

How to Cite:

Mozaffari, M., Moudi, Z., & Ansari, H. (2022). Effect of an education-support program on the quality of life, preventive behaviors, and fear of COVID-19 in pregnant women referred to health centers of zahedan, Iran, 2021. *International Journal of Health Sciences*, 6(S7), 1469–1487. <https://doi.org/10.53730/ijhs.v6nS7.11550>

Effect of an education-support program on the quality of life, preventive behaviors, and fear of COVID-19 in pregnant women referred to health centers of zahedan, Iran, 2021

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Abstract--Introduction: During the outbreak of an infectious disease such as Covid-19, pregnant women are considered a high-risk population due to physiological and anatomical changes during pregnancy. The rapid spread of the virus around the world has led to negative psychological consequences, including fear, especially in pregnant women. Mother's fear has been associated with consequences such as premature delivery or post-term delivery, low birth weight and intrauterine growth restriction. Studies have shown that the psychological consequences of this disease can also affect the quality of life of pregnant women and cause a decrease in the quality of life and affect the health of the mother and baby. People's preventive behaviors, including washing hands, not shaking hands, not kissing, home quarantine, etc., can eliminate the disease cycle. Materials and methods: In this experimental-interventional study, 49 people were assigned to each intervention and control group, and the participants were all mothers who met the conditions to enter the study and were between 16 and 28 weeks pregnant. The questionnaires used included demographic information, preventive behaviors against corona virus, fear of corona virus and a 12-question quality of life questionnaire. Results: The present study showed that providing a supportive educational program reduced fear in pregnant

women and also improved preventive behaviors against Corona, but in general, it did not have a significant effect on the quality of life before and after the intervention, which could be due to other reasons, including high volume transmission. The information and understanding and knowledge of people or the environment of society.

Keywords---covid_19, pregnancy, fear, quality of life.

Introduction

Since its onset in December 2019, the global pandemic of COVID-19 has posed a major threat to public health worldwide. COVID-19 refers to the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was first identified and isolated in patients linked to a seafood market in Wuhan, Hubei Province, China (1). While originating from an animal species, the virus is now spread mainly through human-to-human transmission. Although COVID-19 is less fatal (2-3% mortality) than SARS (~10% mortality) and MERS (~40% mortality), this pandemic has been much more severe than both of those cases. The virus rapidly spread out of Wuhan to 34 Chinese provinces by March 15, 2020 and subsequently to 144 countries/territories on five continents (1). Despite extensive research done on COVID-19, many aspects of this disease are still unknown (2-4). The World Health Organization (WHO) has recommended “cutting off the transmission chain” as the best way to control the disease apart from vaccination and provided a set of guidelines for this purpose, the most important of which are to observe personal hygiene and social distancing (5).

According to WHO’s weekly statistics, as of January 10, 2021, 88 million people have been diagnosed with COVID-19 and 2 million have died because of this disease (6). Over 5 million of these cases and about 124,000 of these deaths have been in the Eastern Mediterranean region (7). In Iran, the first officially recognized cases of COVID-19 were reported on February 19, 2020 in the city of Qom (8). There is evidence suggesting that Iran has been one the countries that have suffered the most from this disease (9). As of January 9, 2021, about 1 million cases of COVID-19 and 70,000 COVID-19-related deaths have been reported in Iran (7).

Although initial reports indicate slightly higher prevalence of COVID-19 among men, recent studies suggest that women may be at higher risk of being affected by the disease (10). During the outbreak of infectious diseases like COVID-19, pregnant women tend to be a high-risk population because of physiological and anatomical changes they experience during pregnancy (11, 12). Furthermore, research has shown that pregnant women are more vulnerable to more severe forms of viral respiratory diseases. In one study, pneumonia was diagnosed in over 60% of women with symptomatic COVID-19 (12). Symptoms of COVID-19 generally vary from mild fever and coughing that disappear over time to more serious disorders such as viral pneumonia followed by systemic dysfunction (13). But infected women are also more likely to experience negative outcomes and therefore need special attention (14, 15). In one study, half of pregnant women with symptomatic COVID-19 required oxygen therapy, 25% of them exhibited the

characteristics of acute respiratory syndrome, and 6.2% of them required mechanical ventilation (12). There are also reports of maternal death rates as high as 12.3% among COVID-19 patients (13).

