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Effects of Self-Care Training Combined with Stress Management on Treatment Adherence in Type 2 Diabetes People

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Abstract

Objective: Diabetes is a chronic metabolic disorder that can be exacerbated by stress, poor compliance and self-care practices. This study investigated the effects of self-care training combined with stress management on treatment adherence in type 2 diabetes mellitus (T2DM) people.

Materials and Methods: This is a randomized clinical trial with repeated measures. The study sample included 30 T2DM who were purposively selected among the eligible members of the Kerman Diabetes Association. The participants were randomized to the experimental group (stress management based on cognitive-behavioral therapy and self-care training) (n=15) and the control group (no intervention) (n=15). Both groups completed the Medanlo Treatment Adherence Questionnaire at the pretest, posttest, and follow-up time points. Data were analyzed statistically using ANOVA.

Results: The post-test and follow-up mean scores of treatment adherence significantly increased in the experimental group compared with the control group ($P< 0.001$). In addition, the results demonstrated that treatment adherence improved in follow-up ($P< 0.001$).

Conclusion: According to the study results, psychological training should be integrated with self-care training to achieve long lasting treatment adherence in T2DM people.

Keywords: Treatment adherence, Self-care, Stress, Diabetes mellitus

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Introduction

Diabetes is a chronic metabolic disorder that requires lifelong treatment (1,2). The prevalence of diabetes has reached epidemic proportions in the 21st century, impacting approximately one in every eleven individuals globally (3). It has been suggested that patients with type II diabetes mellitus (T2DM) are directly responsible for 95% of disease management practices (4). Individuals with diabetes require adequate psychological and self-care instruction to manage the stress and anxiety associated with this condition (5). Improving the lifestyle and quality of life of diabetics and providing them with training on effective self-care practices can aid in controlling the disorder, enhancing their stress management abilities, and promoting their overall health (6). Improved self-care practices are associated with reduced stress. Lower stress, in turn, can affect the self-care quality of patients. Because stress can increase or fluctuate blood sugar levels, stress reduction can benefit people with diabetes (7). Psychological empowerment of patients is critical in diabetes self-care and management (8). Studies have revealed that higher levels of diabetes self-care are significantly associated with reduced perceived stress (9,10).

Stress management is a critical aspect of diabetes treatment (11). Psychotherapy and medication are the most effective ways to control blood sugar levels and reduce stress. Psychotherapy plays a critical role in diabetic stress management because psychological stress is associated with poor blood sugar control and an increased risk of diabetes (12). Furthermore, diabetes self-care is a positive coping method for people suffering from the disease (13). Extending beyond blood sugar control, the benefits of diabetes self-care may also positively affect perceived stress (14). Diabetes self-care should include training in all five self-care fundamentals: medication adherence, dietary recommendations, increased physical activity, blood sugar self-control, and proper foot care (15,16).

The self-care training conducted in this study has effectively covered all five recommended areas (17). Patients with diabetes should be aware of the emotional challenges associated with diabetes and modify their behavior to cope with these psychological burdens. This can help them enhance and sustain their self-care and adherence to treatment (18). Cognitive-behavioral theory proposes that the way people think influences their behavioral choices (19,20). For example, when individuals with low self-control lose control over blood sugar and when dietary and medical diets are disrupted, cognitive distortions may lead to medical failure and despair. Consequently, they are more likely to discontinue treatment and exhibit poor adherence (21). Poor treatment adherence results in metabolic dysregulation, which confirms cognitive distortions and exacerbates pre-existing dysfunctional thoughts (22,23). Therefore, it seems that any diabetes treatment should focus on self-care practices, cognitive and behavioral interventions. Studies have shown that stress can mediate the relationship between cognitive distortions and treatment adherence (24-26).

The individuals with diabetes experience high stress levels because of diabetes-related beliefs and thoughts. Consequently, it is advisable to address their stress through a comprehensive approach that incorporates cognitive regulation of thoughts beside physical-physiological stress management techniques. Accordingly, this study aimed to investigate the effects of self-care training combined with stress management on treatment adherence in T2DM people.

