Original Article

The Effect of Virtual Breastfeeding Counseling on Breastfeeding Self-Efficacy and Exclusive Breastfeeding: A Randomized Controlled Clinical Trial

Abstract

Background: Maternal self-efficacy plays a pivotal role in achieving exclusive breastfeeding (EBF). This study aimed to evaluate the impact of virtual breastfeeding counseling based on Rapport building, Exploration, Decision-making, and Implementation (REDI) approach on breastfeeding self-efficacy (BSE) and EBF rates among breastfeeding women. **Materials and Methods:** This randomized clinical trial was conducted in comprehensive health centers in Hamadan City, Iran, from 2023 to 2024. Using the block randomization method, 70 eligible participants were randomly assigned to either the intervention or control groups. Data were collected using a demographic and reproductive characteristics checklist, the Breastfeeding Self Efficacy Scale (BSES), and a breastfeeding status follow-up checklist. The intervention consisted of one face-to-face breastfeeding counseling session followed by ten virtual sessions guided by the REDI model consultation framework. Data were analyzed using Stata software, with statistical significance set at $P < 0.05$. **Results:** There were no significant differences in demographic and reproductive characteristics between the study groups, and mean (SD) BSES scores before the intervention ($P > 0.05$). However, after the intervention, the mean (SD) BSES scores in the intervention group were significantly higher than that in the control group (t = 2.40; $P = 0.01$). Moreover, the 6-month EBF maintenance was significantly higher in the intervention group than the control group (61.30% vs. 33.30%; $P = 0.029$). **Conclusion:** The results of this study suggest that virtual counseling intervention is effective in improving breastfeeding outcomes. Specifically, these interventions appear to enhance BSE and increase EBF rates during the critical first 6 months postpartum.

Keywords: *Exclusive breastfeeding, randomized controlled clinical trials, self-efficacy, virtual counseling*

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Introduction

The most evident benefit of breastfeeding is its immediate impact on child health and survival.[1,2] Breast milk not only functions as a primary nutritional source for newborns but also plays a vital role in the development and maturation of the digestive, immune, and neurological systems.[3] Exclusive breastfeeding (EBF) involves feeding the infant only breast milk during the first 6 months, without introducing other foods or water.[4] In recent years, the prevalence of EBF has declined.[5] The global weighted prevalence of EBF for infants under 6 months was 45.7% from 2010 to 2018,[6] which remains below the target of the World Health Organization (WHO) for EBF by 2030 that recommended achieving a 70% prevalence of EBF by 2030.[7] A meta-analysis reported an EBF prevalence of 53% in the first 6 months of life in Iran in 2019.[8] Breastfeeding self-efficacy (BSE) is a key factor in the continuation of breastfeeding.[9] BSE is related to mothers' confidence or positive expectations in their ability to breastfeed their infant. Many first-time mothers lack the necessary knowledge and BSE.[10] Several studies have emphasized the positive impact of breastfeeding counseling on both BSE and EBF rates.[10-12] However, the results of the study by Handayani *et al*.[13] indicated that high self-efficacy does not necessarily indicate success in correct breastfeeding practices.

A meta-analysis has emphasized the positive impact of educational or counseling interventions using various individual, group, or family-centered approaches to

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improve self-efficacy and promote the continuation of breastfeeding.[14] It is recommended that breastfeeding education be continued for several weeks postpartum in order to achieve the maximum benefit.[14] Counseling enhances skills and empowers individuals to improve their overall health.[15] While traditional interventions can be costly, digital technologies provide a more cost-effective and safer alternative for breastfeeding support, particularly in long-term interventions.[16] The use of telephone counseling, due to its easy accessibility, enables the provision of remote support and expands access to counseling for a greater number of individuals, particularly those who are unable to access face-to-face counseling.[17] Various approaches are used in counseling; the REDI approach, which stands for Rapport building, Exploration, Decision-making, and Implementing the decision, is an effective, client-centered, four-step counseling process that helps clients make voluntary and informed decisions based on their situation and reproductive needs.[18] A systematic review investigating the role of midwives in breastfeeding support found that midwives consider breastfeeding education and support as an essential part of their role as a midwife.[19] Given the decline in EBF, midwives can play a crucial role in supporting mothers as counselor. With the widespread use of mobile phones, there is now the potential to utilize this for promoting health and encouraging behavioral changes among pregnant women. Considering that a virtual intervention based on the REDI approach on BSE and EBF rate has not been conducted in Iran, the present study was carried out with the aim of determining the impact of REDI approach virtual counseling on women.