In addition to causing physical problems, COVID-19 can also affect the mental health of pregnant women by making them feel vulnerable to catastrophic events or natural disasters (2). Studies have shown that the COVID-19 pandemic has had negative psychological impacts on pregnant women (16). These negative psychological impacts include the sense of fear, which has been attributed to the inability to control the disease, lack of access to vaccines, lack of effective treatment, and the rapid spread of the virus worldwide (17, 18). Fear of COVID-19 in a pregnant woman can originate from the fear of the unknown, a poor understanding of the disease, incorrect information, or the anxiety of getting infected and endangering the health of the fetus, herself, and her family (19, 20).

Fear is an adaptive emotion that helps people deal with potential threats (21). In the context of health and pandemics, fear reduces participation in high-risk behaviors (22) and slows down the spread of the virus (21). However, since fear is a negative emotion, excessive fear can have distressing impacts on the person (e.g. mental health problems such as phobias and social anxiety) as well as the community (e.g. xenophobia, hoarding of supplies) (21, 22).

The media play a key role in disseminating accurate information about COVID-19 (23, 24). Research has shown that people tend to have a poor awareness of protective measures against certain diseases and this deficiency can have major effects on how well they fare in situations like pandemics. Other important sources of information for people include healthcare professionals, friends and family. Receiving sufficient information from health professionals is expected to reduce fear (25).

In pregnant women, fear could be the direct cause of many unforeseen pregnancy and delivery complications. Maternal fear is known to be associated with pre-term and post-term delivery, low birth weight, and poor fetal growth (26, 27).

It has been reported that during the COVID-19 pandemic, fear of COVID-19 has caused some pregnant women to not attend health centers for prenatal care, leading to delayed diagnosis and treatment and therefore more negative outcomes (28, 29). Fear of COVID-19 in pregnant women is associated with higher levels of depression, anxiety and suicidal ideation, and also has a positive correlation with the spouse's depression and anxiety levels (30).

Fear of COVID-19 can be managed through strategies such as improving the person's appraisal of the body's physiological signals, fostering secure attachment (through constructive interactions via phone call and social networks) and adaptive acceptance (with the help of techniques such as abdominal breathing, distraction, and engaging in artistic activities) (20).

Considering the respiratory transmission mechanism of COVID-19 and its persistence in the environment, how people behave in social settings has a major impact on the transmission of this disease. Preventive behaviors that can cut off the transmission chain include washing hands with soap or disinfectant

solutions, avoiding handshake, hugging, and kissing, disinfecting purchased items, car and home environment, and quarantining in home (31).

Experiences gained in previous epidemics (such as SARS) have shown the importance of giving pregnant women the psychological support they need under these circumstances (32). Pregnancy is a transient period involving major physical and emotional changes that can affect the quality of life and health of the mother as well as the baby even when the pregnancy concludes without any complication (33). Research has also shown that the psychological impact of exposure to novel diseases can negatively affect a person's quality of life in various (mental and physical) dimensions (34, 35). Quality of life is a broad concept that can be influenced by a variety of factors including the person's psychological condition, education level, occupation, etc. Studies have shown a positive relationship between quality of life and mental health (17, 36).

Today, the world is still struggling to contain COVID-19 pandemic and this disease is still causing notable psychological stress (including the sense of fear) in infected people and those around them. While multiple studies have investigated the impact of fear on the quality of life of pregnant women and their preventive behaviors against diseases such as diabetes, as of this writing, no interventional study has been conducted on the management of fear and its impacts on the quality of life and preventive behaviors of pregnant women during the COVID-19 pandemic. To address this gap in the literature, this study was performed to investigate the effects of an education-support program for pregnant women in Zahedan, Iran, on their quality of life, preventive behaviors, and fear of COVID-19.

