







# Effectiveness of Cognitive Behavioral Lifestyle Improvement Training on Anxiety and Self-Care in Women with Diabetes

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## ABSTRACT

The purpose of this research is to examine the impact of cognitive-behavioral lifestyle improvement training on reducing anxiety and enhancing self-care in women with diabetes. The study utilized an experimental method. Initially, a sample of women with diabetes was selected and randomly divided into two groups. The first group received cognitive-behavioral lifestyle improvement training, and the second group served as the control. Subsequently, the levels of anxiety and self-care in women from both groups were measured before and after the training. Findings indicate that cognitive-behavioral lifestyle improvement training had a positive effect on reducing anxiety in women with diabetes. Additionally, self-care in the first group significantly increased. These results suggest that cognitive-behavioral lifestyle improvement training can be an effective method in reducing anxiety and enhancing self-care in women with diabetes. In conclusion, the importance of cognitive-behavioral lifestyle improvement training for reducing anxiety and enhancing self-care in women with diabetes is discussed, and the positive impact of this training on reducing anxiety levels and increasing self-care is confirmed. This study demonstrates that attention to a healthy lifestyle and its improvement can lead to significant improvements in the lives of women with diabetes.

**Keywords:** Lifestyle, Cognitive Behavioral Therapy, Anxiety, Self-Care, Women, Diabetes.

## 1. Introduction

Diabetes is a metabolic disorder with various causes, characterized by chronic hyperglycemia and disturbances in carbohydrate, protein, and fat metabolism (1). Diabetes results from defects in insulin secretion, insulin

action, or usually a combination of both. Long-term complications of these metabolic disorders are a major cause of morbidity and mortality. The global prevalence of diabetes is increasing, and its economic burden is significant (2). The two main types of diabetes include Type 1 diabetes (insulin-dependent) and Type 2 diabetes (non-insulin

dependent). While about 422 million people worldwide were affected by diabetes in 2014, it is projected that 645 million people will have diabetes by 2040 (3). According to a 2014 report by the Centers for Disease Control and Prevention (USA), 34.2 million people of all ages, or 10.5% of the total population in the United States, have diabetes. The prevalence of diabetes in Iran was about 7.7% in 2005, and it is projected to reach approximately 5.2 million cases by 2025 if current trends continue (4, 5). This disease is the most common cause of limb amputation, blindness, chronic kidney failure, and a risk factor for heart disease (Chang, 2010). The Global Burden of Disease Study (GBD) 2017 shows that annually, 1,370,000 people die from diabetes worldwide. In Iran, from 2007 to 2017, over ten years, diabetes, with a 63% increase, ranks among the top 10 causes of premature death and is one of the major health and disability issues (6).

Individuals with diabetes may experience problems in managing self-care due to everyday pressures, stress, and anxiety (6, 7). Anxiety is the most common psychological disorder among those with diabetes, manifesting in four different forms: situational anxiety related to the frightening aspects of the disease or treatment, disease-related anxiety, treatment-related anxiety, and the exacerbation of pre-existing anxiety disorders such as phobias, panic attacks, generalized anxiety disorder, or obsessive-compulsive disorder. Anxiety is one of the most common reasons for psychiatric consultation in the final stages of cancer and is associated with poor quality of life, increased insomnia, reduced trust in doctors, and leads to a weak therapeutic alliance (8).

Type 1 diabetes management includes implementing a comprehensive self-care plan typically involving blood glucose monitoring, diet, exercise, medication therapy, body weight control, and foot care (9). Such self-care activities can be burdensome and often require significant lifestyle changes such that many patients, despite being aware of the complications of the disease, do not fully comply with medical and therapeutic recommendations, thereby increasing the likelihood of developing diabetes-related complications (10). Today, many experts consider the control and care of diabetes to be the primary responsibility of the affected individuals, believing that individuals should take responsibility for managing their disease, with more

than 95% of diabetes-related care being performed by the patient and health professionals having limited control over patient self-care (11, 12). Self-care activities in patients with diabetes also include correct and timely insulin injections, adherence to dietary regimens, regular physical activity, recognition of signs of increased or decreased anxiety, regular medication intake, and foot care (13).