Material and methods

Design and participants

A randomized clinical trial was conducted using repeated measures. The study population comprised all T2DM people aged 40-55 years who were members of the Kerman Diabetes Association in 2022-23. They were diagnosed

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by a specialist no less than three years ago. Given an alpha of 0.05, the effect size of 0.50, and a test power of 0.80, the sample size in each group was computed to be n=15. Therefore, a minimum of 15 eligible T2DM people were selected for each group through purposive sampling (Figure 1). The participants were divided into two experimental and control groups by simple randomization method. The inclusion criteria were: the history of diabetes for at least three years, the secondary school degree or higher, the absence of acute or chronic mental disorders, and not taking psychiatric drugs. Exclusion criteria included missing more than two training/therapeutic sessions, reluctance to continue the study, and the development of acute medical or psychiatric disorders.

Procedure

First, all participants completed the Treatment Adherence Questionnaire as the pretest. Participants in the experimental group received a self-care intervention combined with stress management based on the cognitive-behavioral approach, whereas those

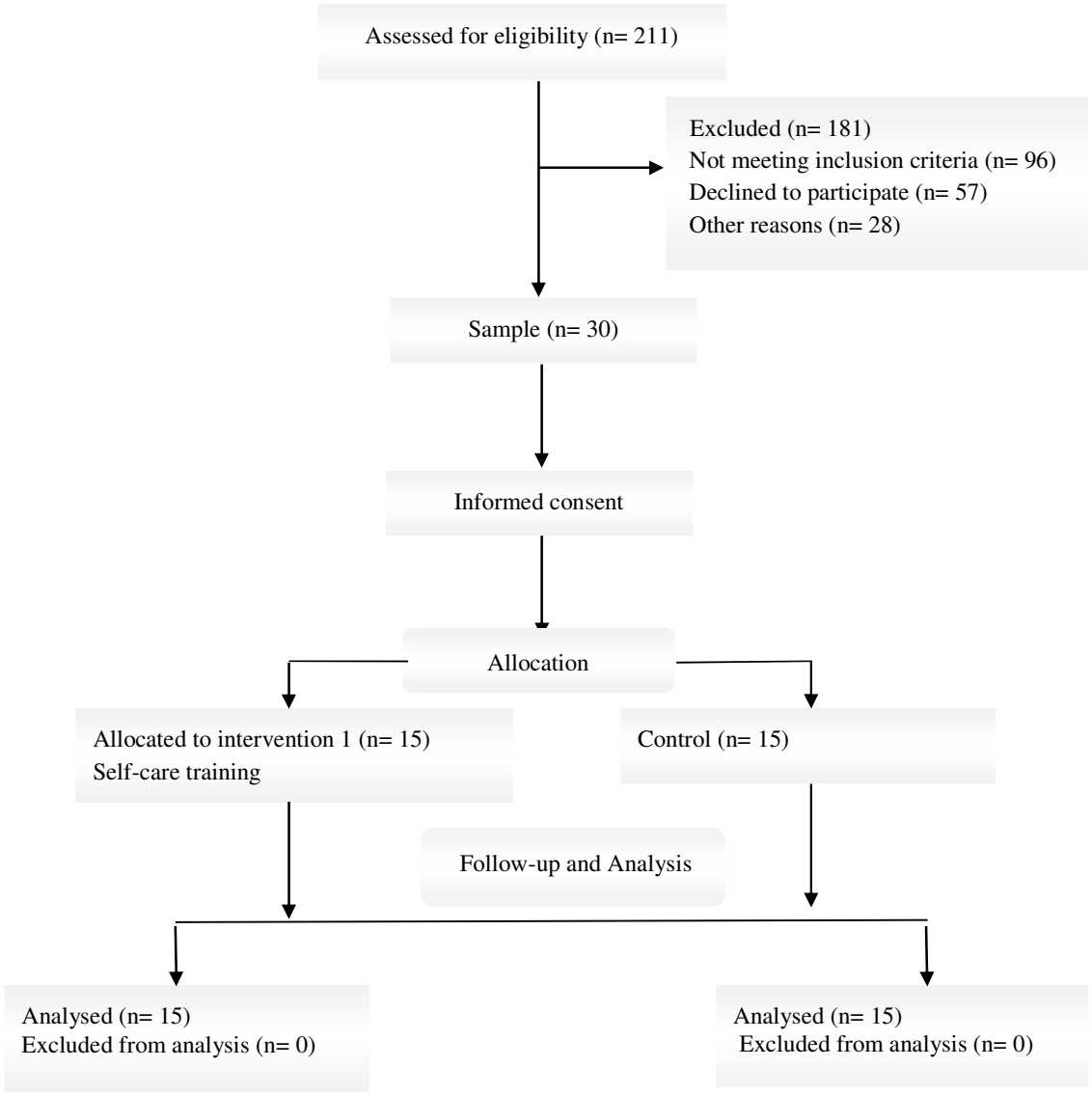

Figure 1. CONSORT flow diagram

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in the control group received no intervention. Participants of both groups completed the questionnaire once more in the last session of the intervention (as the post-test) and two months later (as the follow-up). To observe ethical principles, an informed consent form was obtained from all participants. They were also assured that their personal information would be kept confidential and that they could leave the study whenever desired.

Measurement tool

Adherence Questionnaire

Seyed Fatemi et al. (27) developed and conducted a psychometric evaluation of the Treatment Adherence Questionnaire. This questionnaire consists of 40 items scored on a 6-point Likert scale, with higher scores indicating a higher level of treatment adherence. The questionnaire results are interpreted by converting the obtained score to a percentage and comparing it with the maximum and minimum scores. The degree of adherence to the treatment, as measured by the proportion of points ranging from weak to very good, can be used to evaluate overall treatment adherence. The reliability of the questionnaire was reported 0.92 using Cronbach's alpha (27).

Intervention

The self-care intervention, which incorporated stress management techniques based on the cognitive-behavioral approach, was implemented over eight 120-min group sessions. The sessions focused on general goals, strategies, and specific techniques. Moreover, the protocol was developed on the basis of practical guidelines for cognitive-behavioral stress management (28), diabetes self-care guidelines (29), and diabetes clinical guidelines (30). A summary of the intervention sessions is presented in Table 1.

