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Original Article

Self-Care Performance of Pregnant Women in Preventing COVID-19 Infection and Its Relationship with Perceived Stress

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Abstract

Objective: To determine the status of self-care performance of pregnant women in the prevention of COVID-19 disease and its relationship with perceived stress during the epidemic period of this disease.
Method: This cross-sectional study was performed on 228 pregnant women who referred to the health centers in Tabriz, Iran, for prenatal care. They were selected by cluster sampling. Data collection tools included questionnaires about Demographic-Social Characteristics, the Self-Care Performance Questionnaire and Cohen's Perceived Stress Scale. Spearman correlation test was used to examine the correlation between self-care performance and perceived stress in bivariate and multivariate analyses. Also, multivariate linear regression was used, with control of demographic-social and obstetric characteristics as possible confounders.
Results: The median (25-75 percentiles) self-care performance score of participants was 0.71 (0.65-0.76), from the achievable range of 20-80, and its mean (± SD) perceived stress score was 25.5 (± 5.6), from the achievable range of 0-56. The Spearman's rank correlation test results showed a significant inverse correlation between perceived stress and self-care performance scores (r = -0.13; P = 0.041). According to multivariate linear regression test, the variables of self-care performance, education, spouse's education and number of family members were the predictors of perceived stress in pregnant women during the COVID-19 epidemic.
Conclusion: According to the results of the present study, self-care performance of pregnant women in prevention of the COVID-19 disease was good and their stress was moderate. There was a significant inverse correlation between self-care performance and perceived stress that could indicate the high value and importance of the fetus for the mother and her strict adherence to health protocols to prevent COVID-19, which also leads to calming and reduced perceived stress.

Key words: *COVID-19; Pregnancy; Self-Care; Stress*

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Coronavirus disease (COVID-19) is an extremely infectious disease, which has been referred to as a "public health emergency" by the World Health Organization (1). The first case of COVID-19 pneumonia was reported in Wuhan City, Hubei Province, China, in December 2019. The diagnosis of COVID-19 pneumonia is based on epidemiological exposure, clinical symptoms, laboratory tests, chest computed tomography (CT) results, and a positive COVID-19 test result based on quantitative reverse transcription-polymerase chain reaction (QRT-PCR) analysis of samples taken from the respiratory system (2).

Pregnancy is a physiological condition that predisposes women to viral infections. There are concerns about the potential effects of the COVID-19 infection on fetal and neonatal outcomes, and pregnant women are considered a high-risk group that requires special attention (2). Due to physiological changes in the immune and cardiopulmonary systems of pregnant women, clinical manifestations of COVID-19 infection are likely be severe during pregnancy. In 2009, pregnant women constituted 1% of all influenza A H1N1 cases, while they accounted for 5% of H1N1-related deaths (3). In addition, both the severe acute respiratory syndrome coronavirus (SARS-CoV) and the Middle East respiratory syndrome coronavirus (MERS-CoV) were the causes of serious complications during pregnancy, including the need for intubation, admission to intensive care units (ICUs), kidney failure and death (4). Several cases of pregnancy loss (miscarriage or stillbirth) have been observed in women infected with SARS-CoV and MERS, and high fever during the first trimester of pregnancy can increase the risk of some birth defects (5, 6).

Extensive research on this novel coronavirus can fully clarify its transmission routes and pathogenic mechanisms and specify potential drug targets. This would help authorities develop effective preventive and therapeutic measures. Considering the rapid increase in the number of COVID-19 patients, it is very important to diagnose and isolate all suspected cases as quickly as possible to control the source of infection (7).

Public health measures are needed to control the COVID-19 infection, restrict its global outbreak, and reduce relevant damages. Lack of immunity to the novel coronavirus has predisposed a large number of people to infection, and the fast global spread of the virus has led to public panic worldwide. On the other hand, prenatal psychosocial stress is quite common among mothers, and high levels of stress lead to poor pregnancy outcomes (8). Epidemics, which are often widely publicized in the mass media, are associated with high levels of stress and anxiety (9). The COVID-19 crisis increases stress levels in the general population, and since pregnancy is a potentially stressful event, this infection can cause several maternal and neonatal complications (10). According to many epidemiological studies, psychosocial stress is associated with abortion, preeclampsia, preterm delivery, low birth weight, and congenital anomalies (11-13). Prenatal stress can also lead to other complications such as hypothalamic-pituitary-adrenal (HPA) axis dysfunction, depressive symptoms (in adolescence), and asthma (in childhood) (14).

