



The Impact of a Mindfulness-Based Intervention on Type 2 Diabetes Patients' Empowerment

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Abstract

Introduction: Diabetes mellitus includes a group of common metabolic disorders with a diagnostic hyperglycemia phenotype. The global prevalence of diabetes mellitus has increased dramatically over the last two decades. Recognizing the psychological problems of these patients and eliminating or reducing them is an important part of the complete approach to the treatment of diabetes, and this is why, with psychotherapy, better findings can be achieved in blood glucose control. This study aimed to determine the effectiveness of a combined intervention based on mindfulness-based cognitive therapy and mindfulness-based Stress Reduction and on the empowerment of type 2 diabetes patients.

Methods: This study was performed as a pilot in 48 patients with type 2 diabetes, split into three groups with 16 members. Data collection was done through the Anderson Empowerment Questionnaire, which was designed for people with diabetes. Data were analyzed utilizing the statistical analysis of covariance (ANCOVA).

Results: The findings showed that the combined mindfulness-based intervention improves the management component of psychological aspects more than the mindfulness-based stress reduction intervention. Also, none of the interventions performed significantly improved the components of readiness and dissatisfaction for change, and the evaluation component of the achievement of diabetes control goals.

Conclusion: The combined use of mindfulness techniques is more effective for empowering people with diabetes.

Keywords: Type 2 diabetes, Mindfulness, Empowerment, Diabetes mellitus, Type 2

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Introduction

One of the most prevalent metabolic diseases that endangers a person's overall health is diabetes (1). Estimates show that the incidence of diabetes is 463 million, accounting for 9.3% of the global adult population in 2019, and will increase to 578 million (10.2%) by 2030 and to 700 million (10.9%) by 2045 (2). Moreover, the prevalence of diabetes in Iran indicates an increasing trend of 13.40% from 2018 to 2023, among other periods (3). About 95% of the diabetes prevalence in the world belongs to type 2 diabetes (4). This type of diabetes is one of the costliest diseases and has many complications (5). Diabetes, as the most common endocrine disorder, is one of the major problems in psychiatry (6); recognizing the psychological problems of patients with diabetes and eliminating or reducing them is an important part of the comprehensive treatment of diabetes (7). Also, psychotherapy can achieve better blood glucose control outcomes (8). On the other hand, significant

changes have taken place in managing and controlling this disease in recent years. Today, various prevention and participatory treatments have replaced therapeutic and medical approaches for dealing with patients and conditions. Patients play a decisive role in their health in a new treatment approach of patient empowerment with chronic disease (9,10). Empowerment is a positive idea that focuses on highlighting the potential and qualities of both chronic patients and people in general. There is no emphasis on shortcomings during the empowerment process, and people's abilities and encouragement are taken into account based on the opportunities in their living environment (11).

Three fundamental ideas are included in the empowerment process: responsibility, behavioral skills, and information and knowledge (9). Some people think that because diabetics' health would be greatly impacted by their decisions, they should practice self-care and accept



direct responsibility for their condition. According to some research, patient empowerment may improve the quality of life for people with diabetes by influencing management outcomes, including metabolic control of the disease (12).

Being mindful is a state of consciousness or awareness that results from focusing on the objective in the here and now without evaluating it moment by moment (13). Mindfulness-based therapies are one of the most widely used techniques in the mind-body medicine approach (14). The latest approach for treating diabetes is a mind-based approach (DaiMind). The two most common mindfulness-based therapies used in diabetic patients are mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR), while a newer approach for applying these types of interventions is using a combination of MBSR and MBCT has shown positive effects in reducing emotional distress and controlling glycosylated hemoglobin (HbA1C) levels in diabetic patients (15).

