

Effect of Tele-Medicine on Health Anxiety and Pregnancy-Related Anxiety in Pregnant Women during the COVID-19 Epidemic in Iran

Abstract

Background: The global spread of the new coronavirus has increased the necessity of innovations to increase the quality of health care. This study was intended to examine the impact of tele-medicine on health anxiety and pregnancy-related anxiety in pregnant women during the COVID-19 epidemic in Iran. **Materials and Methods:** This quasi-experimental study was performed between March and May 2020. Sampling was done using multi-stage random sampling method. A total of 104 pregnant women were in two groups (intervention: n = 52, control: n = 52). Data were collected using a demographic and obstetric information questionnaire, the Health Anxiety Questionnaire, and Van den Bergh's Pregnancy-Related Anxiety Questionnaire. The intervention group received counseling services for 2 months by researchers through telephone conversations, text messages, and applications such as WhatsApp, Telegram, and Instagram. In addition to routine pregnancy care, they could contact the researchers by phone and receive the necessary advice in case of any questions, ambiguities, or problems. The control group included pregnant women who received only routine pregnancy care. **Results:** After the intervention, health anxiety scores of pregnant women in the control group were significantly higher than those of the experimental group ($t_{98} = 13.54$, $p < 0.001$). Also, the mean (SD) scores of pregnancy-related anxiety in the control group were significantly higher compared with the intervention group ($t_{98} = 3.80$, $p < 0.001$). **Conclusions:** Using tele-medicine, especially during the COVID-19 pandemic can reduce unnecessary referrals of pregnant women to medical centers and their risk of developing the disease, on the one hand, and by reducing women's anxiety, however, it can improve psychological consequences.

Keywords: Anxiety, COVID-19, Health, Iran, Pregnancy-related anxiety, Tele-medicine

Introduction

Infectious diseases are one of the most important threats to humanity. Coronavirus 2019 (COVID-19) which is a relatively new and highly prevalent disease is a case in point. The virus can cause severe pneumonia such that the World Health Organization has recognized it a global emergency.^[1,2] To better control COVID-19, China implemented a number of measures, including isolation of suspected people, closely monitoring contacts, recording symptoms and biological samples, mobilizing the country's healthcare professionals, establishing telephone counseling lines, and opening special hospitals.^[3,4] On February 19, 2020, the first cases of COVID-19 were seen in Iran, and these cases are increasing day by day.^[5]

COVID-19 has caused general panic and psychological stress, especially in pregnant

women.^[6] However, few healthcare systems around the world are well-equipped and capable enough to deal with a large number of severe infections as in the case of COVID-19.^[7] One of the solutions that has not yet been fully explored to deal with the virus in a comprehensive way can be facilitating the optimal provision of services to individuals by minimizing the risks of direct human-to-human exposure. Providing care by phone, for example, is an attractive, effective, and inexpensive method.^[8] During the movement around the world is restricted and cities are quarantined, vulnerable populations including pregnant women are more prone to physical stress, infectious and non-communicable diseases, and various mental health-related complications^[9,10] There is compelling evidence for the major impact of epidemics on health anxiety. Health concerns can present at different times, such as when there is an unfamiliar

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physical symptom or the broadcast of news related to an unknown disease.^[11]

Pregnant women are at increased risk of viral infections, and this may result in their anxiety.^[12] As a normal feminine function, pregnancy is a stressful experience in itself, and the addition of other stressful events such as epidemics can have devastating consequences.^[13] Under certain circumstances such as epidemics, where access to resources is limited, special solutions such as telephone care become an important and valuable asset. Such solutions will have important consequences extended to the entire range of health care and patient care, particularly in populations with special needs, such as pregnant women, since they reduce unnecessary referrals and address medical needs that do not require direct contact with the patient.^[14,15] This, in turn, reduces resource utilization in previously stressed healthcare infrastructure, improves access to care, and at the same time, reduces the probability of direct transmission of the infectious agent.^[16,17] Given the importance of mental health during pregnancy and the necessity to prevent unnecessary referrals of pregnant women to medical centers, this research was intended to investigate the effect of telephone care on Health Anxiety (HA) and Pregnancy-Related Anxiety (PRA) in pregnant women.