Recognizing the multiple factors that cause disturbances in the proper treatment of diabetes is of particular importance. The specific nature of the disease, frequent insulin injections, multiple anxiety measurements, and the need for overall lifestyle adjustments are thus crucial (14). Lifestyle is the normal and usual daily activity that individuals acceptably incorporate into their lives, impacting their health (3). A person's lifestyle includes their life goals, self-image, feelings about others, and attitudes towards the world and is typically more reflective of their mental state than their physical health and well-being. Lifestyle is formed from cultural patterns, behavioral habits, and practices learned within the family and routinely applied in individual and social life (6).

In the cognitive-social perspective, all cognitive processes are considered part of the psychopathology, involving inaccurate expectations and perceptions that a person has about their self-efficacy, which can lead to anxiety (15). In cognitive-behavioral therapy, the patient is encouraged to perceive the relationship between their negative self-directed thoughts and unpleasant feelings and inappropriate behavioral patterns as hypotheses to be tested and to use behaviors resulting from negative thoughts as a test for evaluating the validity or accuracy of those thoughts (16). Lifestyle is important and determinant for an individual's mental and social health status. Lifestyle refers to the way a person lives and their capabilities. A health-promoting lifestyle includes behaviors through which an individual engages in proper nutrition, regular exercise, avoidance of unhealthy behaviors, protection against accidents, timely recognition of disease symptoms, emotion and thought control, coping with mental and emotional stress, independence, adaptability, and improving interpersonal relationships (15, 17, 18). In this regard, some studies indicate the effect of cognitive behavioral therapy on improving the quality of life, sleep quality, mental health enhancement, self-esteem increase, and weight reduction in

obese individuals through the correction of inaccurate cognitive and behavioral patterns (16).

Given the high stress nature of diabetes, which is widespread in many countries, including ours, and the large number of people annually diagnosed with this disease, it is essential to seriously address the adverse psychological effects of this disease. Patients often face severe physical and psychological challenges due to the destructive impact of the disease on their bodies and minds. Therefore, it is crucial to employ effective non-pharmacological treatment strategies alongside pharmacological treatments to counter the progression of the disease in the psychological and mental health dimensions of patients. Research conducted within the country has shown that all studies have examined the effectiveness of various interventions to improve the condition of patients with diabetes. However, no study has been found that examines the effectiveness of cognitive-behavioral lifestyle improvement training on reducing anxiety and enhancing self-care in women with diabetes. Therefore, the aim of the present research is to determine the effectiveness of cognitive-behavioral lifestyle improvement training on reducing anxiety and enhancing self-care in women with diabetes.

## 2. Methods and Materials

### 2.1. Study Design and Participants

In this study, a quasi-experimental research design was utilized. The current quasi-experimental design was a pretest-posttest multi-group with a control group. The study population included individuals aged 25-55 with diabetes, attending a health center in Ghaemshahr during 2020, totaling 320 individuals. The sample for this research consisted of 30 patients with type 2 diabetes. The sample size for each group was set at 12 individuals. Given the specific conditions of the subjects and the high likelihood of dropout, three additional individuals were added to each group, making the initial sample size 15 per group. Thus, the total sample size considered was 30 individuals. The sampling method was purposive and convenient, and after selection, individuals were randomly assigned into two groups: the cognitive-behavioral therapy group (n=15) and the control group (n=15). Entry criteria included: having type 2 diabetes confirmed by a physician for at least one

year, an A1c level above 6%, age between 25 to 55 years, at least high school education, middle socioeconomic status, not receiving other psychological treatments, no acute or chronic medical conditions such as epilepsy, skeletal diseases, heart and respiratory failures, etc., that could complicate blood sampling and participation in sessions, no severe mental illnesses such as psychotic disorders and attention disorders, not currently using psychotropic drugs or substance abuse, and not having severe diabetes complications (like kidney failure requiring dialysis) leading to hospitalization. Exclusion criteria also included missing more than two therapy sessions and experiencing major stress due to unforeseen events. After the completion of sessions and at the final meeting, participants from all three groups once again completed the research questionnaires, and the research questionnaires were also administered three months after the end of the training period.

Ethical considerations in this research were such that participation was entirely voluntary. Before starting the project, participants were familiarized with the details of the plan and its regulations. The perspectives and beliefs of individuals were respected. Members of both the experimental and control groups were allowed to withdraw from the research at any stage. Additionally, members of the control group could receive the same intervention as the experimental group in similar therapy sessions after the completion of the project, if they were interested. All documents, questionnaires, and records were confidential and only accessible to the investigators. Written informed consent was obtained from all volunteers.

