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Website: www.jehp.net
DOI: 10.4103/jehp.jehp_1729_21

Comparison of the effect of face-to-face training and telemedicine on self-care in adolescent pregnant women: A quasi-experimental study

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Abstract:

BACKGROUND: Improving self-care in adolescent pregnancy leads to improved maternal and neonatal outcomes of pregnancy. However, self-care in adolescent pregnancy is less than other women. The aim of this study was to compare the effect of face-to-face training and telemedicine on self-care in adolescent pregnant women.

MATERIALS AND METHODS: The present study is a quasi-experimental study that was conducted in Zahedan in 2021 and 120 adolescent pregnant women with a gestational age of 15–20 weeks participated in it. The sampling was done in multistage, and the samples were divided into three groups: Face-to-face training, telemedicine, and control. Face-to-face training was presented in five sessions and the telemedicine group received the similar educational content through the mobile applications. The samples completed a researcher-made self-care questionnaire before the intervention and at 28 weeks of gestation. SPSS software version 21 was used for the analysis, and data were analyzed by ANOVA, Tukey *post hoc*, Kruskal–Wallis, and Mann–Whitney tests.

RESULTS: There was no significant difference in face-to-face and telemedicine training in improving the scores of nutritional performance, smoking and narcotics use, personal hygiene, and routine pregnancy care ($P > 0.05$), but face-to-face training caused more improvement in the scores of sports and physical activity as compared to telemedicine group ($P = 0.04$). Face-to-face training and telemedicine training in all domains led to a significant improvement in scores as compared to the control group ($P < 0.05$).

CONCLUSION: The results of this study showed that the face-to-face training and telemedicine methods were proper methods for self-care education in pregnant adolescent women. It is recommended to use these methods in promoting self-care in pregnant adolescent women.

Keywords:

Adolescent, education, pregnancy, self-care, telemedicine

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Received: 29-11-2021
Accepted: 28-12-2021
Published: 31-10-2022

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Introduction

Pregnancy in adolescents has long been considered a risk factor for health condition.^[1] Worldwide, 11.6% of pregnancies occur in adolescents, 95% of which occur in middle- and low-income countries.^[2] According to the latest statistics of the United Nations Population Fund, the

rate of age-specific fertility among the ages of 15–19 years has been declining worldwide;^[3] unfortunately in Iran, there is an increase in the pregnancy rate of adolescents.^[4] Statistics show that in Iran, the specific fertility rate in women 15–19 years of age has increased from 31.5 in 2005–2009 to 40.6 in 2019–2015.^[3] Increased adolescent pregnancy means increased prenatal complications.^[5]

How to cite this article: Khayat S, Palizvan M, Navidian A, Fanaei H, Sheikhi ZP, Comparison of the effect of face-to-face training and telemedicine on self-care in adolescent pregnant women: A quasi-experimental study. *J Edu Health Promot* 2022;11:326.

Adolescent pregnancy is associated with negative consequences on individual and social health, some of which affect the parenting process and some of which affect the future life of the individual. Adolescent mothers receive less community support,^[6] experience more domestic violence, and miss out the education and employment opportunities.^[7] Compared to other age groups, childbirth in these women has more risks, complications, and mortality in their pregnancies,^[6] so that pregnancy complications and childbirth are the second leading cause of death in adolescents 15–19 years.^[7] Pregnancy-induced hypertension, preeclampsia, eclampsia, endometritis, systemic infections, unsafe abortions,^[6,7] and complications of childbirth due to cephalopelvic disproportion increase in adolescent pregnancies.^[8] Psychological complications also increase in these pregnancies. The symptoms of depression and anxiety, tobacco use, and suicide increase in these pregnancies.^[5] In addition to maternal outcomes, neonatal outcomes such as preterm delivery, infant mortality, low birth weight,^[8] hospitalization in intensive care unit, and congenital anomalies are more common in them.^[5]

Numerous factors increase the complications and adverse consequences in adolescent pregnancy, including higher poverty rate and more deprivation for adolescent mothers and children in using services, low level of education, awareness,^[9] and self-care.^[10]