Materials and methods

Designed in the form of an experimental-intervention research, the study was conducted on a population of 16-28 weeks pregnant women meeting the eligibility criteria who were enrolled from the health centers of Zahedan, Iran. After briefing the participants about the research goals and procedures and obtaining written informed consent, the questionnaires of demographic information, fear of COVID-19, COVID-19 prevention behaviors, and quality of life (12-item health survey) were completed, and the first session of the intervention was held at the same encounter. Participants were also asked to provide their contact information (phone number) so that they can be informed about the schedule of following sessions. Inclusion criteria were gestational age of 16 to 28 weeks, no alcohol use, no drug use, no stressful event in the last three months, no complications in the current pregnancy, not participating in any related educational program other than media training, no history of physical or mental illnesses that may interfere with the research, no history of major mental or physical illness, no history of stillbirth or consecutive abortions, ability to read and write in Persian, no history of COVID-19-related death in first-degree relatives, no history of infertility and pregnancy following infertility treatment, and not having severe COVID-19. Exclusion criteria were the unwillingness of the participant or the spouse to continue the intervention, the participant missing a session, the participant experiencing any incident detrimental to her mental health, and the participant contracting COVID-19 during the intervention. Having the standard deviation of the fear score without intervention in previous studies ($SD=5.3$) (37) and

assuming the equality of variance in intervention and control groups, the minimum sample size per group was obtained from the following formula with $\alpha=0.05$, $\beta=0.2$ and the maximum acceptable difference considered to be $d=3$. Using this method, the minimum sample size was determined to be $n=49$ per group. Ultimately, 60 people were enrolled in each group to account for potential drop-outs.

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \times (2S^2)}{d^2} = 49$$

$$\alpha = 0.05 \rightarrow Z_{1-\alpha/2} = 1.96$$

$$\beta = 0.2 \rightarrow Z_{1-\beta} = 0.84$$

Sampling was performed using the multi-stage method. For this purpose, the city of Zahedan was divided into five geographical regions, health centers in each region were numbered randomly, and one odd numbered and one even numbered center were randomly selected (by lottery) from each region. In each region, the odd numbered center was used to as the site of the intervention and the even numbered center was used as control (this was done to prevent the contamination of data of one group by another). After using the information contained in the SIB system (Iran's integrated health system) to compile a list of pregnant women with gestational age of 16-28 weeks for each center, the number of participants to be enrolled from each health center was determined in proportion to the number of eligible women in that center relative to the total number of eligible women. Finally, eligible willing participants were enrolled by convenience sampling. Apart from the information contained in the SIB system, the study used the data collected by a questionnaire consisting of four following parts.

Part I - Personal Information: This researcher-made form included fill-in-the-blank and multiple-choice questions about the demographic characteristics of the mother (age, education level, ethnicity, occupation, number of children, gestational age), demographic characteristics of the father (age, education level, ethnicity, occupation), and general information about the family (family type, polygamy, insurance coverage, place of residence, type of residence). This form was filled out by the researcher through an interview.

Part II - Fear of COVID-19: this part consisted of seven questions on a 5-point Likert scale with answers: "strongly disagree", "disagree", "neutral", "agree", and "strongly agree". Each question is given a score from 1 (for strongly disagree) to 5 (for strongly agree). The total score of this questionnaire ranges from 7 to 35, with higher scores indicating higher levels of fear. This questionnaire has been developed by Ahorsu et al. (2020) and its validity and reliability in Iran have been investigated in several psychometric studies, where it has been confirmed by item-total correlation test and panel assessment. Other relevant characteristics of this questionnaire have also been verified by both classical test theory and Rasch model on a seven-item scale with a Cronbach's alpha of 0.82 (38). In this study, Cronbach's alpha of this questionnaire was also measured.

