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The Effect of Virtual Cognitive Behavioral Therapy on Childbirth Self-efficacy of pregnant women: A Quasi-Experimental Study

Sahar Emamgholi (MSc)[1], Fatemeh Vaseq Rahimparvar (PhD)[2], Maryam Modarres (PhD)[3,4]*

[1] Lecturer, Department of Midwifery and reproductive health, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

[2] Assistant Professor, Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

[3] Associate Professor, Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

[4] Nursing and Midwifery Care Research Center, Tehran University of Medical Sciences, Tehran, Iran

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ABSTRACT

Background & aim: A large number of mothers, despite having high levels of physical fitness and executive skills, have inadequate self-efficacy in choosing natural childbirth. This study aimed to investigate the effect of virtual cognitive behavioral therapy on childbirth self-efficacy of pregnant women.

Methods: This pretest-posttest non-randomized quasi-experimental study was conducted on 76 pregnant women with a gestational age of 24-29 weeks, who referred to health centers affiliated to Alborz University of Medical Sciences, Karaj, Iran. Participant allocated to two intervention and control groups. The virtual cognitive behavioral therapy (VCBT) group received routine pregnancy care and five sessions of 90-minute VCBT training once a week. The control group received only routine pregnancy care. Both groups completed the Louie self-efficacy questionnaire pre and post intervention, and their type of delivery was asked over the phone. The data was analyzed by SPSS statistical software version 25 with ANCOVA, T-Test for correlation, and T independent test.

Results: The main score of childbirth self-efficacy increased by 2.14 points post-intervention compared to pre-intervention in experimental group, which indicated the effectiveness of the cognitive therapy intervention ($P<0.001$). The mean self-efficacy of childbirth after the intervention in the control group was the same as before ($P>0.05$). The total effect of cognitive therapy intervention was 0.379.

Conclusion: The results of this research confirmed the effectiveness and efficiency of cognitive therapy in increasing the self-efficacy of pregnant women in adapting to normal delivery. Therefore, using this intervention is suggested as an effective method to prepare for childbirth.

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Introduction

Pregnancy is a naturally stressful transitions for most women. It is associated with rapid physical and emotional changes in family and social status (1). Vaginal delivery is the safest and least complicated method of delivery in most cases for mother and baby, but sometimes, for various reasons, pregnant women refuse to choose this less complicated and safe method and choose cesarean section. To address this, global midwifery associations have identified key factors promoting vaginal delivery (2). Pregnant women's focus on birth is a motivating factor and

* *Corresponding author*: Maryam Modarres, Associated Professor, Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran. Tel: 00989123880257, Email: modarres@tums.ac.ir

ensures that the delivery process goes according to the mother's expectations (3).

If women have high self-efficacy for normal delivery, normal delivery will increase (2). Higher self-efficacy during childbirth facilitates the development of coping mechanisms for managing pain and uterine contractions (4). Self-efficacy is the belief that a person can do a task successfully (expectation of self-efficacy). Childbirth self-efficacy is the belief that a mother can have a normal birth with the least interventions and with successful results for herself and her newborn. It is shown that low childbirth self-efficacy is associated with fear (2). Razurel et al., (2017) and Saeedi Aval Nooghabi et al., (2019) confirmed the inverse relationship between stressful factors and lack of support for mothers during pregnancy with their self-efficacy (5-6).

Childbirth self-efficacy is defined as a dynamic cognitive process of a person's confidence in their ability to cope with a childbearing event (7). Planned interventions, especially for women with their first pregnancy, such as increasing adaptation skills to normal delivery (such as breathing techniques, relaxing the body, diverting one's thoughts from pain, and recognizing the location of pain, lead to achieving self-efficacy for normal delivery and reducing fear from labor pain (8). Howarth et al., (2019) concluded in their study that women by increasing the information and education could master pain control (9). Cognitive therapy training, before mothers face the birthing situation, can reduce negative thoughts and increase self-efficacy. By organizing cognitive therapy courses in scheduled sessions, it is possible to change people's feelings, thinking, attitudes, and negative self-esteem and make people more adaptable. This training will stop negative thoughts by creating a gradual logical relationship. Ghazaee et al., (2016) in their study have been measured only the effect of cognitive therapy on the fear and anxiety of childbirth (10) and Eidouzaei et al (2023) concluded with an educational cognitive therapy intervention that education was able to reduce mothers' fear and increase their self-efficacy (11).

