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Effectiveness of Internet-Based Emotion-Focused Cognitive Behavioral Therapy (iECBT) with and without husband's participation in improvement of psychological distress in pregnant women with anxiety disorders: a randomized controlled trial

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Abstract

Background Anxiety disorders are common psychological pregnancy problems that can lead to adverse pregnancy outcomes. The study aimed to compare the improvement of psychological distress between Internet-Based Emotion-Focused Cognitive Behavioral Therapy (iECBT) with and without husbands' participation in pregnant women with anxiety disorders.

Method In a randomized controlled trial, 84 pregnant women diagnosed with anxiety disorders were randomly assigned to two groups: iECBT alone ($n=42$) and iECBT with their husband's participation ($n=42$). In a group of iECBT alone, women received eight sessions of iECBT (with a duration of 50 min) once a week. In the iECBT group with the husband's participation, women received psychotherapy as same as iECBT alone, and their husbands received eight sessions (with a duration of 20 min) once a week. The outcomes were the Spielberger State-Trait Anxiety Inventory (STAI), the Brief Symptom Inventory 18, the pregnancy-specific stress, and Garnefski's cognitive emotion regulation in the four-time series.

Results The mean age of participants was about 30 years. Both iECBTs, with and without the husband's participation, were effective in improving state anxiety, psychological distress, pregnancy-specific stress, and emotion regulation in pregnant women. iECBTs with and without the husband's participation were not superior to each other regarding improving the outcomes.

Conclusion As iECBT with the husband's participation was not superior to iECBT alone, further studies should evaluate proper strategies to increase men's effective role in the treatment of their pregnant partners with psychological disorders.

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Introduction

Anxiety is a pervasive mental disorder that a variety of factors influence during this period [1]. Anxiety disorders during pregnancy are associated with adverse outcomes, including preterm birth, low birth weight, and postpartum depression. These outcomes may be influenced by various factors, such as gestational age, parity, high-risk pregnancy, and complications, which also affect the trajectory of symptom development [2]. About 13% of pregnant women suffer from anxiety disorders [3]. These anxiety levels increase in the first and third trimesters of pregnancy. Consequently, women are more prone to psychological disorders, including anxiety, psychological distress, and depression, during pregnancy [4–7]. Anxiety disorders are risk factors for adverse pregnancy outcomes, including low birth weight (LBW) and preterm birth. The adverse outcomes of stress and anxiety during pregnancy have been reported in various studies [8–9].

Given the high prevalence of anxiety disorders in pregnant women and their negative consequences, it is essential to focus on therapeutic strategies for these psychological problems during pregnancy [8]. However, there are several common treatment options for managing anxiety during pregnancy. The most common treatment options include mindfulness-based stress reduction (MBSR), Physical activities like prenatal yoga and relaxation techniques, and cognitive-behavioral therapy (CBT). CBT is a popular pregnancy approach that focuses on the improvement of the mother's ability to reduce psychological stress and adapt to the situation [9]. Dennis et al. (2017) studied 45 pregnant women and indicated that cognitive-behavioral techniques decreased stress and anxiety in pregnant women. Further, such techniques could be maintained for six months [10]. Even though CBT is widely used to decrease psychological symptoms, not paying attention to the role of emotion in the emergence and treatment of anxiety disorders was a limitation of previous studies on the use of the traditional CBT approach [11]. Emotion-focused cognitive behavioral therapy (ECBT) has recently been considered to solve this limitation. By activating and reorganizing emotional schemas, this approach assumes that cognitive changes in people with distress and stress symptoms depend on overcoming negative emotions and finding ways to replace negative emotions with positive emotions [12]. Nath et al. (2018) investigated the effectiveness of internet-based emotion-focused cognitive behavioral therapy (iECBT) in reducing trait anxiety in pregnant women. They indicated that specific ECBT techniques were significantly effective in reducing psychological symptoms and improving resilience in pregnant women [8].

Specific techniques within ECBT have proven effective in reducing psychological symptoms in pregnant women [13]. These include identifying and restructuring cognitive distortions, which helps women challenge negative automatic thoughts associated with anxiety and distress [14]. Additionally, techniques that promote emotional awareness and regulation, such as labeling emotions and replacing maladaptive responses with adaptive strategies, have shown significant benefits [15–18]. Interventions aimed at schema modification and core belief restructuring enable women to develop healthier perspectives about their pregnancy and maternal role, reducing anxiety and fostering resilience [17]. Furthermore, practical strategies like exposure to feared scenarios (in a controlled manner) and practicing relaxation techniques have been effective in addressing pregnancy-specific stress and emotional dysregulation [18]. These techniques empower pregnant women to manage their emotional and cognitive challenges better.

High cost and unavailability are among the limitations of CBT, especially in developed countries; therefore, internet-based cognitive-behavioral interventions (both internet-based and software packages) can be a suitable alternative to traditional cognitive-behavioral therapies [19]. Internet-based interventions have advantages for clients and therapists compared to traditional cognitive-behavioral therapies; for example, anonymity, unrestricted access for patients, and not seeing the therapist prevent patients from being less afraid of being stigmatized by a therapist. Additionally, therapy can be performed at any time and place at any speed, and the subjects can be reviewed if necessary [20].