Self-care is the conscious and purposeful actions and activities that a person takes to maintain life and promote the health of himself and his family. Self-care during pregnancy refers to the decisions and activities that a pregnant person makes to overcome her health problems and issues during this period or to improve her health.^[11-13]

It can also be said that self-care behaviors in adolescent pregnancy means activities and daily life habits that can prevent pregnancy complications and maintain good health throughout pregnancy.^[14] Among the items of self-care programs in pregnancy are nutrition, physical activity, substance abuse, personal hygiene, and prenatal care,^[15] that the promotion of which can lead to a reduction in physical and psychological side effects of pregnancy^[16] and improve the quality of life of mothers and reduce fetal complications such as fetal heart rate deceleration, meconium, and fetal distress.^[17] Pregnancy care is one of the most important aspects of reproductive health. Improper reception of prenatal care increases pregnancy complications and even maternal and fetal mortality, while many of these complications are preventable.^[1] Inadequate prenatal care is associated with increased preterm delivery, unsafe abortions, low birth weight, stillbirth, and maternal mortality.^[18]

Despite the benefits of self-care in pregnancy, adolescent pregnant women have lower self-care than other women.^[10] The factors affecting self-care in adolescent pregnancy include: Family income, access to health services, perceived social support, self-confidence, perceived self-efficacy, and self-care awareness.^[5] One of the effective factors in adolescent pregnancy self-care is having knowledge and awareness of self-care. Therefore, to increase the effectiveness of self-care, pregnant women need to receive training to acquire information and skills.^[11]

Health education can be practiced in a variety of ways, including face-to-face and telemedicine. According to many researchers, face-to-face training is the most effective way to provide training, because it allows participants to receive verbal and nonverbal feedback and also provides communication through body language.^[19] Telemedicine as a new method in education can increase access to health services. This increase improves prenatal outcomes in mothers and children. Easier access to care also increases the likelihood of using appropriate services.^[20] Using these programs, pregnant women can cooperate in all stages of their pregnancy and can perform self-care activities.^[21] Among the various technologies, the use of mobile applications in health care has attracted widespread attention.^[22]

Eshghi Motlagh *et al.* used face-to-face training to improve self-care of prediabetic pregnant women. Their study showed the positive effect of this training method in promoting women's self-care and self-efficacy.^[23] Abbaspoor *et al.* (2020) conducted a study comparing the effect of texting and face-to-face training in promoting self-care in prediabetic pregnant women in Ahvaz. Compared to personal training, sending text messages could not control blood sugar levels properly, but increased nutrition and physical activity to an acceptable level.^[24] Another study in Egyptian diabetic women showed that the use of telemedicine improved their lifestyle, service satisfaction, service use, self-efficacy, and optimal blood sugar control.^[25]

According to our research, so far no program has been offered to increase the self-care of adolescent women, and the majority of educational programs have been related to women with gestational diabetes. While self-care is important and necessary for adolescent pregnancy, studies show that promoting self-care behaviors and lifestyle during adolescent pregnancy contribute to the good health of the mother and her fetus,^[5] as well as appropriate education and life skills can create a promising opportunity for adolescents.^[7]

As a result, there is a need to study different methods of education and choose the best method to use in special

services for this age group to help a healthy transition, more desirable experience and better pregnancy outcomes. Comparing methods will help us choose the best method. However, so far, no comparison has been made between self-care training methods in pregnancy. Therefore, considering the role of midwives in promoting women's health, especially during pregnancy and study deficiencies in adolescents, in this study, we examined and compared the effect of two methods of face-to-face training and telemedicine on promoting self-care of adolescent pregnant women in Zahedan to take a step toward promoting a healthy motherhood experience for these mothers and teen-friendly pregnancy health services.

Materials and Methods

Study design and setting

The present study was a quasi-experimental study conducted in 2021. The sample of this study consisted of 120 adolescent pregnant women referring to health centers in Zahedan.

Study participants and sampling

The sampling in this study was multi-stage. First, the city was divided into four regions: North, South, East, and West. In each region, health centers were considered as clusters. In each region, three centers were selected by lottery, in other words, a total of 12 centers were selected. Then, a lottery was conducted between the centers of each region and a center for telemedicine intervention, a center for individual intervention and a center for the control group were selected.