Therefore, it seems necessary to control pregnant women's stress levels in various critical situations such as the COVID-19 pandemic. In general, an infection can be controlled through increasing public awareness, wearing protective clothes, using treatment measures, and, perhaps most importantly, vaccinating the general public. However, hospitalization, quarantine, and implementation of safety measures are critical to the containment of the COVID-19 infection (15). In this regard, practical and emotional support from informal networks (families) and health professionals, clear and concise communication of necessary instructions, and simple daily physical exercises performed at home or in quarantine (to maintain mobility and reduce stress levels) can lower the increasing trend of the COVID-19 infection worldwide (16).

On the other hand, self-care is the first step to help mothers better manage their illnesses, and the health slogan of 2014, "A lifetime of health with self-care", indicates the need to improve the self-care capabilities of all people (17). Self-care measures reduce various complications, hospital readmissions, and health costs and increase patients' satisfaction and their sense of control over themselves, their disease, and various symptoms. Low levels of self-care are associated with poor health outcomes (18).

Despite the widespread media coverage of COVID-19, there is still little information about the self-care performance of people, especially in high-risk groups such as pregnant women. Pregnant women are among the most vulnerable groups in the society and the physiological changes in pregnancy predispose a person to infection, which requires special attention to this group of people in the society. Also, self-care of pregnant women in the context of the corona epidemic is important for both their own health and the health of their fetus. Given the importance of this emerging disease and the necessity of communicating prevention and self-care measures, especially to vulnerable groups, we decided to conduct the present study with the aim of determining the self-care performance of pregnant women in the prevention of COVID-19 and its relationship with their perceived stress with the following objectives: determining the self-care performance of pregnant women in the prevention of COVID-19, determining the perceived stress of pregnant women during the COVID-19 pandemic and determining the relationship of their self-care performance with their perceived stress.

Materials and Methods

Study design and participants

This study was conducted in accordance with the Helsinki Declaration and relevant guidelines. After obtaining permission from the Ethics Committee of Tabriz University of Medical Sciences (Code:IR.TBZMED.REC.1399.403), this cross-sectional study was conducted on 228 pregnant women visiting the health centers of Tabriz, East Azerbaijan Province, Iran, in 2020 for routine pregnancy care. The Inclusion criteria were having a file at a health center, a telephone number to communicate with, and minimum educational attainment (i.e. reading and writing skills). The exclusion criteria also included the self-reported history of mental illnesses, high-risk pregnancy (e.g. suffering from heart diseases, hypertension, lung diseases, iron deficiency anemia, diabetes, thyroid disorders, epilepsy, threat of miscarriage, bleeding during pregnancy, amniotic sac rupture, preeclampsia, etc.,) based on their medical records, and self-reported experience of a severe psychological crisis (e.g. death of a relative) in the past 3 months.

Sampling

The participants were selected using the cluster sampling method. First, 22 health centers (a quarter of all health centers) in Tabriz were randomly selected through the www.random.org website. The researcher referred to the selected health centers and extracted the list and phone numbers of pregnant women covered by those centers from Iran's Integrated Health System (SIB). Then, participants were randomly selected from each center in proportion to the number of pregnant women covered by each center. The author then made phone calls to brief the participants on the research objectives and procedures and to evaluate them in terms of the inclusion and exclusion criteria. Finally, the eligible candidates were asked to visit the respective health centers at a specific time and complete the informed consent form and relevant questionnaires while observing necessary health protocols.

Data collection tools

The socio-demographic and midwifery questionnaire was prepared by the authors and its validity was confirmed by 10 academic members of Tabriz University of Medical Sciences, and included items about the participants' age, educational attainment, job, income level, number of children, etc.