Another noteworthy point about anxiety disorders during pregnancy is that a partner's presence can either provide emotional security or, conversely, contribute to distress if relational conflicts arise. Possible conflicts include lack of emotional support, disagreements over parenting expectations, financial stress, and communication difficulties, all of which have been linked to higher prenatal anxiety levels [21]. In other words, prenatal anxiety has a direct relationship with the partner's lower levels of positive relationships, and higher levels of negative relationships are associated with poorer mental health outcomes. According to studies, women with more effective emotional

companions have less anxiety in mid-pregnancy and lower anxiety from middle to late pregnancy [22]. On the contrary, studies indicate that women with negative relationships with their spouses experience higher anxiety than those with positive relationships [23]. Further, men's participation in prenatal care has positive outcomes, including reduced preterm childbirth and better development of children [24]. Therefore, it seems that the husband's participation is associated with higher therapy efficiency, although this issue has been less considered in studies.

Existing approaches to men's participation in perinatal care can be categorized into three primary types: (1) Couple-Based Interventions, which focus on joint therapy or counseling sessions aimed at enhancing communication and relationship satisfaction; (2) Partner Psychoeducation on Maternal Care, which equips partners with knowledge about pregnancy, childbirth, and postpartum needs to improve support behaviors; and (3) Skill-Building Interventions, which train partners in specific techniques such as stress management, empathy, and conflict resolution [25]. Psychoeducation was selected over other common approaches, such as improving relationship satisfaction and partner skill-building for stress management, due to its structured and accessible nature. Unlike relationship-focused interventions, which often require intensive couple-based therapy, psychoeducation provides partners with targeted knowledge on perinatal mental health, equipping them to offer informed and practical support. Additionally, while stress management training enhances the partner's coping skills, it does not directly address the mother's psychological needs. The purpose of the men's sessions was to psycho-educate the partners on how to provide emotional and practical support to the mother during pregnancy, thereby fostering a healthier relationship and better mental health outcomes for the mother. These sessions focused on enhancing relational skills and understanding pregnancy-specific challenges to ensure the partner could effectively contribute to a supportive environment.

Even though there is enough evidence for the effect of ECBT on the treatment of anxiety disorders [28–29], there is no evidence for the efficacy of iECBT in the treatment of anxiety disorders in pregnant women. Unlike the non-pregnant population, pregnant women experience significant hormonal changes, physical discomfort, and concerns about fetal health, which can amplify anxiety and emotional distress. These factors require tailoring iECBT to focus on pregnancy-specific stressors, such as fear of childbirth, parenting concerns, and managing physical symptoms. Moreover, the digital delivery of iECBT allows pregnant women who may face mobility restrictions or scheduling difficulties to access therapy at their convenience. By incorporating pregnancy-specific psychoeducation, relaxation techniques tailored to physical limitations, and strategies for managing uncertainty about childbirth, iECBT offers a more nuanced and supportive approach for pregnant women compared to the general population.

While previous studies have explored the effectiveness of internet-based cognitive-behavioral therapy (iECBT) in pregnant women across various settings, there is currently no evidence-based research on iECBT for pregnant women in Iran. This gap is significant given the unique cultural, social, and healthcare factors that shape maternal mental health in Iran. Iranian pregnant women may experience higher levels of family influence, gender role expectations, and limited access to mental health services, which could impact both their psychological distress and response to therapy. Faramarzi et al. (2020) found that psychiatric symptoms were highly prevalent in Iranian pregnant women, emphasizing the role of sociocultural stressors and the need for targeted mental health interventions [28]. Unlike Western populations, where individualistic coping strategies are more prevalent, Iranian women often rely on familial and spousal support for emotional regulation, which can significantly influence treatment engagement and outcomes. Additionally, stigma surrounding mental health disorders and psychological interventions may reduce help-seeking behaviors among Iranian women, making accessible and private interventions like iECBT particularly relevant in this context. Healthcare accessibility and affordability issues in Iran further limit the use of traditional in-person psychological interventions, increasing the need for cost-effective digital therapies [28].

To improve access to evidence-based pregnancy care, we compared the outcomes of iECBT with partner participation to the outcomes of iECBT without partner participation. To our knowledge, the present study provides the first report on iECBT development with husband participation. As mentioned, there is currently no evidence-based national, regional, or local iECBT study related to pregnant women in Iran. This is the first report on iECBT development in Iranian pregnant women. The research objectives include: (1) Evaluating the effectiveness of IECBTs with and without the husband's participation on the improvement of anxiety, psychological distress, pregnancy-specific stress, and emotion in pregnant women with AD; (2) Comparing the effectiveness of iECBTs with and without husband's participation on the reduction of psychological distress in pregnant women with AD, The inclusion of husbands aimed to enhance their

understanding of pregnancy and emotional challenges while fostering their ability to provide adequate support to their partners, and (3) Comparing patient satisfaction of iECBTs with and without husband's participation.

Methods

Study design

This two-arm parallel-group randomized control trial was conducted in two hospitals (Ayatollah Rohani and Yahyanejad) outpatient obstetric clinics of the Babol University of Medical Sciences (north of Iran) from August 2022 to March 2023. The Babol University of Medical Sciences Ethics Committee approved the study (IR.MUBABOL.HRI.1400.164). Also, the study was registered in the Iranian Registry of Clinical Trials (IRCT20110228005931N10). All participants signed written informed consent forms before the study.

The study reports were based on the Consolidated Standards of Reporting Trials (CONSORT) guidelines [29].

Participants During sampling, all pregnant outpatients referred to two teaching hospitals were invited to evaluate their eligibility to be included in the study. Inclusion criteria were a gestational age of 13–28 weeks, a diagnosis of anxiety disorder based on the Structured Clinical Interview for DSM-5 Disorders (SCID-5-CV) [30], access to computers and the Internet, an education level higher than primary school, and the consent of the wife and husband to be included in the study. The participants were excluded if the following factors were reported through the clinical interviews: Substance abuse or addiction, current use of sedatives, receiving psychotherapy in the past few months, women with severe anxiety disorders requiring hospitalization or medical treatment, severe psychiatric disorders, and suicidal ideation. The patients who reported severe psychiatric disorders or current suicidality were referred to a mental health service to receive suitable treatment.

