

The Impact of Mindfulness-Based Cognitive Therapy (MBCT) on Mental and Physical Well-Being Indicators in Patients with Type 2 Diabetes

Khadijeh Arab-Sheibani,*¹ Ahmad Alipor,¹ Hamid Poursharifi,² Hossein Zare¹

1. Department of Psychology, Payam-e-Noor University, Tehran, Iran
2. Department of Psychology, Tabriz University, Tabriz, Iran

Article information	Abstract
<p>Article history: Received: 17 Jan 2013 Accepted: 16 Apr 2013 Available online: 6 July 2013 ZJRMS 2014 Oct; 16(Suppl 1): 19-23</p> <p>Keywords: Diabetes HbA1c Well-being</p> <p>*Corresponding author at: Department of Psychology, Payam-e-Noor University, Tehran, Iran. E-mail: shakiba_a_shaibani@yahoo.com</p>	<p>Background: The present study aims to investigate the impact of mindfulness-based cognitive therapy on mental and physical well-being indicators in diabetic patients.</p> <p>Materials and Methods: In the present study is that of experimental, all women with type 2 diabetes in Yazd Diabetes Research Centre were considered as statistical community from which 80 women were selected by random sampling. They completed questionnaire of Problem Areas In Diabetes and diabetes-dependent quality of life questionnaire and then were introduced to lab for blood test. Data was analyzed by SPSS-18 software using <i>t</i>-test for separate groups.</p> <p>Results: Statistical analysis showed that the scores of experimental group on quality of life and diabetes related stress were significantly lower in post-test compared to pre-test. Moreover, experimental group and control group showed a significant difference in these variables in pre-test and post-test. Also HbA1c level had a significant decrease in post-test of experimental group compared to pre-test of this group. This difference was observed in control group too.</p> <p>Conclusion: The results showed that mindfulness-based cognitive therapy has positive effects on glycemic control in diabetic patients and leads to well-being and a better quality of life in those patients.</p> <p>Copyright © 2014 Zahedan University of Medical Sciences. All rights reserved.</p>

Introduction

Diabetes is a heterogeneous metabolic disease that is characterized by chronic hyperglycemia and impaired metabolism of carbohydrates, fats and proteins leading to defects in insulin secretion or function [1]. This disease is in the centre of behavioral problems and social and psychological factors have a crucial role in its management [2, 3]. Today, diabetes is growing and there are different ways to control and reduce its complications, although many factors affect its control. These factors include social and psychological support, health beliefs, health attitudes, self-efficacy, socio-economic factors and behavioral factors or life-style. Among these elements self-efficacy promotes self-care behaviors and health-related quality of life in these patients [4].

In recent years developments in treatment of psychological disorders and chronic diseases such as diabetes has led to new methods provided by clinical psychologists [5, 6]. One of these cases is treatment by stress reduction through mindfulness which has been suggested by Kabat-Zinn [7]. This method was later changed by different people and used for various disorders. Its effectiveness was also confirmed by controlled experiments. Mindfulness-based cognitive therapy has been effective in some disorders such as chronic pains [8], depression [9], obsessive compulsive disorders [10] and the like.

Mindfulness-based cognitive therapy is a new treatment which was first used in Iran for eating disorders. It includes different meditations, yoga shrinkage, basic education about depression, and cognitive therapies which show the relation between mood, thoughts, feelings and physical senses. All these exercises allow attention to physical location and environment in the "present moment" and reduce automatic processing leading to depression. In this way, sensory sources are like semantic patterns. Physical exercise changes the form of schematic models [8]. Bishop believes that mindfulness is a new approach in contemporary psychology, which raises awareness and response to emotional distress [11]. Kabat-Zinn et al. confirmed the impact of mindfulness on treatment of patients with chronic pain [10]. Randolph used this method for patients with chronic pain and observed significant statistical improvement in pains, other medical indexes and general psychological signs [12]. Kristeller and Hallett confirmed the effects of cognitive therapy based on mindfulness on eating disorders [13]. Teasdale et al. investigated the effects of mindfulness-based cognitive therapy on depression return rate in a large group of depressed patients who received medical treatment and found that return rate was less in these patients [9]. Although researches indicate the effects of mindfulness-based cognitive therapy in reducing depression and other psychological variables,

investigating its role in diabetes control is a new work which will help further understanding of diabetes.