Materials and Methods

This quasi-experimental study was performed from March to May 2020 in Ahvaz, Iran. The sample size was calculated to be 95, considering 95% confidence interval, 5% error, and 36% power. The final sample size, however, was 104 (52 women in each group), assuming a 10% attrition rate. The sampling sites (health centers) were selected by random cluster sampling, and the patients were selected using the convenience method. To select the sampling sites, the health centers of the city of Ahvaz were divided into four strata: north, south, east, and west, and then three of them were selected randomly. Afterward, the sample size inside each health center was determined by quota sampling and according to the population covered. Finally, convenience sampling was done in the selected health centers. The participants were divided into intervention and control groups based on a table of random numbers.^[18] Inclusion criteria were aged 18–45 years, ability to use a smartphone, and gestational age ≤ 30 weeks. Exclusion criteria were termination of pregnancy before the end of the intervention, any symptoms of high-risk pregnancy, unwillingness to continue participating in the study, failure to answer the researcher's phone calls, inadequate completion of the questionnaire, debilitating diseases that can lead to termination of pregnancy in past pregnancies, history of the death of a close relative in the last 6 months, and taking psychiatric drugs due to a particular disorder.

Data were collected using a demographic and obstetric information questionnaire, the short form of Health

Anxiety Questionnaire (HAQ), and Van den Bergh's Pregnancy-Related Anxiety Questionnaire (PRAQ). The short form of (HAQ), which includes 18 items, is a standard tool to evaluate health anxiety based on a cognitive, health anxiety, and hypochondriasis model. The short form was developed in 2002 by the same authors who developed the original version. Based on test-retest method, a Cronbach's alpha of 0.7–0.82 was reported for this questionnaire.^[19] The validity and reliability of the Persian version of HAQ had previously been evaluated and approved in Iran. The test-retest reliability of this questionnaire was 0.9, and the Cronbach's alpha coefficient obtained was 0.82.^[20] The maximum and minimum scores of this questionnaire are 54 and 0, respectively. Higher scores represent higher health anxiety. Developed by Van den Bergh in 1989, the Pregnancy-Related Anxiety Questionnaire (PRAQ) measures fears and worries about pregnancy. This questionnaire has 58 items. Exploratory factor analysis of anxiety data showed five factors: fear of childbirth (14 items), fear of giving birth to a physically or mentally disabled baby (five items), fear of change in marital relations (13 items), fear of change in mood and temperament and its consequences on the child (16 items), and self-centered fears or fear of change in personal life (seven items). Scoring the questionnaire is very simple, and the overall score is obtained by adding up the scores of each phrase. Each statement receives a score between zero and seven. Therefore, the overall pregnancy-related anxiety score ranges between zero and 406.^[21] Higher scores represent higher health anxiety.

In the psychometric examination of this questionnaire, Heisenck and colleagues showed its correlation coefficient with Spielberger's state-trait anxiety questionnaire to be acceptable, and Cronbach's alpha of all sub-scales was reported as 0.76 throughout pregnancy.^[22] The face validity of this questionnaire was confirmed by five psychologists in Iran, and the Cronbach's alpha coefficient for the entire questionnaire was reported to be 0.7.^[23]

Participants of both groups were briefed on the objectives of the study and were asked to complete an informed consent form as well as the demographic and obstetric characteristics questionnaire, HAQ, and PRAQ. Mothers in the intervention group received education about nutrition, personal hygiene, corona disease prevention, pregnancy risk factors, and routine pregnancy care through telephone conversations, text messages, and applications such as WhatsApp, Telegram, and Instagram over the course of two months. To offer better training, educational video clips (each lasting from 15 to 30 minutes) were prepared and provided to the participants in eight sessions through a mobile application. In case of any ambiguity or occurrence of any disorder or danger symptoms, the mother could contact the researcher 24/7 through a phone call, text message, or even through the application.

The control group received only routine pregnancy care. Two months after the commencement of the intervention, HAQ and PRAQ were completed again by both groups. Data analysis was performed using SPSS version 22. One-way analysis of variance was used to compare quantitative variables. To compare the study groups, the Chi-square test and paired sample and independent sample t-tests were administered.

Ethical considerations

The present study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (AJUMS) (IR.AJUMS.REC.1399.110). All participants were briefed on the study objectives and were ensured that their information would remain confidential and that they had the right to withdraw from the study at any stage. The women, who signed the informed consent form, participated in this study.