The sample size was calculated using G Power software. Based on a previous study [31], the sample size was calculated based on an estimated effect size of 0.21, which represents the expected impact of partner participation in psychological interventions on relationship quality and psychological well-being during the transition to parenthood. Assuming a type I error of 0.05 and an 80% power to measure the primary outcome between the two groups, the minimum number of samples per group was 34. A total of 42 participants were considered for each group based on a 20% drop.

Procedure Four midwives in hospitals and private clinics invited pregnant inpatients and outpatients to participate in the study. They evaluated the patients based on the inclusion criteria. If the patients met the criteria, they invited pregnant women to clinical interviews with the psychologist. The Ph.D. psychologist (First author), who was trained for iECBT before the initial trial, contacted the women and interviewed them using the Structured Clinical Interview for DSM-5 (SCID-5-CV) [32]. As this work was implemented during the COVID-19 pandemic, the psychologist interviewed patients via phone calls. The psychologist interviewed 432 pregnant women, and 348 patients were excluded (258 due to no clinical anxiety disorders, 31 due to having severe psychiatric disorders, including severe major depressive disorder (MDD) with the indication of hospitalization, suicidal ideations, psychotic symptoms, bipolar disorders, substance abuse), and 11 owing to attending psychotherapy sessions in the last three months and the current use of antidepressants) and 48 for other reasons (Fig. 1).

A hospital employee who was not involved in the trial completed randomization according to a 1:1 ratio within blocks of 4 using a random number generator (www.random.org). A total of 84 patients diagnosed with anxiety disorders were randomly allocated to either "iECBT alone" ($n=42$) or "iECBT with husband's participation" ($n=42$) interventions. Due to the nature of the intervention, group allocation was obvious for participants and investigators. However, the allocation sequences were concealed from the research team. Additionally, the statistician was masked during data analysis to reduce bias risk.

After being interviewed by the psychologist, a midwife asked eligible women to complete questionnaires. She conducted the evaluations using the DigiSurvey® platform via a link sent to the women through WhatsApp® or Telegram®. All participants completed the questionnaires, including the demographic Stat-Spilberger Anxiety, Brief Symptoms Inventory (BSI-18), Pregnancy Specific Stress, Client Satisfaction Questionnaire (CSQ-8), and Cognitive Emotion Regulation Questionnaire at the baseline and post-trial stages (eight weeks after the treatment), one month after the post-trial, and three months after the post-trial.

Interventions

We developed the content of two intervention models, including "iECBT alone and "iECBT with the husband's participation in previous studies [33–34]. The intervention was designed to address key psychological challenges that arise during pregnancy by targeting anxiety symptoms, pregnancy-specific stressors, and difficulties in emotional regulation. The program sessions were provided via the www.peacefulmindme.com website [34], which allowed us to track participants'