While, by encouraging healthy behaviors, positive thoughts can be created and a feeling of relaxation arise in the person, which will lead to more self-efficacy in the person (12). The cognitive therapy method will be more flexible, cost-effective and useful if it is based on the Internet (13). Alavi et al. (2023) compared internet-based cognitive behavioral therapy (ICBT) with face to face interventions, and concluded that both methods had positive effects on depression and quality of life (14). Eadie et al. (2023) believed that Face-to-face cognitive behavioral therapy (CBT) affects self-efficacy and motivation, but has limitations due to high cost, long waiting list, and unavailability. The web-based method can reduce these limitations (15). Also, nowadays, online mental health services have become more popular and people are more accepting of them. However, there is no consensus about who should use online psychological intervention (16). In Iran, few studies have been conducted in this field (10). Therefore, the present study aimed to evaluate the efficacy of internet-based CBT on the childbirth self-efficacy of pregnant women.

Materials and Methods

This research was a pertest-posttest non-randomized quasi-experimental study conducted on 80 pregnant women with a gestational age of 24-29 weeks, who referred to health centers affiliated to Alborz University of Medical Sciences, Karaj, Iran. participants were selected by convenience sampling method from Razavi health care network. The sample size was calculated according to the study by Ghazaee et al. (2016). (10): G Power software was used to estimate the sample size. The statistical test of analysis of covariance (ANCOVA) was chosen. The input parameters in the formula include the effect size equal to 0.34 (which was a value between moderate i.e. 0.25 to strong 0.40), type 1 error or alpha value equal to 0.05, test power of 80%, number of groups equal to 2 and the maximum control variables were determined to be equal to 4. The output of the software based on the input parameters was equal to at least 72 samples. To account for a predicted attrition rate of 10%, the sample size was increased to 40 participants per group (N=80). The numbers considered in G Power software include the following data:

Input:

Effect size f=0.336

α err prob=0.05

Power (1-β err prob) =0.80
Numerator df=1
Number of groups=2
Number of covariates=4
Output:
λ=8.1285120
Critical F=3.9862695
Denominator df=66
Total sample size=72
Actual power=0.8021652

Inclusion criteria included being 18-40 years old, reading and writing literacy, not participating in classes similar to cognitive behaviour therapy, understanding the Persian language, having Low-risk pregnancy (absence of chronic diseases in pregnancy according to the mother's file), no contraindications for vaginal delivery, having a gestational age of 24-29 weeks, not using sedatives or anti-anxiety drugs, and not having a known mental illness.

Exclusion criteria included participation in one of the similar cognitive therapy classes during the intervention, use of sedative or anti-anxiety drugs during the study, and in case of any complications in pregnancy (such as premature separation of the placenta, fetal death, premature rupture of the amniotic sac, premature delivery, gestational hypertension, gestational diabetes and maternal heart diseases) during the study, emergency cesarean section and (absence of more than one session during the educational intervention).

The participants were selected by convenience sampling; randomization was not done due to the importance of the mothers' free and voluntary requests to enter each group. CBT classes were scheduled on separate days for the intervention to avoid any cross-contamination of information between the two groups. Blinding was partially considered in the research. The data collector did not know which group was intervention or control and the groups were separated into two groups without personal names. Statistician and data analyst also did not know the group. Sampling continued for 3 months in person on some days, except for holidays, from 1st October to the end of December 2019. In the intervention group, there was no dropout, but in the control group, 4 people were excluded from the study due to non-cooperation to participate in the study. The reason was that they did not complete the second stage questionnaire.

The content of curriculum was prepared according to the cognitive behavioral therapy of VCBT with the help of a psychologist and the content was validated by five faculty members of the Tehran University of Medical Sciences, Tehran, Iran. Then pamphlets, whiteboards, images, videos, and audios were presented to the members of the intervention group (Table 1).

Curriculums in the form of screens and photos, videos, and audio recordings were placed in each group. Mothers could ask their questions, which was used as verbal communication to provide information about the usefulness of the treatment. After viewing the materials and watching the video of both birth types and related photos, people asked their questions during the sessions and the researcher answered them. Mothers communicated with the researcher in each group by typing or by sending recorded audio in online groups. In the three remained sessions, including the third, fourth, and fifth sessions, a psychologist was also present at the request of the mothers, and the classes continued in the same virtual way with the presence of the psychologist alongside the researcher and the mothers. To unify the training of four intervention subgroups, the first sessions were held in person for all groups, and the next sessions were virtual. After five consecutive sessions (once a week), the self-efficacy questionnaire was completed again virtually by the participants.