Materials and Methods

All women with type 2 diabetes (diagnosed by a diabetes specialist) who were members of Yazd Diabetes Research Centre were considered as statistical community of whom 80 samples were selected randomly. In this way a complete list of all diabetic women was prepared by help of Centre's computer engineer and then those who had inclusion criteria and lacked exclusion criteria were selected as the sample. From these, the educational level of 20 was recorded wrongly; therefore 80 patients were invited to Diabetes Research Centre. First they signed the consent form and then given some tests and enough information on how to complete them. After coordination with laboratory, according to the schedule given to subjects, they were asked to go there for blood test. Mean age of subjects was 46 years and 2 months. Of this number 20 patients used insulin, 59 patients used tablets and one person hadn't started any drug treatments. Subjects were divided into 5 groups of 15 patients, one of which received mindfulness-based cognitive therapy. The results were analyzed and compared to control group. It is worth mentioning due to the loss of subjects, 14 people were analyzed. Inclusion criterion was the age of 40-50, diabetes mellitus type 2 for at least 6 month, and an educational degree higher than guidance school. The following items were considered as exclusion criterion: acute or chronic medical problems which make blood sampling difficult, history of receiving relaxation training or stress management, and having family background of diabetes.

Cognitive therapy instructions consist of 8 sessions of group education; each session lasts one hour [14]. The number and content of each session is shown in the following table (Table 1). At the end of these sessions blood test was repeated. Three months after intervention sessions, subjects completed questionnaires again but due to anemia in some patients, blood test was prevented by doctor's advice in Research Centre.

Two patients had operations during the period and experience anemia; therefore according to diagnosis of diabetes centre expert they were not able to pass the third stage of blood test. As a result, to assess HbA1c as an indicator of physical well-being only two levels of blood test in pre- and post-tests were sufficient.

Questionnaire of problem areas in diabetes (PAID): this questionnaire was provided by Polanski in order to measure the relation between stress and glycemic control in diabetic patients. It has 20 questions and answers are from "never" to "very much". Scoring is done according to Likert scale from zero for "never" to four for "very much" [15]. Thus the range of scores for this scale is variable between zero (absence of stress and worry about diabetes control) to 80 (high stress about diabetes control). In a study by Miller et al., using explanatory factor analysis two subscales were obtained for this questionnaire: low self-esteem subscale and negative

emotional consequences. Cronbach's alpha coefficient was reported 0.85 for the first scale and 0.94 for the second one which shows internal consistency of test statements. In the present study Cronbach's alpha was 0.66 for total scale, 0.71 for low self-esteem subscale and 0.69 for negative emotional consequences [16].

Audit of diabetes-dependent quality of life (ADDQOL19): This questionnaire contains 19 statements and is designed to measure patients' perception about the effects of diabetes on health-related quality of life. Each statement is scored in a seven-degree scale. As Cronbach's alpha (0.85) shows, there is a good internal reliability. Factor analysis and Cronbach's alpha coefficient support integration of statements in a scale. This questionnaire has been designed for both insulin and non-insulin patients. ADDQOL's validity is confirmed by the difference between patients who take insulin, use tabs or have a diet [17]. HbA1c test: HbA1c is a protein which is clinically recognized as an important marker for long-term blood sugar control. HbA1c test measures average blood glucose 2-3 months ago [1, 2]. In fact, the effects of treatment and better control of blood sugar can be recognized by HbA1c decrease. This index is reported by percentage and can be interpreted according to normal range set by each examiner. This rate was variable between 5.5-13.5 in subjects of this study.

Results

Subjects of control and experimental groups were all women who were homogeneous in level of education, history of diabetes, and age. Table 2 shows the mean and standard deviation of intervention and control groups before and after intervention. Given that psychological variables in pre-test, post-test (immediately after intervention) and follow-up (one month after intervention) are measured, all statistical processes were done in two stages based on the difference of indices in first and second steps and the first and third indices of first and third steps. But regarding HbA1c index, first measurement minus second measurement will be considered as the basis of calculations. Based on Kolmogorov-Smirnov test, all variables showed normal (natural) distribution.