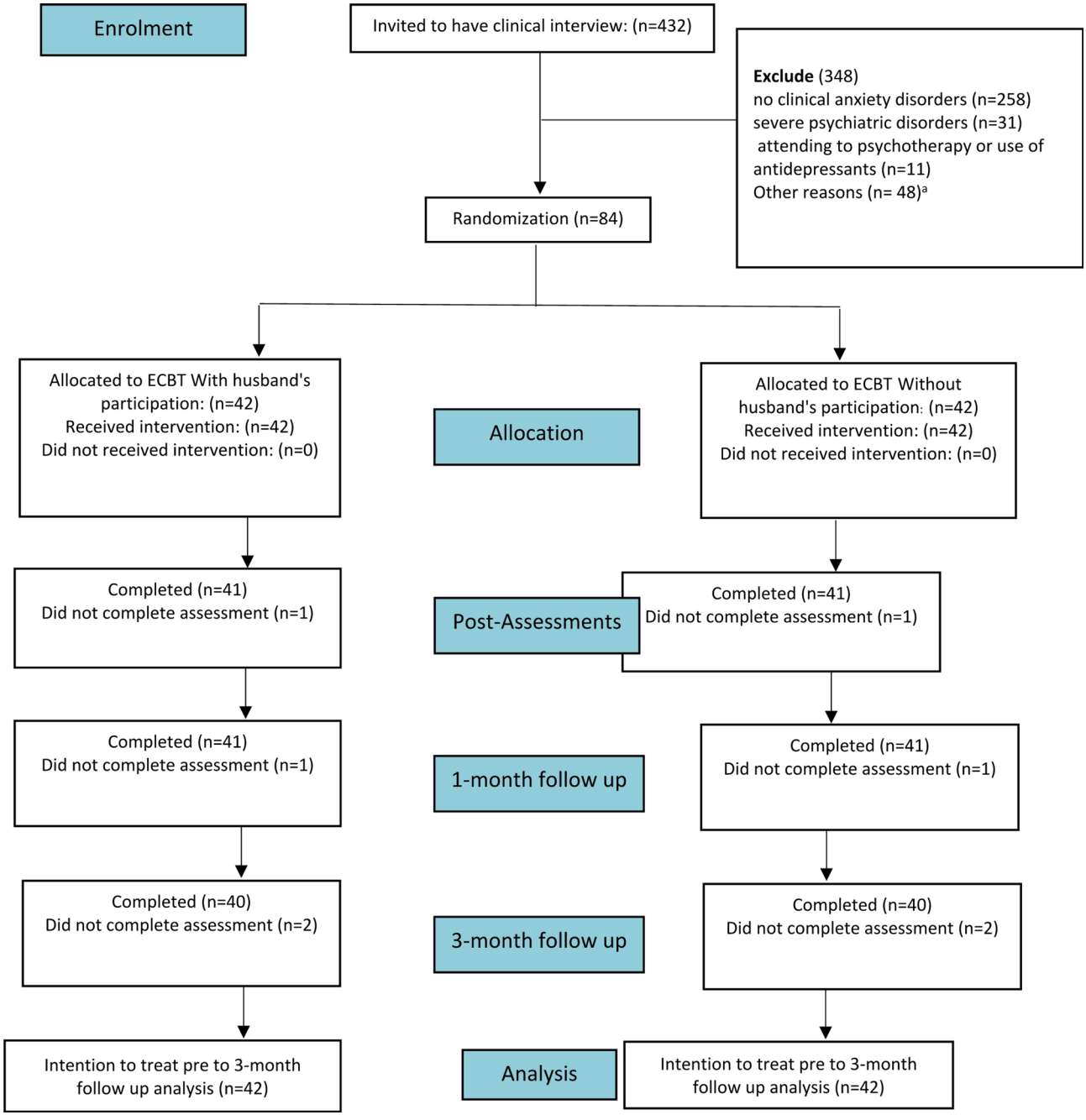

Fig. 1 Flowchart of the participants

[a] Other reasons: experiencing abortion at this stage ($n=5$), Software problems receiving the online intervention ($n=7$), Lack of consent of their spouses to participate in the study ($n=12$), Not meeting inclusion criteria: ($n=24$)

progress. The website recorded login times, session completions, and the time spent on each session.

"iECBT alone It is a therapist-guided program consisting of eight sessions once a week for 50 min. The treatment steps included videos of a psychologist who guided patients and discussed ways to help themselves. Some videos were based on a fictional character struggling with anxiety and trying to improve conditions with this approach. The participants were able to identify their problems more effectively and felt less isolated by recognizing that others faced similar challenges. Additionally, quizzes and assignments were designed to improve participants' interactions with therapy [33].

"iECBT with husband's participation The participants of this group were women, and their husbands also partici-

pated in the therapy through separate sessions specifically designed to address their role in supporting their pregnant wives. Women received the iECBT for eight sessions. The content of iECBT was the same as a group of iECBT alone (50 min of iECBT). Further, husbands received eight sessions once a week for 20 min via a separate link. The content of the husband's therapy sessions was prepared based on a previous Faramarzi study [32]. The intervention for husbands consisted of psychoeducational sessions designed to improve their ability to support their pregnant partners. These sessions focused on increasing knowledge about pregnancy, fostering empathy, improving communication skills, and preparing them for fatherhood. The ultimate goal was to empower spouses to create a more supportive environment, indirectly benefiting the psychological outcomes of their partners. Table 1 presents the content of the two programs ("iECBT alone" and "iECBT with husband's participation"). Also, a previously published study reported the feasibility and acceptability of both iECBT alone and iECBT with the husband's participation [33].

Primary outcomes

Spielberger State-Trait anxiety inventory (STAI) It consists of 40 questions for measuring state anxiety ($n = 20$) and trait anxiety ($n = 20$) rated on a four-point Likert scale (1 = never, 2 = somewhat, 3 = moderate, and 4 = very much) [35]. State anxiety was used in the present study. Panahi-shahri (2002) confirmed the reliability of the Persian inventory version. Cronbach's alpha coefficients of the state and trait anxiety scales were 0.91 and 0.90, respectively, and 0.94 for the whole test [36].

Brief symptom inventory 18 (BSI-18) It has three subscales, namely somatization, depression, and anxiety, in addition to the total scores. Higher BSI-18 scores indicate more significant psychological symptoms. The Persian version of the BSI-18 has good validity and reliability. Further, the reliability of the Persian BSI-18 was high. The Persian version of this tool demonstrated a Cronbach's alpha of 0.89, which reflects good reliability [37].

"Psychological distress" is a term that encompasses a range of symptoms, including anxiety and depression, and indicates a state of emotional suffering often characterized by symptoms such as sadness, anxiety, and irritability. In this study, we considered the total score of BSI-18 as an index for "psychological distress" [37].

Secondary outcomes

Revised Prenatal Distress Questionnaire (NuPDQ) This scale assesses the pregnancy-specific distress. It comprises 17 questions scored on a Likert scale (0 = never, 1 = somewhat, and 2 = very high). The score range is from 0 to 34. The higher the score obtained from this questionnaire, the higher the stress level increases during pregnancy, and vice versa [38]. The Cronbach's alpha for the Persian version of this scale was 0.87, confirming its reliability in assessing pregnancy-specific stress. The reliability of the questionnaire was confirmed in a study by Esfandiari et al. 2019 [39].