### 2.2. Measures

#### 2.2.1. Self-Care Behaviors

This standard questionnaire consisted of three parts and was collected through interviews. The first part included 6 questions about demographic characteristics of the patients including age, marital status, education level, occupation, ethnicity, and social network, while the second part contained 6 questions about disease characteristics such as the type of medication regimen, duration of diabetes, how they consult with physicians, sources of diabetes information, family history of diabetes, and fasting blood glucose from the last test (with a minimum interval of one

month). The third part of the questionnaire was the Summary of Diabetes Self-Care Activities measure by Toobert and Glasgow, which included 12 questions. Five aspects of self-care activities for diabetic patients were assessed, including diet (with 3 questions), physical activity (with 2 questions), proper insulin injection or tablet intake (with 1 question), anxiety self-monitoring (with 2 questions), and foot care (with 2 questions). This questionnaire allowed participants to report the amount and frequency of their diabetes-related self-care activities over the past 7 days, asking questions such as "How many days in the past week have you engaged in physical activities for at least 30 minutes?" Each behavior was scored on a scale from zero to seven, based on the number of days per week, with a complete score of 7 if the behavior was performed every day and a score of zero if not performed at all. The total score was calculated by adding up the scores for each question, ranging from 0 to 77. Cutoff points for determining the status of self-care behaviors were based on quartiles, where scores below the first quartile (0-22) were considered poor self-care, the second and third quartiles (23-39) as moderate self-care, and above the fourth quartile (30-77) as good self-care. The validity and reliability of the Self-Care Behaviors Questionnaire were confirmed in a study by Dr. Mohammad Ali Morowati Sharifabad in Yazd. Cronbach's alpha for the construct of self-care behaviors was calculated as 0.66 in a preliminary study and 0.68 across all samples. The validity and reliability of the questionnaire were also assessed and confirmed by the researcher. Content validity was determined using content validity methods, and for this purpose, feedback was sought from 10 expert academics in the field. The scientific trustworthiness of the tool was also established by providing the self-care scale to 30 eligible diabetic patients, and the overall reliability of the scale (12 questions) was confirmed using internal consistency with a Cronbach's alpha of 0.75. Cronbach's alpha for the 11 questions used was calculated as 0.76 (6).

### 2.2.2. Anxiety

This questionnaire was designed by Beck and colleagues (1988) to assess the level of anxiety and includes 21 statements. Each statement reflects one of the symptoms of anxiety, typically experienced by individuals who are clinically anxious or are in anxiety-inducing situations. For

the administration of the questionnaire, the individual must read the list of symptoms and rate each symptom. The range of scores is from zero to 63, with higher scores indicating more severe anxiety. Beck and colleagues (1988) found the internal consistency of this scale to range from 0.73 to 0.92. They reported similar reliability for the short form. Marnat (1990) obtained retest reliability for the Beck Depression Inventory based on the statistical population ranging from 0.48 to 0.86 (19-21). The reliability of this questionnaire in this research was reported using Cronbach's alpha as 0.78.

## 2.3. Intervention

### 2.3.1. Cognitive Behavioral Lifestyle Improvement

#### Session 1: Introduction to Therapy and Related Concepts

The first session is designed to introduce participants to the therapy and its underlying concepts. This session begins with an introduction of the members and establishing the therapeutic contract. Educational information about diabetes is provided, explaining the rationale for the therapy. Participants also set individual goals, list their personal issues, and complete a pre-test. Additionally, relaxation training is introduced to prepare participants for subsequent sessions.

#### Session 2: Understanding the Link Between Thoughts, Feelings, and Behaviors

The second session focuses on educating participants about the relationship between thoughts, emotions, and behaviors. Specific attention is given to self-directed thoughts and the symptoms of diabetes. Participants engage in cognitive restructuring exercises to help identify and modify maladaptive thoughts, enhancing their understanding of how thoughts can influence emotional and physical reactions.

#### Session 3: Teaching Cognitive Distortions

This session introduces participants to cognitive distortions that underlie self-defeating thoughts related to diabetes symptoms and related emotions. By identifying these cognitive distortions, participants learn to recognize irrational thoughts and begin the process of challenging them to reduce their negative impact on mental health.

#### Session 4: Pain Management Education

In the fourth session, participants are introduced to the theory of pain and engage in exercises for mental distraction

and baseline pain assessment. Muscle relaxation techniques and guided imagery are taught to help participants manage pain, focusing on how these strategies can be applied to alleviate discomfort associated with diabetes-related complications.