Self-Care Performance Questionnaire (designed to prevent COVID-19 infection in pregnant women): Due to the emergence of COVID-19 disease and the lack of a standard questionnaire in this area, this 20-item questionnaire was developed by the research team based on self-care instructions of the Iranian Health Education and Promotion Association (19). The items were scored based on a 4-point Likert scale from always to never. The total score on this questionnaire ranges between 20 and 80, and higher scores indicate better self-care performance. Scores from "20-40", "41-60", and "61-80" indicate poor, moderate, and good self-care performance, respectively. To assess the content validity of this scale, the content of the instrument was reviewed by ten faculty members of the Tabriz University of Medical Sciences and their suggestions and recommendations were applied in the questionnaire. They were also asked to specify their opinions on the necessity and relevance of each of the questionnaire items to determine the content validity ratio (CVR) and content validity index (CVI).

Cohen's Perceived Stress Scale: Cohen's 14-item Perceived Stress Scale (14-PSS) was developed in 1983 by Cohen *et al.* Three versions of this scale (including 4, 10, and 14-item scales) have been developed to measure general perceived stress level over the past month. The 14-PSS measures an individual's thoughts and feelings about stressful events and assesses his/her control over experienced stresses and tensions. This scale also examines risk factors associated with behavioral disorders and shows the process of stressful relationships. The items are scored based on a 5-point Likert scale anchored with 0 (never), 1 (almost never), 2 (sometimes), 3 (fairly often), and 4 (very often). Items 4, 5, 6, 7, 9, 10, and 13 are scored inversely, and range from never (score 4) to very often (score 0). The total score on this scale ranges between 0 and 56, and higher scores, with a cut-off score of 21.8, indicate higher perceived stress levels. The reliability coefficients of the internal consistency of the scale were obtained through Cronbach's alpha in the range of 84% to 86% in two groups of students and one group of smokers in the smoking cessation program (20). The psychometric analysis of the Persian version of this scale (including 14 items) was performed by Maroufizadeh *et al*. (2014) (21). Bastani *et al.* confirmed the reliability of the Persian version of 14-PSS by measuring its internal consistency (Cronbach's alpha = 0.74) (22).

The content validity of the self-care performance questionnaire was confirmed with a Content Validity Index (CVI) of 0.82 and a Content Validity Ratio (CVR) of 0.88. The test-retest reliability of 14-PSS and the self-care performance questionnaire were also confirmed with Intra-class Correlation Coefficients (ICCs) of 0.85 and 0.79 and a Cronbach's alpha of 0.95 and 0.85, respectively.

Sample size

The sample size was estimated to be 138 in G-power (α = 0.05, two-tailed; power = 95%; correlation coefficient = 0.3). Since the cluster sampling method was employed, the sample size was increased to 207 by considering a design effect of 1.5. Moreover, assuming an attrition rate of 10%, the final sample size was determined to be 228.

Statistical analysis

The obtained data were analyzed with SPSS-21. The normality of the quantitative data was tested using the Kolmogorov-Smirnov test. The quantitative and qualitative variables were assessed using central and dispersion indicators and frequencies (percent),

respectively. In the bivariate correlation analysis, Spearman's rank correlation coefficient test was used to examine the correlation between self-care performance and perceived stress levels. Univariate and multivariate regression tests were also conducted by adjusting the confounding effects of socio-demographic and obstetric variables for determining the correlation between self-care performance and perceived stress levels.

Results

The data were collected from August to September 2020 during the COVID-19 pandemic. Participants included 228 pregnant women, 17 of whom had a history of COVID-19 infection. The mean (± SD) age of the participants and their spouses was 25.7 (± 6.7) and 31.8 (± 5.5) years, respectively. Most of the women (43%) had a high school diploma or higher and most of them (83%) were housewives. Also, about half of the spouses had a high school diploma and university education (54%) and 53% of them were self-employed. More than half of the women lived in private homes (56%), and most of them (85%) were satisfied with their married life. The mean (± SD) gestational age of the participants was 24.9 (± 9.1) weeks; about one-third of participants (35%) were primiparous, and only 9 of them (3.9%) had a history of infertility (Table 1).

