



# Evaluating the Effectiveness of an Intervention Program to Regulate Cognitive Emotion of Patients with Type 2 Diabetes

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## ABSTRACT

The aim of this study was to test the efficacy of a training program for cognitive emotion regulation of patients with type 2 diabetes at psychiatric clinic. The Mindfulness-Based Cognitive Therapy (MBCT) training program focused on the use of positive and negative strategies in cognitive emotion regulation. Participants were randomly assigned to MBCT group (n = 15) and non-MBCT group (n = 13). The research variables were measured at baseline and after the MBCT intervention, and at a 4-month follow-up for the MBCT group. The MBCT training program was effective in significantly increasing patients' positive strategies use and reducing patients' negative strategies use. MBCT program gains were maintained at the 4-month follow-up. This study shows that MBCT program can protect patients with type 2 diabetes to regulate cognitive emotion during a defect in the secretion of insulin.

**Key Words:** Intervention, Cognitive Emotion Regulation, Type 2 Diabetes

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## Introduction

The global prevalence of diabetes in 2014 has been reported about 9% of the population over 18 years (WHO, 2014). Approximately 85-90% of these people have type 2 diabetes (Aleidi *et al.*, 2015; Gonder-Frederick *et al.*, 2005; Phanse *et al.*, 2016). While type 2 diabetes levels of men are higher than type 2 diabetes levels of women, women are more affected than men due to more life expectancy and longer life (Poursharifi *et al.*, 2013). In a study in Libya, the incidence of type 2 diabetes was reported in the age group newborns to 34 years, 19.6% in men and 35.3% in women per 100,000 (Kadiki *et al.*, 1994).

Type 2 diabetes mellitus, known as non-insulin-dependent, is common among 90% of diabetic patients. Diabetes Mellitus has long-term and short-term complications and it as a widespread effect on the lives of patients due to

physical complications such as retinopathy, nephropathy, neuropathy, and cardiovascular disease (Wiener *et al.*, 2012; Wang *et al.*, 2017). Based on the empirical evidence, the behaviors that cause these complications affect the mental adjustment of diabetic patients (Katon *et al.*, 2004). Despite the physiological issues associated with the disease, the lack of response to the disease, susceptibility to fluctuations in blood glucose, the need for insulin injections, dietary restrictions, and the level of activity and the need for careful and continuous care of themselves, cause psychological problems in diabetics (White, 2001; Miao *et al.*, 2017).

The goal of most psychotherapy strategies to help these patients is to reduce the psychiatric problems associated with diabetes and minimize subtle and complex interactions between these factors. Since diabetes can

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affect the emotional processing of individuals, it seems that cognitive emotion regulation is one of the factors that has been less addressed in relation to the psychological aspects of type 2 diabetes. Emotion regulation is the inherent aspect of emotional response trends (Amstadter, 2008). In fact, emotional regulation refers to acts used to change or modify an emotional state, and it is a particular form of self-regulation that is defined as external and internal processes involved in emotional reactions (Thompson, 2008; Tabatabaei *et al.*, 2017; Xiaoxu *et al.*, 2017). Garnefske and Kraaij (2009) describe cognitive emotion regulation strategies as actions that reflect ways of coping with stressful situations or unpleasant events. Psychological studies show that emotional cognitive regulation is an important factor in determining health and having successful performance in social interactions (Lame *et al.*, 2005).

Few studies that focus on cognitive emotion regulation in patients have been systematically evaluated. Garnefski *et al.*, (2002) conceptually identified nine different strategies for cognitive regulation, which include: acceptance, positive refocusing, planning, putting into perspective, positive reappraisal, self-blame, rumination, catastrophizing, and blaming others. These strategies are divided into two groups of positive strategies (acceptance, positive refocusing, planning, putting into perspective, and positive reappraisal) and negative strategies (self-blame, rumination, catastrophizing, and blaming others). Therefore, it seems that the strategies of cognitive emotion regulation in interaction with mood disorders that are defined as an inability to process cognition and regulation of emotions increase the problems of type II diabetes patients.