Table 3 presents distribution of variables. Given the normal distribution of variables, one independent variable and three dependent variables, MANOVA was used as statistical method. According to the results of Box-test (M-Box=38.27, $p=119$ for indicators of mental health, and M-Box= 194.9, $p=136.0$ for indicators of physical health) the presumption of equality of covariance was confirmed. Based on Levin test for indicators of problems associated with diabetes and HbA1c ($F=29.2$, 125.0 and 324.2 respectively) the presumption of equality of covariance was approved and the required assumption for statistical test was present.

Descriptive results of MANOVA test showed that mindfulness-based cognitive therapy intervention has positive effects on indicators of physical health in first stage and mental health in first and second stages.

MANOVA analytical results showed that regarding mental health indicators (problems associated with diabetes and quality of life) in the first stage (subtracting 1st and 2nd measurements) none of multi-variable tests (Pilla's Trace, Wilk's Lamda, Hotelling's Trace, and Roy's Largest Root) were meaningful ($F=53.1, p=0.221$). Therefore, combined mean of mental health indicators is obtained in both control and intervention groups which means that mindfulness-based cognitive therapy has not improved mental health indicators in type 2 diabetic patients, although it shows positive descriptive results. But at the second stage (subtracting 1st and 3rd measurements) all multi-variable tests (Pilla's Trace, Wilk's Lamda, Hotelling's Trace, and Roy's Largest Root) were meaningful ($F=6.7, p=0.001$), therefore The difference between combined mean of mental health indicators is observed in both control and intervention groups and shows that according to descriptive results mindfulness-based cognitive therapy improves mental health indicators in type 2 diabetic patients.

Regarding HbA1c as an indicator of physical well-being, analytical results showed that none of multi-variable tests (Pilla's Trace, Wilk's Lamda, Hotelling's Trace, and Roy's Largest Root) are significant ($F=69.1, p=0.195$). Therefore, equal combined health index (HbA1c) is obtained in control and intervention groups which mean that according to descriptive results mindfulness-based cognitive therapy has not improved blood sugar in type 2 diabetic patients.

Discussion

The present study shows that mindfulness-based cognitive therapy is effective in diabetes control and leads to higher health-related quality of life and less stress in these patients. Although there is less research background which directly investigates the effects of mindfulness-based cognitive therapy on type 2 diabetes control, findings show its impact on improvement of chronic diseases [9].

Table 1. Schedule of Mindfulness-based cognitive therapy (MBCT)

Number of session	Content of session
Pre-treatment session	Welcoming- completing questionnaires
1 st intervention session	Automatic control in presence of mind
2 nd intervention session	Being in the body
3 rd intervention session	Strengthening mental state of being, seated meditation
4 th intervention session	Staying in the present
5 th intervention session	Acceptance/ Authorization of presence
6 th intervention session	Absence of facts and thoughts
7 th intervention session	How to take care of oneself well
8 th intervention session	Sum of trainings for future life, a new being for the rest of life
9 th session	Completing questionnaire again and introducing to lab

Table 2. Mean and standard deviation of stress due to diabetes, health-related quality of life, HbA1c in both intervention and control groups before intervention

Variable	Intervention Group Mean±SD	Control Group Mean±SD
Quality of life	54.14±18.11	61.28±18.44
PAID	58.64±15.76	46.93±14.41
HbA1c (mg/dL)	8.33±1.74	9.23±1.3

Table 3. Distribution of problems associated with diabetes, quality of life, HbA1c regarding normal distribution of first and second stages measurement in 28 case

Variable	First stage Kolmogorov Smirnov (<i>p</i> -value)	Second stage Kolmogorov Smirnov (<i>p</i> -value)
Quality of life	0.888 (0.409)	0.59 (0.87)
PAID	0.77 (0.586)	0.62 (0.83)
HbA1c (mg/dL)	0.60 (0.87)	- -

Table 4. Descriptive results of mental health (quality of life and problems associated with diabetes) and physical health (HbA1c) indicators in intervention and control groups