Mindfulness-based therapies emphasize the interaction between the brain, mind, body, behavior, and robust methods through which emotional, psychological, spiritual, social, and behavioral factors directly affect mental health and physical (14). According to Shapiro, the action mechanisms of mindfulness-based therapies are a crucial research area that can be considered in future studies on mindfulness (16). Since mindfulness means responsible responses rather than impulsive ones (17), it aligns with the empowerment process that empowers individuals to make health-related decisions and act responsibly at the same time (12). In contrast to the quasi-intervention and control groups, we sought to determine the impact of mindfulness-based combination therapy (MBSR and MBCT) on the empowerment of patients with type 2 diabetes.

Methods

This study employed a pre-test-post-test experimental design with a control group. All individuals referred to Kerman City's Diabetes Charity Center were included in the study population. The guidelines state that at least 15 participants is the ideal sample size for an experimental behavioral science study. Purposive sampling was used to choose 48 diabetic individuals based on their likelihood of recurrence. The criteria for entering the study were as follows: diagnosis of type 2 diabetes, lack of experience of diabetic coma, absence of amputation and amputation due to diabetes, not using psychological services six months before the intervention and during the intervention, the same amount of using the previous training of the association, not participating in yoga and meditation classes before the current intervention, not using psychiatric drugs, not suffering from severe psychiatric illness at the same time with diabetes, depression score at least 22 in Beck Depression Inventory questionnaire, informed consent for participating in the research. Exclusion criteria included withdrawal of consent, attendance percentage of fewer than 70% of the sessions, development of any new significant psychological or medical condition during the study period, or significant diabetic complications. To control for

confounding variables, strict inclusion/exclusion criteria were applied.

The sample group was randomly apportioned into three groups: intervention (MBSR, MBCT), quasi-intervention (MBSR), and control. Patients in the combined intervention group were trained according to the mindfulness-based cognitive therapy (MBCT) (18) and mindfulness-based stress reduction protocols (MBSR) (19) (Table 1). The quasi-intervention group was trained according to a mindfulness-based stress reduction protocol (MBSR) (19) (Table 2). And the control group used only the usual counselling services of the association. All sessions began with a group discussion about people's experiences of doing home exercises. Also, during each session, after the end of each exercise, the subject was asked about the experience of doing the exercises. Random assignment of participants to the three study groups further helped balance potential unmeasured confounders such as comorbid psychological conditions or previous meditation experience.

The research tool was an empowerment questionnaire developed by Anderson et al. The tool includes three subscales, which are managing the diabetes psychological aspects (9 questions), assessing readiness and dissatisfaction for change (9 questions), and setting the diabetes goals achievement (10 questions). A five-point Likert scale is used to rate the items (strongly agree = 5, agree = 4, no comment = 3, disagree = 2, severely disagree = 1), and the lowest and highest diabetic ability scores, which range from 28 to 140, can be computed (11). The reliability and validity of this tool have been confirmed in our country (20).

Statistical analyses were conducted using SPSS version 22 (IBM Corp., Armonk, NY, USA). Before hypothesis testing, the normality of data distribution was assessed using the Shapiro-Wilk test. The results indicated that the assumptions of normality were met for all variables. Descriptive statistics, including means $\pm$ standard deviations (SD), were employed to outline demographic and baseline characteristics. To evaluate the effectiveness of interventions, covariance analysis (ANCOVA) was used, adjusting for pre-test scores as covariates to control for baseline differences among the groups. The intervention group (MBSR+MBCT), quasi-intervention group (MBSR only), and control group were compared across three empowerment dimensions: managing dissatisfaction and readiness for change, psychological aspects of diabetes, and achievement of diabetes goals. Statistical significance level was considered at $P < 0.05$. Partial eta squared (η^2) was used to report effect sizes, which show the percentage of variance explained by group membership.