The aim of this study is to determine whether an intervention that targets reducing stress, blood pressure, depression and intrusive thoughts, and improving quality of life and sleep quality is effective in regulating the cognitive emotion of patients with type 2 diabetes. Across most surveys of diabetes, the effectiveness of mindfulness-based interventions has also attracted much interest in improving the health and well-being of patients with diabetes (Whitebird *et al.*, 2009). In this regard, studies indicate that Mindfulness-Based Cognitive Therapy (MBCT) can play a role in reducing stress and improving quality of life (Green and Bieling, 2011), reducing blood pressure (Schuster, 2010),

reducing depression (Rosenzweig *et al.*, 2007), reducing disturbing thoughts and improving sleep quality (Faude-Lang *et al.*, 2010) in patients with type 2 diabetes, but its effectiveness on the strategies of cognitive emotion regulation and alexithymia in these patients is unclear. Our study hypothesized that the intervention would increase the use of adaptive strategies and would reduce the use of maladaptive strategies for cognitive emotional regulation.

## Methods

### Sample and procedure

The patients participated in this study ( $n = 28$ ) are in their first visit to the psychiatric clinics in Beijing (China). Patients were in the age group of 20-30 years ( $n = 6$ ), 31-45 years ( $n = 14$ ) and 46-60 ( $n = 8$ ). The sample consisted of male ( $n = 17$ ) and female ( $n = 11$ ), with a mean age of 38.21 years ( $SD = 2.31$ ). The patients with type 2 diabetes were randomly assigned to a Mindfulness-Based Cognitive Therapy (MBCT) group ( $n = 15$ ) and a non-MBCT group ( $n = 13$ ). In this study, there were no differences concerning age (MBCT group:  $M = 38.11$ ,  $SD = 2.19$ ; non-MBCT group:  $M = 38.30$ ,  $SD = 2.44$ ) and age group (MBCT group: 23% age group of 20-30 years, 52% age group of 31-45 years, 25% age group of 46-60 years; non-MBCT group: 21% age group of 20-30 years, 53% age group of 31-45 years, 26% age group of 46-60 years).

Patients in the MBCT group learned and practiced a 8-sessions Mindfulness-Based Cognitive Therapy (MBCT) intervention, while patients in the MBCT group received a traditional training related to diabetes patients. We balanced the amount of instructor input and length of learn period in the MBCT and non-MBCT groups. The MBCT and traditional training programs were conceptualized by various interventions. We performed assessments at before the MBCT intervention, after the MBCT intervention, and at three-month follow-up for the MBCT group. No patients dropped out from the MBCT group or from the non-MBCT group over the non-MBCT duration. Twenty-eight (100%) patients completed the questionnaire of this paper at before and after the MBCT intervention, and 15 patients in the MBCT group completed the questionnaire at follow-up.

### The program

Patients in the MBCT group received a 8 sessions program (60-90 minutes) of group mindfulness-



based cognitive therapy with respect to another MBCT intervention (Segal, Teasdale & Williams, 2002), and the non-MBCT group received traditional treatment for diabetic patients, prescribed by diabetes specialist. The MBCT

sessions were designed and implemented in one of the psychological clinics in Beijing that had previously obtained the necessary permits. The contents of the sessions in the MBCT program are presented in Table 1.

**Table 1.** Contents of the MBCT sessions

Sessions	Contents
1	Identification of automatic guidance and withdrawal, Mindfulness of daily activities, physical examination.
2	Handling obstacles, responding to daily events, enjoyable activity table, 10-minute sitting meditation
3	Mindfulness or awareness of breathing: Awareness, 40-minute sitting meditation of breathing and body, unpleasant body feelings
4	Stay in the present, attachment, disgust and mischief
5	Allow / Attendance: Accepting individual experiences
6	Thoughts are not truths, they are only thoughts
7	How we can take care of ourselves at the best: a list of enjoyable et al. skillful activities, a list of signs et al. symptoms of depression, preparing a program of action to deal with depression, and preparing a workout plan to say goodbye.
8	The use of the lessons to deal with and create the future.

### Measures

The CERQ scale is a 21-item cognitive emotion regulation questionnaire in order to identify the cognitive coping strategies of individuals after experiencing situations and negative events, developed by Garnefski *et al.*, (2001). Unlike other questionnaires that do not explicitly distinguish between individual thoughts and actual actions, this questionnaire assesses individual thoughts after a negative experience or traumatic events. The questionnaire is a self-report tool that its implementation is so easy and used for people over 12 years (normal people and clinical populations). The scale consisted of 5-point 36 questions ranged from 1 (always) to 4 (never), which totally evaluates 2 main component with 9 sub-factors: positive strategies (acceptance, positive refocusing, planning, putting into perspective, and positive reappraisal) and negative strategies (self-blame, rumination, catastrophizing, and blaming others). A large number of studies have been conducted on this questionnaire, and the results of all of them indicate the validity and reliability of this questionnaire (Muris, 2002). We obtained an alpha coefficient of 0.80 at before the MBCT intervention and of 0.83 at after the MBCT intervention.

