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The Role of Counseling based on the Fogg Behavior Model as a Trigger for the Choice of Vaginal Birth after Cesarean Section: A Randomized Clinical Trial

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ABSTRACT

Background & aim: The high rate of repeat cesarean section and its complications call for changing birth mode choices by mothers with previous cesarean section. The present study investigates the role of counseling based on the Fogg behaviour model as a trigger for the choice of vaginal birth after cesarean section (VBAC).

Methods: This parallel cluster randomized clinical trial was conducted on 62 mothers with repeat cesarean section at 28-30 weeks of gestation by multistage sampling in health centers of Mashhad, Iran between June and December 2020. Participants were randomly allocated to counseling based on the Fogg's model and control groups. Intervention group participated in two sessions (45-60 minutes) of individual counseling and one online session through the Telegram channel. Participants in the control group only received the routine care. Both groups completed the demographic questionnaire and the self-structured questionnaire of triggers for birth options and and the checklist for choice of birth at the beginning and two weeks after the counseling. Data analyzed by SPSS 25 using Fisher's exact, Chi-square and the Mann-Whitney U tests.

Results: The frequency of intention to choose VBAC in the intervention group before and two weeks after counseling was significantly different (P<0.001). There was also a statistically significant difference between the frequency of intention to choose after the counseling in the two groups (P<0.001).

Conclusion: Counseling as a trigger by increasing the motivation and ability in choosing birth mode, increase the intention to choose VBAC and can be considered during prenatal care.

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Introduction

Reduction of unnecessary cesarean sections is one of the significant goals of maternal health (1). The cesarean section rate is high worldwide, which is mostly owing to repeat cesarean sections (2). In Iran, almost half of cesarean sections are due to previous cesarean sections (3). Vaginal Birth After Cesarean section (VBAC) is a significant strategy to decrease the rate of cesarean section (4), and its success rate is 60% to 80% (5). Notwithstanding the high success rate, the VBAC rate is very low in many countries, including Iran (0.8%) (6). Studies have shown that women with successful VBAC experience fewer complications, including postpartum

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bleeding and surgical adhesions, and a shorter recovery period. Also, respiratory distress in the newborn and admission to the neonatal intensive care unit are less common in VBAC (7-9).

Several factors are effective in choosing the delivery method, including lack of knowledge about delivery methods, perceived factors of natural delivery, unpleasant experiences, lack of self-confidence, risk of cesarean delivery for the infant and subsequent pregnancies, and fear of delivery and lack of access to a physician (6, 10-13). The decision to have a normal delivery or cesarean section is one of the most strenuous decisions made by the pregnant mother and the medical team (14). Health care providers have an effective role in women's decisions about vaginal birth after cesarean section (15). In other words, the mode of birth is strongly related to the advice of the physician. Physicians need to provide more in-depth information about TOLAC (Trial of Labor after Cesarean) so that women can make informed decisions (5). Based on the results of Andron et al.'s study, individual counseling in primiparous women during pregnancy leads to a positive attitude towards natural childbirth, informed decision-making, and an increased choice of natural childbirth (16). The results of the studies showed that the presence of primiparous women in group counseling, the rate of physiological childbirth, and motivational interviewing increases the intention to choose natural childbirth in women who had a previous cesarean section (3, 17). The choice of birth mode is also influenced by a range of medical characteristics such as race, psychological characteristics such as fear of a new experience, sociological characteristics such as attitude to cesarean delivery as a culture, and spiritual characteristics such as forgiveness of sins (18). Education and counseling with mothers can increase their knowledge, making a positive attitude and increasing their self-confidence, as well as their trust in health care providers. The result leads to better interaction for more appropriate selection (19). Also, according to the studies, counseling is effective in increasing the self-efficacy of childbirth and reducing the fear of childbirth (20-21). Among the different behavior change models and techniques, short-term and simpler interventions are more effective in the behavior change process (22-23). In 2007, Dr. Fogg introduced the Fogg Behavioral Model (FBM) as a practical model to guide technology design to maximize superior product selection. According to this model, behavior occurs when three factors are present simultaneously: motivation, ability, and prompt. Motivation means how willing a person is to intervene in a behavior, ability means the ease or difficulty of intervening in a behavior, and in this model, the prompt means the factors that can potentially contribute to the formation of behavior. This model shows that after the occurrence of prompt, people with high motivation and ability will perform this action (24). Fogg model changes attitudes, motivates customers, and focuses on positives such as patronage, self-efficacy, empowerment, and encouragement. When a person has no motivation to perform the goal behavior, a trigger factor should be designed alongside a motivational element (25). Although counseling can play a role in choosing a natural childbirth, according to the best of our knowledge, no study has been found on the role of counseling as a trigger for choosing the mode of birth in women with a previous cesarean section. Therefore, this study was conducted to assess the role of counseling as a trigger in Fogg model on the choice of vaginal birth after cesarean section.