Table 1. Summary of self-care intervention combined with stress management based on the cognitive-behavioral approach

Session	Description
1	Familiarity of members with one another and with the therapist; discussing the anticipated outcomes of participating in these meetings, such as explaining the nature of diabetes; explaining the relationship between diabetes and stress, the factors causing stress, and the role of stress in the onset, exacerbation, and persistence of diabetes; teaching progressive muscle relaxation; and providing an overview of the importance of diabetic self-care.
2	Introducing and elucidating the relationship between activation, cognition, behavior, and emotion; explaining feelings, methods for recognizing irrational thoughts, and processing errors; re-evaluating and challenging thoughts to change irrational thoughts; exercises in diaphragmatic breathing; establishing the importance of blood sugar control and various blood sugar control methods; frequent blood sugar measurement training and blood sugar testing with a blood measuring device; answering participant questions and distributing worksheets and pamphlets from the second session; and assigning homework.
3	Reviewing the content of previous sessions; explaining erroneous thinking and negative spontaneous thoughts; teaching cognitive restructuring through mindful sitting with breathing awareness (sitting meditation and mantra meditation); instruction in problem-solving techniques; explaining the chronic complications of diabetes; explaining how insulin works in the body and how to properly inject it; and defining the importance of treatment adherence.
4	Investigating the impact of pleasant and unpleasant events on feelings, thoughts, and bodily sensations; anger management training; relaxation and guided imagery training; developing adaptive coping strategies; explaining the complications of hypoglycemia and hyperglycemia; explaining diabetic kidney, eye, leg, and neuropathy problems; and making diabetic kidney, eye, and foot care recommendations.
5	Performing behavioral tests to evaluate acquired knowledge and strategies; reintroducing mindful sitting (being aware of one's breath, body, sounds, and thoughts); explaining stress and identifying participants' stress reactions; education that occurs naturally; exercise and physical activity guidelines for people with diabetes; and recommending diabetic patients who also have comorbidities, such as hypertension.
6	Fostering communication skills, courage, self-expression, and social support; physical relaxation; active responsibility sitting meditation (mind presence from sounds and thoughts); and making dietary recommendations for people with diabetes.
7	Time management training; relaxation and guided imagery; making a list of enjoyable activities; and explaining the COVID-19 pandemic recommendations for people with diabetes (to prevent infection, while infected, and after recovery).
8	Training in sleep hygiene, revising the overall program, examining and debating the programs, and incorporating exercise into daily life. Participants were provided with a blood pressure measuring device and a booklet on diabetic self-care. Posttest.