Health Indicators	Groups	First stage N (Mean±SD)	Second stage N (Mean±SD)
Quality of life	Control	14 (7.64±19.91)	14 (0.93±14.8)
	Intervention	14 (13±11.97)	14 (9.07±13.34)
	Total	28 (10.32±16.35)	28 (5±14.43)
PAID	Control	14 (19.21±10.3)	14 (4.43±1.96)
	Intervention	14 (17.21±6.56)	14 (16.64±6.34)
	Total	28 (18.21±8.53)	28 (10.53±15.2)
HbA1c	Control	14 (1.93±1.1)	-
	Intervention	14 (1.36±0.86)	-
	Total	28 (1.64±1)	-

Some characteristics of this disease include emotional distress such as anxiety, depression and high stress. This is while diabetes is considered as a chronic disease itself. These emotional problems lead to poor glycemic control which is a kind of stress itself. As a result diabetic patients encounter a repeated cycle of stress, poor control and distress which affects well-being and health-related quality of life leading to depression and low mood. Today the main goal of diabetes treatment is to achieve HbA1c (lower than) 7% of proper control because it is associated with less mortality rate [17]. Many studies have been conducted on the relationship between glycemic control and health-related quality of life some of which have confirmed this relation while others have not. Studies that have found this relation suggest that optimal glucose control is associated with better control of health-related quality of life.

Teasdale et al. found that mindfulness-based cognitive therapy is effective in treating problems of depression [9]. Kabat-Zinn and Randolph examined the effects of this therapeutic approach in treating patients suffering chronic pain and found it to be effective [10-12]. This method makes the patients aware of the roots of disorder and its mechanism in the brain, prevents them from being anxious, focuses on their thoughts and desires, and allows them not to repeat their actions or thoughts to reduce anxiety but to think about the roots of biological impairment. Generally mindfulness is effective in diabetic patients, because it changes patients' perception about their thoughts and practices and benefits from principles of conditional strengthening. A patient who wants to go to the next step tries to see himself in a higher level and this gradually improves his health. At the same time the patient continues his personal treatment and solves problems and defects in face to face meetings [10].

These findings are consistent with Shapiro and Schwartz, Davidson et al., Carlson et al., Singh et al. [12-18]. Cardociotto believes that changing patients' content of thoughts, attitudes and perception towards disease can control obsessiveness and its symptoms [21]. Rachman and Hodgson suggest that gradual time reduction is a good therapeutic method for patients who lack negative emotional conditions and anxiety but it is also time-consuming. Mindfulness which controls awareness step

by step and in a gradual non-judgmental way helps patients to conduct self-control and self-regulation over their behaviors. Mindfulness-based cognitive therapy provides an opportunity for patients to observe their emotions, thoughts, perception, and physical senses without judgment. They should accept them and understand that thoughts are not necessarily consistent with reality [22].

According to findings, although the effects of mindfulness-based cognitive therapy on mental well-being were approved, this method did not have any significant effects on blood sugar index. It should be mentioned that cognitive therapy reduces patients' control on sugar intake and keeping their diet through control of stress, concerns, and problems associated with diabetes. When patients are free from stress, they think less about negative dimensions of diabetes and as a result HbA1c level increases in them. Accordingly two types of consequences could be considered: practical and theoretical. At the practical level, training programs and mindfulness-based cognitive therapy are used to help patients control their blood glucose, increase health-related quality of life and reduce stress and worry associated with disease. At theoretical level, findings of this study could be added to practical findings and promote self-care behaviors. In this way diabetic complications which are a constant challenge for health systems and governments could be prevented.

Acknowledgements

This article is a part of author's doctorate thesis on health psychology. The sincere staffs of Yazd Diabetes Research Centre, especially nursing unit and laboratory staff, are thanked. The author thanks dear patients too.

Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

Funding/Support

Payam-e-Noor University Tehran.

