

## Comparison of the effectiveness of cognitive-behavioral and metacognitive therapy on anxiety and biological indicators in pregnant women

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### Abstract

**Introduction and aim:** A long wait to give birth and constant concern for the health of the baby accompany the mother during all pregnancy periods. The aim of the present study was to compare the efficacy of cognitive-behavioral therapy and metacognitive therapy on anxiety and biological indicators in pregnant women.

**Methods:** The present study was a semi-experimental study with a pre-test-post-test-follow-up design with a control group. The statistical population of the present study consisted of all pregnant women in the second 3 months of pregnancy who referred to the hospitals and pregnancy clinics of Tehran in 2020-2021. 45 people were selected in a purposeful way and randomly assigned to two experimental groups and one control group. The tools of this research included Cattell's anxiety questionnaires (1957), special armband for sphygmomanometer and glucose test kit. For the first experimental group, German - Canadian - Iranian system metacognitive therapy and for the second experimental group cognitive behavioral therapy were held in 8 sessions of 90 minutes, but the control group did not receive any intervention. The data were mixed using analysis of variance and analyzed through spss-26 software.

**Results:** The results indicated that metacognitive therapy and cognitive behavioral therapy increased psychological well-being and decreased blood pressure and blood sugar at the end of the interventions and the follow-up period ( $p < 0.05$ ). The method of metacognitive therapy has caused a further decrease in biological indicators and a further increase in anxiety ( $p < 0.05$ ).

**Conclusion:** Due to the effect that metacognitive therapy has on correcting metacognitive beliefs affecting anxiety and increasing blood sugar and blood pressure in pregnant women, it can be effective alone or with complementary treatment in reducing biological indicators and reducing anxiety in pregnant women.

**Keywords:** Anxiety, Biological Indicators, Cognitive-Behavioral Therapy, Metacognitive Therapy, Pregnant Women

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### Introduction:

Pregnancy is one of the most sensitive periods of human life. A long wait to give birth and constant concern for the health of the baby accompany the mother during the entire pregnancy period. Therefore, young mothers generally experience constant stress and anxiety, and mental health during pregnancy is one of the issues that has received a lot of attention nowadays (1). Pregnancy-related anxieties can be associated with high levels of pregnancy anxiety, known as pregnancy-specific anxiety. Anxiety during pregnancy is a special emotional state that is related to specific anxieties during pregnancy, such as anxiety about the health of the baby and childbirth (2).

Pregnancy anxiety has many causes. A woman's perception of pregnancy and labor pains, fear of childbirth, age, level of education and low marital satisfaction, mother's literacy level, low economic status, insufficient support, poor relationship with the husband and physical violence from husband are also closely related to anxiety during pregnancy. (3).

Pregnancy is not considered as a pathological condition. However, pregnancy increases vulnerability to emotional and psychological conditions such as anxiety and depression, and the prevalence of anxiety symptoms and disorders is high during this period (4). In a study that examined generalized anxiety disorder in 528 pregnant women, the results indicated that the prevalence of anxiety for this sample was 17%, and for generalized anxiety disorders, social phobia, specific phobia, and obsessive-compulsive disorder, we respectively reported as 5%, 4%, 8%, and 2% (5). In another study, the incidence of prenatal anxiety is considered to be 1.1 to 6.75% (6). The findings of various studies have shown that anxiety is one of the psychological problems for pregnant mothers, and it increase in the first and third trimesters (7).

Anxiety during pregnancy and childbirth can make the child vulnerable to schizophrenia and emotional disorders in the future, and self-restraint, hyperactivity, adjustment disorders, and physical problems during infancy (9, 8). Also, anxiety before delivery is effective in infant's sleeplessness and early childhood behavioral problems (10). On the other hand, mother's pregnancy anxiety affects arousal, disturbance of fetal neurobehavioral responses, and mental development of infants (11).

On the other hand, disorders caused by high blood pressure and diabetes are still among the most important and significant unresolved problems in midwifery and occur in 5-10% of pregnancies. Blood pressure disorders and gestational diabetes, along with bleeding and infection, are four fatal factors that are responsible for a major part of maternal mortality and the occurrence of complications in them (13, 12).