Then, the researcher referred to the centers with valid and reliable tools, after introducing herself and stating the goals and importance of the research, in the clients who were willing to participate, checked the inclusion criteria, people with inclusion criteria were selected and written consent was obtained. In total, 10 people in each center were selected by the easy method.

Inclusion criteria include: Age 10–19 years, gestational age 15–20 weeks, first pregnancy, absence of any disease and psychological disorder, no complications in pregnancy and lack of contraindications to exercise in pregnancy, having a minimum basic literacy, understanding and speaking Persian, having the ability to use the messengers including the phone and Internet access. Exclusion criteria include: Unwillingness of the mother to continue the participating in study, failure to complete the questionnaires, failure to participate in a training session in both training methods, and the occurrence of any complications during the study that require the mother's hospitalization or change in her lifestyle.

The sample size was calculated by the following

formula: $n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2 (\delta_1^2 + \delta_2^2)}{(\mu_1 - \mu_2)^2}$, considering the

95% confidence interval and 80% power according to the variables in the article of Zhianian *et al.* in each group of 28 people. Due to the fact that three groups were studied, the sample size was multiplied (root 2) in 1.4. Finally, 40 people in each group and a total of 120 people participated.^[26]

Data collection tool and technique

The data gathering tools

Data collection tools in this study were included demographic and pregnancy information forms and self-care questionnaire. The self-care questionnaire was a researcher-made questionnaire including: Nutritional performance, exercise and physical activity, smoking and narcotics use, personal hygiene, and routine pregnancy care. To design the questionnaire, the researcher has designed the initial questionnaire after conducting library studies and authoritative articles and websites.

After the initial design, the content validity of the questionnaire was quantitatively examined. The questionnaire was reviewed by 10 reproductive health professionals and master midwives, and then corrections were made. Its relative content validity ratio (CVR) was 0.7, and its content validity index was 0.85 was calculated.

Then, the reliability of the questionnaire was evaluated by internal consistency method and the questionnaire was given to 30 people and Cronbach's alpha of the whole questionnaire was calculated to be 0.86. It should be noted that the answers are classified based on the 4-point Likert scale (always, most of the time, sometimes, and never) and each is given a score of 0–3, respectively. A higher score indicated a better level of self-care and vice versa. The final questionnaire consisted of 15 items to assess nutritional performance, 4 items in the field of exercise and physical activity, 4 items in the field of smoking and narcotics use, 23 items in the field of personal hygiene, and 11 items in the field of routine pregnancy care.

Intervention

The method was that the researcher, after obtaining licenses from the university and obtaining the code of ethics obtained the sampling license in 12 health centers in the city of Zahedan.

The initial questionnaires of self-care and personal and pregnancy information were completed by the research unit. How to participate in the study was explained to

the individual. The person's name was taken along with his contact number to coordinate the meetings. In the face-to-face intervention group, coordination was done for the training sessions and the trainings were presented in five sessions as 1 day in between or 2 days in between, depending on the convenience of the research unit and for 45–60 min.

The content of the training included: Personal hygiene, nutrition, physical activity and exercise, routine pregnancy care, pregnancy risk symptoms, smoking cessation, and drugs. The training sessions were in the form of lectures, questions and answers, and an educational booklet. Again, at the end of the 28th week of pregnancy, the research units completed their care questionnaire. During this period, telephone follow-up was done weekly by the researcher. Finally, the researcher provided them with her own phone number so that they could call if they had any questions.

In the telemedicine training group, the training content was the same as face-to-face training and only the training method was different. The research unit in the health center completed the questionnaires, and then, the training files were sent to her through Whatsapp on every 2 days, depending on the convenience of the research unit in five rounds. In order to send the files, the research unit was coordinated in advance when it would be better for them to send the file to them. The content of the training was sent through audio, images, videos and animations through WhatsApp messenger, and before sending the file, the follow-up was done through the same software to make sure that the previous file was received and read by the person. Follow-up was done every week through the same program, and finally, the self-care questionnaire was completed by the research unit at the end of the 28th week of pregnancy.