References

1. American Diabetes Association (ADA). National standards for diabetes self-management education. *Diab Care*. 2005; 28(11): 72-79.
2. Snoek FJ. Management of diabetes: Psychological aspects of diabetes management. *Medicine*. 2002; 30(1): 14-15.
3. Denollet J. DS14: standard assessment of negative affectivity, social inhibition, and type D personality. *Psychosom Med*. 2005; 67(1): 89-97.
4. Barth J, Schumacher M, Herrmann-Lingen C. Depression as a risk factor for mortality in patients with coronary heart disease: A meta-analysis. *Psychosom Med*. 2004; 66(6): 802-13.
5. Douketis JD, Macie C, Thabane L and Williamson DF. Systematic review of long-term weight loss studies in obese adults: Clinical significance and applicability to clinical practice. *Int J Obes*. 2005; 29(10): 1153-1167.
6. Powell LH, Calvin JE 3rd, Calvin JE Jr. Effective obesity treatments. *Am Psychol*. 2007; 62(3): 234-246.
7. Kabat-Zinn J. Full catastrophe living." Using the wisdom of your body and mind to face stress, pain and illness. 15th ed. New York: Delacorte; 1990: 57-63.
8. Segal ZV, Williams J MG, Teasdale JD. Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse. 1st ed. New York: Guildford Press; 2002: 105-114.
9. Teasdale JD, Segal ZV, Williams JMG, et al. Prevention of relapse/recurrence in major depression by mindfulness

- based cognitive therapy. *J Consult Clin Psychol.* 2000; 68(4); 615-623.
10. Kabat-Zinn J, Lipworth L, Burney R and Sellers W. Four-year follow-up of a meditation-based program for the self-regulation of chronic pain: Treatment outcome and compliance. *Clin J Pain.* 1986; 2(3): 159-173.
 11. Bishop SR. What do we really know about mindfulness-based stress reduction? *Psychosom Med.* 2002; 64(1): 71-84.
 12. Randolph PD, Caldera YM, Tacone AM and Greak ML. The long-term combined effects of medical treatment and mindfulness based behavioral program for the multidisciplinary management of chronic pain in west Texas. *Pain.* 1999; 9(3): 103-112.
 13. Kristeller JL, Hallett CB. An exploratory study of a meditationbased intervention for binge eating disorder. *J Health Psycho.* 1999; 4(3): 357-363.
 14. Mohammadkhani P, Tamanaiefar S, Jahanitabesh O. Mindfulness based cognitive therapy in depression patients, Tehran, social welfare and rehabilitation sciences university. 2005, 215-223
 15. Polonsky WH, Anderson BJ, Lohrer PA, et al. Assessment of diabetes-related distress. *Diab Care.* 1995; 18(6): 754-760.
 16. Miller ST, Elasy TA. Psychometric evaluation of the problem areas in diabetes (PAID) survey in Southern, rural African American women with type 2 diabetes. *BMC Pub Health.* 2008; 8: 70.
 17. Bradley C, Todd C, Gorton T, et al. The development of an individualized questionnaire measure of perceived impact of diabetes on quality of life: The ADDQoL. *Qual Life Res.* 1999; 8(1-2): 79-91.
 18. Shapiro SL, Schwartz GE. *The role of intention in selfregulation: Toward intentional systemic mindfulness.* San Diego, CA, US: Academic Press; 2000: 253-273.
 19. Davidson RJ, Kabat-zinn J, Schumacher J, et al. Alterations in brain and immune function produced by mindfulness meditation. *Psychosom Med.* 2003; 65(4); 564-570.
 20. Carlson LE, Speca M, Patel KD and Goodey E. Mindfulnessbasedstress reduction in relation to quality of life, mood, symptoms of stress and immune parameters in breast & prostate cancer outpatients. *Psychosom Med.* 2003; 65(4): 571-581.
 21. Cardaciotto LA. [Assessing mindfulness: The development of a bidimensional measure of awareness and acceptance]. [dissertation]. USA: University of Drexel; 2005: 254-265.
 22. Rachman SJ, Hodgson RJ. *Obsessions and compulsions.* Englewood cliffs. New York: Prentice-Hall; 1980: 122-126.

Please cite this article as: Arab-Sheibani K, Alipor A, Poursharifi H, Zare H. The impact of mindfulness-based cognitive therapy (MBCT) on mental and physical well-being indicators in patients with type 2 diabetes. *Zahedan J Res Med Sci.* 2014; 16(Suppl 1): 19-23.