Materials and Methods

This study was a cluster randomized controlled trial registered in the Iranian Clinical Trials Registry (IRCT20200105046014N1).

Participants were 62 women with a previous caesarean section who were referred to the Comprehensive Health Center in Mashhad City between June 16 and December 2020. Inclusion criteria included one prior caesarean section, gestational age based on the first day of the last menstrual period or first trimester ultrasound 28 to 30 weeks, an interval of more than 6 months between the previous caesarean section and the first day of the last menstrual period, no medical or onstetric complications, and no indication for caesarean section in the current pregnancy. Exclusion criteria included not attending at least one counseling session, indication for termination of pregnancy before the end of the follow-up period, incomplete completion of questionnaires, medical illness or obstetric complication during the research period.

The sample size was calculated based on a study by Esmaili et al. (18).

Based on a proportion comparison in two independed population, and 5% error, and a test power of 80%, the minimum sample size in each group was calculated to be 31 participants using the prevalence comparison formula for two independent populations.

$$\frac{\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 \left(p_1(1-p_1) + p_2(1-p_2)\right)}{(p_2 - p_1)^2} = \frac{(1.96 + 0.84)^2 \left(0.903(1-0.903) + 0.613(1-0.613)\right)}{(0.613 - 0.903)^2} = 31$$