High blood pressure and gestational diabetes in developing and developed countries cause the increase of many complications in the mother and fetus, including increased fetal and infant mortality (15, 14), premature birth, low birth weight (16), intrauterine growth restriction (17), and stump prematurity of the placenta, increase of cesarean (18), heart failure (19), kidney failure (20) and HELLP syndrome (21). Despite the problem of high blood pressure and diabetes in pregnancy and its numerous complications, no specific treatment has been found for it yet (22).

According to the above, dealing with anxiety, high blood pressure and blood sugar in pregnant women and the interventions affecting them are very important. In the research literature, psychological interventions, especially cognitive-behavioral therapy, have been proposed for pregnancy challenges in pregnant women. Cognitive-behavioral therapy is an approach that helps patients recognize the power of "self-talk" (what they tell themselves) and increase their coping skills in dealing with emotional distress (23). There is also evidence that cognitive-behavioral therapy is cost-effective, reduces resource wastage, and plays an important role in preventing the progression of chronic and debilitating conditions (24). Increasing adherence to

diet therapy is another advantage of this model in the care of high blood pressure and blood sugar (25).

Evidence shows the effectiveness of cognitive-behavioral therapy in treating depression, anxiety, and other psychological problems and improving diabetes management through blood sugar control. So that cognitive-behavioral therapy is suggested as a primary psychological intervention to address "negative behaviors" and "dysfunctional thinking" among people with diabetes is recommended by the National Institute for Health and Care Excellence, The Scottish Intercollegiate Guideline Network, the American Diabetes Association and the International Diabetes Federation (25). Also, metacognitive therapy is one of the effective psychological interventions that has made good progress in understanding the causes of mental health problems and their treatment in recent decades (26). This approach was initially used to treat emotional disorders, depression, and generalized anxiety and was later expanded as a general treatment approach (27-29).

Methods based on metacognition are the third generation of psychotherapy that emphasize acceptance as much as change (30). In this research, metacognitive therapy is a method of treating mental disorders that was first invented in 2003 by an international German-Canadian-Iranian group (31) at the University of Hamburg. In 2010, this therapy received the World psychotherapy award in Europe. The method used by the cited collection of this metacognitive therapy method is completely different from Wells' metacognitive system (32). The effectiveness of metacognitive therapy has been investigated in several studies. Now, considering what was said, the present study tries to answer the question that are the effectiveness of cognitive-behavioral therapy and metacognitive therapy on anxiety and biological indicators (blood pressure and blood sugar) different in pregnant women?

### **Research method:**

The current research was a semi-experimental method and a 30-day pre-test – post-test-follow-up design was used with a control group. The statistical population of the present study consisted of all pregnant women in the second 3 months of pregnancy who referred to the hospitals and pregnancy clinics of Tehran in 2020-2021. The sample group was selected from pregnant women who referred to Nikan Gharb and Arad. The sample size in this research was determined according to the number of groups and the number of investigated variables. The selected groups to implement the experimental intervention and play the role of controls were already three different groups. Based on this, 45 people from the mentioned society after the preliminary interview and based on the criteria for entering and leaving the research were selected in a purposeful way and randomly assigned to experimental and control groups (experimental group cognitive behavioral therapy, 15 people), (experimental group of metacognitive therapy, 15 people) and (control group, 15 people) were included. The criteria for people to enter the research include informed consent, minimum education at the diploma level, minimum age of 20 and maximum 40 years, natural pregnancy, desired pregnancy, living with a partner, physical and mental readiness to answer the questions, and the criteria for exiting the research, including the emergence of problems related to pregnancy based on the doctor's confirmation that their presence in treatment sessions should not continue, such as premature birth, absolute rest, high blood pressure, high blood sugar, etc., unwillingness to participate in group therapy sessions and absence of more than two sessions.