Results

The study comprised 44 female patients with diabetes, whose mean age was 48 years (48 ± 7.86). Of these, 17 patients (39.5%) had a diploma, 23 (53.5%) had a master's degree, and 4 (7%) had a bachelor's degree. Thirty-nine patients (90.7%) and 4 (9.3%) were housewives and retired employees, respectively. Twenty-three patients (53.5%), 16 patients (37.2%), and 4 patients were between 1 and 10

Table 1. Mindfulness-Based Cognitive Therapy (MBCT) and Mindfulness-Based Stress Reduction (MBSR)

Content/ Activities	First Session	Second Session	Third Session	Fourth Session	Fifth Session	Sixth Session	Seventh Session	Eighth Session
Introduction & Group Discussion	Introduce group members, overview of 8 weeks, group discussion on diabetes, management, outcomes, and psychological aspects	Review the previous week's exercises, challenges in practice, and coping with restlessness/distraction	Review of home practice, discussion of mindful seeing/hearing	Review of meditation/homework	Breathing meditation with 4 focuses, discussion on "accepting reality."	Discussion on the best ways to take care of ourselves	Review of body exercise and experiences	Evaluation of training, reflection on learning, and feedback
Core Mindfulness Exercises	Raisin exercise, Body Scan (35 min)	Sitting meditation (focus on breathing), Thoughts & feelings exercise	Sitting meditation (breath + sensations), 3-min breathing space, mindful body movements	Sitting meditation with 4 focuses, mindful walking	Sitting meditation with 4 focuses + open awareness, "separate creations" practice, 1-hour meditation	Sitting meditation with 4 focuses + open awareness, 3-min breathing space, Loving-kindness meditation	Body review, 3-min breathing space	Story reading ("Five Chapters"), mindfulness reflection
Home Practice	Body scan (5x/week), mindful daily activity (handwashing, eating, brushing teeth)	Awareness of pleasant events, sitting meditation, body scan, and daily mindfulness	Sitting meditation, body scan, mindful movement, 3-min breathing space, unpleasant event awareness	Meditation, mindful movement, 3-min breathing space (during unpleasant events)	Daily mindful task (new activity), breathing exercises, 3-min breathing space	Meditation of choice, mindful daily task (new activity), 3-min breathing space during unpleasant events	Self-reflection on skills learned, continued practice encouraged	Resources for continuation (books, yoga, exercises)

Table 2. Mindfulness-Based Stress Reduction Intervention (MBSR)

Content/ Activities	First Session	Second Session	Third Session	Fourth Session	Fifth Session	Sixth Session	Seventh Session	Eighth Session
Main Practices	Raisin Eating Practice, Breathing Practice	Breathing Exercise, Body Review Exercise	Body Review Exercise, Awareness of Pleasant Events	Breathing Practice, Awareness of Unpleasant Events	Mindfulness Walking Practice	Mindfulness Seeing and Hearing Practice	Body Review Exercise, Breathing Exercise	One Day Solitude

years, 10 to 20 years, and 20 to 30 years, respectively, had a history of type 2 diabetes. Table 3 displays the descriptive features of the empowerment components in the three groups' pre- and post-tests.

The group membership effect on the scores of the management component of the psychological aspects of diabetes in the post-test phase was significant. Specifically, the observed difference between groups accounted for 41% of the variance in scores, which can be attributed exclusively to group membership ($\eta^2P = 0.41$, $F(2,40) = 16.37$, $P < 0.001$) (Table 4).

The LSD post-hoc test results showed that the amount of management component of psychological aspects in the mindfulness-based combined intervention group (37.14 ± 4.67) was significantly higher than the MBSR group (34.21 ± 3.84) and the control group (31.12 ± 72.3) in the post-test stage. Also, the rate of management of psychological aspects in the MBSR group (34.21 ± 3.84) was significantly higher than the control one (31.12 ± 72.3) (Table 4).

The group membership effect on the scores of the dissatisfaction assessment component and readiness for change in the post-test phase was not significant. The observed differences between groups for these components were not statistically significant ($F(1,43) = 1.62$, $P = 0.20$, $\eta^2P = 0.07$). Similarly, no significant difference was found in the overall scores of these components in the post-test

stage (Table 5).

The group membership effect on the scores of the assessment component of achieving diabetes goals in the post-test phase. The findings showed that the observed difference between the scores of the component for achieving diabetes goals regarding the group membership in the post-test stage was not significant. $\eta^2P = 0.03$, $P = 0.47$, $F(2,40) = 0.75$ (Table 6).