### Statistical analyses

The MBCT and non-MBCT groups were compared in a mixed model 2 (group) × 2 (time) ANOVAs with group membership as a between-subject factor, and the time of measurement (before and after the MBCT intervention) as a within-subject

factor to examine changes in positive and negative strategies with the MBCT program relative to the non-MBCT group. According to the Huberty and Morris's theory (1989), the use of ANOVAs in this study was considered appropriate.

### Results

According to patients report at before the MBCT intervention, there were no significant differences between MBCT and non-MBCT groups on acceptance, positive refocusing, planning, putting into perspective, positive reappraisal, self-blame, rumination, catastrophizing, and blaming others. Univariate ANOVAs tested for between-group MBCT program effects on all outcome measures using before and after the MBCT scores. Also, there were no differences across groups in the non-MBCT group.

Table 1 shows means of outcome measures for the MBCT and non-MBCT groups. Compared with participants in the non-MBCT group, patients in the MBCT group reported significantly greater increases in acceptance (before the MBCT intervention:  $F(1, 26) = 23.34, p < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 25.61, p < 0.001$ ), positive refocusing (before the MBCT intervention:  $F(1, 26) = 31.11, p < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 35.41, p < 0.001$ ), planning (before the MBCT intervention:  $F(1, 26) = 21.84, p < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 29.03, p < 0.001$ ), putting into perspective (before the MBCT intervention:  $F(1, 26) = 16.47, p < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 22.13, p < 0.001$ ), and positive reappraisal (before the MBCT



intervention:  $F(1, 26) = 26.11, \rho < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 34.13, \rho < 0.001$ ). Compared with participants in the non-MBCT group, patients in the MBCT group reported significantly greater reductions in self-blame (before the MBCT intervention:  $F(1, 26) = 11.45, \rho < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 18.17, \rho < 0.001$ ), rumination (before the MBCT intervention:  $F(1, 26) = 24.10, \rho < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 28.14, \rho < 0.001$ ), catastrophizing (before the MBCT intervention:  $F(1, 26) = 19.24, \rho < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 25.33, \rho < 0.001$ ), and blaming others (before the MBCT intervention:  $F(1, 26) = 27.13, \rho < 0.001$ ; after the MBCT intervention:  $F(1, 26) = 36.42, \rho < 0.001$ ).

Compared with participants in the MBCT group, patients in the non-MBCT group reported a reduction in positive refocusing between before and after the MBCT intervention, whereas these patients in the MBCT group improved in their scores. Further, patients in the non-MBCT group reported an increase in self-blame, rumination, catastrophizing and blaming others between

before and after the MBCT intervention, whereas these patients in the MBCT group improved in their scores. Mean effect sizes for outcome measures by the MBCT group were shown in Table 2.

This study carried out paired participant's *t-test* to analyze within-group differences between after the MBCT program and the 4-month follow-up for patients in the MBCT group only. At the follow-up, there were significant changes in scores for acceptance,  $t(1, 14) = 2.79, \rho < 0.01$ , and positive reappraisal,  $t(1, 14) = 3.26, \rho < 0.05$ , but no for other variables, indicating maintenance of gains.

### Discussion

Our experimental study presents a training program addressing positive and negative strategies factors for type 2 diabetes. Type 2 diabetes patients who participated in the MBCT program reported a significant increase in acceptance, positive refocusing, planning, putting into perspective, and positive reappraisal.

**Table 2.** Means (SD) of outcome measures for the MBCT and non-MBCT groups

Assessment measure	Group	Before the MBCT intervention	After the MBCT intervention	Follow-up
Acceptance	MBCT	7.23 (4.16)	14.19 (4.78)	26.27 (4.45)
	non-MBCT	6.67 (3.61)	6.92 (3.11)	-
Positive refocusing	MBCT	4.29 (2.27)	11.36 (2.71)	18.71 (2.65)
	non-MBCT	4.53 (2.18)	4.19 (2.55)	-
Planning	MBCT	8.66 (5.12)	19.17 (6.32)	24.11 (6.08)
	non-MBCT	8.47 (6.44)	8.62 (5.61)	-
Putting into perspective	MBCT	5.99 (2.19)	8.48 (2.31)	12.18 (2.43)
	non-MBCT	6.12 (2.51)	6.12 (2.61)	-
Positive reappraisal	MBCT	9.26 (5.04)	13.44 (5.29)	18.24 (5.11)
	non-MBCT	8.89 (5.44)	8.91 (5.62)	-
Self-blame	MBCT	9.12 (2.44)	4.05 (3.04)	2.08 (2.64)
	non-MBCT	8.79 (3.11)	8.85 (3.34)	-
Rumination	MBCT	11.43 (4.11)	8.19 (4.21)	4.39 (3.98)
	non-MBCT	11.25 (3.99)	11.53 (3.18)	-
Catastrophizing	MBCT	10.28 (3.11)	6.94 (3.42)	3.09 (3.35)
	non-MBCT	10.31 (3.22)	10.46 (3.28)	-
Blaming others	MBCT	9.49 (2.83)	2.31 (2.74)	1.08 (2.54)
	non-MBCT	9.35 (2.77)	9.56 (2.24)	-