The method of conducting the research was such that after coordinating with the Islamic Azad University of Karaj branch and the management of Nikan Gharb and Arad hospitals, after selecting the sample subjects using the purposeful sampling method, based on the entry and exit criteria, 45 patients were selected and were assigned through random division into three groups, including two experimental groups and one control group. After being placed in the groups, the subjects answered the research questionnaire as a pre-test before the implementation of the

intervention. The first experimental group is cognitive behavioral therapy for 10 sessions of one and a half hours and the second experimental group is metacognitive therapy for 8 sessions of one and a half hours in a face-to-face group manner received from the researcher with a sequence of two sessions per week on Saturdays and Wednesdays. But the subjects of the control group did not receive any intervention. After the end of the treatment sessions, all three groups responded to the research questionnaire again in the post-test stage and 30 days later in the follow-up stage. Also, for the participants of the control group to comply with ethical issues in the research and acknowledge them, after the end of the research, the therapy sessions were held. The following instruments were used to collect data:

**1. Cattle Anxiety Questionnaire (CAQ):** This questionnaire contains 40 questions that make up the anxiety scale of the 16-factor Cattle personality test. Each question is scored on a three-point scale (0, 1, and 2). Cattle's 16-factor test has acceptable psychometric indices. Therefore, Cattle's anxiety questionnaire has the necessary validity and reliability. This questionnaire was standardized in 2018 in an Iranian sample including 977 students of Tehran University in the age range of 18 to 30 years, and it has level scores or norms for trait anxiety (hidden), state (overt) and general anxiety (33). In the research conducted by Ghasemzadeh et al. (34), the reliability of this questionnaire was calculated using Cronbach's alpha method, and the alpha coefficient for the entire scale was 0.81.

**2. Measurement of biological indicators:** To measure blood pressure, a special armband for a standard sphygmomanometer approved by doctors and a glucose test kit were used to measure blood sugar.

**3. Metacognitive therapy training package:** The structure of metacognitive therapy sessions was implemented from the protocol designed by (31). A brief description of behavioral activation therapy sessions is presented in Table 1.

**Table 1. German, Canadian, Iranian system metacognition therapy sessions (31)**

Treatment headline	Subject	Unique topics of metacognitive therapy
Thinking and reasoning 1	Mental refinement, overgeneralization	
Memory	Memory and concentration, memory error	Distortion of memory, rechanging of memory
Thinking and reasoning 2	Dictatorship/ the phrase "must" Devaluing positive points, black and white thinking	Dictatorship/must Finding the right balance
Self-esteem, valuing yourself	Self-esteem, perfectionism	Identifying values, to live a life worth living
Thinking and reasoning 3 Distorted thinking in depression	Zooming in and out, document style	
Strategies and behaviors	Withdrawal leads to a vicious cycle, depressive rumination, suppression of thoughts	
Thinking and reasoning 4	Hasty conclusion, mind reading, prediction	
Understanding emotions and feelings, self- confidence	Understanding emotions, emotional reasoning, understanding non-verbal cues	Self-confidence, mood swings and negative sculptural thoughts

**4. Cognitive-behavioral therapy training package:** The structure of cognitive-behavioral therapy sessions was implemented from the protocol designed by Greenberg and Padesky (32). A brief description of cognitive behavioral therapy sessions is presented in Table 2.

**Table 2. Cognitive behavioral therapy sessions (32)**

Sessions	Title of meetings
Session 1	Objectives: initial acquaintance and establishment of a therapeutic relationship, raising the main complaints of women, briefly introducing the type of treatment, collaborating with the research sample in determining the goals of the treatment protocol, determining the relationship between cognition, emotion and behavior, choosing goals and identifying goals, and agreeing on homework, recording life events based on the ABC model
Session 2	Objectives: formulation of women's general problems in the form of cognitive-behavioral model, integration of cognitive triangle in treatment strategies, use of standard techniques of behavioral activation, rescheduling of negative spontaneous thoughts and presentation of ineffective thoughts registration sheet
Session 3	Objectives: to continue working with spontaneous thoughts, to review the patients' ineffective thoughts registration sheets, to challenge spontaneous thoughts in the Socratic way
Session 4	Objectives: recognizing the underlying beliefs and how they are activated in certain situations, using the downward arrow technique, examining some of the patient's target issues
Session 5	Objectives: developing awareness of underlying beliefs, strengthening positive self-talk, using behavioral techniques to replace positive thoughts with negative ones
Session 6	Objectives: using cognitive-behavioral techniques on courage, problem solving and teaching social skills to women
Session 7	Objectives: to identify more unconditional beliefs and core beliefs, to weaken unconditional beliefs by questioning them in the Socratic way, and to rate negative beliefs on a scale of 0 to 100 degrees
Session 8	Objectives: Continue to produce and develop alternative positive beliefs through the development of social and communication skills, develop problem-solving skills and courageous behaviors, grade alternative thoughts, prepare to apply the learned methods in future life situations
Session 9	Objectives: teaching communication skills, group discussion, providing additional activities, in this session people were taught efficient verbal response style and active listening skills, then people are asked to pay attention to the reactions of others to these verbal response styles and at the end of the session Affiliation contracts were signed with patients (it is a behavioral therapy method whereby agreements are made between group members in order to exchange rewards for expressing desirable behaviors)
Session 10	Objectives: teaching self-control and alertness skills, group discussion, providing supplementary activities and conducting post-test. It should be noted that in each meeting, the materials and homework of the previous meeting were reviewed, and at the end of the meeting, new assignments were assigned to people