Part III - COVID-19 prevention behaviors: this part consisted of five questions on a 5-point Likert scale with answers: "strongly disagree", "disagree", "neutral", "agree", and "strongly agree", which are scored from 1 (for strongly disagree) to 5

(for strongly agree). The total score of this questionnaire ranges from 5 to 25, with higher scores indicating a better attitude towards preventive behaviors against COVID-19. The reliability and validity of this questionnaire has been confirmed by Lin et al. (39) with a Cronbach's alpha of 0.70. For each question enquiring about a certain preventive behavior, a question was added to measure the number of times that behavior is performed. The study also measured the Cronbach's alpha of this questionnaire.

Part IV - 12-item quality of life survey: Developed by Ware, Kosinski, and Keller (1996), this 12-item survey is a short-form version of the 36-item health survey. This survey has 8 subscales with different scores given to answers of different questions. For example, for question 4, the answers "yes" and "No" get a score of 1 and 2 respectively, but questions 1, 8, 10 and 11 are scored on a scale of 1 to 5 but in reverse. In this survey, the first question measures the person's general view of their health, questions 2 and 3 are related to physical function, questions 4 and 5 are related to physical health, questions 6 and 7 are related to emotional problems, question 8 measures physical pain, question 9 measures social function, question 11 measures vitality and vital energy and questions 10 and 12 measure mental health. High scores in this survey indicate a higher quality of life. Typically, the scores 37-38 classify as good, 25-36 classify as moderate, and 12-24 classify as poor (40). The validity and reliability of this survey was first established by Ware et al. Using the test-retest reliability assessment method, they reported a Cronbach's alpha of 0.89 for the physical dimension and 0.76 for the mental dimension of this survey. The experimental validity and the construct validity of this tool have been established by Ware et al. and Kontodimopoulos et al. respectively (40,41). In Iran, Montazeri et al. examined the validity and reliability of this survey. Using the test-retest method, they reported a reliability of 0.73 for the tool's physical dimension and 0.72 for the tool's mental dimension. They established the validity of the tool using the convergent validity assessment method (42). The present study also measured the Cronbach's alpha of this survey. This survey was completed three times at three stages: 1- before the intervention, 2- one month after the intervention, and 3- two months after the intervention. The survey was completed by the researcher through interviews.

The intervention was in the form of three sessions held in three weeks, one session a week. The first session was performed in-person with adherence to social distancing and other relevant health guidelines (wearing a mask, providing alcohol-based disinfectant solution for hands and surfaces) in the selected health centers. In order to prevent transmission, the second session was held by phone and the third session was held at the patient's next scheduled visit for receiving prenatal care. At the end of the last session, a booklet containing the educational content was given to the mothers. In-person sessions lasted 20 to 30 minutes and telephone sessions lasted 10 to 15 minutes. The details of the sessions are provided in the table below.

Educational Content	Education Methods and Tools	Package Details	Sessions
The contents were collected from the reputable sources (the World Health Organization and the U.S. Center for Disease Control and Prevention) and were checked to conform to the guidelines of Iran's Ministry of Health. Addressing misconceptions like the virus can be transmitted via radio waves, the virus cannot survive sunlight, the infection will be life-long, the infection cannot hold breath for 10 seconds, the infection rate is higher in hot and humid climates or cold climates, the virus is transmitted by mosquito bites, drinking alcohol provides protection against the virus, UV light must be used for hand disinfection, etc.	In-person education using educational texts and images (in the form of PowerPoint, DVD, pamphlet) Getting participants involved through Q&A	General education on COVID-19 (including the nature of the disease, transmission mechanisms, prevention methods, symptoms, where to go in case of infection), eliminating misconceptions, asking participants whether they need further clarification or have any unanswered question	First session At gestational age of 16 to 28 weeks
Components of resilience in the COVID-19 pandemic, mental aspects of the crisis, post-crisis growth and its positive predictors, the positive aspects of home quarantine, the negative emotions that arise in crises such as fear and panic and sense of ambiguity and helplessness, tips on how to deal with these feelings, support programs, breathing techniques, pregnancy exercises, etc.	Education via phone call	Educating participants on how to remain resilient in this crisis, how to use a mask, how to disinfect (equipment, surfaces, clothing, food, etc.), answering questions raised in the previous session	Second session At gestational age of 17 to 27 weeks