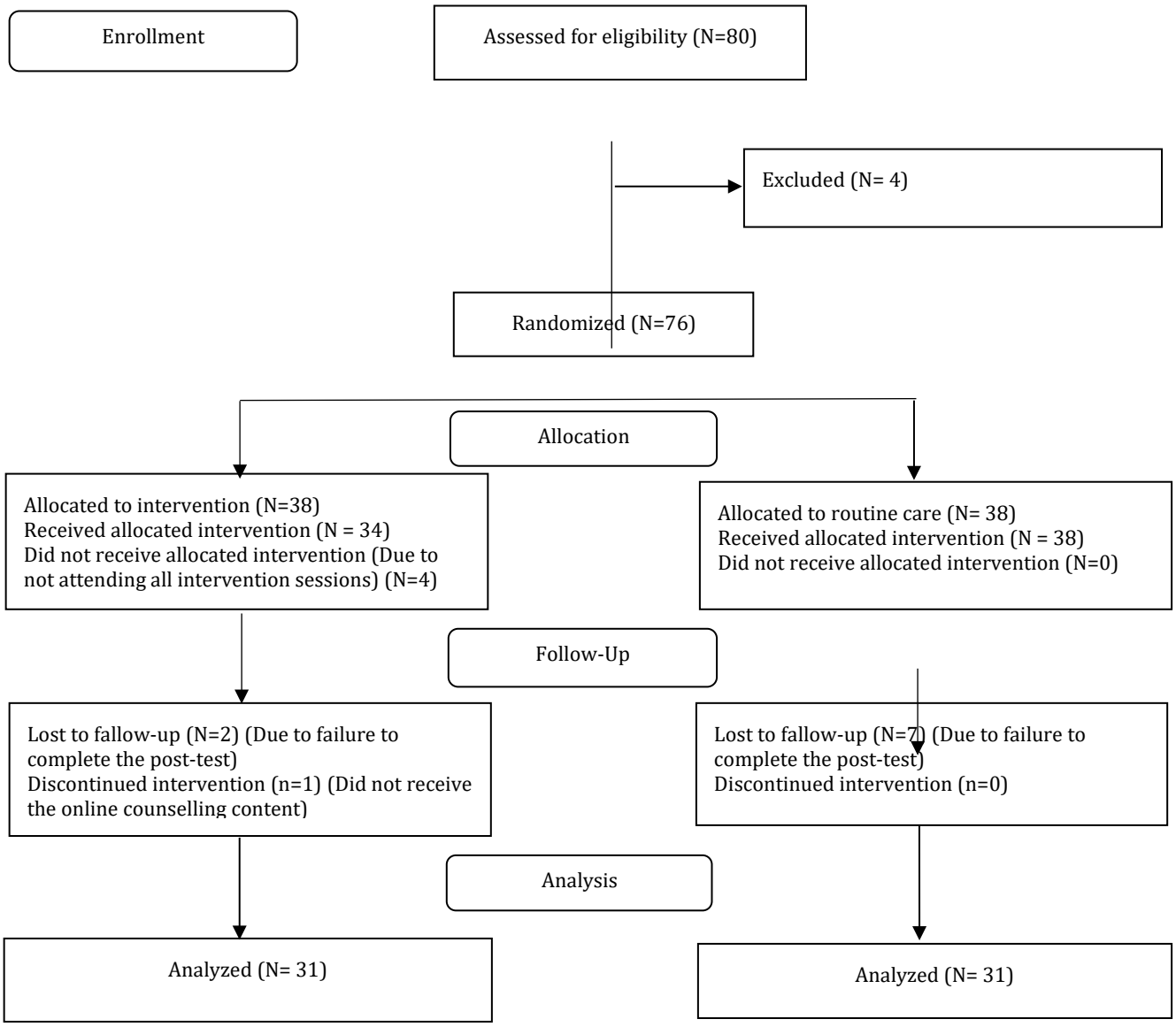

Figure 1. CONSORT Flowchart of the study

Participants were recruited using a multistage sampling method. Two comprehensive health centers were randomly selected, and four affiliated subcenters were selected from each based on population size and geographic location. The eight subcenters were randomly allocated to either the intervention or control group (four subcenters per group) using sealed opaque envelopes. Subsequently, eligible participants were recruited through convenience sampling within each subcenter.

The study instruments included a demographic and obstetric questionnaire, a questionnaire based on the trigger of Fogg behavior model, and a checklist to assess the intention to choose a vaginal birth after cesarean section.

The demographic and obstetric questionnaire included age, maternal education and occupation, health insurance coverage, and family income level, as well as obstetric characteristics, including gestational age, gravidity, parity, interval between the current pregnancy and previous delivery, history of vaginal delivery, satisfaction with the previous cesarean section, pregnancy planning, and the woman's preference for mode of delivery.

All of the study instruments were prepared using updated books and papers, and they were validated by seven faculty members of Mashhad University of Medical Sciences; the final instrument was edited and applied after considering their suggestions. The content validity method was used to evaluate the validity of the personal and obstetric information form, and a checklist was used to examine the intention to choose vaginal birth after cesarean section. For the questionnaire based on Fogg behavior model, the average index of CVI and CVR was obtained as 0.946 and 0.737, respectively. The reliability of the questionnaire was calculated based on Fogg model (internal consistency) with a Cronbach's alpha coefficient of 0.72. Two assessors agreed to determine the reliability of the checklist to examine the intention to choose vaginal birth after cesarean section, and it was confirmed with kappa = 0.92.