For data analysis at the level of descriptive statistics, mean and standard deviation indicators were used, and at the level of inferential statistics, mixed variance analysis was used, which was analyzed by spss-26 software.

### Findings

The findings of the research on demographic information showed that 21 people (47%) of the participants in the research were 20 to 30 years old and 24 people (53%) were older than 30 to 40 years old. Meanwhile, the mean and standard deviation of the average age of the participants in the research are 30.3 and 5.8 years, respectively.

**Table 3. Average and standard deviation of the research components separately for the three groups of control, cognitive-behavioral therapy and metacognitive therapy in three measurement stages (pre-test, post-test and follow-up)**

	Stage	Pre-test		Post-test		Follow-up	
		Mean	SD	Mean	SD	Mean	SD
Anxiety	Control	590.07	17.07	58.87	16.43	58.93	16.92
	Cognitive therapy	61.60	15.33	49.73	11.88	50.40	13.73
	metacognition	60.00	16.49	43.00	14.67	42.53	12.37
Blood sugar	Control	123.07	3.92	122.93	3.86	123.00	4.19
	Cognitive therapy	122.87	4.60	111.40	5.51	111.13	5.40
	metacognition	122.93	3.95	104.27	4.04	104.40	4.40
Blood pressure	Control	98.80	4.36	97.67	5.31	97.73	5.11
	Cognitive therapy	97.40	4.00	88.87	4.90	88.80	4.95
	metacognition	97.00	4.24	82.93	3.56	83.20	3.91

In Table 3, the results have shown that in the control group, the mean scores of the components of anxiety, blood pressure, and blood sugar in the post-test and follow-up did not show much change compared to the pre-test stage, but in the cognitive-behavioral and metacognitive therapy groups, we witness a decrease in the anxiety score in the post-test and follow-up stages compared to the pre-test stage. Also, the biological indicators of blood sugar and blood pressure in the cognitive-behavioral and metacognitive therapy groups have decreased in the post-test and follow-up stages compared to the pre-test stage.

Based on this, the results of mixed variance analysis are presented in Table 4.

**Table 4. The results of mixed variance analysis related to intragroup and intergroup effects**

Variable	Factors	Change sources	Sum of squares	Degree of freedom	Mean squares	F statistics	Level of significance	Effect rate
Anxiety	Intragroup	Time	1991.76	2	995.88	27.61	0.0001	0.42
		Time × group	810.98	4	202.75	5.62	0.0001	0.23
		Error	241.18	76	36.07	-	-	-
	Intergroup	Group	241.18	76	1711.14	20.65	0.0001	0.52
		Error	3148.68	76	82.86	-	-	-
Blood pressure	Intragroup	Time	82.93	1.45	57.06	0.25	0.77	0.01
		Time × group	1619.63	2.91	557.24	2.45	0.05	0.11
		Error	12544.89	55.22	227.17	-	-	-

Blood sugar	Intergroup	Group	2255.22	2	1127.61	4.95	0.01	0.21
		Error	8656.41	38.002	227.8	-	-	-
	Intragroup	Time	292.98	1.33	220.53	0.46	0.56	0.01
		Time × group	5812.2	2.66	2187.5	4.55	0.01	0.19
		Error	24283.19	50.48	481.02	-	-	-