Providing instructions on how parents should intervene to help the family, e.g. helping children participate in distance learning activities, encouraging healthy behaviors in children, turning coping activities into team efforts, not hiding infection from children, being patient. Special tips on pregnancy, delivery, and breastfeeding during the pandemic, e.g. protection methods during pregnancy, vaccination during pregnancy, prenatal care and baby care during the pandemic, importance of not delaying emergency care, infant feeding during the pandemic, recommended vitamins and minerals	In-person training at the participant's scheduled visit for receiving prenatal care, Giving the participant the educational booklet at the end of the session	Providing tips on dealing with COVID-19 during pregnancy and breastfeeding, educating parents who have other children, asking some questions to assess the participant's knowledge of matters discussed in sessions	Third session At gestational age of 18 to 38 weeks
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Content used in the educational program, which included the information about the nature of the disease, transmission and prevention methods, symptoms, things to do after infection, tips on pregnancy, breastfeeding, and infant care during COVID-19 pandemic, tips for parents with more than one child, tips on how to use a mask and how to disinfect equipment, etc. were collected from reputable sources such as the World Health Organization (WHO) and the U.S. Center for Disease Control and Prevention (CDC) and checked to conform to the latest guidelines of Iran's Ministry of Health. Also, educational materials on how to manage fear were collected from the resilience components in the guidelines of Iran's Ministry of Health. The support program was conducted in accordance with the Ministry of Health's guidelines for resilience in the COVID-19 crisis (e.g. empathy, breathing techniques, pregnancy exercises, focus on positives, etc.).

At the end of the last session, a series of concluding questions were asked to assess the participants' understanding of what was discussed during the program. The post-intervention scores were measured in a follow-up session held 4 weeks after the last session. At the end of the intervention, the control group was also given the booklet containing the educational content. Descriptive statistics including statistical tables and graphs, frequency and percentage and centrality and dispersion measures were used to describe the data. The normality of the variables was checked using the Kolmogorov-Smirnov test. For normally distributed quantitative data, the repeated measures analysis of variance, and for non-normal data, the Friedman and Kruskal-Wallis tests were used to analyze and compare the data collected from the two groups at different times. The multiple linear regression method with relevant assumptions was used to control for potential confounders. Data were analyzed in SPSS.22 at the 5% significance level.

Results

Of all the participants, 18% were younger than 20, 55% were 20 to 30 years old, and 26% were older than 30. The age group with the highest frequency was 20-30 years. Although there was a statistically significant difference between the two groups in terms of the frequency of people aged less than 20 ($p = 0.003$) there was no significant difference between them in terms of mean age.

Table 1. Frequency distribution of age in the control and intervention groups

Group Age	Control		Intervention		Total	sig
	Frequency	Percentage	Frequency	Percentage		
Less than 20	3	6	15	31	18(18.5%)	0.003
Between 20 and 30	34	70	20	40	54(55%)	
Over 30	12	24	14	29	26(26.5%)	
Total	49	100	49	100	98(100%)	
Mean $\pm$ SD	6.55 $\pm$ 25.9		6.55 $\pm$ 25.2			0.57

Table 2. Frequency distribution of demographic variables in the control and intervention groups

Group Education (women)	Intervention		Control		sig
	Frequency	Percentage	Frequency	Percentage	
Elementary	18	37	6	12	0.003
Middle school	13	26	9	18	
High school	7	14	21	43	
University	11	23	13	27	
Total	49	100	49	100	
Ethnicity (women)					
Baloch	31	63	14	29	0.002
Fars	18	36	34	69	
Total	49	100	49	100	
Insurance					
Yes	35	71	42	86	0.08
No	14	29	7	14	
Total	49	100	49	100	
Family type					
Nuclear	34	69	42	86	0.058
Extended	15	31	7	14	
Total	49	100	49	100	
Bigamy					

Yes	2	4	0	0	0.15
No	47	96	49	100	
Total	49	100	100	100	
Type of pregnancy					0.42
Wanted	39	79	42	86	
Unwanted	10	21	7	14	
Total	49	100	49	100	
Occupation (women)					0.173
Homemaker	40	81	46	94	
Employee	5	10	2	4	
Self-employed	4	9	1	2	
Total	49	100	49	100	
Ethnicity (men)					0.001
Baloch	32	65	14	29	
Fars	17	35	35	71	
Total	49	100	0	0	

As shown in the above table, there were significant differences between the two groups in terms of the education level of participating women and the ethnicity of these women and their spouses, but not in terms of any other variable.

