



Original Article

# The effectiveness of behavioral activation training on self-care behaviors, perceived pain, and reaction to stress in women with diabetes mellitus type 2

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## Abstract

**Introduction:** Regarding the high prevalence of adverse complications of diabetes and the importance of psychological intervention to improve self-care behaviors and adaptive coping styles in diabetic patients, the present study aimed to assess the effectiveness of behavioral activation training on self-care behaviors, perceived pain, and reaction to stress in women with diabetes mellitus type 2.

**Materials and Methods:** The statistical population comprises all women with type 2 diabetes who referred to Neishabour health centers. Thirty women were selected based on a voluntary and convenient sampling method. They were divided randomly into the behavioral activation training group and a control group. They fulfilled the Summary of Diabetes Self-Care Activities, Visual Analog Scale (VAS), and Coping Inventory for Stressful Situations (CISS). We analyzed the data using the descriptive statistics, multivariate covariance analysis test, and SPSS-22 software.

**Results:** The results revealed that behavioral activation training improved self-care behaviors ( $P= 0.001$ ), decreased pain ( $P= 0.001$ ), increased problem-solving oriented coping to stress ( $P= 0.001$ ), while it decreased emotion-oriented and avoidant-oriented coping styles ( $P= 0.001$ ,  $P= 0.001$ , respectively) in the experimental group compared to the control group.

**Conclusion:** It seems that behavioral activation training improves self-care behaviors, decreases pain, and increases problem-solving-oriented coping to stress in women with type 2 diabetes.

**Keywords:** Behavioral activation, Coping, Diabetes type 2, Neuropathic pain, Self-care behaviors

## Please cite this paper as:

Nakhaei N, Amiri M, Ziaee M. The effectiveness of behavioral activation training on self-care behaviors, perceived pain, and reaction to stress in women with diabetes mellitus type 2. *Journal of Fundamentals of Mental Health* 2023 Nov-Dec; 25(6): 395-401. DOI: 10.22038/JFMH.2023.23768

## Introduction

The prevalence rate of diabetes mellitus type 2 is increasing rapidly worldwide; therefore, the consequences of this metabolic disease will be increased (1). Although the higher prevalence rate is observed in elderly people aged 65-80

years (2), the incidence rate of onset of diabetes in the younger population can increase the complications and morbidities related to this disease dramatically (3). In Iran, the prevalence of type 2 diabetes in the population aged 25-65 years is 13.2% (4). Type 2 diabetes is caused by

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Received: Jun. 15, 2023

Accepted: Oct. 05, 2023

insulin insensitivity due to insulin tolerance (5), so glucose regulation is an effective recommendation for diabetic patients (6). Based on the evidence, most diabetic patients have inadequate glycemic control, and they are not aware of their conditions (7). On the other hand, poor glycemic control leads to harm complications (8), including heart disease, stroke (9), neuropathies (10), kidney failure (11), ulcers in feet (12), and damage to the eyes (13). Neuropathic pain is a complex complication of diabetes, and 50% of diabetic patients suffer from neuropathic pain despite different medical treatments (14).

Diabetes diagnosis is a stressful condition for patients in physical and psychological aspects (15). So, using the proper coping strategies is an important factor in improving mental health and physical conditions in diabetic patients (16,17). Based on the evidence, patients with chronic illnesses who use more problem-solving coping strategies have better physical condition and higher health-related quality of life than others who use more emotional coping strategies (18).

Behavioral Activation Therapy (BAT) is derived from the third wave of psychotherapy (19). It focuses on problem-solving and helps people recognize their avoidant coping styles and alternate them with adaptive ones (20). In addition to mental problems, this treatment was used in conditions with chronic pain (21) and physical illnesses such as multiple sclerosis (22), diabetes (23), hypertension (24), and obesity (25). So, regarding the high prevalence of adverse complications of diabetes in our country and the importance of psychological intervention to improve self-care behaviors and adaptive coping styles in diabetic patients, the present study aimed to assess the effectiveness of behavioral activation training on self-care behaviors, perceived pain, and reaction to stress in women with diabetes mellitus type 2.

## Materials and Methods

The present study was approved by Branch of Neishabour, Islamic Azad University. The statistical population of this research consists of all women with type 2 diabetes who referred to Neishabour health centers, who lived in the city of Neishabour, and who had files in these centers, which consisted of 127 people. Thirty women with type 2 diabetes who referred to health centers 10, 4, and 2 were selected based on voluntary and convenient sampling methods.