**Table 3.** Mean effect sizes for outcome measures by the MBCT group

Outcome measure	MBCT group	non-MBCT group	MBCT minus non-MBCT group
Acceptance	1.26 (1.14-1.38)	0.06 (-0.04-0.16)	1.20
Positive refocusing	1.20 (1.11-1.29)	-0.03 (-0.11-0.05)	1.23
Planning	1.38 (1.26-1.51)	0.10 (-0.41-0.62)	1.28
Putting into perspective	1.21 (1.15-1.27)	0 (-0.11-0.11)	1.21
Positive reappraisal	1.42 (1.22-1.63)	0.04 (-0.12-0.21)	1.38
Self-blame	0.67 (0.49-0.85)	-0.25 (-0.09-0.04)	0.92
Rumination	1.08 (0.98-1.19)	-0.04 (-0.16-0.08)	1.12
Catastrophizing	1.68 (1.55-1.81)	-0.03 (-0.18-0.13)	1.71
Blaming others	1.09 (1.02-1.15)	-0.02 (-0.12-0.07)	1.11



These patients also reported a significant decrease in self-blame, rumination, catastrophizing, and blaming others. The patient report of this study suggests that MBCT can increase the use of positive strategies and reduce the use of negative strategies in patients with type 2 diabetes.

The findings of this study support former findings in the occupational context showing positive effects of MBCT intervention on indicators of identified coping strategies (Vaziri *et al.*, 2017), reducing stress and improving quality of life (Green and Bieling, 2011), reducing blood pressure (Schuster, 2010), reducing depression (Rosenzweig *et al.*, 2007), reducing disturbing thoughts and improving sleep quality (Faude-Lang *et al.*, 2010) in patients with type 2 diabetes. According to the Kabat-Zinn (2003) study, observing without judgment in Mindfulness can reduce emotional responses. Therefore, the practice of mindfulness skill will increase the ability of users to tolerate negative emotional states and enable them to cope effectively, and it reduces the use of nonconforming coping strategies.

In explaining the findings of this study, it can be said that one of the important aspects of mindfulness-based cognitive therapy is that individuals learn to deal with negative emotions and experience mental affairs positively. Another important point is that mindfulness-based cognitive therapy leads to the subjective representation of objects in life that are beyond the control of mankind, and this is taught through deep breathing and thinking (Mace, 2008). In explaining this theory and its relation with type 2 diabetes, it can be stated that patients with type 2 diabetes, using mindfulness-based training, tolerate the negative emotions of the disease, subjectively represent it in their path to life, accept it instead of avoiding, and use more adaptable strategies. Accordingly, the emphasis on conscious attention to the present and exposure to unpleasant feelings and thoughts and non-avoidance of feelings leads to cognitive changes, thereby reducing and improving symptoms, which may be one of the reasons for reducing the use of maladaptive strategies such as blaming oneself, blaming another and rumination in patients with type 2 diabetes, and changes in their coping strategy of avoiding the acceptance of emotions and thoughts.

According to the studies mentioned and with the advent of the fact that in the third wave of cognitive behavioral therapies, including mindfulness-based cognitive therapy, there is the idea that cognition and emotion should be considered in the conceptual context of phenomena (Hayes *et al.*, 2006), it can be stated that due to the fact that the conditions and characteristics of the disease and lifestyle of patients with type 2 diabetes are different from other chronic medical conditions; the MBCT program has helped these patients change their cognition and emotions to take advantage of adaptive strategies in cognitive emotion regulation.

There are several limitations in this study. The first limitation is related to statistical sample. The sample limitation in this study led to restricting in generalizing the results to the population. Another of the limitation is lack of self-assessment and self-reporting questionnaires for measurement.

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