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Data analysis

The Shapiro- Wilk test examined the normal distribution of data, and Levene's test investigated the equality of variances. After these assumptions were established, repeated measures ANOVA using SPSS-27 was employed to analyze the research data.

Ethical considerations

The study protocol was approved (cod: IR.UT.PSYEDU.REC.1400.078) by the Ethics Committee of Tehran University.

Number of Clinical Trial information is: IRCT20211214053413N1

Results

Table 2 displays the results of the paired T-test and chi-square test (2) used to examine participants in terms of age and gender.

According to the findings, the groups were matched in terms of age and gender. Table 3 presents the descriptive statistics for treatment adherence scores per group and time point. The distribution of treatment adherence scores in the pretest, posttest, and follow-up stages was normal for both groups, according to the Shapiro- Wilk test results. Box's M test results were also employed to test and confirm the homogeneity of correlations. Levene's test results confirmed the equality of error variances in the pretest, posttest, and follow-up. Furthermore, the variance- covariance matrix's sphericity assumption was valid on the basis of Mauchly's sphericity test results.

According to the ANOVA results, changes in treatment adherence were dependent on the interaction between time and group ($P<$ 0.001). The effect of time was larger ($\eta^2=$ 0.45). To test the stability of the intervention effects, the modified Bonferroni's test (pairwise comparison) was performed to compare the mean scores of treatment adherence across the time points. The study findings suggest that there was a significant increase in treatment adherence mean scores during the posttest and follow-up periods compared with the pretest scores ($P<$ 0.001). However, there was no significant difference between the posttest and follow-up mean scores. This means that the increased treatment adherence in the posttest stage remained stable until the follow-up stage.

Discussion

This study investigated the effects of self-care training combined with stress management on treatment adherence in patients with type II diabetes. The study findings showed that treatment adherence increased after the intervention and remained stable until the follow-up stage. This finding is consistent with the results of previous studies (5,10). Stress is considered a major contributor to the development of many diseases and impairing mental health. Everyday life stressors can also disturb blood sugar levels in people with diabetes (13). Participating in cognitive-behavioral stress management training courses can lead to the reconstruction of an individual's cognitions and beliefs regarding diabetes. In addition, it can strengthen positive and hopeful beliefs while

Table 2. Demographic variables of patients with type 2 diabetes

Groups	Age (year)	Gender	
		Male	Female
Experimental group	42.53 (± 8.97)	2 (13.30%)	4 (26.70%)
Control group	44.67 (± 8.15)	4 (86.70%)	11 (73.30%)
***P*-value**	0.177	0.639	

Table 3. Mean ± SD of treatment adherence in the experimental and control groups

Variable	Phases	Experimental group Mean (± SD)	Control group Mean (± SD)
Treatment adherence	**Pretest**	111.93 (± 13.77)	119.07 (± 14.27)
	Posttest	123.87 (± 12.15)	120.33 (± 13.04)
	Follow-up	123.40 (± 12.09)	120.53 (± 15.15)
	***P*-value**	0.022	0.788