They were divided randomly into the experimental group and the control group.

Inclusion criteria included willingness and informed consent to participate in the research, having a file in the health center, and at least six months since they received the diagnosis of type 2 diabetes.

The exclusion criteria included unwillingness to continue cooperation in any phase of the study, experiencing an unfortunate incident or extreme stress during treatment sessions (such as the death of a first-degree relative or hospitalization), or absence of more than two sessions in training sessions.

## Research instruments

*A) Summary of Diabetes Self-Care Activities:* This questionnaire has 15 questions and evaluates self-care quality during the past seven days. The questions are related to food regimen (5 questions), exercise (2 questions), control of blood sugar (5 questions), foot care (4 questions), smoking (1 question), and regular taking of medicines (1 question). The questions are scored 0 and 1 based on self-care each day of the week (except the question on smoking, which scored 0 to 1). So, the total score is in the range of 0 to 99. The scores 0-33 indicate poor self-care, 34-67 indicate medium self-care, and the scores higher than 67 indicate good self-care (26). This questionnaire has good psychometric properties in Iranian populations (27).

*B) Visual Analog Scale (VAS):* It is a simple and commonly used method to evaluate changes in pain intensity. Different studies have proven its validity and reliability for evaluating acute and chronic pain (28-30). On this scale, people were asked to show pain intensity on a ruler ten horizontal or vertical centimeters (a zero score indicates the absence of pain, and a score of ten indicates the most severe pain the patient can imagine) (31).

*C) Coping Inventory for Stressful Situations (CISS):* Endler and Parker (1990) developed this questionnaire to evaluate various coping methods in stressful situations. This test has 48 five-choice Likert questions ranging from never (1) to always (5). Each of the 16 questions is related to one of the coping dimensions. 1) Dealing with the problem or actively dealing with the problem to manage and solve it, 2) Emotion-oriented coping or focusing on emotional responses to the problem, and 3) Avoidant coping or running away from the problem (32). In the main scale of Endler and

Parker, the total internal consistency coefficient was reported as 0.92 (33). In Iran, Ghoreyshirad reported the Cronbach alpha for a total scale equal to 0.84 (34).

After obtaining the necessary permits and coordinating with the health centers, the diabetic patients were selected. Regarding ethical considerations, written and verbal consent was obtained from all participants. Treatment sessions were held in 8 sessions. Also, behavioral activation training sessions were held for the control group after this study.

In this research, behavioral activation training based on the protocol of Gollon et al. (2003) was conducted on the experimental group of type 2 diabetic patients during eight sessions of 120 minutes (35). The content of the sessions is below:

First session: At the beginning of the introduction session, the psychologist established a relationship with the patients, presented the rationale (self-introduction, meeting time, number of sessions, group membership rules), gave a sheet (group rules, description of the group framework, confidentiality), introduced diabetes, types of diabetes, and symptoms, then the pre-test was carried out.

Second session: In this session, while welcoming the patients of the experimental group, the behaviors that lead to diabetes, the factors that initiate and sustain diabetes were explained, and activation strategies to increase self-care in diabetes, i.e., healthy diet, engaging in physical activities, adherence to medication regimen and their role in blood sugar were mentioned. Finally, completing the daily activity table was considered the next week assignment.

Third session: The task of the previous session was discussed, and each person shared her experience with others about their self-care behaviors. Then, what is stress? What are the physical, psychological, emotional, and cognitive symptoms of stress? The relationship between stress and depression and finding the times that create the highest degree of stress, how to react to stress, and the type of coping were explained. The group members were asked to remember the stressful situations they experienced last week and write their reactions. The people's avoidance and active coping strategies in dealing with stress were discussed. Finally, as an assignment, people were asked to substitute a different response instead of avoidance in the next week and more effectively

and actively to deal with the stressful situations they face.

Fourth Session: Examining assignment one, one of the members talked about a new proactive method that was adopted in a stressful situation. Investigating the effect of reinforcing effective behavior and how to eliminate or reduce stressful behavior, after providing explanations about the relationship between enjoyable activities and their achievement with mood, they were asked to rate their activities based on how much they feel pleasure or skill in at the end of the meeting; the members were asked to choose at least two activities and commit to doing them according to a specific pattern.

Fifth session: The task review discussed planning enjoyable activities and their relationship with mood. It was discussed about what self-care is. How does it make a person feel? Each of the members gave an example of enjoyable activities for self-care. At the end of the meeting, the members were asked to do at least one activity every day as a task for the next meeting. Take care of yourself and write down your feelings before and after doing the work.