The training of intervention groups was in (4 subgroups of 10 people) for 5 sessions of 90 minutes during 5 weeks (once a week). The control group, received only the usual prenatal care, while those in the intervention group received cognitive therapy training in addition to the usual pregnancy care.

Table 1. Curriculum content of VCBT intervention

Number of Sessions	Content of curriculum	Teaching method
Session 1	Introducing the therapist and familiarizing the members with each other, introducing the rules of the group, and teaching clients about the fear of childbirth and its effect on the process of childbirth. Familiarizing clients with cognitive therapy, choosing the delivery method, advantages and disadvantages of normal delivery and cesarean .getting to know the birth canal, summarizing the first session, assigning tasks and feedback.	Getting to know the interactive method and establishing basic communication and building trust by holding the class face-to-face by presenting information on the whiteboard and presenting videos of births.
Session 2	Examining the assignments and brief review of the previous session, teaching to identify spontaneous thoughts, teaching the beginning and stages of childbirth, using surrogate experience, Introduction of common mental errors in childbirth, self-efficacy training, final summarization, assignment and feedback.	Conducting an online class with a virtual method in the form of recorded audio of content, screened images
Session 3	Teaching the behavioral techniques of distraction, and concentration, and familiarizing clients with common mental images in pregnancy. .Jumping images forward in time if not controlled, changing mental images and finally relaxing muscles with deep breathing and muscle relaxation, summarizing, assigning tasks, and providing feedback.	Holding a virtual class in the form of recorded audio and screened images and teaching practical techniques and repeating and practicing them at home
Session 4	Confrontation cards, teaching the stages of adaptation and adapting to specific conditions, and teaching the mechanism of counter-conditioning to the clients. .Conduct regular visual and factual desensitization, summarizing, assigning assignments, and providing feedback.	Holding a virtual class in the form of recorded audio and screened images and repeating and practicing them at home
Session 5	Teaching CBT strategies to deal with negative factors and increasing the self-efficacy of childbirth, final summarization, assignments, and feedback.	Holding a virtual class in the form of recorded audio and screened images and questions and answers

The intervention was in such a way that a group was formed for the members of each subgroup of intervention through the electronic messenger and they entered the online group. After re-introducing and announcing the online class days, the members were present on the same day and the classes were held virtually. Training sessions were determined according to validated curriculum information by the researcher and its VCBT content with the guidance of a psychologist in the sessions. In addition, mothers were asked by phone on 2 occasions at intervals of at least one week about performing the necessary techniques at home. Educational pamphlets were given to both intervention and control groups in a screened and virtual form via WhatsApp at the end of the intervention.

Two questionnaires used in this research included a demographic-and obstetric questionnaire and Iranian version standardized childbirth self-efficacy inventory (17).

Demographic and obstetric questionnaire included eight questions about age, mother education, spouse's education, occupation, husband's job, type of housing, income and pregnancy week.

Lowe childbirth self-efficacy questionnaire was developed by Lowe in 1991 to measure the mother's perception of her ability to adapt to normal delivery and labor pain. This instrument measures expected outcomes and expected self-efficacy and is a self-report of 64 items that are scored on a Likert scale of 10 from 1 to 10. The minimum score in this questionnaire is 64 and the maximum score is 640, and the average is from 1 to 10. This questionnaire evaluates two primary dimensions: outcome expectancy and childbirth self-efficacy, related to two time points of labor: the active phase and the

transition/second stage of childbirth. Each part contains 15 questions and its items is divided into two parts, consequences and expectations. The second part, which is related to the second stage of childbirth, also includes the expectation of the outcome, which is from questions 31 to 46. The second part of this section, which measures childbirth self-efficacy, is from questions 47 to 64. The overall score of childbirth self-efficacy is also obtained from the average of these two (17-18). The internal validity of this questionnaire among 150 pregnant women, was obtained for all four scales with Cronbach's alpha of 0.84 to 0.91 and by adding one item, its internal validity was increased between 0.93 and 0.96. The construct validity of the instrument was equal and more than 0.40. Its reliability compared to other tools was reported between 0.84 and 0.94 and, it was approved (17).