Materials and Methods

This randomized clinical controlled trial was conducted from 2023 to 2024. The study was approved by the Iranian Registry of Clinical Trials (IRCT20120215009014N456). The research setting included all comprehensive centers in Hamadan City, Iran, where women visited for care. Participants were pregnant women aged 18–40 years who were referred to the comprehensive health centers of Hamadan City. The inclusion criteria were a gestational age of 36–38 weeks, literacy in Persian (reading and writing), not participating in other educational research, having a normal singleton pregnancy, no medical problems based on the personal health record, and access to the Internet and WhatsApp. The exclusion criteria included more than one absence from the counseling session, hospitalization of the mother or baby after delivery for any reason, separation of the mother and child for any reason, EBF cessation, and the occurrence of a stressful incident.

Based on the primary outcome of this study (BSE variable),[15] with the assumptions of an α =0.05, power = 80%, m^1 = 47.7, m^2 = 52.9, sd^1 = 6.5, sd^2 = 7.0, and 20% as attrition rate, we calculated that 35 mothers were required for each of the intervention and control groups (n = 70). The sampling was initially conducted using an availability sampling method, and participants were then randomly assigned to either the intervention or control group. Randomization was performed using the permutation block method, with blocks of four. These blocks were generated and placed in opaque envelopes. Each participant randomly selected an envelope, and based on the block pattern, they were assigned to either the intervention or control group. This process continued until the total sample size was achieved. The research sampling was conducted across all 36 comprehensive health centers in Hamadan using the Integrated Health System software (Sib). A total of 120 mothers were identified, and 70 were selected based on the inclusion criteria. Participants were then randomly assigned to two groups. However, nine participants were excluded from the study due to loss of follow-up. Ultimately, data analysis was performed on 61 people by a statistical analyst who was blind to the group allocation [Figure 1].

To collect data, a demographic and reproductive characteristics checklist, the Breastfeeding Self-Efficacy Scale (BSES), and the breastfeeding status follow-up checklist were used. The BSES consists of 33 items rated on a 5-point Likert scale, where 1 indicates "not at all confident" and 5 indicates "very confident". This tool was developed by Dennis and Faux. The theoretical range of the scale is 33–165, with scores categorized as follows: 33–76 indicating low, 77–120 medium, and 121–165 high self-efficacy.[20] Various studies have confirmed the reliability and validity of the Persian version of this questionnaire.[21,22] In the present study, the reliability of the questionnaire was confirmed with a Cronbach's alpha coefficient of 0.88.

The lactation status checklist collected data on infant feeding (EBF, formula feeding, or mixed feeding), reason for formula feeding, breastfeeding challenges, and breastfeeding support. This questionnaire was developed based on a review of scientific references. Its content validity was verified by ten midwifery faculty members, and its reliability was confirmed through the test–retest method, yielding a correlation coefficient of 0.80.

After selecting the samples, the researcher, a midwife counselor, visited women based on the time of their visit to the comprehensive center. During the first meeting, the objectives of the study were explained and the necessary information was provided. After providing a written and signed informed consent in Persian, the participants completed the questionnaires independently. The REDI counseling approach was utilized in the intervention group through counseling sessions.

The initial breastfeeding counseling session was conducted individually in-person, lasting 45–60 minutes, while the subsequent sessions were held online via WhatsApp. These online sessions were scheduled weekly during the first