Table 1 The structure of internet-based cognitive behavioral therapy sessions for women and their husbands

Sessions	Women's sessions	Men's sessions
1	Introducing emotion-focused cognitive-behavioral therapy (familiarity with thoughts, feelings, behavior) Psychoeducation about Fetus growth steps	Knowledge growth: investigating the adaptive processes of couples, investigating the consequences of relationship (commitment and separation) Psychoeducation about Fetus growth steps
2	Identifying private automatic thoughts, changing negative thoughts, and recognizing emotions Psychoeducation about women's bodies during pregnancy	Marital intimacy: Effective communication style of mature cooperation Psychoeducation about women's bodies during pregnancy
3	Identifying cognitive errors and their role in depression and anxiety Observing and changing errors in thinking Psychoeducation about prenatal care (part 1)	Practical communication skills: Active listening, feedback, and empathy Psychoeducation about prenatal care (part 1)
4	Modifying automatic thoughts, creating a healthy logical thinking style, and replacing it Psychoeducation about prenatal care (part 2)	Empathic skill: Summarizing important concerns and disturbances of couples Psychoeducation about prenatal care (part 2)
5	Learning principles of emotional functions, the connection between thoughts, behavior, and emotion Psychoeducation about important care during pregnancy	Conflict resolution skills: Types of conflict control strategies Psychoeducation about important care during pregnancy
6	Changing behavior with a step-by-step approach and organizing them, Acting against strong emotional desires Psychoeducation about planning for delivery	Reciprocal reinforcement of behavior: Clients' sincere conflict with their husbands, making a happy story of the relationship Psychoeducation about planning for delivery
7	Schema (central belief): the relationship between main belief and identification of compelling belief Psychoeducation about the postpartum recovery period	Preparing for the father role: acceptance of new situations, creation of secure attachment Psychoeducation about the postpartum recovery period
8	Strengthening skills of emotion-focused cognitive behavioral therapy Psychoeducation about infant care	Physical relaxation: massage during pregnancy Psychoeducation about infant care

Cognitive emotion regulation questionnaire It consists of 18 items measuring cognitive emotion regulation strategies in a general category of adaptive and maladaptive strategies on a five-point Likert scale from 1 (never) to 5 (always) [40]. The reliability of the questionnaire was confirmed in a study by Besharat 2018 [41]. This tool showed excellent internal consistency, with a Cronbach's alpha of 0.91 for the Persian version.

Client Satisfaction Questionnaire (CSQ) consists of eight Likert items ranging from 1 to 4 (1 the lowest satisfaction, and 4 the highest satisfaction). The reliability of the questionnaire was confirmed in a study by Larsen et al. [42]. The CSQ-8 exhibited excellent reliability, with a Cronbach's alpha of 0.91.

Statistical analysis

Data were analyzed using SPSS 21 (SPSS Inc., Chicago, IL, USA). The Kolmogorov-Smirnov test was utilized to evaluate the normal distribution of continuous variables. Descriptive statistics were used to evaluate the frequency distribution, mean, and standard error of the mean. Additionally, the repeated-measures analysis of variance (ANOVA) was utilized to compare the intra- and intergroup changes in outcomes in the two groups (IECBTs with and without the husband's participation). T-tests were applied to compare treatment satisfaction. The p-value ≤ 0.05 was considered the significance level.

Table 2 Characteristics of the study sample

variables	iECBT with Husband	iECBT Without Husband	Test
Pregnant women			
Age, mean (SD)	29.7 (6.1)	30 (5.9)	$p=0.8$
Education, n (%)			
≤Diploma	20 (47.6)	23 (54.8)	$p=0.5$
University	22 (51.4)	19 (45.2)	
Job, n (%)			
Unemployed	26 (61.9)	32 (76.2)	$p=0.15$
Employee	16 (38.1)	10 (23.8)	
Gestational age, Mean (SD)	18.3(6.7)	17.6(8)	$p=0.6$
Parity, n (%)			
1	(47.6)20	(40.5)17	
2	(26.2)11	(35.7)15	$p=0.6$
3≤	(26.2)11	(23.8)10	
High-risk pregnancy, n (%)			
Yes	(54.8)23	(50)21	$p=0.6$
No	(45.2)19	(50)21	
Place of residence, n (%)			
City	37 (88.1)	34 (81)	$p=0.36$
Town	5 (11.9)	8 (19)	
Family relationship with a spouse			
No	34 (81)	37 (88.1)	$p=0.36$
Yes	8 (19)	5 (11.9)	
Husbands			
Age, mean ± SD	34.3 (5.1)	34.1 (5.2)	$p=0.9$
Education, n (%)			
≤Diploma	17 (40.5)	12 (28.6)	$p=0.2$
University	25 (59.5)	30 (71.4)	
Job, n (%)			
Government Job	19 (45.2)	15 (35.7)	$p=0.5$
Freelance Job	23 (54.8)	27 (64.3)	

* *P*-values were calculated using an independent t-test for between-group comparisons

Results

Among 84 pregnant women suffering from an anxiety disorder, 30 had generalized anxiety disorder (GAD) (35.7%), 39 had pregnancy adjustment anxiety (46.5), and 15 had phobia (17.8) and met the inclusion criteria. Further, 42 participants in groups with and without their husbands' participation completed the study. In both groups, the mother was about 30 years and the husband was about 34. The two groups were similar in age and other demographic variables, including education level, job, gestational age, parity, high-risk pregnancy, and residence (Table 2). None of the participants or their husbands had a history of neurology hospitalization.

The primary outcomes of the comparison of anxiety and psychological distress after the intra-group and intergroup intervention changes in four measurements are shown in Table 3. Based on the results, the state anxiety scores improved significantly before the end of therapy at one-month and three-month follow-ups in the samples ($p = 0.001$); the scores of the two groups indicated no significant difference ($p = 0.9$). Additionally, the state anxiety scores of pregnant women in the group receiving iECBT alone significantly decreased at the end of the therapy compared to before the therapy ($p = 0.02$) (Eta = 0.08), and the improvement remained constant in one- and three-month follow-up.

