-19				
Yes	2.09 (1.18, 3.70)	0.011	2.25 (1.22, 4.16)	0.009
No	1	1	1	1
Infection to COVID-19 by family				
Yes	1.32 (0.77, 2.25)	0.309	-	-
No	1	1	-	-
History of mental disorder				
Yes	13.55 (5.53, 51.98)	< 0.001	10.11 (2.44, 41.75)	0.001
No	1	1	1	1
Number of pregnancies				
Second	1.88 (1.15, 3.09)	0.012	1.87 (1.11, 3.14)	0.018
Third	2.63 (1.46, 4.71)	0.001	2.59 (1.39, 4.81)	0.003
More than third	1.84 (0.64, 5.23)	0.253	1.54 (0.49, 4.77)	0.451
First	1	1	1	1
History of infertility				
Yes	1.13 (0.52, 2.41)	0.751	-	-
No	1	1	-	-
Assisted pregnancy				
Yes	1.04 (0.49, 2.21)	0.917	-	-
No	1	1	-	-
Month of pregnancy				
Second trimester	1.03 (0.51, 2.06)	0.931	-	-
Third trimester	1.10 (0.55, 2.20)	0.786	-	-
First trimester	1	1	-	-
History of hospitalization during pregnancy				
Yes	1.19 (0.43, 3.24)	0.733	-	-
No	1	1	-	-
Bed rest during pregnancy				
Yes	1.19 (0.74, 1.92)	0.459	-	-
No	1	1	-	-
Pregnancy-related diseases				
Yes	1.42 (0.92, 2.21)	0.111	1.12 (0.67, 1.85)	0.660
No	1	1	1	1
History of chronic diseases before pregnancy				
Yes	1.73 (1.08, 2.77)	0.021	1.65 (0.95, 2.86)	0.073
No	1	1	1	1
FCV-19S score				
Height	1.29 (0.79, 2.13)	0.301	-	-
Low	1	1	-	-

FCV-19S: Fear of COVID-19 Scale, OR: Odds ratio, CI: Confidence interval, AOR: Adjusted OR

poor support from the spouse, previous psychiatric problems, chronic medical disorders, and poor prenatal services were the potential risk factors for prenatal depressive disorders.[35] A former study in Iran also reported that childbirth history, pregnancy problems, history of COVID-19 in family members, concern for maternal and neonatal consequences, and receiving care could predict anxiety and perceived stress scores in pregnant women.[9]

In this study, second and third pregnancies were associated with a significantly higher risk of general health problems than first pregnancies, although the association was not statistically significant among those with more than three pregnancies. However, some studies reported that those with a first pregnancy and no childbirth experience had more stress than those with multiple pregnancies.[2,9] Such differences may be attributed to differences in the prevalence of the disease in different societies or cultural differences between societies.

Only women who were literate and had access to the Internet were included in this study. Furthermore, due to the cross-sectional nature of the study, the reported statistical associations cannot demonstrate causality. More rigorous study designs, such as cohort studies, might be helpful to further investigate the causal relationships. However, the random and multicenter sampling methods were among the strengths of this study and increased the external validity of the results.

Conclusion

In this study, pregnant women presented a high rate of fear of COVID-19. Furthermore, poor financial status, number of pregnancies, history of COVID-19 infection, and a history of mental problems were associated with an increased risk of mental disorders in pregnant women but not with the fear of COVID-19. Considering the prevalence of fear and mental health disorders in pregnant women, it is recommended that health care providers and health policy makers develop and implement educational and counseling programs to improve the mental health of pregnant women during the COVID-19 pandemic.

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Conflicts of interest

There are no conflicts of interest.

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