Table 1. Socio-Demographic Characteristics of Pregnant Women Participated in This Study (n = 228)

Characteristic	Number (%)	Characteristic	Number (%)
Age (years) *	25.7 (6.7)	Spouse's Job	
Spouse's age (years) *	31.8 (5.5)	Self-employment	122 (53.5)
gestational age (week)*	24.9 (9.1)	Employee	57 (25.0)
Infertility History		Worker	43 (18.9)
No	219 (96.1)	Jobless	6 (2.6)
Level of education		Monthly income level	
Elementary	17 (7.5)	Adequate	142 (62.3)
Secondary school	71 (31.1)	Inadequate	16 (7.0)
High school	43 (18.9)	Relatively adequate	70 (30.7)
High school diploma	64 (28.1)	House status	
University	33 (14.5)	Personal	24 (10.5)
Job		Rental	128 (56.1)
Housewife	190 (83.3)	House of woman's parents	9 (3.9)
Employed at home	14 (6.1)	House of spouse's parents	67 (29.3)
Employed outdoors	24 (10.5)	Number of family members	
Husband's education		2-4	181 (79.3)
Elementary	36 (15.8)	5 and more	47 (20.7)
Secondary school	46 (20.2)	History of COVID-19	
High school	23 (10.1)	Yes	17 (7.5)
High school diploma	58 (25.4)	Wanted pregnancy	
Academic	65 (28.5)	Yes	185 (81.1)
Marital life satisfaction		Number of pregnancies	
Completely	194 (85.1)	1	79 (34.6)
Relatively	31 (13.6)	2-3	128 (56.1)
Unsatisfied	3 (1.3)	≥ 4	21 (9.2)
Number of children		Number of abortions	
0	77 (33.8)	0	198 (86.8)
1-2	139 (60.9)	1-2	28 (12.2)
≥ 3	12 (5.3)	≥ 3	2 (0.8)

*Mean (SD)

The mean (± SD) perceived stress score of participants was 25.5 (± 5.6) and the median (25-75 percentiles) score of their self-care performance was 0.71 (0.65-0.76). The Spearman's rank correlation test results showed a small significant inverse correlation between perceived stress and self-care performance scores (P = 0.041) (Table 2).

Table 2. The Status of Self-Care Performance, Perceived Stress and their Correlation in Pregnant Women (n = 228)

Variable	Mean (SD)	Score Range	Scoring	Correlation r (p)
self-care performance	71.0 (65.0 to 76.0)	20-80	34-80	-0.13 (0.041)
Perceived stress	25.5 (5.6)	0-56	9-40	

*It did not have a normal distribution, so the median (percentiles 25-75) was reported.

The univariate linear regression test demonstrated that the perceived stress level had a significant relationship with self-care performance, women's educational attainment, spouse's educational attainment, type of pregnancy (i.e. wanted or unwanted), number of family members, and marital satisfaction (P < 0.05) (Table 3). These variables were inserted into a multivariate linear regression model using the backward elimination strategy. Finally, self-care performance, woman's educational attainment, spouse's educational attainment, and the number of family members predicted 11% of the variance of participants' perceived stress during the COVID-19 pandemic period (Table 3).

Table 3. The Correlation between Self-Care Performance and Perceived Stress of Pregnant Women Participated in This Study based on Univariate and Multivariate Linear Regression (n = 228)