No intervention was performed in the control group and only at the end of the 28th week of pregnancy they were asked to complete the questionnaire, and during this period, they received routine care. Finally to appreciate their participation, the educational content in the form of a booklet or file was sent to them through messenger after the intervention and the necessary instructions were given to them.

Data analysis

Data were analyzed using the descriptive and analytical statistical tests using the SPSS software version 21 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp), and the significance level was $P < 0.05$. For descriptive purposes, frequency, percentage, mean, and standard deviation were used. For analytical purposes, the normal distribution of data was investigated by Shapiro – Wilk test. Based on the results of this test, in data with normal

distribution, analysis of ANOVA and Tukey *post hoc* test were used, and in data with no normal distribution, Kruskal–Wallis and U-Mann–Whitney were used for the analysis.

Ethical consideration

The objectives of the study were explained to the samples. Participation in the study was voluntary, and the participants' written consent was obtained. The study approved by from the ethics committee of Zahedan University of Medical Sciences (code: IR.ZAUMS.REC.1399.297). (file:///C:/Users/Sam-pc/Downloads/r1t8vhqi62r66gj2.pdf).

Results

One hundred and twenty people participated in this study. The mean age was 16.78 ± 1.81 in the face-to-face training group, 17.1 ± 1.89 in the telemedicine group, and 16.2 ± 2.06 in the control group. The analysis of variance showed that there was no significant difference between the three groups in terms of age ($P = 0.11$). The mean gestational age in the face-to-face training group was 17.25 ± 1.54 in the telemedicine group was 17.18 ± 1.78 and in the control group was 16.55 ± 1.31 , the analysis of variance test ($P = 0.09$) showed there was no significant difference between the three groups in terms of gestational age. The mean age of husbands in the face-to-face training group was 24.3 ± 3.04 , in the telemedicine group was 23.05 ± 3.57 and in the control group was 22.68 ± 3.44 . Analysis of variance showed that there was no significant difference between the three groups in terms of age of husbands ($P = 0.08$). All samples were housewives. The socioindividual characteristics of the research units are summarized in Table 1.

Before analyzing the analytical data, Shapiro–Wilk test was performed to investigate the normal distribution. The results showed that in all three groups, the variables of nutritional function before and after the intervention, personal hygiene before the intervention and routine prepregnancy and postpregnancy care had a normal distribution ($P < 0.05$). Analysis of variance with Tukey's *post hoc* test was used for the group comparison of data with normal distribution and Kruskal–Wallis and U-Mann–Whitney tests were used for data with nonnormal distribution [Table 2].

The results of the analysis showed that the groups were homogeneous in scores of self-care before the intervention ($P < 0.05$). Face-to-face and telemedicine training did not differ significantly in improving the scores of nutritional performance, smoking and narcotics use, personal hygiene and routine pregnancy care, but face-to-face training compared to telemedicine improved the scores of sports and physical activity ($P = 0.04$).

Table 1: Frequency distribution of individual-social characteristics of research units

Variables	Group			Test results Kai Square and Monte Carlo (P)
	Control, n (%)	Telemedicine, n (%)	Face to face training, n (%)	
Level of education of the samples				
Illiterate and elementary	30 (75)	27 (67.5)	26 (65)	0.6
Middle education and higher	10 (25)	13 (32.5)	14 (35)	
Husband's education level				
Illiterate	2 (5)	4 (10)	6 (15)	0.57
Elementary	12 (30)	10 (25)	8 (20)	
Middle education	14 (35)	11 (27.5)	16 (40)	
Diploma and above	12 (30)	15 (37.5)	10 (25)	
Husband's employment status				
Unemployed	6 (15)	3 (7.5)	1 (2.5)	0.12
Employed	34 (85)	37 (92.5)	39 (97.5)	

Table 2: Comparison of scores of self-care domains before and after intervention in three study groups