Sixth session: First, the previous assignment was addressed, and the members stated their experiences; then, the members discussed how they could make changes in their interpersonal relationships that lead to improved mood, and the importance of having social support was emphasized.

Then, as an exercise, the members were asked to record their social relationships in their personal lives on a special sheet for intimacy with others and to take action and plan to increase social support in their environment.

Seventh session: First, the assignments about the complications of diabetes, pains, and pain control by reducing blood sugar using lifestyle modification and increasing self-care activities, using more effective coping strategies in response to stress, and increasing beneficial and enjoyable activities in daily life were explained. The members were asked to think about the continuation of the benefits of treatment and planning for possible relapses and to express their coping plan. Eighth session: The topics mentioned in different meetings were summarized in this meeting, and the members' questions were answered. The importance of continuing this process to increase self-care and the correct reaction in stressful situations to improve their illness was emphasized. At the end of the meeting, a post-test was conducted.

We used the descriptive statistics, multivariate covariance analysis test, and SPSS-22 software to analyze the data.

**Results**

In the present study, 30 women with type 2 diabetes participated. Regarding demographic

variables, most had diplomas and were aged 45-50. In terms of duration of diabetes, the majority of the experimental group had diabetes for 5-7 years, while the majority of the controls had diabetes for more than nine years. The descriptive statistics of the experimental and control groups are presented in Table 1.

**Table 1.** The scores of self-care behaviors, pain, and coping with stress in the pre-test and post-test stages

Variable	Stage	Experimental group (M ± SD)	Control group(M ± SD)
Self-care behaviors	Pre-test	36.86 ± 12.13	28.80 ± 8.13
	Post-test	43.93 ± 12.10	28.60 ± 8.20
Pain	Pre-test	5.13 ± 3.33	6.66 ± 2.89
	Post-test	3.73 ± 3.08	6.53 ± 2.87
Coping with stress			
Problem-oriented	Pre-test	46.40 ± 8.33	45.26 ± 7.51
	Post-test	50.66 ± 8.03	44.13 ± 7.31
Emotion-oriented	Pre-test	47.93 ± 9.73	46.00 ± 9.89
	Post-test	43.13 ± 9.99	48.33 ± 8.36
Avoidant-oriented	Pre-test	46.66 ± 10.44	39.60 ± 9.05
	Post-test	42.06 ± 10.41	40.40 ± 9.53

Based on the results, in the experimental group, the scores of self-care behaviors and problem-oriented strategies were improved, and the scores of pain, emotion-oriented, and avoidant-oriented strategies were decreased after intervention. In contrast, the scores of these variables did not change significantly in the control group. To assess the effect of the intervention, we assessed the normality of the

variables through the Kolmogorov-Smirnov test. The findings indicated that all variables had normal distribution ( $P > 0.05$ ). Also, the results of Levene's test and Box's M test showed the homogeneity of the variances ( $P > 0.05$ ) and equality of the matrix of covariance ( $P = 0.483$ ). Table 2 presents the multivariable covariance analysis to assess the effect of behavioral activation on dependent variables.

**Table 2.** The results related to the multivariable covariance analysis to assess the effect of behavioral activation

Test	Amount	Presumed degree freedom	Error degree freedom	F statistic	P
Pillai's effect	0.898	5	19	33.369	0.000
Wilks-Lambda	0.102	5	19	33.369	0.000
Hotelling's effect	8.781	5	19	33.369	0.000
The greatest Roy's root	8.781	5	19	33.369	0.000

Based on the results of Table 2, there are significant differences between the experimental and control groups in the studied

variables. Tables 3-5 present the covariance analysis in self-care behaviors, pain, and coping with stress after the intervention.

**Table 3.** The covariance analysis of self-care behaviors in the post-test stage

Statistical indexes	Sum of squares	Freedom degree	Mean of squares	F	P
Group	364.74	1	364.74	51.20	0.001
Error	192.34	27	7.124		
Total	44216	30			
Corrected total	4757.86	29			

Also, the above table and the adjusted means of self-behaviors in the experimental group and the control group (40.02 in the experimental

group versus 32.50 in the control group) indicated the effectiveness of the intervention on self-behaviors.