Participants filled out the demographic and self-efficacy questionnaire before and immediately after the intervention. Questionnaires were completed by the samples in the pre-intervention stage after full explanation. The first session was held for the samples in order to answer to the questionnaire in 20-30 minutes. The questionnaires were completed virtually due to the restrictions of COVID-19. Then the completed questionnaires were collected by the researcher after the final control. The second stage of completing the questionnaire was immediately after the intervention (after the completion of the training sessions) for both groups. The questionnaires of the second stage were completed also virtually due to the restrictions of COVID-19. Ultimately 76 subjects (40 participants in the intervention and 36 participants in the control group) participated in this research.

Statistical data was analyzed using descriptive statistics including frequency and percentage of frequency, mean and standard deviation, as well as inferential statistics including normality, homogeneity of variance, linearity of relationships, and homogeneity of variance-covariance matrices, ANCOVA, T correlated, and T independent in SPSS version25.

Results

Table 2. shows distribution of demographic characteristics of two control and experimental groups were homogeneous (age, education, occupation, housing type, income, and month of pregnancy). The significant level of the chi-square test showed the homogeneity of the two groups in terms of demographic variables (P>0.05).

Table 2. Frequency distribution of demographic characteristics of the two intervention and control groups

Variable	Control group	Intervention group	P-Value
	No. (%)	No. (%)	
Age(years)			
- 25 20	5 (13.9)	10 (25)	
- 30 26	8 (22.2)	10 (25)	0.396
- 31- 35	14 (38.9)	9 (22.5)	
- 40 36	9 (25)	11 (27.5)	
Education			
High school	8 (22.2)	10 (25)	0.386
Diploma	18 (50)	14 (35)	
BS	10 (27.8)	16 (40)	
Spouse's education			
High school	13 (36.1)	12 (30)	0.051
Diploma	18 (50)	17 (42.5)	
BS	5 (13.9)	11 (27.5)	
Occupation			
Housewife	33 (91.7)	39 (97.5)	0.340
Employee	3 (8.3)	1 (2.5)	
Husband's job			0.415

Variable	Control group	Intervention group	P-Value
	No. (%)	No. (%)	
Employee	8 (22.2)	10 (25)	
Labor	15 (41.7)	11 (27.5)	
Self-employer	13 (31.6)	19 (47.5)	
Type of housing			0.210
Personal	14 (38.9)	22 (55)	
Rental	22 (61.1)	16 (40)	
Organizational	0 (0)	1 (2.5)	
Living with relatives	0 (0)	1 (2.5)	
Income(Rial)			
50 to 250 million	18 (50)	23 (57.5)	0.645
More than 250 million	18 (50)	17 (42.5)	
Pregnancy week			
24-20	19 (52.8)	14 (35)	0.130
25-28	7 (19.4)	16 (40)	
28-30	10 (27.8)	10 (25)	

The findings show that in terms of age, the respondents were in the age range of 20 to 40 years, and in the intervention group, 50% of participants were under 30 and 50% were over 30 years old. The mean age in the intervention group is 30.65 and the control group is 31.64 (Table 2). In table 3., the descriptive statistics including the mean and standard deviation for self-efficacy and all its components are shown separately for the groups. As well as the percentage of changes, mean changes and the significance level of the paired T-test has been separately in order to compare the mean in each group.

According to table 3, the findings show that the average self-efficacy in the control group has increased from 2.99 in the pre-test to 3.08 in the post-test, which shows a difference of 0.09 points. Also, the findings show that the average post-test of self-efficacy and its four components increased in the intervention group, and the CBT intervention resulted in a statistically significant increase in the average of self-efficacy (P<0.001). The mean total self-efficacy increased by 2.14 points. In total, the results of the correlated t-test showed that cognitive therapy has caused a significant increase in self-efficacy and its components in the intervention group (Table 3).