Scores of self-care domains	Group (mean±SD)			ANOVA test result and Kruskal-Wallis	Tukey's <i>post hoc</i> test result U Mann-Whitney (P)
	Control	Telemedicine training	Face to face training		
Feeding performance					
Before intervention	23.7±4.11	20.57±5.93	21.47±7.92	P=0.07 F=2.7	0.79 [□] 0.24 [□] 0.06 [■]
After the intervention	24.2±4.23	28.42±3.38	26.92±6.3	P=0.001 F=7.86	0.35 [□] 0.03 [□] <0.001 [■]
Exercise and physical activity					
Before intervention	4.22±1.34	3.7±1.43	4±2.53	P=0.15 $\chi^2=3.71$	0.94* 0.15** 0.06***
After the intervention	4.65±1.47	6.62±1.67	7.37±1.58	P<0.001 $\chi^2=43.2$	0.04* <0.001** <0.001***
Smoking and narcotics					
Before intervention	9.22±1.99	10.1±1.72	9.45±2.8	P=0.16 $\chi^2=3.55$	0.6* 0.29** 0.04***
After the intervention	9.2±1.93	10.65±1.27	10.37±2.24	P=0.001 $\chi^2=14.1$	0.48* 0.002** 0.001***
Personal hygiene					
Before intervention	34.27±5.28	38.4±8.06	38.3±13.78	P=0.09 F=2.37	1 [□] 0.15 [□] 0.14 [■]
After the intervention	35.15±5.48	50.3±6.67	48.07±11.51	P<0.001 $\chi^2=48.41$	0.72* <0.001** <0.001***
Routine pregnancy care					
Before intervention	14.82±3.71	17.17±4.94	17.37±7.19	P=0.07 F=2.68	0.98 [□] 0.13 [□] 0.09 [■]
After the intervention	15.05±3.99	22.72±3.98	21.2±6.03	P<0.001 F=29.02	0.32 [□] <0.001 [□] <0.001 [■]

*Results of Mann-Whitney U to compare face to face education and telemedicine, **Results of Mann-Whitney U to compare the face to face education and control, ***Results of Mann-Whitney U to compare telemedicine and control, [□]Results of ANOVA with Tukey *post hoc* to compare the face to face education and telemedicine groups, [□]Results of ANOVA with Tukey *post hoc* to compare the face to face education and control, [■]Results of ANOVA with Tukey *post hoc* to compare telemedicine and control. SD=Standard deviation, ANOVA=Analysis of variance

Face-to-face training in all domains led to a significant improvement in scores as compared to the control group ($P < 0.05$). Furthermore, telemedicine training in all domains led to a significant improvement in scores as compared to the control group ($P < 0.05$) [Table 2].

Discussion

In the present study, the effect of face-to-face and telemedicine training on pregnancy self-care in adolescent women was investigated. The findings of the present study showed that face-to-face training and telemedicine were effective in improving the mean scores of self-care areas. The mean score of nutritional performance after training in the telemedicine group and face-to-face training was significantly increased and these two methods were not significantly different in improving nutritional performance. Consistent with the results obtained in this study, the results of the study of Jimoh *et al.* also showed that the use of mobile application could have been associated with better diet in adolescents.^[27] A study by Haghi *et al.* also showed that face-to-face training improves nutrition knowledge, attitude, and nutritional practice in pregnant women.^[28]

The mean score of exercise and physical activity after training in telemedicine and face-to-face training groups increased significantly and this increase was significantly higher in the face-to-face group than in the telemedicine group. The study of Matin *et al.* compared the effect of mobile education and face-to-face training on the amount of exercise in pregnant women in Zahedan. The results of this study in line with the present result showed that both methods are effective in promoting exercise but face-to-face training is more effective.^[20] In face-to-face training, the educator-mother interaction is greater^[29] and this factor probably leads to a greater effect of face-to-face training than telemedicine training in improving physical performance. However, the results of some studies contradict the results of the present study: In a study conducted in Australia on adolescent school girls, the interventions offered at school were not associated with a significant improvement in their level of physical activity.^[30] In another study conducted by Direito *et al.* on New Zealand adolescents, the use of mobile-based applications failed to have a significant effect on their physical activity.^[31] This difference is probably due to the demographic characteristics of the studied communities. In the present study, the target group was adolescent pregnant mothers and pregnancy is a time when women have a greater desire and motivation to learn and change behavior.^[32]