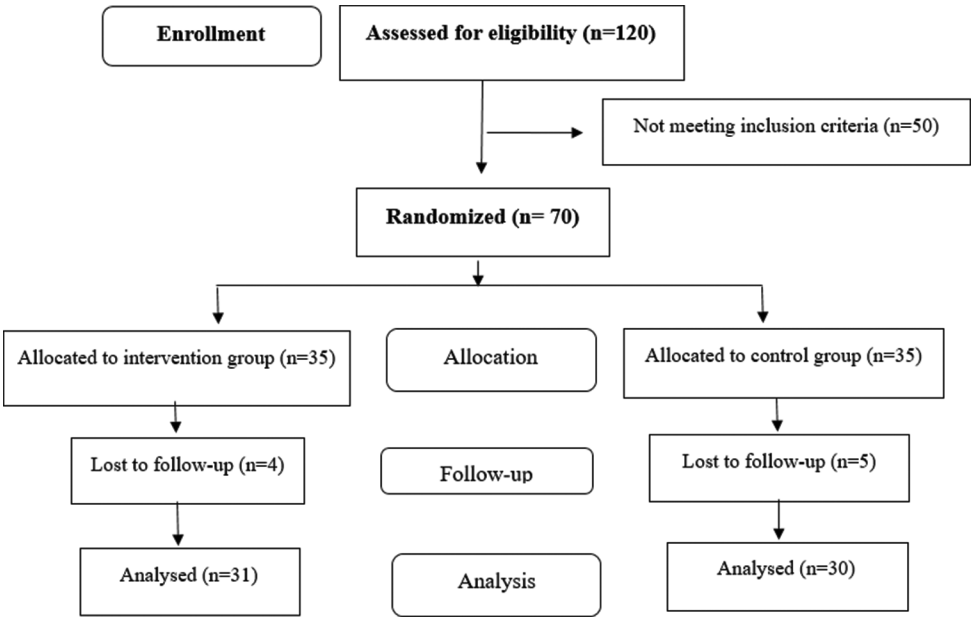

Figure 1: Flowchart consort

month, biweekly in the second month, and monthly until the end of the sixth month, with each session lasting 20–30 minutes. Additionally, daily text messages were sent for continuous support. Online counseling started on the third day postdelivery. The intervention group maintained contact with the researcher via WhatsApp and phone calls. Both groups filled out the BSES and lactation status checklist again 4 weeks after the 11th counseling session. The control group underwent standard routine care.

Content of counseling sessions based on the REDI's model via WhatsApp included: welcoming and properly engaging with participants; outlining the objectives of the study; asking questions about counseling needs in the field of breastfeeding; gathering opinions and feedback from participants; discussing the benefits of breastfeeding for both mother and baby; teaching correct breastfeeding techniques; emphasizing the advantages of EBF; demonstrating correct breastfeeding methods; guiding mothers in choosing the best feeding approach for their babies; becoming familiar with common infant issues; discussion on prevention and treatment of typical breastfeeding problems; explanation of the disadvantages of formula feeding; addressing the use of pacifiers, milk bottles, and infant feeding behaviors; evaluating the mother's ability to breastfeed and maintain it; explaining common breastfeeding challenges; answering related questions; and prevention and management of common issues.

Data analysis was conducted using Stata statistical software (version 13; StataCorp LLC, College Station, TX, USA). The normality of the quantitative data distribution was assessed using the Kolmogorov–Smirnov test. Intragroup comparisons were performed using either a paired *t*-test or the Wilcoxon test, while intergroup comparisons were conducted using the independent *t*-test or the Mann–Whitney test. A *P*-value of less than 0.05 was considered statistically significant.

Ethical considerations

The study protocol was approved by the Ethics Committee of Hamadan University of Medical Sciences (ID-code: IR.UMSHA.REC.1401.623). The study objectives were explained to all participants, and written informed consent was obtained from them.

Results

In this research, 70 mothers were entered into the study; however, four mothers in the intervention group and five in the control group were excluded from the study. Demographic and midwifery variables demonstrated no significant differences between the intervention and control groups [Table 1]. There was no significant difference in BSE between the study groups before the intervention (P = 0.71); however, after the intervention, the mean BSE score in the intervention group increased; in contrast, the control group experienced a decrease [Tables 2 and 3]. The study also examined the breastfeeding status of infants in the intervention and control groups on the sixth month. The results revealed a significant difference in EBF rates between the study groups 6 months after birth (P = 0.02) [Table 4].