Table 3. Mean and standard deviation and percentage changes and level of significance of self-efficacy and expectation of childbirth in two groups before and after the intervention

Variable	Control M±SD	Intervention M±SD	Percentage, Mean changes and P-Value	
			Control group	Intervention group
Expected consequence of childbirth 1				
pre-test	3.77(1.90)	2.39(0.83)	%1.1	%111.6
post-test	3.73(2.09)	5.05(1.41)	-0.04 0.872	2.66 P<0.001
Childbirth self-efficacy 1				
pre-test	2.66(1.51)	1.63(0.50)	%2.8	%112
post-test	2.74(1.55)	3.46(1.15)	0.08 0.729	1.83 P<0.001
Expected consequence of childbirth 2				

Variable	Control M±SD	Intervention M±SD	Percentage, Mean changes and P-Value	
			Control group	Intervention group
pre-test	3.08(1.91)	2.21(0.83)	%4.6 0.14	%96.2 2.14
post-test	3.22(1.85)	4.35(1.23)	0.530	P<0.001
Childbirth self-efficacy 2				
pre-test	2.42(1.60)	1.45(0.51)	%8.3	%131.5
post-test	2.62(1.47)	3.36(1.09)	0.20 0.412	1.91 P<0.001
Total childbirth self-efficacy				
pre-test	2.99(1.66)	1.92(0.48)	%2.8	%111
post-test	3.08(1.70)	4.06(0.97)	0.09 0.700	2.14 P<0.001

While in the intervention group, this increase was from 1.92 to 4.06, which shows an increase of 2.14 points. In the component of the expected result of the first stage of childbirth, the average has reached from 2.39 to 5.05 and shows an increase of 111.6 percent (or 2.66 points). In the self-efficacy component of the first stage of childbirth, the average has reached from 1.63 to 3.46, which shows an increase of 112 percent (or 1.83 points). In the component of the expected outcome of the second stage of childbirth, the average has reached from 2.21 to 4.35, which shows an increase of 96.2 percent (or 2.14 points). In the self-efficacy of childbirth 2, the average has reached from 1.45 to 3.36, which shows an increase of 131.5 percent (or 1.91 points). In Table 4., the findings show that the results of the t-test of independent groups of all averages have statistically significant differences with each other (P<0.001).

According to Table 4., the findings show that VCBT has significantly increased the total self-efficacy rate in pregnant women (P<0.001) and the Partial Eta Squared (η^2) with the coefficient obtained is equal to 0.379.

The average self-efficacy in the control group has increased from 2.99 in the pre-test to 3.08 in the post-test, which shows a difference of 2.8 percent. The VCBT had the greatest impact on the expectation of childbirth in the second stage with an Eta coefficient of 0.371(effect size) and the self-efficacy of childbirth in the second stage with an Eta coefficient of 0.363(effect size) (Table 4).

Table 4. Comparing the effect of the intervention on self-efficacy and the expected outcome of childbirth with ANCOVA test

Dependent variable	Degrees of freedom	Mean square	The value of F	The significance level	Effect size
Intervention					
Expected consequence of childbirth 1	1	74.06	33.42	P<0.001	0.326
Childbirth self-efficacy 1	1	32.42	26.49	P<0.001	0.277
Expected consequence of childbirth 2	1	57.68	40.70	P<0.001	0.371
Childbirth self-efficacy 2	1	36.52	39.38	P<0.001	0.363
Total self-efficacy	1	49.37	44.51	P<0.001	0.379

According to the Table 5, the findings show that the childbirth self-efficacy in two control and intervention groups were significantly different from each other (P<0.01). The difference in self-efficacy scores was (0.08)1.27 in the control group and (0.89) 2.13 in the intervention group. The results showed that the intervention was effective and the independent t-test also showed the effectiveness of the intervention in line with the ANCOVA test (P<0.01).

Table 5. Comparing the average difference of self-efficacy in two intervention and control groups

Variable	Mean difference (SD)		Mean (SD)		Confidence interval	
	Intervention	Control	The value of T	P-Value	Lower limit	Upper limit
Expected consequence of childbirth 1	2.66(1.51)	-0.04 (1.56)	7.64	P<0.001	2	3.41
Childbirth self-efficacy 1	(1.03) 1.83	0.07 (1.28)	6.60	P<0.001	1.23	2.29
Expected consequence of childbirth 2	2.13(1.21)	(1.34) 0.14	6.77	P<0.001	1.40	2.57
Childbirth self-efficacy 2	1.91(0.8)	(1.19) 0.17	7.48	P<0.001	1.28	2.21
Total self-efficacy	2.13(0.89)	(1.27) 0.08	8.49	P<0.001	1.55	2.55