After securing approval from the regional ethics committee, each of the eight comprehensive health centers was assigned to either an intervention group or a control group, from which individuals meeting the inclusion criteria were selected. Before the intervention, the demographic and onstetric questionnaire and two other questionnaires were completed by the participants.

In the intervention group, the researcher provided individual counseling based on Fogg model through face-to-face interviews in two sessions lasting 45-60 minutes, with a 14-day interval, as well as an online counseling session through the Telegram channel, concurrently with routine care at the health center. The researcher's ability to conduct individual counseling sessions was approved after obtaining a license to conduct counseling under supervision of specialized counseling professors on performing three counseling sessions for pregnant women, who had a previous cesarean section (Table A).

Table A. Content of sessions in intervention group

Sessions	Base of session	Contents of session
The first session	Creating a positive motivation to have a vaginal birth	Describing the advantages of vaginal birth for mother and infant, The complications of repeat cesarean section for the mother The complications of repeat cesarean section on fertility
The second session	Providing the content of the ability structure focusing on empowering the woman in accepting the preferred birth	Strategies to reduce childbirth pain, Helping the mother to realize her potential abilities to informed decision making and what she stated about her choice Developing positive points in her choice Eliminating barriers to choose vaginal birth from her perspective Planning to overcome the barriers to vaginal birth

Sessions	Base of session	Contents of session
The third session (online through telegram)	Presenting all educational and motivational content and materials related to choice of birth mode	Cesarean section and vaginal birth videos Non-pharmacological methods of labor pain management Exercises during pregnancy and childbirth Auditory file of interviews with mothers who experienced Successful vaginal birth after cesarean VBAC pamphlets

In this study, participation in an individual counseling program was considered an equal stimulus in the intervention group, and its effect was evaluated in comparison with the control group. Two weeks after the end of the intervention, the checklists were also completed again in two groups, and the educational pamphlet was given to the control group. Data were analyzed in SPSS (version 25; IBM Corp., Armonk, NY, USA) using Chi-square, Mann-Whitney, Fisher's exact tests, and Spearman correlation test. P-value less than 0.05 was considered statistically significant.

Results

The mean age of participants was 29 years old, and all of them were in 28-29 weeks of pregnancy. The baseline characteristics were homogeneous in both groups (Table 1).

Table 1. Comparison of demographic and obstetric characteristics between the two groups

Quantitative variables	Intervention group (N=31)	Control group (N=31)	P-Value**
	Mean ± SD	Mean ± SD	
Age (year)	29.56±4.14	31.55±4.29	0.301[a]
Gestational age (weeks)	28.74±1.18	29.39±1.14	0.351[a]
Number of pregnancies	2.47±0.82	2.27±0.57	0.301[a]
Number of children	1.12±0.32	1.00±0.24	0.417[a]
The interval between the previous delivery and the current pregnancy	5.06±1.89	4.97±1.94	0.975[a]
Qualitative variables	**N (%)**	**N (%)**	**P-Value****
Education			
Primary	1(3.2)	1(3.20)	
Junior high school	6(19.4)	3(9.70)	0.157[b]
Secondary high school	17(54.8)	12(38.70)	
Academic education	7(22.6)	15(48.40)	
Job			
Housewife	28(90.3)	26(83.90)	0.707[b]
Employed	3(9.7)	5(16.10)	
Family income			
Less than enough	3(9.7)	2(6.50)	0.999[b]
Enough	28(90.3)	28(90.30)	
More than enough	0(0.0)	1(3.20)	
Insurance coverage			
Yes	28(90.3)	31(100)	0.238[b]
No	3(9.7)	0(00)	
History of natural childbirth			
Yes	5(16.1)	3(9.70)	0.707[b]
No	26(83.9)	28(90.30)	
Satisfaction with previous cesarean section			
Yes	26(83.9)	24(77.40)	0.749[c]
No	5(16.1)	7(22.60)	