Since data were collected at three stages, repeated measures analysis of variance was used to analyze the data. First, the variables “ethnicity” and “education level”, on which the two groups had shown significant differences (see the above table), were checked to determine which of them could be a confounding variable and need adjustment in regression (upon detecting a statistically significant confounder variable, the two-way analysis of variance with repeated measures must be performed with the confounder variable taken into account)

Table 3. Determination of confounding variable for the variable “fear” using regression

sig	t	St. Error	B	Variable
0.052	-1.9	3.79	-7.47	Ethnicity (men)
0.066	1.35	3.82	8.15	Ethnicity (women)
0.14	1.47	0.4	0.58	Education level

From the results presented in the above table, it was determined that none of these variables is a significant covariate for the fear of COVID-19. Therefore, the two-way analysis of variance was performed without confounder variables to determine the impact of the intervention on the fear of COVID-19.

Table 4: Effects on “fear of COVID-19” scores without confounding variables

sig	Intervention	Control	
0.21	16.26±4.6	17.36±4.14	Stage 1 (pre-intervention)
0.1	15.67±4.08	17±3.97	Stage 2 (mid-intervention)
0.02	15.12±3.7	16.89±3.9	Stage 3(post-intervention)
	0.041	0.14	sig
0.082	Significance of the effect of Group (control/intervention)		
0.002	Significance of the effect of Time		
0.127	Significance of Time*Group interaction effect		

As the above table shows, there was no significant difference between the control and intervention groups in terms of mean fear scores, but there was a significant decline in the mean fear score over the three stage of measurement. From the significance value obtained for time-group interaction, it was concluded that while there was a significant difference between the mean fear scores of the three stages of measurement, there was no significant difference between the two groups in this respect. The difference between the mean scores of the intervention and control groups was insignificant at the pre-intervention and mid-intervention stages, but became significant at the post-intervention stage.

Table 5. Determination of confounding variable for the variable “preventive behaviors” using regression

sig	t	St. Error	B	Variable
0.52	0.63	6.06	3.84	Ethnicity (men)
0.9	-0.125	6.11	-0.7	Ethnicity (women)
0.30	1.03	0.639	0.66	Education level

As the results of this table show, among these variables, only “family type” was found not to be a confounding factor for “preventive behaviors” and not have a significant effect on the intervention.

Table 6: Effects on “COVID-19 prevention behavior” scores without confounding variables

sig	Intervention	Control	
0.001	19.46±2.17	33.14±2.9	Stage 1 (pre-intervention)
0.001	20.95±1.9	33.16±2.48	Stage 2 (mid-intervention)
0.001	21.22±1.84	32.93±2.36	Stage 3(post-intervention)
	0.036	0.64	sig
0.0001	Significance of the effect of Group (control/intervention)		
0.001	Significance of the effect of Time		
0.001	Significance of Time*Group interaction effect		

In the above table, it can be seen that there was a significant difference in terms of preventive behavior scores not only between the intervention and control groups but also between the stages of measurement (pre-, mid- and post-intervention). This is indicative of the effectiveness of the intervention on this parameter over the course of the period.

Considering the significance value obtained for time-group interaction effect, a significant difference in effect was observed between the two groups at the pre-intervention stage, and also between the mid-intervention and post-intervention stages.

Table 7. Determination of confounding variable for the variable “quality of life” using regression

sig	t	St. Error	B	Variable
0.26	-1.11	13.5	-15.07	Ethnicity (men)
0.58	0.54	13.6	7.45	Ethnicity (women)
0.202	-1.2	1.42	-1.82	Education level

As shown in the above table, none of the variables were found to be significant confounders for quality of life before or after the intervention.