The results of the present study showed that both telemedicine and face-to-face training methods were able to successfully improve smoking status. Caine *et al.* (2012) showed that face-to-face training during

pregnancy has positive and significant results on smoking cessation.^[33] Furthermore, the study of Abroms *et al.* in pregnant women showed that using a mobile phone app could have a good effect on smoking cessation.^[34] Due to the special conditions of pregnancy, it seems that mothers have a strong motivation to adopt health-based behaviors to promote their health and that of their children.^[35] Contrary to the results of the present study, the results of Wilkinson and McIntyre study on pregnant women indicated that the use of face-to-face educational intervention based on lifestyle did not have a significant effect on reducing smoking in the intervention group compared with the control group.^[36] This difference is probably due to the fact that their intervention consisted of only 60 min of training in a variety of lifestyle areas. In another study conducted by Forinash *et al.* on pregnant women, education by sending mobile text messages was not effective in quitting smoking.^[37]

This difference is probably due to the type of content that in the Fourinash study were text messages, but in the present study, the messages were presented through video and the possibility of questions and answers with the researcher was provided. Smoking during pregnancy can increase the risk of miscarriage, birth defects, stillbirth, fetal growth retardation, preterm birth, placental abruption, and complications. In infants, sudden infant death syndrome and impaired lung function in childhood are also associated with smoking.^[38] Investing in this field can play an important role in promoting the health of women and children.

The results of the present study showed that the mean score of personal health after training in telemedicine and face-to-face training groups increased significantly. Consistent with the results of the present study, in a study conducted in the United States in 2019, the use of mobile telephony health program led to improved health care in pregnant women.^[39] In Izadi Rad study (2021), education based on health belief model was associated with increased self-care behaviors in pregnant women.^[40] However, the results of some studies were not in line with the results of the present study. In the study of Ghahremani *et al.*, which examined the effectiveness of an educational method based on the theory of self-efficacy in the field of lifestyle, no significant difference was observed between the two groups of intervention and control in terms of personal health.^[41] Explaining the observed differences between the mentioned studies and the results of the present study, we can point to the characteristics of the studied populations that pregnant adolescents probably have a higher motivation to change their lifestyle during pregnancy.

The results of the present study showed that the mean score of routine pregnancy care after training in

telemedicine and face-to-face training groups increased significantly. In this regard, in the study of Marko *et al.*, the use of remote health program with mobile phone was associated with greater satisfaction of pregnant mothers with prenatal care.^[39] The purpose of prenatal care is to protect the health of the mother and fetus, diagnose any pregnancy complications and take the necessary measures, respond to maternal complaints, prepare the mother for birth, promote healthy maternal behaviors, and maximize good health outcomes.^[42] As a result, increasing the use of prenatal care in adolescents is an essential component in improving the outcomes of pregnancy. However, pregnant adolescent mothers receive less prenatal care and experience adverse delivery outcomes as compared to older pregnant women.^[15] Increasing training to benefit from prenatal care can be helpful in promoting maternal and infant health outcomes.

Limitation and recommendation

One of the strengths of the present study is the comparison of two different educational methods and dealing with pregnant mothers in adolescence, which has received less attention from previous researchers. The use of self-reporting in the telemedicine group to ensure their participation in the training was limitation that the researcher tried to reduce the effect by following up after each time the content was sent. Due to the effectiveness of both methods of education, it is recommended that studies be designed on the effectiveness of combined methods of education in the self-care of pregnant women. It is also recommended that more studies be conducted with different approaches to promoting self-care for adolescent pregnant women.

Conclusion

Pregnancy in adolescence is associated with greater risks than in older ages. As a result, there is a need for methods to encourage them to participate in care. The results of the present study showed that face-to-face and telemedicine training methods can improve the self-care of pregnant adolescents. It is recommended to use these methods in the care of pregnant women.

Acknowledgments

This article is based on master's thesis in midwifery with the support of Zahedan University of Medical Sciences. The study approved by from the ethics committee of Zahedan University of Medical Sciences (code: IR.ZAUMS.REC.1399.297). The Vice Chancellor for Research and Health of Zahedan University of Medical Sciences, officials and staff of health centers in Zahedan and all participants in this study are thanked and appreciated.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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