Discussion

Based on the findings of this study, BSE and EBF were influenced by virtual breastfeeding counseling based on the REDI approach in primiparous women. After the intervention, participants in the intervention group showed higher BSE compared to the control group. Consistent

Table 1: Comparison of demographic and reproductive characteristics of intervention and control groups

Variables	Intervention group *n*=35	Control group *n*=35	*p*
Age (year)/Mean (SD)	23.97 (4.52)	23.40 (5.10)	0.64**
Spouse's age (year)/Mean (SD)	30.70 (4.11)	29.53 (4.61)	0.31**
Infant's birth age (week)/Mean (SD)	36.26 (8.26)	37.50 (6.15)	0.48*
Infant's birth weight (gr)/Mean (SD)	2957.10 (323.32)	2999.50 (404.54)	0.07*
Time to start breastfeeding at birth (hours)/Mean (SD)	1.42 (0.50)	1.40 (0.50)	0.88**
Education/*n* (%)			0.51**
Pre-diploma	12 (34.30)	10 (28.60)	
Diploma	13 (37.10)	17 (48.60)	
Academic education	10 (28.60)	8 (22.80)	
Current occupation/*n* (%)			0.41***
Housewife	31 (88.57)	30 (85.70)	
Employee	4 (11.43)	5 (14.30)	
Spouse's education/*n* (%)			0.52***
Pre-diploma	10 (28.60)	11 (31.40)	
Diploma	21 (60.00)	17 (48.60)	
Academic education	4 (11.40)	7 (20.00)	
Spouse's current occupation/*n* (%)			0.92***
Employee	5 (14.29)	6 (17.14)	
Labor	5 (14.29)	6 (17.14)	
Self-employed	25 (71.42)	23 (65.72)	
Residence/*n* (%)			0.51***
Urban	27 (77.14)	24 (68.57)	
Rural	8 (22.86)	11 (31.43)	
Type of delivery/*n* (%)			0.14***
Natural vaginal delivery	17 (48.57)	11 (31.43)	
Cesarean section	18 (51.43)	24 (68.57)	
Tendency to breastfeed/*n* (%)			0.99****
Yes	29 (82.86)	31 (88.57)	
No	6 (17.14)	4 (11.43)	

*Mann-Whitney; **t-test; ***Chi-square test; ****Fisher's exact test; *****$p<0.05$

Table 2: Comparison of breastfeeding self-efficacy in intervention and control groups before and after the intervention

Breastfeeding self-efficacy	Preintervention Mean (SD) *n*=31	Postintervention Mean (SD) *n*=30	*t**	*p***
Intervention group	72.45 (15.11)	81.22 (22.44)	1.86	0.07
Control group	70.99 (16.44)	66.30 (21.66)	1.18	0.24

*Paired t-test; **Significance level: $p<0.05$

Table 3: Comparison of breastfeeding self-efficacy between intervention and control groups before and after the intervention

Breastfeeding self-efficacy	Intervention group Mean (SD) *n*=31	Control group Mean (SD) *n*=30	*t**	*p***
Preintervention	72.45 (15.11)	70.99 (16.44)	0.37	0.71
Postintervention	81.22 (22.44)	66.30 (21.66)	2.40	0.01**

*Independent t-test; **Significance level: $p<0.05$

with the results of the present study, Heydari *et al.*[23] introduced virtual education as an effective method for increasing BSE in primiparous women. Mohammadi *et al.*[24] reported a significant improvement in BSE in the intervention group compared to the control group. A study by Akyıldız and Bay[25] demonstrated that breastfeeding support through video calls had positive effects on BSE and infant health.

Various studies have reported the positive impact of different counseling methods on BSE. Shafaei *et al.*,[26] Poorghasemian *et al.*,[27] and Aghababaei *et al.*[11] utilized in-person methods for counseling. The results of a study by Ramezani *et al.*,[28] which involved breast massage with the direct participation of a midwife, showed that the mean (SD) of BSE in the intervention group was significantly higher than in the control group.