**Session 5: Addressing Performance Anxiety and Shame Related to Diabetes**

This session deals with performance anxiety and shame stemming from diabetes. It includes an explanation of the vicious cycle of anxiety, identifying trigger situations, extracting self-directed thoughts related to these triggers, and practicing anxiety management techniques. Participants also learn about cultural and social sources of shame related to diabetes symptoms and societal expectations of patient competency.

**Session 6: Anger Control and Assertive Behavior Training**

Participants are taught how to control anger and engage in assertive behaviors, alongside problem-solving skills and self-efficacy. The session covers the cognitive model of anger related to illness symptoms, cognitive-behavioral management of anger, assertive behavior training, and the relationship between self-efficacy, problem-solving skills, and managing diabetes symptoms.

**Session 7: Challenging Perfectionism and Social Approval**

The seventh session focuses on identifying and challenging irrational beliefs about social approval, normal versus abnormal behaviors, and unpredictable behaviors. It addresses coping with disapproval and challenges high, often unattainable standards (negative perfectionism) that can exacerbate stress and dissatisfaction with one's self-management of diabetes.

**Session 8: Termination of Therapy**

The final session discusses how to conclude therapy and addresses anxieties related to the end of the treatment. A post-test is conducted to assess progress, and arrangements are made for follow-up to ensure sustained benefits of the therapy and to monitor ongoing management of diabetes. Participants reflect on their experiences and plan for continued application of skills learned during the therapy sessions (16, 19-21).

**2.4. Data Analysis**

In the descriptive analysis of the data, statistical indices for each of the research variables were calculated. In the inferential statistics section, repeated measures analysis of variance and SPSS-22 software were used.

**3. Findings and Results**

The descriptive statistics for the research variables are reported in Table 1.

**Table 1**

*Central and Dispersion Indices of Research Variable Scores in the Experimental and Control Groups*

Variable	Group	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Follow-up Mean	Follow-up SD
Diabetes Self-Management	Cognitive-Behavioral	44.88	6.72	49.55	7.93	49.83	7.74
	Control	44.33	6.24	45.16	6.21	45.16	6.31
Anxiety (HbA1c)	Cognitive-Behavioral	7.22	1.09	6.68	1.01	6.64	1.02
	Control	7.16	0.84	7.11	0.85	7.11	0.85

Shapiro-Wilk test results indicated that the data distribution related to the research hypotheses is normal, and the assumption of data normality has been met. The Mauchly's test of sphericity showed significance for the variable of diabetes self-management, indicating that the

sphericity assumption (homogeneity of variances across measurements) has not been met (Mauchly's  $W = .19$ ;  $df = 2$ ;  $p < .001$ ). Therefore, the Greenhouse-Geisser test was used to examine the results of the univariate test for within-group effects and interaction effects.



**Table 2**

*Results of Multivariate Analysis of Variance*

Effect	Test Name	Value	F	df1	df2	Significance Level	Eta Squared
Time	Pillai's Trace	0.68	30.33	2	33	.001	.64
	Wilks' Lambda	0.35	30.33	2	33	.001	.64
	Hotelling's Trace	1.83	30.33	2	33	.001	.64
	Largest Root	1.83	30.33	2	33	.001	.64
Time*Group	Pillai's Trace	0.48	15.42	2	33	.001	.48
	Wilks' Lambda	0.51	15.42	2	33	.001	.48
	Hotelling's Trace	0.93	15.42	2	33	.001	.48
	Largest Root	0.93	15.42	2	33	.001	.48

As seen in Table 2, the significance levels of all tests are at .001, indicating that there are significant differences in the mean scores of cognitive-behavioral therapy's effectiveness in improving diabetes self-management. Notably, the Wilks' Lambda test with a value of .48 and an F-value of 15.42

shows significant differences between the scores of effectiveness in diabetes self-management in the experimental and control groups at a significance level of .001.

**Table 3**

*Repeated Measures Analysis of Variance for Comparing Pre-test, Post-test, and Follow-up of Diabetes Self-Management in Experimental and Control Groups*

Variable	Effect Source	Sum of Squares	df	Mean Square	F	Significance	Eta Squared
Diabetes Self-Management	Time	191.13	1.10	172.27	58.44	.001	.63
	Time*Group	95.01	1.10	85.64	29.05	.001	.46
	Group	277.12	1	277.12	11.98	.001	.22
Anxiety	Time	2.24	1.03	2.17	8.37	.006	.19
	Time*Group	1.54	1.03	1.49	5.75	.025	.14
	Group	54.13	1	54.13	6.86	.031	.18

Results in Table 3 indicate that the analysis of variance for the within-group factor (Time) is significant and also for the between-group factor. These results imply that considering the group effect, the time effect is also

significant independently. Additionally, the interaction between group and time is significant, with an effect size of .46. The Bonferroni post-hoc test was also used for pairwise comparisons between groups.