Table 8: Effects on “quality of life” scores without confounding variables

sig	Intervention	Control	
0.001	67.6±6.46	41.24±4.37	Stage 1 (pre-intervention)
0.001	67.43±6.24	41.58±3.5	Stage 2 (mid-intervention)
0.001	68.1±5.5	40.6±2.98	Stage 3(post-intervention)
	0.84	0.71	sig
0.219			Significance of the effect of Group (control/intervention)
0.001			Significance of the effect of Time
0.5			Significance of Time*Group interaction effect

As the above table shows, there was no significant difference between the quality of life scores of either group at pre and post-intervention stages, which suggests the insignificant effect of time with regard to this parameter. However, a significant difference was observed between the scores of control and intervention groups, meaning that the group (intervention vs. control) has had a significant impact on this outcome.

The insignificance of the group-time interaction effect for this variable reflects the fact that although there has been a significant effect on the mean quality of life scores of the two groups, the difference in effect between the stages has not been significant.

Discussion

In this study, the mean age of participants in the two groups was 25 years and there was no significant difference between two groups in this respect. Although the education level of a polarity of participants in both groups was high school, there was a significant difference between them in terms of education level (the intervention group had a lower education level than the control group). However regression analysis showed that this difference had no significant impact on the results. The ethnicity of most participants was native Baluch but the two groups were not homogeneous in this regard and there was a significant difference between them in this respect. The results of regression analysis however showed that ethnicity did not affect the outcome of the educational program as a confounding variable. About 78% of the participants had insurance coverage. Most participants were homemakers, had wanted pregnancy, and had nuclear families, which may have affected their participation in the study and the intervention activities.

The results of repeated measures analysis of variance showed that the education-support program had a significant impact on the pregnant women's fear of COVID-19. This is reflected in the fact that while there was no significant difference between the initial mean fear scores of the two groups, at the post-intervention stage, the mean fear score of the intervention group (16.89) was significantly higher than that of the control group (15.12). There was also a significant difference between the fear scores of the intervention group before and after the program. In a study by Reznik et al. (2020) on the general Russian population, the average fear of COVID-19 was higher than what we observed in our research (43). In a study carried out by Derya et al. (2021) on the effect of distance education on the anxiety and fear levels of pregnant women during the COVID-19 pandemic, women in the intervention group were found to have lower anxiety and fear levels than those in the control group (44). In a study by Asai et al. (2021), women with more information and higher awareness were found to be less afraid and anxious than their counterparts, which highlights the importance of giving pregnant women the information they need via social networks and the internet (45). In a study conducted in China, it was reported that the dissemination of prenatal healthcare information by hospitals through social media platforms was associated with a lower risk of stress, anxiety and fear among pregnant women (46). According to Gordon et al. (2), the novel and unknown nature of COVID-19 has caused it to become a major source of fear for many populations across the world (47). It has been shown that lifestyle changes due to COVID-19 impose extra psychological burden on pregnant women, making them feel even more anxious and insecure during this challenging period of their life (48). In Iran, the pregnant women's fear of COVID-19 has been intensified by the repeated peaking of caseloads despite the government's insistence on keeping people in their homes as well as poor awareness about the disease in combination with the fear of unknown and fear of transmitting the virus to the fetus. Therefore, an education-support package based on COVID-19 awareness could be effective in reducing the fear level of pregnant women in the country. In this regard, it should be noted that exposure to unknown threats, wherever and whatever they are, inherently stimulates a sense of fear and panic in humans. Therefore, in this study, our goal in the development of the education-support program was to reduce the pregnant

women's fear of COVID-19 by improving their awareness and knowledge of the disease through various means such as educating them about the nature of the disease, transmission and prevention methods, and transmission rate and also eliminating their misconceptions about the disease.