Results

Two women from both groups of participants were excluded from the study since they gave birth before the end of the intervention. Therefore, the final analysis was performed on 100 women (50 in each group). The mean (SD) age of the participants in the control group (26.38 (4.42); min: 18, max: 33) and in the intervention group (26.44 (4.41); min: 18, max: 35) were not statistically significant ($p = 0.94$). Also, the mean (SD) gestational age was not significantly different between the control (21.82 (4.26); min: 18, max: 30) and intervention (20.41 (4.44); min: 11, max: 28) groups ($p = 0.127$). Moreover, there was no

statistically significant difference between the study groups concerning other specifications including educational attainment ($p = 0.76$), job ($p = 0.50$), gravidity ($p = 0.33$), live child ($p = 0.37$), abortion ($p = 0.64$), and current diseases in this pregnancy ($p = 0.91$) [Table 1].

Before intervention, the control and intervention groups were not statistically different concerning the mean (SD) HA score (42.02 (9.27) vs. 41.24 (7.66), $p = 0.64$) and the mean (SD) PRA score (156.90 (67.44) vs. 157.31 (63.46), $p = 0.97$). However, after the intervention, the control group obtained significantly higher scores in both HA (30.42 (4.09) vs. 44.92 (6.36), $t_{98} = 13.54$, $p < 0.001$) and PRA (123.04 (37.2) vs. 163.84 (65.98), $t_{98} = 3.80$, $p < 0.001$) compared with the intervention group [Table 2].

Based on the results of paired t-test, since the beginning of the study, the control group experienced a significant increase over time in terms of the mean (SD) HA score (42.02 (9.32) vs. 44.92 (6.36), $t_{49} = -4.28$, $p < 0.001$) and the mean (SD) PRA score (156.91 (67.44) vs. 163.84 (65.98), $t_{49} = 12.35$, $p < 0.001$). By contrast, the mean (SD) scores of HA (41.24 (7.66) vs. 30.42 (4.09), $t_{49} = -6.48$, $p < 0.001$) and PRA (157.30 (63.46) vs. 123.04 (37.2), $t_{49} = 6.97$, $p < 0.001$) decreased significantly in the intervention group [Table 3].

Discussion

The present study was intended to assess the impact of tele-medicine on health anxiety and pregnancy-related anxiety in pregnant women during the COVID-19 epidemic

Table 1: Comparison of demographic and midwifery characteristics of the control and intervention groups

Demographic and Midwifery variables	Options	Control n (%)	Intervention n (%)	p
Education (years)	<6	7 (14)	9 (18)	0.76
	6–12	7 (14)	9 (18)	
	>12	36 (72)	32 (64)	
Job	Employed	18 (36)	19 (38)	0.50
	Housewife	32 (64)	31 (62)	
Gravidity	1	22 (44)	15 (30)	0.33
	2	21 (42)	25 (50)	
	≥3	7 (14)	10 (20)	
Live child	0	26 (52)	19 (38)	0.371
	1	18 (36)	23 (46)	
	≥2	6 (12)	8 (16)	
Abortion	0	46 (92)	46 (92)	0.643
	Yes	4 (8)	4 (8)	
Complications of pregnancy	No disease	33 (66)	34 (72)	0.918
	Severe vomiting	5 (10)	7 (14)	
	Gestational diabetes	6 (12)	4 (8)	
	Hypertension	3 (6)	3 (6)	
	UTI*	3 (6)	2 (4)	

Data are based on frequency (percentage). Statistical test: Chi-square. UTI*: Urinary tract infection

Table 2: Comparison of study groups based on HA* and PRA**

Variable	Time	Control	Intervention	t	df	p
HA	Before	42.02 (9.27)	41.24 (7.66)	0.43	98	0.648
	After	44.92 (44.92)	30.42 (4.09)	13.54	98	<.001
PRA	Before	156.9 (67.44)	157.3 (63.46)	0.03	98	0.979
	After	163.84 (65.90)	123.04 (37.20)	3.80	98	<.001

Data are based on mean (standard deviation). Statistical test: independent *t*-test. *: health anxiety, **: pregnancy-related anxiety

Table 3: Comparison of mean scores of HA* and PRA before and after the intervention**

Variable	Group	before	after	t	df	p
		Mean (SD)				
HA	Control	42.02 (9.27)	44.92 (6.36)	-4.28	49	<.001
	intervention	41.24 (7.66)	30.42 (4.09)	-6.48	49	<.001
PRA	Control	156.9 (67.44)	163.84 (65.98)	12.35	49	<.001
	intervention	157.3 (63.46)	123.04 (37.2)	6.97	49	<.001

Data are based on mean (standard deviation). Statistical test: paired *t*-test. HA*: health anxiety, PRA**: pregnancy-related anxiety

in Iran, and the results showed a significant effect of tele-medicine on reducing HA and PRA.