**Table 4**

*Results of Bonferroni Post-hoc Test for Comparing Diabetes Self-Management*

Variable	Group	Stage	Post-test Difference	Follow-up Difference
Diabetes Self-Management	Cognitive-Behavioral	Pre-test	-4.67*	-4.95*
		Post-test	-	0.28-
	Control	Pre-test	-0.83	-0.70
		Post-test	-	0.17
Anxiety	Cognitive-Behavioral	Pre-test	0.54*	0.58*
		Post-test	-	0.04
	Control	Pre-test	0.01	0.01
		Post-test	-	0.03

Results in Table 4 show that the mean diabetes self-management in the experimental group at the post-test stage

is higher than in the control group, indicating a high effectiveness of cognitive-behavioral therapy on improving

diabetes self-management. Also, these results demonstrate that diabetes self-management in the follow-up stage in the cognitive-behavioral therapy group remains stable compared to the control group. The mean anxiety in the experimental group at the post-test stage is lower than in the control group, indicating a high effectiveness of the experimental group on reducing anxiety. Additionally, these results indicate that anxiety in the follow-up stage in the experimental group remains stable compared to the control group.

#### 4. Discussion and Conclusion

The purpose of the current research was to determine the effectiveness of cognitive-behavioral lifestyle improvement training on self-care and anxiety in women with diabetes.

One effective method for managing diabetes is cognitive-behavioral lifestyle improvement training for women with diabetes. This training provides useful information and necessary skills, helping women with diabetes improve their self-care and derive the most benefit from therapeutic interventions (22). One advantage of cognitive-behavioral lifestyle improvement training for women with diabetes is better anxiety management. By changing their diet, managing medication intake, engaging in regular exercise, and controlling stress, women can maintain their anxiety within the desired range. This leads to improved diabetes control and a reduction in disease complications. Additionally, the training helps women with diabetes improve their dietary patterns. By consuming healthy and controlled foods, they can maintain a proper diet, which includes an appropriate amount of carbohydrates, healthy fats, and fruits and vegetables. These changes in dietary patterns can help improve blood test outcomes and reduce complications associated with diabetes. Furthermore, training in regular exercise helps women with diabetes incorporate physical activity into their daily routine. Regular exercise aids in anxiety control, weight reduction, increased energy, and improved cardiovascular function. This not only helps improve physical indices but also enhances the morale of women (23).

Moreover, in explaining the effectiveness of cognitive-behavioral lifestyle improvement training on anxiety in women with diabetes, it can be said that this type of training includes teaching stress management skills, changing unhealthy behaviors, and fostering positive approaches. This

training helps women with diabetes become familiar with factors affecting anxiety and healthy lifestyles, enabling them to make necessary changes in their lives (23). Given the studies conducted, cognitive-behavioral lifestyle improvement training can help reduce anxiety in women with diabetes. This training allows women with diabetes to become better acquainted with factors affecting anxiety and to change their unhealthy behaviors (19-21, 23). A limitation of the research could relate to the selection of samples. It would be better for the samples to be randomly selected from the population of women with diabetes to ensure that the results are generalizable.

#### Authors' Contributions

M.A. conceptualized and designed the study, supervised the data collection, and oversaw the implementation of the cognitive-behavioral lifestyle improvement training sessions. N.T., the corresponding author, led the data analysis, interpreted the results, and was primarily responsible for drafting and revising the manuscript. M.A. contributed to the recruitment of participants, facilitated the training sessions, and assisted in the initial analysis. L.T. supported the data collection process, helped with literature review, and participated in manuscript preparation. All authors collaboratively discussed the findings, critically reviewed the manuscript for important intellectual content, and approved the final version for publication.

#### Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

#### Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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#### Declaration of Interest

The authors report no conflict of interest.

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## Ethics Considerations

The study placed a high emphasis on ethical considerations. Informed consent obtained from all participants, ensuring they are fully aware of the nature of the study and their role in it. Confidentiality strictly maintained, with data anonymized to protect individual privacy. The study adhered to the ethical guidelines for research with human subjects as outlined in the Declaration of Helsinki.

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