Variable	Univariable analysis*		Multivariable analysis**	
	B (95%CI)	P	B (95%CI)	P
Self-Care Performance	-0.1 (-0.2 to -0.0)	0.011	-0.1 (-0.1 to -0.0)	0.012
Age (years)	0.0 (-0.2 to 0.2)	0.925		
Spouse's age (years)	0.1 (-0.1 to 0.3)	0.385		
gestational age (week)	0.0 (-0.0 to 0.1)	0/111		
Infertility History (reference: No)				
Yes	0.6 (-3.4 to 4.7)	0.767		
Education (reference: secondary school)				
Elementary	1.5 (-1.9 to 5.0)	0.390	0.5 (-2.4 to 3.5)	0.730
High school	-1.4 (-3.7 to 0.9)	0.239	-1.2 (-3.4 to 0.9)	0.269
High school diploma	-1.6 (-3.9 to 0.7)	0.041	-2.1 (-4.2 to 0.1)	0.037
University	-0.6 (-3.7 to 2.5)	0.650	-0.5 (-3.1 to 2.0)	0.680
Job (reference: Housewife)				
Employed at home	-0.8 (04.0 to 2.4)	0.625		
Employed outdoors	0.2 (-2.8 to 3.2)	0.887		
Spouse's education (reference: Academic)				
Elementary	3.0 (0.6 to 6.3)	0.033	2.7 (0.3 to 5.1)	0.027
Primary school	-0.1 (-2.3 to 2.5)	0.917	-0.4 (-2.6 to 1.7)	0.860
Secondary school	-1.2 (-4.9 to -0.4)	0.630	-2.8 (-5.4 to -0.2)	0.680
High school	1.1 (-1.7 to 4.0)	0.036	0.1 (-1.7 to 2.0)	0.031
High school diploma	3.8 (0.6 to 6.9)	0.869	2.7 (0.3 to 5.1)	0.884
Spouse's Job (reference: Self-employment)				
Employee	0.3 (-4.5 to 5.2)	0.884		
Worker	0.9 (-1.0 to 2.9)	0.360		
Jobless	0.8 (-1.1 to 2.9)	0.398		
Monthly income level (reference: Adequate)				

Inadequate	0.0-3.0 to 3.1)	0.981		
Relatively adequate	1.0 (-0.9 to 3.1)	0.308		
House status (reference: Rental)				
Personal	-1.5 (-4.1 to 1.0)	0.244		
House of woman's parents	-4.6 (-8.9 to -0.3)	0.333		
House of spouse's parents	-1.6 (-3.7 to 0.5)	0.140		
Number of family members (reference: 2-4)				
≥ 5	4.1 (1.5 to 6.6)	0.002	2.9 (1.0 to 4.9)	0.003
History of COVID-19 (reference: No)				
Yes	1.7 (-1.3 to 4.9)	0.268		
Wanted pregnancy (reference: Yes)				
No	2.6 (0.5 to 4.8)	0.048	2.2 (0.4 to 4.1)	0.055
Number of pregnancies (reference:2-3)				
1	1.1 (-3.7 to 6.0)	0.646		
≥ 4	1.9 (-2.3 to 6.2)	0.381		
Number of abortions (reference: 0)				
1-2	-0.8 (-3.8 to 2.0)	0.555		
≥ 3	1.9 (-6.3 to 10.3)	0.640		
Marital life satisfaction (reference: Completely)				
Relatively	1.0 (0.0 to 3.0)	0.044	3.5 (0.0 to 5.6)	0.061
Unsatisfied	2.0 (-4.0 to 9.0)	0.375	2.8 (-3.9 to 8.5)	0.351

*R = 0.476, R Square = 0.227
**R = 0.326, R Square = 0.106

Discussion

The aim of this study was to determine the self-care performance of Iranian pregnant women and its relationship with perceived stress during the COVID-19 pandemic period. The results indicated that 85% of the participants had a good self-care performance in preventing the COVID-19 infection. The spouse's educational attainment, wanting to get pregnant, marital satisfaction, and the housing status of pregnant women were significantly related to self-care performance. Higher educational attainment of husbands was associated with greater self-care performance of wives, because a more educated man transfers his knowledge and awareness to other family members and provides his pregnant wife with more support. In addition, women who had wanted pregnancy and those who were satisfied with their married life had higher levels of self-care performance. These issues highlight the important effect of family and children on women's performance. A woman who lived with her parents or with her husband's parents had lower levels of self-care performance compared with one who lived independently in a private or rented house. This is probably because a pregnant woman who lives with more people cannot take care of herself and follow all health protocols at all times. This was the first study to examine the self-care performance of pregnant women in preventing the COVID-19 infection; thus, there was no similar study to compare with the present study.