Further, the total BSI score and the dimensions 'somatization' and 'depression' significantly improved before the end of therapy at one-month and three-month follow-up in all samples ($p < 0.05$). The comparison of the two groups indicated that only the depression score in the group without the husband's participation was better than the group with their participation. The scores of all dimensions of psychological distress improved significantly in the group of iECBT without the husband's participation, but only the scores of somatization and depression improved in the group of iECBT with the husband's participation ($p < 0.05$).

Table 4 compares the secondary outcomes of pregnancy-specific stress and adaptive emotional regulation of the two intervention methods regarding intra- and intergroup changes over four-time measurements. Based on the results, the pregnancy-specific stress scores of pregnant women significantly decreased at the end of

Table 3 Group comparisons before, after intervention, one and three-month follow-up (primary outcome)

Group	Pre-test	Post-test	1-month follow-up	3-month follow-up	Within-group		Between-group	
					p	Eta	P^1 P^2	Eta^1 Eta^2
State Anxiety mean (SD)								
iECBT with Husband	48.59 (4.19)	47.11 (4. 41)	46.78 (4.75)	46.93 (4.38)	0.1	0.05	0.9	0.002
iECBT Without Husband	48.17 (4.12)	46.23 (3.07)	46. 45 (4.22)	46.05 (4.55)	**0.02**	**0.08**	**0.001**	**0.06**
BSI-18								
Somatization								
iECBT with Husband	7.01 (4.7)	4.71 (3. 44)	5.5 (4.03)	4.97 (4.3)	**0.01**	**0.08**	0.5	0.009
iECBT Without Husband	7.7 (3.8)	5.02 (3.55)	5.2 (3.3)	4.33 (3. 4)	**< 0.001**	**0.24**	**< 0.001**	**0.14**
Depression								
iECBT with Husband	6.17 (6. 4)	3.74 (5)	4.1 (5.2)	3.8 (5. 4)	**< 0.001**	**0.18**	**< 0.001**	**0.13**
iECBT Without Husband	6.78 (5. 4)	3. 4 (3.5)	3.95 (4.2)	3.3 (3.9)	**0.01**	**0.09**	**0.001**	**0.001**
Anxiety								
iECBT with Husband	7.7 (6)	3.7 (3.7)	4.5 (4.3)	4.3 (5.6)	< 0.001	0.2	0.9	0.001
iECBT Without Husband	7.9 (5. 4)	3.8 (3.1)	4. 4 (3.2)	4. 4 (4.7)	**0.01**	**0.2**	< 0.001	0.2
Total BSI-18 (Psychological distress)								
iECBT with Husband	21.57 (14.3)	12. 45 (11.1)	13.78 (11. 45)	12.5 (13.7)	< 0.001	0.21	0.9	0.001
iECBT Without Husband	21.7 (13.1)	11.9 (8.1)	13.86 (8.6)	12.7 (11.1)	**0.01**	**0.2**	**< 0.001**	**0.21**

**P*-values were calculated using an independent t-test for continuous variables and chi-square tests for categorical variables

*Repeated-measures ANOVA was applied to assess intra-group changes over time

* Repeated Measure Considering Time & Group, 2. Repeated Measure Considering Time in the Whole Sample

*Effect sizes (Eta squared) are reported where applicable

Table 4 Group comparisons before, after intervention, one and three-month follow-up (secondary outcome)

Group	Pre-test	Post-test	1month follow-up	3-month follow-up	Within-group		Between-group	
					p	Eta	P^1 P^2	Eta^1 Eta^2
NuPDQ (SD)								
iECBT with Husband	13.7 (6. 44)	10.35 (4.9)	11.07 (5.5)	10 (6)	**< 0.001**	**0.14**	0.97	0.001
iECBT Without Husband	13.02 (6.31)	10 (5.53)	10.23 (6.3)	9.62 (6.6)	**0.001**	**0.13**	**< 0.001**	**0.14**
Emotion Adjustment								
Adaptive								
iECBT with Husband	30.35 (7.41)	30.5 (6.7)	31.53 (6.7)	33.2 (8)	0.1	0.04	0.5	0.009
iECBT Without Husband	29.28 (7.82)	30.46 (8.7)	29.02 (8.8)	30.6 (8.8)	0.07	0.5	**0.01**	**0.04**
Maladaptive								
iECBT with Husband	20.25 (6.2)	17.8 (5.6)	17.6 (5.7)	16.8 (5)	**< 0.001**	**0.15**	0.3	0.07
iECBT Without Husband	20.93 (6.9)	19.3 (6.3)	19.3 (6.2)	19.4 (6.6)	0.2	0.03	**< 0.001**	0.07

(1) Repeated Measure Considering Time & Group, (2) Repeated Measure Considering Time in the Whole Sample

therapy compared to before therapy in both groups of IECBTs with and without the husband's participation ($p = 0.02$) (Eta = 0.08). Further, this improvement remained stable at one- and three-month follow-up. Even though pregnancy-specific stress scores improved significantly from the beginning to the end of therapy and in one- and three-month follow-up in all samples ($p = 0.001$), the scores were insignificant between the two groups ($p = 0.9$).

The adaptive emotion regulation scores improved significantly from before therapy to the end of therapy and one- and three-month follow-up in all samples ($p < 0.05$). Additionally, the comparison between the two groups indicated no statistically significant difference in adaptive and maladaptive emotion regulation scores ($p > 0.05$). The maladaptive emotion regulation score only improved significantly in the iECBT group with the husband's participation ($p < 0.05$).