Discussion

The present study aimed to evaluate the impact of a combined mindfulness-based intervention (MBCT and MBSR) on psychological empowerment in patients with type 2 diabetes. The findings demonstrated that only the psychological management component significantly improved in the combined intervention group compared to both the MBSR-only and control groups. However, there were no notable changes in dissatisfaction/readiness for change or goal achievement components.

These results align with prior studies indicating mindfulness-based interventions' benefits in psychological well-being. MBCT and individual cognitive behavior therapy (CBT) effectively improve psychological symptoms in individuals with type 1 and type 2 diabetes (21, 22). Rahmani et al. reported that women with breast cancer can experience less fatigue and an overall improvement in their quality of life when they practice mindfulness-based stress

Table 3. Descriptive Characteristics of Diabetes Empowerment Components in Control and Intervention Groups (Pre-test and Post-test)

Group	test	Managing the psychological aspects of diabetes	Evaluation of dissatisfaction and readiness for change	Evaluation of adjustment for achieving diabetes goals
		Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
MBSR*MBCT	Pre-test	27.50 $\pm$ 4.43	23.21 $\pm$ 4.02	27.64 $\pm$ 4.87
	Post-test	37.14 $\pm$ 4.67	25.14 $\pm$ 3.59	29.00 $\pm$ 3.25
MBSR	Pre-test	29.78 $\pm$ 4.87	26.64 $\pm$ 5.30	33.78 $\pm$ 3.06
	Post-test	34.21 $\pm$ 3.84	25.35 $\pm$ 4.19	33.14 $\pm$ 5.93
control	Pre-test	31.62 $\pm$ 2.94	25.87 $\pm$ 4.87	28.31 $\pm$ 3.82
	Post-test	31.12 $\pm$ 3.72	27.25 $\pm$ 3.00	28.06 $\pm$ 3.76

Values are illustrated as mean $\pm$ standard deviation (SD). Empowerment components include managing the dissatisfaction and readiness for change, psychological aspects of diabetes, and achievement of diabetes goals, calculated based on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). MBSR: Mindfulness-Based Stress Reduction; MBCT: Mindfulness-Based Cognitive Therapy.

Table 4. Comparison of the intra-group effects of the psychological aspects of diabetes management in the post-test by group

The group effect on Managing the psychological aspects of diabetes***	Total Squares	DF	Average Squares	F	Sig	Partial Eta squared
	414.88	40-2	207.44	16.37	0.000	0.41

ANCOVA results comparing post-test scores for managing psychological aspects of diabetes among combined intervention (MBSR+MBCT), control, and MBSR-only groups. Significant differences were observed between groups. *** $P < 0.001$. MBSR: Mindfulness-Based Stress Reduction; MBCT: Mindfulness-Based Cognitive Therapy.

Table 5. Comparison of the intra-group effects of the dissatisfaction assessment component and readiness for change in post-test by group

The group effect on the dissatisfaction assessment component and readiness for change	Total Squares	DF	Average Squares	F	Sig	Partial Eta squared
	34.96	40-2	17.48	1.62	0.209	0.07

The ANCOVA results comparing post-test scores for dissatisfaction and readiness for change among groups. No statistically significant differences were observed. MBSR: Mindfulness-Based Stress Reduction; MBCT: Mindfulness-Based Cognitive Therapy.

Table 6. Comparison of the intragroup effects of the assessment component of the regulation for achieving diabetes goals in the post-test by group

The effect of group on the assessment of dissatisfaction and achievement of diabetes goals	Total Squares	DF	Average Squares	F	Sig	Partial Eta squared
	20.42	40-2	10.21	0.75	0.47	0.03

ANCOVA results comparing post-test scores for achievement of diabetes goals among groups. No statistically significant differences were observed.