**Table 4.** The covariance analysis of pain in the post-test stage

Statistical indexes	Sum of squares	Freedom degree	Mean of squares	F	P	Eta square
Group	13.165	1	13.165	34.971	0.001	0.564
Error	10.164	27	0.376			
Total	1098	30				
Corrected total	307.467	29				

Regarding the above table, the adjusted means of pain in the experimental group and the control group (4.45 in the experimental group

versus 5.81 in the control group) indicated the effectiveness of the intervention on pain severity.

**Table 5.** The covariance analysis of coping with stress in the post-test stage

Variable	Statistical indexes	Sum of squares	Freedom degree	Mean of squares	F	P	Eta square
Problem-oriented	Group	223.565	1	223.565	52.479	0.001	0.66
Emotion-oriented	Group	2148.474	1	2148.474	41.687	0.001	0.60
Avoidant-oriented	Group	180.160	1	180.160	20.225	0.001	0.42

Also, regarding the above table and the adjusted means of problem-oriented coping (50.137 in the experimental group versus 44.663 in the control group), emotion-oriented coping (42.271 in the experimental group versus 49.196 in the control group), and avoidant-oriented coping (38.610 in the experimental group versus 43.850 in the control group) indicated the effectiveness of the intervention on coping to stress in diabetic women.

**Discussion**

In the present study, we assessed the effectiveness of behavioral activation training on self-care behaviors, perceived pain, and reaction to stress in 30 women with type 2 diabetes mellitus. The results revealed that Behavioral Activation (BA) training improved self-care behaviors, decreased pain, and increased problem-solving-oriented coping to stress in the experimental group compared to the control group. In this line, the results of a study on 24 elderly people in Tehran indicated that eight sessions of behavioral activation intervention increase self-care behaviors and life expectancy in elderly adults (36). These findings support our results about BA effectiveness in improving self-care behaviors and reducing complications of chronic diseases in patients.

In a study by Winters et al. in the United States on adherence to regular ophthalmic evaluations in 206 old African-American patients with diabetes using behavioral activation or supportive therapy, the results indicated that behavioral activation is more cost-effective than

supportive therapy (37). This finding supported the effectiveness of BA in more self-care behaviors in diabetic patients.

Also, Almutairi et al. conducted a systematic review to assess the effect of patient activation intervention on glycemic control and self-care behaviors in patients with type 2 diabetes. The results of 10 clinical trials (number of patients 3728) indicated that BA positively impacts glycemic control and self-care behaviors, especially physical activity, diet, foot care, and self-monitoring of blood glucose (38). These findings are consistent with the present study.

In our study, behavioral activation training decreased self-reported pain severity in women with diabetes. In a systematic review by Walsh et al. in 2022, they assessed 15 articles in North America and Canada that used BA to manage chronic pain in 3 to 12 sessions. Walsh et al. concluded that BA can decrease pain in most studied articles, and the patients in these articles have reduced or were less impacted by pain after BA intervention (39). This finding supports our result about the effectiveness of BA on diabetic patients who experienced chronic neuropathic pain.

In addition, we concluded that BA improves problem-oriented coping to stress and decreases emotion-oriented and avoidant-oriented coping styles in diabetic women. In this line, Tajipour and Abbasi Motlagh studied the effectiveness of BA (8 ninety-minute session) on coping strategies in 30 female university students with generalized anxiety disorder in Khorram Abad city-Iran through Lazarus and Folkman coping strategies questionnaire. They concluded that

BA significantly decreases emotion-oriented coping while it increases problem-oriented coping to stress in patients with generalized anxiety disorder (40). Regarding the psychological symptoms of anxiety, depression, and stress in patients with chronic illnesses such as diabetes, this finding is consistent with our study. The present study has some limitations, such as limited patients to one city, a lack of evaluating psychological conditions of these patients, and a lack of conducting laboratory tests such as HbA1c and measuring body mass index to assess the exact impact of the intervention on glycemic control or food diets, and lack of follow-ups to assess the persistency of the intervention. It is recommended that future studies be conducted on wider geographical areas and consider laboratory tests or follow-ups.

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### Conclusion

Overall, behavioral activation training improves self-care behaviors, decreases pain, and increases problem-solving-oriented coping to stress in women with type 2 diabetes. So, healthcare workers can use this intervention, especially in diabetic patients with poor adherence to self-care behaviors and patients who use more emotion-oriented coping to stress.

### Acknowledgments

This study resulted from a Master's dissertation and was approved by the Branch of Neishabour, Islamic Azad University. The authors thank all patients who participated. The authors declare no conflict of interest or financial support.

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