Based on Table 5, the independent t-test indicated that the total score of therapy satisfaction was high in both iECBT alone (24.9 ± 5.2) and with the husband's participation (26.6 ± 4.3), and there was no statistically significant difference between them ($p > 0.05$). However, the satisfaction scores of the iECBT with the husband's participation were significantly higher on two of the eight variables (meeting needs and facing problems) compared to the iECBT alone ($p < 0.05$).

Table 5 Group comparison of the client satisfaction score in two intervention groups

Variables	iECBT Without Husband	iECBT with Husband		P^1	P^2
		Women	Men		
1. Quality of service	3.01 (0.7)	3.3 (0.8)	3.2 (0.6)	0.4	0.12
2. Type of requested service	2.9 (0.7)	3.2 (0.6)	3.1 (0.6)	0.5	0.22
3. Meeting needs	2.8 (0.7)	3.1 (0.6)	3.1 (0.7)	0.6	**0.03**
4. Recommend to friends	3.2 (0.8)	3.4 (0.7)	3.5 (0.7)	0. 4	0.1
5. Satisfaction with the received help	3.2 (0.6)	3. 4 (0.6)	3.3 (0.6)	0.8	0.3
6. Dealing with the problem	3.3 (0.6)	3.6 (0.6)	3.5 (0.7)	0.5	**0.04**
7. Overall satisfaction	3.2 (0.7)	3.3 (0.8)	3.3 (0.6)	0.7	0.6
8. Reuse of the program	3.1 (0.9)	3.4 (0.7)	3.4 (0.7)	1	0.1
Total score	24.9 (5.2)	26.6 (4.3)	26. 4 (4. 4)	0.8	0.1

1: *P*-value of paired t-test, 2: *P*-value of independent t-test

Also, women in the iECBT-alone group attended an average of 5.4 sessions (SD = 2.2), while those in the iECBT-with-husband group attended an average of 6.9 sessions (SD = 1.7). The average number of session participants in the iECBT-with-husband group who attended the treatment was significantly higher than in the iECBT-alone group ($P < 0.001$). Male participants in the iECBT-with-husband group attended an average of 6.7 sessions (SD = 1.8).

Discussion

Based on the research results, both IECBTs with and without the husband's participation were effective in improving state anxiety, psychological distress, pregnancy-specific stress, and emotion regulation in pregnant women; however, the two psychotherapy methods were not superior to each other regarding the improvement of state anxiety, psychological distress, pregnancy-specific stress, and emotion regulation in pregnant women. There was no study on the effect of this psychotherapy on pregnant women, but it was evaluated in other groups.

While some previous studies have demonstrated that partner engagement in therapy can significantly improve maternal psychological outcomes, findings remain mixed and highly dependent on the nature and depth of partner participation. Several studies have shown that men's participation in perinatal care benefits both maternal and infant well-being. For example, Xue et al. (2018) found that partner involvement in prenatal education was associated with lower maternal stress and enhanced emotional well-being [24]. Similarly, Gourounti et al. (2014) highlighted that perceived emotional support from a spouse plays a crucial role in buffering against perinatal anxiety and depression [22]. However, these studies emphasize that the quality of involvement matters more than the presence of a partner alone.

Our study's approach—providing psychoeducation to partners—may have increased awareness but did not necessarily translate into behavioral changes that directly improved maternal outcomes. Previous research suggests that interventions incorporating relationship-building exercises, active communication training, or stress-management skills for partners yield stronger effects on maternal mental health [25]. This may explain why the inclusion of partners in our intervention did not lead to significantly greater improvements compared to iECBT without a partner. Moreover, partner involvement is influenced by preexisting relationship dynamics. Studies suggest that women in supportive relationships benefit more from partner participation, whereas those in strained relationships may experience little to no benefit or even increased distress—when partners are involved in an uninformed or passive way [23].

Afshari et al. (2014) compared the effectiveness of ECBT and CBT in improving anxiety symptoms in anxious children. It reported that ECBT, in comparison to CBT, effectively improved emotion regulation strategies in children suffering from separation anxiety [26]. This aligns with our findings, as ECBT in both formats (with and without husband participation) significantly improved emotion regulation and reduced psychological distress in pregnant women. Both studies underscore the value of emotion-focused techniques for addressing anxiety-related symptoms across different populations. Additionally, Suveg et al. (2018) compared the effectiveness of ECBT with CBT in a sample of children with primary anxiety disorder. They reported that young people showed similar improvements in emotion regulation under both conditions, and pretreatment levels of emotion regulation disorder did not moderate the therapy results [27]. Similarly, in our study, iECBT showed comparable improvements regardless of the inclusion of the partner, indicating that the therapy's core emotional focus drives outcomes rather than external moderators like partner involvement.

Torres et al. (2020) investigated the initial long-term results and feasibility of an emotion-focused cognitive behavioral therapy (EF-CBT) in people with obesity and binge eating disorder (BED). They reported the long-term effectiveness of this program in improving psychological

distress, emotional processing, and alexithymia [43]. Consistently, our study found that iECBT effectively reduced psychological distress in pregnant women and maintained improvements during follow-up, supporting the adaptability and lasting impact of emotion-focused techniques. Timulak et al. (2022) compared the effectiveness of ECBT and CBT in improving anxiety symptoms regarding Irish public health services. They reported that even though the difference between the two methods was not statistically significant, EFT was a potentially promising therapy for GAD [44]. Likewise, our study found no significant difference between the two formats of iECBT, highlighting that the emotional and cognitive components of the therapy are sufficient for significant symptom improvement.