Quantitative variables	Intervention group (N=31)	Control group (N=31)	P-Value**
	Mean ± SD	Mean ± SD	
Spouse's advice for the type of delivery			
Cesarean section	14(45.2)	17(54.80)	0.412[b]
Natural childbirth	4(12.9)	1(3.20)	
Has no comment	13(41.9)	13(41.90)	
Pregnancy planning			
By planning	20(64.5)	22(71.00)	0.165[b]
without planning	11(35.5)	9(29.00)	

*Standard Deviation /**Significance level: P<0.05/[a]Mann-Whitney test / [b]Fisher's exact test / [c]Chi-squared test

According to the results of the study, in both groups before the intervention, the majority of the research participants (58.1%) considered "their own opinion" as the motivation for choosing the mode of delivery. The results of Fisher's exact test showed that before the intervention, there was no statistically significant difference between the two groups in terms of the motivation for choosing the mode of delivery (P=0.144). However, after the intervention, in the counseling group, the majority of the participants stated that counseling based on the Fogg model was the trigger for choosing the mode of delivery. According to Fisher's exact test, there was a statistically significant difference between the two groups in terms of the triggers for choosing mode of delivery after the intervention (P<0.001) (Table 2).

Table 2. Distribution of Fogg model trigger categories before and two weeks after the intervention by study group

Fogg model trigger for choosing the mode of birth	Intervention group	Control group	P-Value*
	N (%)	N (%)	
Before intervention			
Herself*	32 (71.00)	14 (45.20)	P=0.144[a]
Family	3 (9.70)	4 (12.90)	
Physician	6 (19.40)	12 (38.70)	
Counsellor	0 (0.00)	1 (3.20)	
Two weeks after intervention			
Herself	12 (38.70)	15 (48.40)	P<0.001[a]
Family	3 (9.70)	6 (19.40)	
Physician	4 (12.90)	10 (32.20)	
Counsellor	12 (38.70)	0 (0.00)	

*Significance level: P<0.05 , [a] Fisher's exact test

The data related to intention to choose vaginal birth after cesarean section are shown in Table 3. Based on Table 3, the comparison of the frequency of intention to choose vaginal birth after cesarean section, before the intervention, 2 weeks and 4 weeks after the end of the intervention in the intervention group with the control group, Fisher's exact test showed that before the intervention, there is no statistically significant difference between the two groups in terms of the frequency of choosing natural delivery after cesarean section (P=0.726).

The results of the same test two weeks after the end of intervention showed that the frequency of the intention to choose natural delivery after cesarean in the two groups has a statistically significant difference (P < 0.001).

Table 3. Distribution of intention to choose vaginal birth after cesarean section before, two and four weeks after the intervention by study group.

intention to choose vaginal birth after cesarean section	intervention group N (%)	Control group N (%)	P-Value*
Before intervention			
Probably VBAC	3 (9.70)	1 (3.20)	
Probably cesarean section	15 (48.40)	16 (51.60)	P=0.726[a]
Definitely VBAC	0 (0.00)	0 (0.00)	
Definitely cesarean section	13 (41.90)	14 (45.20)	
Two weeks after intervention			
Probably VBAC	5 (16.10)	0 (0.00)	
Probably cesarean section	10 (32.30)	7 (22.60)	P<0.001[a]
Definitely VBAC	7 (22.60)	0 (0.00)	
Definitely cesarean section	9 (29.00)	24 (77.40)	
Four weeks after intervention			
Probably VBAC	5 (16.10)	0 (0.00)	
Probably cesarean section	10 (32.30)	5 (16.10)	P<0.001[a]
Definitely VBAC	7 (22.60)	0 (0.00)	
Definitely cesarean section	9 (29.00)	26 (83.90)	
Results related to within-group in three stages	df=2 P<0.001[b]	df=2 P<0.001[b]	