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reducing stress levels in patients (14). Diabetes is a chronic debilitating disease that can induce anxiety and depression (31). Cognitive-behavioral therapy uses cognitive restructuring techniques to assist patients in directly confronting disturbing thoughts. It also helps them evaluate the evidence and determine whether negative thoughts are valid while comparing them with alternative interpretations. Patients learn to overcome their anxiety using exposure techniques through role-playing (26). The findings of this study and previous ones studies highlighted the importance of using cognitive-behavioral stress management to improve treatment adherence in patients with diabetes.

The combination of self-care treatment and stress management instructs individuals on how to handle daily stressors, cultivate a positive self-image, and have confidence in their ability to manage life's challenges (7). The success of cognitive-behavioral therapy lies in its emphasis on identifying cognitive errors in individuals and attempting to inform them of such errors. Because this process of identification and awareness of thoughts cannot be achieved through drug therapy, cognitive-behavioral treatments must be prioritized (18). Psychological interventions, such as cognitive-behavioral therapy strategies, can help manage stress in patients with diabetes. These interventions focus on modifying attributional styles, challenging irrational beliefs, relaxation, and coping skills. They not only alleviate negative emotional consequences but also increase patients' self-efficacies in diabetes management (20). Patients with diabetes receiving cognitive-behavioral therapy centered on stress management can learn about the root causes of their problems and effective coping mechanisms. This enhances treatment adherence. In fact, these therapies assist individuals in using their capacities and abilities to better withstand stressful situations and effectively manage their health.

Stress management is a set of techniques that help individuals more effectively control and manage their anxiety and reduce its negative effects on their lives. Self-care combined with stress management helps individuals learn to encourage themselves by overcoming each stressful step (14). Teaching social skills and courage also helps them improve their communication skills while empowering them to accept themselves, gain self-confidence, and focus less on their illness. The self-care treatment combined with stress management reduces anxiety and improves treatment adherence in patients with diabetes.

By changing the patient's beliefs about the incurability and uncontrollability of the disease, self-care treatment combined with stress management increases the patient's hope for recovery and highlights the significance of adhering to all treatment strategies (10). Patients can integrate the treatment into their lives and improve their ability to adapt to the symptoms of the disease and the treatment process. This can be achieved by identifying negative thoughts and cognitive distortions and replacing them with logical thoughts (7). In addition, patients can examine the dimensions of the disease and treatment in their lives and correct any wrong thoughts and behaviors. Dealing with patients' stress, correcting maladaptive beliefs, and providing practical coping skills tailored to diabetic patients' conditions will encourage them to be more committed to their treatment.

Similar to any other research project, this study faced some limitations. A limitation of this study was the small sample size. In this study, factors such as genetics, lifestyle, food patterns, and economic status were not considered. It is suggested to control these factors in future studies. Because this study was conducted on diabetic patients aged 40 to 55 years living in Kerman, Iran, further studies on larger samples are needed to add to the generalizability of these findings.

Conclusions

The study findings demonstrated that self-care training combined with cognitive-behavioral stress management significantly

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improved treatment adherence in patients with type-II diabetes. Because stress management and life skills training are known to be effective in reducing stress and anxiety symptoms, it may also be beneficial to train diabetic patients in such issues. Based on the study findings, it is recommended that psychological interventions, such as cognitive-behavioral therapy based on stress management, be included in treatment plans for diabetic patients to improve treatment adherence.

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Conflict of Interest

The authors declare that they have no conflicts of interest.

Authors' contributions

A. J: conceived and designed the analysis, collected the data, contributed data, performed the analysis and conceived of the presented idea.

R. P and A. A: contributed data or analysis tools and performed the analysis.

GhA. A: collected the data, prepared first drafts of the manuscript.

All authors have accepted responsibility for the entire content of this manuscript and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved and approved the version to be published.

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