As seen in Table 4, the effect of time is significant in the variable of anxiety ( $P < 0.05$ ), therefore, there is a significant difference between the three stages of pre-test, post-test and follow-up in this variable. Also, according to the results of the table, it shows that there is a significant difference between the group and time in the variables of anxiety, blood pressure and blood sugar, and it is determined that there is a difference in the dependent variable between the pre-test, post-test and follow-up stages between the treatment and the control groups. Also, according to the group effect, considering the values and the significance level of F in the variables of anxiety, blood pressure and blood sugar, there is a significant difference between the metacognitive and cognitive therapy groups and the control group whose results are presented in Table 5.

**Table 5. Benferoni test for pairwise comparison of research variables**

				Mean difference	Test statistics	Level of significance
Anxiety	Pre-test	Cognitive therapy	Control	-1.53	1.36	0.22
			Metacognitive	0.60	1.36	0.37
	Post-test	Cognitive therapy	Control	-9.14*	4.06	0.03
			Metacognitive	-6.73*	4.06	0.00
	Follow-up	Cognitive therapy	Control	-8.53*	13.92	0.03
			Metacognitive	7.78*	13.92	0.01
Blood pressure	Pre-test	Cognitive therapy	Control	-0.20	1.52	0.90
			Metacognitive	-0.07	1.52	0.97
	Post-test	Cognitive therapy	Control	-11.533*	1.66	0.00
			Metacognitive	7.133*	1.66	0.00
	Follow-up	Cognitive therapy	Control	-11.867*	1.71	0.00
			Metacognitive	6.733*	1.71	0.00
Blood sugar	Pre-test	Cognitive therapy	Control	1.40	1.53	0.37
			Metacognitive	0.40	1.53	0.80
	Post-test	Cognitive therapy	Control	-8.800*	1.70	0.00
			Metacognitive	5.933*	1.70	0.00
	Follow-up	Cognitive therapy	Control	-8.933*	1.71	0.00
			Metacognitive	5.600	1.71	0.00

According to Table 5, no significant difference is observed between the control group and the experimental groups at the significance level of 0.05 in the pre-test stage. But in the post-test and follow-up stages, we witness a decrease in the research components of the experimental groups compared to the control group, which indicates the effectiveness of the two methods of cognitive-behavioral therapy and meta-cognitive therapy. As can be seen in Table 5, there is a significant difference between metacognitive and cognitive-behavioral treatment methods in the post-test and follow-up stages. And the method of metacognitive therapy has caused a further reduction of blood pressure and blood sugar components, and a further reduction of anxiety.

### **Discussion and conclusion:**

The present study sought to answer the question that whether there is a difference between the effectiveness of cognitive-behavioral therapy and metacognitive therapy on anxiety and biological indicators (blood pressure and sugar) in pregnant women. The results of mixed variance analysis indicated that both treatment groups were effective on anxiety and biological indicators (blood pressure and sugar) compared to the control group, and metacognitive therapy was more effective in reducing biological indicators (blood pressure and blood sugar) and increasing anxiety compared to cognitive behavior treatment.

In explaining the effectiveness of cognitive-behavioral therapy on anxiety and biological indicators (blood pressure and blood sugar) in pregnant women, the results of the present study are consistent with studies (36-39). It can be said that cognitive-behavioral therapists use various cognitive strategies and techniques such as relating thoughts to situations and emotions, gathering evidence and identifying thought distortions, experiments, discovering central and underlying beliefs and assumptions (40).

Also, cognitive therapists can use a wide range of therapeutic strategies to help clients test their cognitive validity. They can benefit from many cognitive and behavioral techniques, many of which are provided by logical-emotional-behavioral therapists and taking benefit of behavioral therapists, such as thinking, discussing, debating, taking challenges, encouraging, changing, explaining, teaching, and cognitive tasks. For example, treatment seekers learn how to examine and modify values and behaviors related to themselves and others. Therapists show treatment seekers how to make things look bad and how they make themselves small and inferior. Also, in the role of an educator, the leaders of the therapy group focus on the discussion of irrational thoughts and replace irrational, and disastrous beliefs with logical ideas. They show how these beliefs create unnecessary discomfort and encourage referents to change these dysfunctional behaviors. In addition, group members learn how irrational beliefs can be dismissed with rational terms. Referents are expected to examine their speaking style by writing and analyzing the quality of their language. Relaxation was used in cognitive-behavioral therapy, and relaxation techniques have led to the reduction of anxiety, blood pressure and blood sugar in pregnant women (37).