*Significance level: P<0.05 / [a] Fisher's exact test / [b] Friedman test

The results of the same test four weeks after the end of the intervention also showed that there is a statistically significant difference in the frequency of the intention to choose vaginal birth after cesarean section in the two groups (P < 0.001). Comparison of the frequency of intention to choose vaginal birth after cesarean section in the intervention group (within group) by the Friedman test showed that there is a statistically significant difference in the stages before the intervention and two weeks and four weeks after the end of the intervention (P < 0.001). The results of the same test in the control group also showed that there is a statistically significant difference between the three stages, but in favor of increasing the choice of cesarean section (P<0.001) (Table 3).

Data related to the amplitude of changes in Fogg model trigger scores in the control and intervention groups are birth after cesarean in the intervention group (within group), by the Wilcoxon test, showed that there is a statistically significant difference in the stages before the intervention and two weeks after the end of the intervention (P=0.019). But the results of the same test in the control group showed that there is no statistically significant difference between the two stages (P=0.457) (Figure 2).

Accordingly, counseling increased the total score of the Fogg model, so that the comparison of the mean trigger scores compared to vaginal birth after cesarean in the intervention group (within group), by the Wilcoxon test, showed that there is a statistically significant difference in the stages before the intervention and two weeks after the end of the intervention (p=0.019). But the results of the same test in the control group showed that there is no statistically significant difference between the two stages (P=0.457).

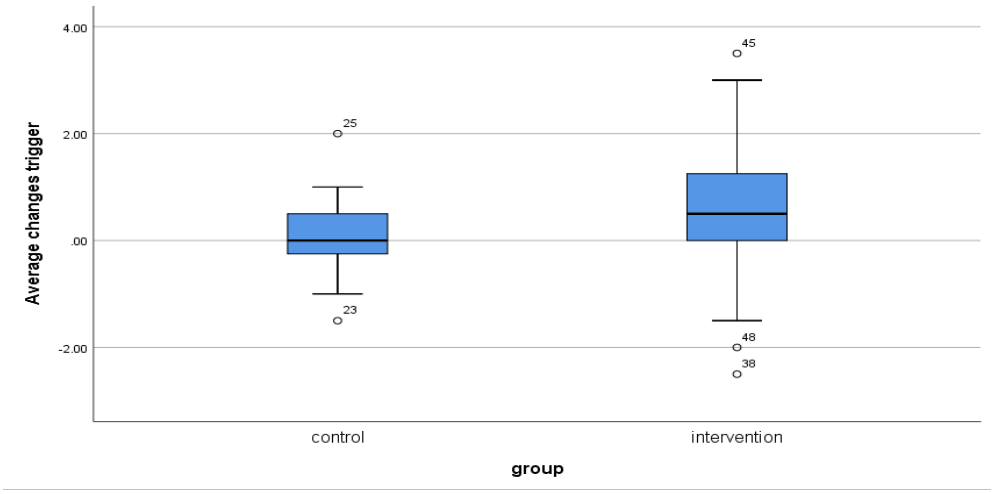

Figure 2. Changes in Fogg Behavior Model trigger scores in the intervention and control groups

Discussion

This study aimed to determine the impact of the role of counseling based on Fogg behaviour model, as a trigger, on the choice of vaginal birth after cesarean section. Based on the results, counseling through Fogg model can increase the intention to choose natural childbirth. According to Fogg (2020), the right choice occurs with increasing motivation and ability and the presence of triggers (25). The existence of a factor as a trigger
is important in choosing health behaviors during the counseling process. The researcher, as a counselor, focused on what was personal as the factors in low motivation and inabilities of mothers in decision making for childbirth and, after identifying them, she presented strategies to improve them. Firoozi et al. (2021) in a qualitative study found that the lack of decision self-efficacy as well as the lack of effective counseling (26), the lack of access to specialized services, insufficient incentive system, modeling in cesarean section, Axial physician in VBAC, fear of legal responsibilities, imposing policies, marginalizing midwives, and Lack of staff support for VBAC (6) are barriers to choosing VBAC.