In the present study, counseling was conducted based on the REDI approach, and the results indicated that using this approach had a positive impact on BSE and EBF. Therefore, utilizing the REDI approach in breastfeeding counseling can be effective. Studies examining the impact of counseling based on the REDI approach are limited, and the existing studies have primarily focused on sexual counseling,[29,30] and family planning.[31] In several

Table 4: Comparison of exclusive breastfeeding rate between the intervention and control groups at 2, 4, and 6 months after childbirth

Exclusive breastfeeding	Intervention group *n*=31 *n* (%)	Control group *n*=30 *n* (%)	Chi-square test	*p**
Two months after childbirth			3.62	0.15
Yes	26 (83.87)	23 (76.66)		
No	5 (16.13)	7 (23.34)		
Four months after childbirth			3.70	0.04*
Yes	23 (74.19)	17 (56.67)		
No	8 (25.81)	13 (43.33)		
Six months after childbirth			4.80	0.02*
Yes	19 (61.30)	10 (33.30)		
No	12 (38.70)	20 (66.70)		

*Significance level: $p<0.05$

studies, the GATHER approach has been used for BSE counseling.[27,32] A study by Fahim *et al*.,[32] which provided counseling using the GATHER approach, showed the positive effect of breastfeeding counseling on BSE and performance in adolescent mothers.

The study found a significant difference in EBF rates at 6 months postpartum, with 61.3% of women in the intervention group exclusively breastfeeding compared to 33.3% in the control group. These findings suggest that virtual counseling is an effective tool for enhancing BSE and promoting EBF in first time mothers. In a clinical trial conducted by Kohan and Heydari, a notable increase in EBF rates was observed following counseling interventions.[21] A systematic review and meta-analysis also showed that theory-based interventions, conducted in-person with phone follow-ups during pregnancy and postdelivery, can effectively promote EBF for 6 months.[33] In the study by Tahir *et al*.,[17] despite providing telephone-based breastfeeding counseling twice a month for the intervention group, no difference was observed in EBF rates between the intervention and control groups at 4 and 6 months postpartum. This discrepancy in study results may be attributed to differences in the counseling approach. Overall, breastfeeding education programs have shown a positive impact on mothers' awareness and attitudes toward BSE, and breastfeeding continuity up to 6 months postpartum. However, other studies have reported different results.

Unlike the result obtained in the present study, in the study by Antoñanzas-Baztán *et al*.,[34] which aimed to evaluate the effectiveness, feasibility, and acceptability of a new BSE promotion program on the maintenance of breastfeeding for 6 months, BSE scores were higher in the intervention group than in the control group, although no statistically significant difference was observed. In the study by Shariat *et al*.,[35] mothers in the intervention group received a training session on BSE, as well as educational and audio packages regarding postpartum care and relationship with neonates. The results of the study indicated that there was no statistically significant difference in terms of self-efficacy between the intervention and control groups.

The findings of Handayani *et al*.[13] indicated that there was no significant relationship between self-efficacy and breastfeeding practices. The statistical explanation for this was that several respondents with high self-efficacy scores did not achieve appropriate scores in breastfeeding practices. According to the concept, an individual's actions are always influenced by self-efficacy; however, high self-efficacy does not necessarily indicate success in correct breastfeeding practices. One significant and expected finding of this study was the impact of spousal support on continued breastfeeding among primiparous women, which exceeded the influence of other demographic and obstetric factors. This could be attributed to active spousal involvement in family decision-making. Previous research has also emphasized the positive effect of spousal support on the duration of breastfeeding.[36] BSE is a critical factor in identifying mothers at risk of discontinuing breastfeeding. According to the authors' research, this study is the first attempt to utilize virtual space, particularly WhatsApp, for REDI approach midwifery counseling. Given the vital role of midwives in women's care, their ability to interact can significantly contribute to empowering women. However, the findings should be interpreted cautiously due to some limitations. While the intervention period extended up to 6 months postpartum, a notable strength, it might have influenced the study's findings. Additionally, due to the nature of the intervention, only the statistical analyst was blinded.

Conclusion

The results of this study suggest that virtual counseling intervention based on REDI approach is effective in improving breastfeeding outcomes. Specifically, these interventions appear to enhance BSE and increase EBF rates during the critical first 6 months postpartum. Midwifes involved in breastfeeding education should be well informed about BSE; they should make an effort to integrate the concept of BSE into their teaching methods in order to more effectively support and empower mothers in their breastfeeding experiences and improve breast milk nutrition.

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Conflicts of interest

There are no conflicts of interest.

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