According to findings, internet-based CBT content improved psychological indicators in pregnant women, including anxiety. In this regard, Bastani et al. (2006) emphasize that specific training for pregnant women identifies cognitive distortions and irrational thoughts. Pregnant women learn to dominate their cognitive content and manage their thought flow by receiving specific training. This content is important as, contrary to the previous idea, the husband's presence did not significantly change the pregnant woman's ability to conceptualize cognitive-behavioral techniques [45]. In addition to the significant effect of ECBT on the reduction of psychological distress in pregnant women, it is necessary to emphasize that ECBT places a special emphasis on techniques of personal empowerment and increasing potential. This emphasis is noteworthy as the husband's presence in ECBT sessions has little effect on increasing training effectiveness [46]. The conceptualization and formulation of ECBT sessions are based on the fact that participants can find self-control and dominance over their cognitive distortions and thoughts.

Additionally, the relative dominance of women in expressing emotions and feelings is also an important factor in the effectiveness of ECBT techniques, as they are taught about the methods of expressing positive and negative emotions and putting them into words (not just keeping them in mind) [47]. This dual role of the partner underscores the complex nature of partner involvement. While CBT empowerment enables women to express their emotions and dissatisfaction openly, this does not necessarily diminish their partner's willingness to be involved. Instead, it can foster a more profound understanding between partners. However, further research is required to explore the nuanced dynamics of emotional expressiveness in women and how it influences their partner's engagement in therapy, particularly in culturally diverse settings.

The important question is why was the effectiveness of iECBT with the husband's participation not superior in improving anxiety symptoms compared to iECBT alone? Despite the lack of an exact answer to the above question, there are assumptions. The lack of significant differences in the results between the two groups may be attributed to several factors. First, the intervention's short duration (20 min) and limited content for husbands might not have been sufficient to create a measurable impact. Second, while husband participation aimed to enhance emotional and practical support, the self-directed nature of the sessions might not have effectively translated into significant behavioral changes. In contrast, iECBT alone empowered pregnant women to address their psychological distress independently, potentially offsetting the need for additional partner involvement. Additionally, cultural and contextual factors could play a role. In some contexts, women may prefer to rely on their coping mechanisms rather than involve their partners extensively, particularly in sensitive areas like mental health. This preference might have influenced the outcomes, as both groups exhibited high satisfaction and significant improvements. Lastly, the study's design, which did not evaluate the direct impact of husband participation on the quality of support provided, may have limited the ability to capture subtle differences between the groups. Future research should include measures to assess the specific contributions of partner involvement, such as qualitative feedback from participants and their husbands.

The present study had many clinical advantages. Considering the effectiveness of two types of iECBT in improving the treatment of anxiety in pregnant women, these two new strategies might be introduced as appropriate psychotherapies to fill the enormous gap between the need and provision of evidence-based therapies for anxiety and depression in pregnant women. Of course, it is important to compare the outcomes of iECBT with those of other interventions and the natural course of symptoms to understand its effectiveness fully. It also evaluates the effectiveness of iECBT alone in reducing psychological distress in pregnant women with anxiety disorder. Before introducing iECBT as a new appropriate psychotherapy, more comprehensive research is needed. Health experts can consider using research results to improve the mental and reproductive health of pregnant women. It is recommended to use such methods in clinical conditions based on the selection of anxious pregnant women.

Despite many beneficial clinical results, the present study also had some limitations; a significant limitation of this study was the lack of direct assessments to evaluate the impact of the partner intervention on the partners themselves. While the intervention was designed to improve relational dynamics and support the mothers, specific evaluations of the partners' mental state, relationship quality, or perceived ability to support their

partners were not conducted. Future studies should incorporate assessments for partners to comprehensively evaluate their mental health, relational outcomes, and the overall effectiveness of such interventions. Another limitation related to the lack of assessment of treatment adherence. A low sample size and limited to two educational centers was another limitation of this study. It is suggested to conduct further randomized clinical trial studies with larger sample sizes, multi-centers, and long-term follow-up.

Conclusion

Both IECBTs, with and without the husband's participation, were effective in improving the symptoms of pregnant women with anxiety disorder, but they were not superior to each other. Moreover, treatment satisfaction is high with both methods, and they are not significantly different. However, given the small sample size and lack of comparison to other groups, these findings should be considered preliminary. The present study suggests that therapists offer IECBTs with and without the husband's participation to pregnant women with anxiety disorder based on their preference and choice and according to the patient's preference. Further studies are needed to evaluate proper strategies to enhance men's effective roles in the treatment of their wives with mental disorders.

Abbreviations

IECBT	Internet-Based Emotion-Focused Cognitive Behavioral Therapy
ECBT	Emotion-Focused Cognitive Behavioral Therapy
CBT	Cognitive-Behavioral Therapy
AD	Anxiety Disorder
SCID-5	Structured Clinical Interviews for the DSM-5
MDD	Major Depressive Disorder
BSI-18	Brief Symptom Inventory 18
PSS	Pregnancy-specific stress
CSQ	Client Satisfaction Questionnaire
EF-CBT	Emotion-Focused Cognitive Behavioral Therapy
BED	Binge Eating Disorder
GAD	Generalized anxiety disorder

Supplementary Information

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Supplementary Material 1

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Author contributions

MF designed and conducted the project. MS contributed to data collection and writing the original draft. SB contributed to supervision, reviewing, and editing. MF and AF contributed to reviewing and editing. HS performed the data analysis. All authors have read and approved the final version of the manuscript.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The present study was approved by the Ethics Committee of Babol University of Medical Sciences (IR.MUBABOL.REC.1400.164). Written informed consent was received from all participants for study participation. Participants' anonymity and confidentiality were assured.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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