These pregnant women had a moderate mean perceived stress score (25.5). This is in line with the findings of Iranzad *et al.* and Kashanian *et al.* who measured Iranian pregnant women's perceived stress before the COVID-19 epidemic period (23, 24). Epidemic and contagious diseases are stressful for all members of a society, and pregnancy alone puts lots of stress on women; therefore, pregnant women are expected to have higher stress levels during the COVID-19 epidemic. Yet, the present results did not support this assumption. A few studies have investigated pregnant women's health status during the COVID-19 epidemic. For example, the results of Medina et.al (in Mexico) (25), Alan *et al.* (in Turkey) (21), Khatri *et al.* (in India) (26), and Effati *et al.* (in Iran) (27), which assess the effect of the COVID-19 pandemic disease on the mental health of pregnant women, are almost in line with the results of the present study on perceived stress. One can conclude that the pieces of training provided by the mass media and health centers may have successfully controlled negative emotions during this critical period. However, Johnbosco *et al.* (in Nigeria) (28), Jose *et.al* (in Granada) (29) and Jiang et.al. (In China) (30) Reported high levels of stress among pregnant women during this period, which may be attributed to the different research settings and sampling times.

A significant inverse relationship was found between self-care performance and perceived stress scores; as self-care performance increased, perceived stress score

decreased. In this respect, the strong mother-fetus bond may have encouraged mothers to better take care of themselves and fully adhere to health protocols to prevent the COVID-19 infection, and this proper self-care may have in turn reduced their perceived stress. The study by Masjoudi et.al. Was in line with the present study. They found a small negative significant association between perceived stress and self-care in pregnant women (31).

Woman's education, spouse's education, and the number of family members predicted pregnant women's perceived stress levels; as higher educational attainment led to lower levels of stress. Higher levels of education may increase women's knowledge and understanding of the COVID-19 infection, help them better protect themselves against the disease, and thereby reduce their perceived stress. This is in line with the results found by Kingston *et al.* (32), Wang et.al. (33) Salmalian *et al.* (34) and Fallahzadeh *et al.* (35). Effati *et al.* enrolled 205 pregnant women visiting health centers of Tabriz for mental health assessment during the COVID-19 pandemic, and found that the variables of woman's education, spouse's education, marital satisfaction, and family income can predict pregnant women's stress levels. Unlike the present study, Effati *et al.* observed higher stress levels in women with greater educational attainment (27). This discrepancy can be attributed to the differences in the number of highly educated people in the two studies and differences in sampling times. The present study was carried out about 8 months after the onset of the COVID-19 pandemic, at a time that the level of public awareness about this disease was relatively high. In the study by Khatri *et al.* in India, most pregnant women had a moderate stress level during the COVID-19 pandemic, and perceived stress scores had no significant relationship with the variables of age, gestational age, and gravida (26). These findings are in line with the present results.

The higher number of family members also resulted in higher perceived stress levels; because, in larger families, it is more likely for one to become infected with COVID-19 and transmit it to the rest of the family members. Therefore, stress levels are higher in larger families.

Limitation

All the answers of pregnant women to the questions of the questionnaires were considered correct, which was one of the limitations of the study. Besides, due to the cross-sectional nature of the study, the pregnant women's stress levels and self-care performance may change over time as a result of the changing prevalence of COVID-19 and the change in its mortality rates, or due to increased awareness levels.

Conclusion

The results showed that Iranian pregnant women had moderate stress levels and good self-care performance in preventing COVID-19 during the outbreak of the disease. The high educational attainment of a pregnant woman and her husband predicted low stress levels. This indicates that high awareness and proper information about a disease and a sense of control over emotions and feelings in critical situations (like pandemics) reduce perceived stress.

High stress during pregnancy is associated with complications such as preterm delivery, preeclampsia, low Apgar scores, depression, etc. On the other hand, any factor that reduces stress during pregnancy can protect the mother and fetus from adverse pregnancy outcomes. Therefore, provision of proper training to pregnant women and their husbands about the COVID-19 infection and prevention strategies may effectively increase women's self-care performance, and thereby reduce their stress levels.

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Conflict of Interest

None.

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