Our results are in line with Wu *et al.*^[24] who reported that online prenatal care would be a good alternative for mothers who need basic prenatal care and mental health counseling during the COVID-19 epidemic. A recent systematic review and meta-analysis by Hessami *et al.*^[25] suggested improved Internet-based services as a means to alleviate COVID-19-related anxieties and depression during pregnancy and shortly after delivery. A systematic review including 27 studies was conducted to investigate the effect of mobile applications and SMS services on the treatment of a wide range of areas including depression, anxiety, and stress. The results showed the positive effect of using mobile health apps on the treatment of these disorders.^[26] However, our study emphasized the positive effect of mobile apps and tele-medicine not only on the treatment of mental disorders such as anxiety but also on their prevention.

In study by Derya *et al.*,^[27] the tele-education for pregnant women during COVID-19 decreased their prenatal distress and pregnancy-related anxiety. Our study was different from theirs in that the duration of the intervention was longer and mobile apps were interactively used in our study. Badon *et al.*^[28] showed that using online programs may be associated with better mental health in pregnant individuals. Of course, they focused on the participants' coping strategies against anxiety disorders during the COVID-19 pandemic and did not focus solely on educational intervention. In another study, the use of mobile-based applications was found to facilitate self-care for Iranian pregnant women with preeclampsia during COVID-19. According to the results, this intervention could not only

reduce the preeclampsia-induced anxiety and stress but also improve the mothers' knowledge of and attitude toward the COVID-19 pandemic and preeclampsia.^[29] Despite the differences in the type of application used, the educational program, and the research population, it can be said that their results are consistent with ours. A review study shows that telehealth with antenatal care can effectively improve mental health among pregnant women and be recommended for use by healthcare providers in pandemic COVID-19.^[30]

Hashemzahi *et al.*^[31] highlighted the role of tele-medicine in reducing the perceived stress and anxiety of pregnant women during the coronavirus pandemic. Like our study, they used WhatsApp application, but the duration of their intervention was only two weeks and in the form of six training sessions. Therefore, it can be argued that the results of the mentioned studies, despite their different research populations, are consistent with the results of the present study in terms of the role of tele-medicine in reducing mental disorders such as health anxiety and pregnancy-related anxiety.

The results of the present study showed that over time, the level of health anxiety and pregnancy-related anxiety increased in the control group. Similar results were obtained in Ayaz *et al.*^[32] where the level of anxiety and depression symptoms of pregnant women during the COVID-19 infection significantly increased. In Hamzehgardeshi *et al.*, around 21% of the studied pregnant women were reported to suffer from pregnancy-related anxiety during the COVID-19 pandemic.^[33] Another study in Iran by Saadati *et al.* showed 9%, 13%, and 21% of women in the first, second, and third trimester of pregnancy had severe anxiety, respectively. They also reported that higher levels of anxiety among pregnant women during the COVID-19 pandemic might be due to their limited access to healthcare services, their concerns over the unsafe environment of healthcare settings, and concerns over affliction by the disease.^[34] In fact, it can be stated that if preventive measures and special educational and care interventions are not carried out during crises such as the COVID-19 pandemic, this will increase the chances of mental disorders. Therefore, it behooves healthcare professionals to develop comprehensive treatment plans for pregnant women, who are a highly vulnerable population, to prevent psychological harms during infectious disease outbreaks.

Our study was worthwhile in that one of the researchers was always available to respond to the intervention group 24/7, through phone calls, and WhatsApp, Telegram, and Instagram. In this way, the pregnant women could resolve their ambiguity in case they had any problems or if questions arose. This played a major role in reducing their stress.

One of the limitations of the present study is related to inherent problems associated with online surveys, for example, lack of trust in the answers given by the study

participants due to the uncertainty about who is completing the online questionnaire. To solve this problem, questions and answers can be done through telephone by the researcher. Given the important findings of the present study, the scarcity of relevant studies, and cost-effectiveness of the intervention used, future studies are recommended to create more professional platforms for the implementation of care programs. Tele-medicine plays a decisive role in promoting the implementation of such programs, especially those targeting pregnant women who are in high-risk groups.

Conclusion

This research indicated the effect of tele-medicine on reducing HA and PRA in pregnant women. Therefore, it can be argued that the use of tele-medicine can greatly prevent the occurrence of mental disorders caused by pregnancy and its complications, especially during the occurrence of pandemics such as COVID-19.

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Conflicts of interest

Nothing to declare.

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