Discussion

The present study was conducted to investigate the effect of virtual cognitive behavioral therapy on childbirth self-efficacy of pregnant women. The findings showed that the implementation of VCBT is an effective intervention to increase self-efficacy in accepting normal childbirth. This finding was consistent with the results of the studies of Ghazaee et al. (2016) and Eidouzaei et al. (2023) (10, 11). The results of this research were consistent with the results of a study conducted by Çankaya et al. (2021) in Turkey in which, pregnant women were trained in antenatal education two hours' sessions twice in week (19). Also, it was similar with the results of study by Tsai, et al. (2018), who similarly found that applying CBT curriculum implementation model, resulted in a significant difference in self-efficacy between the intervention and control groups (P<0.010) (20). The findings of the present study also indicated a statistically significant difference in mean self-efficacy between the intervention and control groups. Because the means of self-efficacy and its four components increased in the intervention group, VCBT intervention caused a significant increase in the mean of self-efficacy. The means of expected consequence of childbirth and childbirth self-efficacy have increased in the first stage. These components increased more in the second stage of childbirth, and in general, cognitive therapy caused a significant increase in the self-efficacy and its components among women in the intervention group. Abdolalipour et al. (2023) in a meta-analyze confirmed these results (21).

Also, the results of the present study indicate that the VCBT intervention has an incremental effect on total self-efficacy in pregnant women, as indicated by the Eta coefficient (effect size). In the comparison of the effect size, which shows the impact of the intervention on the dependent variables, VCBT had the greatest positive effect on the expectation of second-stage labor and the self-efficacy of the second stage.

In total, the results showed that the VCBT was effective and the difference in pre-test and post-test scores in the intervention group was significantly higher than the control group. Nashtifani et al. (2021) reported that other interventions such as cognitive-behavioral counseling can also improve the ability of pregnant women (22). Aminolroayaeeand & Aghaei (2018) found that after cognitive therapy training based on mindfulness, the positive effect of reducing the fear of childbirth has been lasting for one month (23). Likewise, during non-pregnancy, interventions such as combined behavioral therapy have positive effects on infertile couples' self-efficacy (24).

However, CBT changes faulty thinking patterns and teaches the skill of attention control, and by encouraging a person to practice paying attention to the characteristics of experiences in a non-judgmental way, it causes more specific encoding of information in memory. CBT helps people take an active role in their lives and make lasting changes in behavior patterns. Mothers with low self-efficacy have a higher fear of normal vaginal delivery (6). We

must increase pregnant women's self-efficacy through training (20). Prenatal cognitive therapy training can reduce negative thoughts and increase self-efficacy in mothers. Self-efficacy in childbirth is one of the factors that can play an important role in reducing the fear of childbirth (6, 25, 26). In a review study, it was proved that Internet-based cognitive behavioral therapy can be useful. Because this method, if done online, is simple and applicable for all urban and rural people or those who live in remote places with limited facilities, and finally at the global level (13).

One of the strengths of this study was that pregnant mothers were able easily to participate in classes and be satisfied during the COVID-19 pandemic, using the virtual program of this study, without having to suffer the difficulties of being physically present. Of course, one of the limitations of the present study in first was the lack of timely and boredom referral research units due to pregnancy, which we reduced this limitation by following up and calling the research units. For future studies, we suggest developing a simple, convenient, and ready-to-use online cognitive therapy application for use by pregnant women.

Conclusion

The findings of study showed that VCBT is effective in increasing self-efficacy in compatibility with normal vaginal delivery. Health workers and midwives should help mothers during pregnancy with appropriate cognitive therapy programs to improve women's self-efficacy to adapt to natural childbirth. Pregnant mothers should be helped to take an active role in their lives, make lasting changes in their behavioral patterns, and increase their self-efficacy.

Declarations

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

Initially the aim and method of the study was explained to the participants and they were given a written informed consent form to sign. They were also assured about the confidentiality of personal information. To comply with ethical considerations, after completing the research, all mothers were allowed to participate in counseling sessions if they wished.

Code of Ethics

IR.TUMS.FNM.REC.1398.168**.**

Use of Artificial Intelligence (AI)

All of study design, data collection, analysis, interpretation and conclusion were performed by the authors. In some cases, artificial intelligence was used to translate or edit the text.

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Authors' contribution

SM contributed to the initial design, writing the proposal, and data collection. FVR interpreted the results. MM designed the research, handled the submission process and revised the manuscript critically. All authors approved the final manuscript.

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