In explaining the effectiveness of metacognitive therapy on the level of anxiety and biological indicators (blood pressure and blood sugar) in pregnant women, the results of the present study are consistent with studies (31, 41-44). As a result, it can be stated that metacognitive therapy is based on the basic principle that psychological disorder persist due to the effects of thinking style, that is, cognitive-attentional syndrome on emotional experiences and knowledge (beliefs). Cognitive-attentional syndrome causes the continuation of a person's negative feelings about himself and the perception of threats through certain channels. Cognitive-attentional syndrome is related to the activation of positive and negative metacognitive beliefs. The separation of the metacognitive level from the common cognitive level includes the consequence that the experiences of internal events (such as thoughts, beliefs and emotions) may be processed in cognitive and metacognitive mindsets. This model offers a range of possible therapeutic methods that focus on putting aside the cognitive-attentional syndrome, correcting metacognitive beliefs, shaping different ways of experiencing and relating to internal events (27). In metacognitive therapy, by placing metacognitive beliefs and replacing the internal experience of a negative thought or a common belief instead of an activating event, it is not necessary for the activating event to be the external situations, but internal cognitive events can also act as an activating event (27) as a result of which anxiety reduces.

In explaining the effectiveness of metacognitive therapy, it can be stated that metacognitive training and therapy, by correcting the thinking process in pregnant women and reducing negative emotions and thoughts and adjusting wrong processes, make it easier to deal with difficult pregnancy conditions and increases their ability to overcome the problems caused by

pregnancy. When facing difficult and stressful situations, the beliefs and perceptions of these women provide information to their brains and the situation is interpreted in their minds. Therefore, they evaluate their abilities and the value of dealing with that situation in their mind. These evaluations stimulate their cognitive processes as well as their emotions. When the brain's information processing becomes balanced, pregnant women use more rational coping strategies and see events as more controllable and manageable. Flexible thinking leads pregnant women to better know and understand their situation and position against the pressures caused by pregnancy. When the understanding of the situation increases and the events become more controllable, life will become more meaningful for them and it will be worth it for them to work harder to improve their lives and raise and care for their children. Anxiety was further reduced by metacognitive intervention. Metacognitive therapy strengthens women's psychological well-being as an internal resistant factor. When their cognitive biases are reduced and their information processing process becomes more balanced, they distance themselves from catastrophism and all-or-nothing thinking and see anxiety-causing events as more controllable. In other words, a moderate and flexible attitude, which is one of the teachings of metacognitive training and therapy for pregnant women, causes them to have a clear understanding of the events (comprehensibility), and as a result, their ability to manage existing conditions (manageability) increases and their lives become more purposeful (meaningfulness). Therefore, anxiety and biological indicators decrease (43, 14).

In general, the results indicated that cognitive-behavioral therapy and metacognitive therapy were effective on anxiety and biological indicators (blood pressure and blood sugar) in pregnant women. Therefore, metacognitive therapy can be used as an effective psychological intervention in the treatment of pregnant women's problems.

#### **Research limitations**

The limitations of the research include the semi-experimental nature of the research; that is, the groups were selected purposefully (pregnant women referring to Nikan Gharb Hospital and Arad), but the individuals were randomly assigned and the lack of control of demographic characteristics as an influencing variable in the effectiveness of the intervention pointed to a larger number of samples due to limited access.

#### **Ethical considerations**

This article is taken from the doctoral dissertation of the first author in the field of health psychology at the Islamic Azad University of Karaj, which was approved by the university's research council on 24/05/2021. In this research, ethical considerations such as the full consent of the sample, compliance with the principle of confidentiality and confidentiality of information have been observed, and the researcher has conducted the research process after obtaining approval from the ethics committee with ID IR.IAU.ABHAR.REC.1400.001.

#### **Conflict of interest**

The authors also declare that there is no conflict of interest in the results of this research.

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