In this study, there was a significant difference between the control and intervention groups in terms of COVID-19 prevention behaviors, as the intervention group had a lower mean score in this aspect than the control group. Also, the COVID-19 prevention behavior score of the intervention group before the program was higher than after the program. This is inconsistent with the results of a study by Aghababaei et al. (2020), which reported that pregnant women had a high level of knowledge and information about protective behaviors against COVID-19 (49). In the study conducted by Ahorsu et al. (2020) on the association between fear of COVID-19, mental health, and preventive behaviors in pregnant women and their spouses, the findings showed a positive relationship between fear of COVID-19, mental health and preventive behaviors of husbands and their pregnant wives, in the sense that the higher the fear of COVID-19 is, the stronger are the protective behaviors (30). A study by Bassetti et al. reported that higher levels of fear of COVID-19 in Iranian pregnant women were associated with stronger preventive behaviors (50). In the present study, after the program, the intervention group had a lower level of fear of COVID-19 than the control group, one result of which could be the decrease in the mean score of preventive behaviors. In this respect, the results seem to be consistent with the finding of Ahorsu et al. To explain this finding, one can argue that pregnancy causes women to experience much higher COVID-19-related anxiety and also a stronger fear of contracting COVID-19 (30), which in turn cause them to strongly engage in preventive behaviors, sometimes to the extent of causing problems for the fetus. This study found that an education-support intervention program can alleviate the pregnant women's fear of COVID-19 and thus improve their COVID-19 prevention behaviors.

In this study, there was no significant difference between the quality of life scores of the intervention group before and after the program, but there was a significant difference between the control and intervention groups both before and after the intervention. These results indicate the insignificance effect of the education-support program on the quality of life of pregnant women who participated in the study. In a study by Naghizadeh et al. (2021), quality of life had a significant negative relationship with fear of COVID-19 (51); a relationship that was not observed in the present study. This discrepancy is probably due to the difference between the studies in terms of measurement tools, the standards of living in the two areas, and the education level of participants. In a study by Dule et al. (2021) on the health-related quality of life of Ethiopian pregnant women during the COVID-19 epidemic, they found a significant inverse relationship between pregnant women's fear of COVID-19 and their quality of life, as pregnant women had significantly below normal quality of life during the pandemic (38). These researchers argued that COVID-19 pandemic has been associated with an increased level of fear, which has been more pronounced in pregnant women than in other sections of the population, notably reducing their quality of life. The results of this study showed that the length of intervention sessions did not have a significant effect on women's quality of life, although it might be possible to

reach better results with more compact sessions held over longer periods of time. Providing too much information and excessive use of the media can also result in overreaction, irrational fear and overestimation of the threat, which in turn may affect the behaviors of pregnant women in such ways that lead to lowered quality of life.

Conclusion

Physiological and anatomical changes during pregnancy can generally increase the women's susceptibility to infection. Also, research has shown that novel infections can have a significant impact on the health of pregnant women and fetuses (52). This highlights the importance of providing accurate information about diseases such as COVID-19 to pregnant women and their families as well as healthcare providers. In the present study, participation in an education-support program reduced the pregnant women's fear of COVID-19 and improved their COVID-19 prevention behaviors. However, the program did not have a significant effect on the pregnant women's quality of life; a result that can be attributed to reasons such as conveying too much information during the program, and the population's existing perception and knowledge of COVID-19. In general, it might be better for pregnant women to continue observing personal and community health guidelines and avoiding unnecessary travel, crowded places, and public transportation, and limiting contact with other people as much as possible for the remainder of the COVID-19 pandemic. However, since women are at higher risk of developing an unreasonable fear of COVID-19 during the critical period that is pregnancy, it is recommended to develop and implement a program for teaching pregnant women how to maintain their quality of life and also providing adequate care to vulnerable groups during the COVID-19 pandemic. Also, educational content on pregnancy and childbirth planning during the COVID-19 pandemic need to be added to the existing educational materials for prenatal care in order to reduce the negative effects of COVID-19 on pregnant women.

Acknowledgments

The authors would like to thank the VP of Research and Technology, Zahedan University of Medical Sciences for their support. This research was conducted in full compliance with the requirements for ethical research, including those related to informed consent, anonymity, and blinding.

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