In the present study, in addition to the fear of childbirth, a good and satisfactory experience
from the previous cesarean section was the first important factor in motivating women to choose a cesarean section, and the doctor's opinion was the second motivating factor for choosing the mode of birth. The results of numerous studies have shown that the most common reasons for preferring cesarean section in Iran are rooted in fear of labor and irreversible damage to the body and sexual function (27-31). Hoseini et al. (2020) alsoreported that fear of childbirth is an important barrier to the choice of vaginal birth (32).

In the present study, before the intervention, the physician's opinion was the second motivating factor for choosing the mode of delivery, but two weeks after the intervention, counseling for choosing a VBAC had a more important role. Ridley et al. (2002) considered the encouragement of physicians to perform vaginal birth after cesarean section, the ultimate benefits of the mode of delivery, physical and psychological factors, and the woman's sense of control over the decision-making process to be effective in choosing the mode of delivery (33).

The intention to choose VBAC before the intervention was not statistically different in the two groups. But after the counseling in the intervention group, the tendency to choose VBAC increased by 29% and was statistically significant. In a study, optimism training has been reported to be effective on the attitude and intention to choose the birth method. From this point of view, it can be compared and checked (34). In the present study, the result of counseling on the frequency of intention to choose VBAC was greater in the intervention

group than in the control group. Due to insufficient support for the choice of VBAC in most current care centers and the influence of mothers, especially women with a previous cesarean section, on physicians and medical staff, the impact of such resources on the choice of mothers is not far from the mind. The tendency to choose in comparison before and after the counseling in the counseling group increases and confirms the effectiveness of counseling with this approach. In another study, a motivational interview group counseling based on MI in the intervention group, compared to the control group, increased the tendency to choose VBAC in women with previous cesarean sections by 17%, which is less than the 29% increase in the present study, and this increase is likely related to the counseling approach (3). A study examined the effect of evidence-based advice provided by midwifery manuals on the choice of mode of delivery and found that information about VBAC increased. But it did not affect mothers' preferences for the mode and intention of delivery, which is inconsistent with our study. This difference shows that having information alone is not enough to increase the intention of women with a previous cesarean section, and in addition to providing information, we helped mothers with their motivation and ability to make the right decision (35).

One of the strengths of the study was that it paid attention to important factors such as motivation and ability, as well as utilizing counseling , especially individual counseling, which provided the conditions for analyzing the strengths and weaknesses of each mother in choosing VBAC. One of the limitations of the research was that due to the coronavirus pandemic and the need to reduce the presence of mothers in health care centers, we had to reduce counseling sessions.

Conclusion

The high rate of repeat cesarean section and its complications in Iran, along with the current policies of population increase, are among the reasons for the necessity to pay attention to solutions to reduce repeat cesarean sections. Counseling based on Fogg behavior model as a trigger in decision-making by women with a previous cesarean section can be recommended by maternal health care providers.

Declarations

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical approval

The participants entered the study with written consent, and the objectives of the study, the optionality of participating in the study, as well as ensuring the confidentiality of the data and the possibility of withdrawing from the study at any time during the study were explained to them. In order to comply with ethical principles, after the intervention completion, educational pamphlets about VBAC were given to the control group.

Code of ethics

The study protocol was approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran (Ethics Code: IR.MUMS.NURSE.REC.1398.081).

Use of artificial intelligence (AI)

No artificial intelligence tools were used in the writing or analysis of this manuscript.

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Authors' contributions

SA and MF and ZHF designed the study. SA carried out the data collection. JJ performed the analysis and designed the figures and tables. SA and MF prepared the draft of manuscript. MF supervised the project and reviewed the manuscript critically. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work.

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