reduction (23). Moreover, Son et al. showed that diabetic patients in the mindfulness group will experience significant improvements in emotional well-being, self-esteem, dispositional mindfulness, self-care, and blood pressure compared to those in the control group (15). Additionally, the MBSR intervention demonstrated increased health status and decreased depression (24). Our study reinforces the potential of mindfulness practices to enhance self-regulation, emotional resilience, and psychological adaptation in contexts of chronic illness. Among groups of individuals with various chronic pain problems, the MBSR program showed reductions in psychological distress, physical pain, and HRQOL for the entire sample of diverse chronic pain patients (25). Miller et al. (2014) (26), Sun et al. (2022) (27), and Rosenzweig et al. (2007) (28) showed that mindfulness-based interventions have a significant effect on reducing psychological problems in diabetic patients. Interestingly, other results of our study revealed that the combined intervention based on the MBCT and MBSR has no significant effect on the components of readiness to change and dissatisfaction assessment, and adjust the achievement of goals. This could stem from the relatively short intervention duration, the limited focus on motivational interviewing techniques, or the possibility that these dimensions require more personalized and ongoing

behavioral strategies. Future research should consider tailoring interventions to target these specific components more explicitly. In behavioral medicine, mindfulness-based therapies are designed for patients suffering from chronic pain and stressful conditions (29). In addition, mindfulness is one of the techniques used in body-mind medicine to improve the quality of life and reduce stress in patients with chronic diseases (14). These programs are used to reduce the suffering caused by physical, psychological, and medical problems, while the underlying assumption of these programs is that increasing awareness increases empowerment, ability to cope, and reduces posed negative effects (30). In these types of treatments, the main focus is on targeting the needs of patients with chronic diseases (31). The superiority of the combined MBCT+MBSR approach may stem from its enriched structure, integrating cognitive restructuring with stress reduction, offering patients both practical mindfulness tools and cognitive reframing techniques. Prior studies support this notion: mindfulness practices have been shown to reduce automatic negative thinking, promote positive emotions, and foster conscientiousness and responsibility, traits linked with better diabetes management.

Ravesteijn et al. considered that the effectiveness process in mindfulness-based interventions has six stages for chronic

diseases: 1- Being in the present moment, 2- Awareness, 3- Acceptance, 4- Awareness of patterns, 5- Changing patterns, and 6- Self-compassion, while acceptance and awareness are two key components that change behavioral patterns, and as a result, bring compassion and self-care to individuals. Being in this positive cycle can be another reason for improving the management of psychological aspects in patients with diabetes (32).

Considering that mindfulness-based interventions have positive effects on increasing positive emotions and decreasing negative ones (33), reducing negative behaviors patterns, automatic thoughts, and regulating positive health-related behaviors (34), improving mood, reducing depression and anxiety (35), and increasing psychological adjustment (36), the effectiveness of these interventions in improving the psychological aspects related to diabetes has been shown. Mindfulness also has a positive and significant relationship with emotional, psychological, and social well-being (37), the factor of personality conscientiousness (38). At the same time, it has a significant negative association with emotional failure (39), negative emotions such as worry (40), and the dimension of personality neurosis (41), as improvement of these components can also be a reason for improving the psychological aspects related to diabetes.

The results indicate that integrating comprehensive mindfulness strategies into diabetes education programs may enhance psychological empowerment. This could contribute to better treatment adherence and self-management. The small sample size and restricted regional coverage of this study are among its limitations. Generalizability should therefore be approached with caution. Moreover, biological markers such as HbA1c were not included in this phase and are proposed for assessment in future trials to link psychological changes with physiological outcomes.

Conclusion

A combined mindfulness-based intervention (MBSR+MBCT) significantly improves psychological empowerment in type 2 diabetic patients, particularly in managing emotional and cognitive aspects. However, additional strategies are needed to target motivational readiness and behavioral goal achievement. These findings support the inclusion of structured mindfulness programs in diabetes care, with future research needed to expand on these results with broader outcome measures and long-term evaluation.

Authors' Contribution

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Competing Interests

The authors declare no competing interests.

Ethical Approval

The research with Reg. No. 950123 was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1395.178).

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