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Effectiveness of Cognitive Therapy based on Mindfulness on Self-Efficacy and Weight Loss in Patients with Diabetes Type 2

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In daily life, cognitive therapy is one of the skills that can be taught to increase the levels of self-efficacy and weight loss. The purpose of this study was to evaluate the effectiveness of cognitive therapy based on mindfulness skills in promoting self-efficacy and weight loss in patients with diabetes type 2 in the city of Salas city of Kermanshah province. The present study is an experiment with a pre-test-post-test design with a control group. The statistical population of the study was all patients with diabetes type 2 in Salas city of Kermanshah province. Using a convenience sampling method, participants were randomly assigned to an experimental group (n=15) and a control group (n=15). After that, the experimental group was trained in cognitive therapy skills and weight loss for 8 weeks in a total of 8 sessions of two-hour. After completing the training and after one month, the post-test was performed simultaneously and under the same conditions for both experimental and control groups. Data were analyzed by multivariate analysis of covariance (MANCOVA) with SPSS 24 software. Results of analysis of covariance on post-test scores showed a significant difference between the test and control groups in self-efficacy and weight loss variables (P-value< .05). The effect size indicates that about 85% of the variance of the self-efficacy score

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and about 77% of the variance of the weight loss score is explained by the difference between the two methods. Therefore, cognitive therapy training is effective in the self-efficacy and weight loss of diabetic patients.

Keywords: cognitive-therapy, mindfulness, self-efficacy, weight loss, diabetes type 2

Diabetes refers to a group of metabolic diseases whose common feature is high blood glucose. Chronic hyperglycemia leads to a series of complications that lead to damage to various organs and disrupt their function. People with this disease have a shorter life expectancy and on average their life expectancy is 7 to 10 years less than the general population (Sky ler, 1996). According to the World Health Organization (WHO), if special measures are not taken in the field of diabetes prevention, The number of participants suffering from it will increase to 7 million participants in 2030 in Iran. With a prevalence of more than 8%, Iran is one of the regions with the highest percentage of diabetes in the world (Alijani, Akrami & Faghih-Imani, 2015). This disease is one of the disasters of the last century, which led to an increase in cardiovascular diseases, cerebral vessels, peripheral vessels, retinopathy, neuropathy, diabetic foot, amputation, and depression. Complications and problems caused by diabetes have a great impact on the quality of life of the individual and the family and impose a large cost on the individual and the economy of the society (Eisser, et al., 1992). Regarding the etiology of diabetes type 2, newer researches emphasize the role of psychosocial factors in diabetes type 2. These socio-psychological factors include environmental risk factors, increased sedentary lifestyle, religious beliefs, socioeconomic status, gender, ethnicity, low education, poverty, anxiety, and unhealthy eating habits (Azuamah et al., 2013; Joseph et al., 2010; Silink, 2009).

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Self-efficacy is one of these factors that is likely to be effective on the quality of life of these patients. Self-efficacy is one of the constructs of the social cognitive model (Bandura) which explains the interaction between individual, behavioral, and environmental factors in health and illness (Sarkar, Fisher & Schillinger, 2006). The results of Chi et al.'s study on adolescents with diabetes showed that the more self-efficacy is in adolescents with diabetes, the better the control of diabetes (Chen, et al., 2012). Most participants with diabetes believe that they are not successful in maintaining diet, exercise, medication, and other key behaviors for diabetes self-management, which indicates a lack of self-efficacy in managing their disease (Boothroyd & Fisher, 2010). Self-efficacy is actually a person's belief and expectation based on his/her capacity to influence the desired outcome through individual efforts the person uses self-efficacy tools to monitor nutrition and physical activities to control blood sugar and can prevent the complications of these diseases (Saito et al., 2006; Dishman et al., 2005). Jursam and Maytag (1995) showed that general self-efficacy has a positive correlation with optimism, self-respect, internal control, and motivation for progress, and a negative correlation with anxiety, depression, and neurotic disorders (Jerusalem & Mittag, 1995). Mindfulness is one of the psychological treatment methods for treating dysfunctional cognitions and reducing interpersonal problems. Mindfulness or presence of mind means awareness of thoughts, behavior, emotions, and motivations so that we can better manage and regulate them (Hayes, 2004). Being overweight is also one of the variables closely related to the increase in the prevalence of diabetes type 2. Based on the fact that adipose tissue is an important endocrine organ, it is not surprising that obese participants are at a higher risk of developing diabetes (Haluzik

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et al., 2004; Havel, 2002). Increased secretion of resistin disrupts insulin action and glucose metabolism and acts as an important link between insulin resistance and obesity. The level of this hormone is high in diabetic and obese participants. An increase in resistin reduces insulin-dependent glucose transport, which ultimately leads to an increase in insulin resistance. While the consumption of anti-resistin antibodies increases the capacity of glucose transfer by insulin (Azab, 2016). One of the factors derived from lipids, which is involved in creating insulin resistance in obese participants, is free fatty acids. (FFA) (McGarry, 2002). There is evidence that in diabetes type 2, the increase in glucose and FFA levels leads to insulin resistance and decreased insulin secretion (Joseph et al., 2003).

The possible mechanisms of obesity in causing cognitive impairment include increased blood sugar, increased insulin, and damage to brain vessels (Morley, 2004). Poor control of blood sugar over a long period can destroy nerve cells in pain and increase the risk of dementia in participants with diabetes type 2 (MacKnight et al., 2002; Logroscino et al., 2004). The explanation of the results related to the improvement of body image can also be said that since many researchers have identified body image as a multidimensional construct that includes dimensions such as perception, attitude, cognition, behavior, body distortion, body dissatisfaction, evaluation, and the preference is for slimming (Smith & DeCoster, 2000). Therefore, correcting false beliefs can be very effective in improving negative body image. Actually, in methods based on cognitive therapy, familiarizing the participants with cognitive distortions and finally with the practical application of different methods of correcting external defects and identifying their strengths and positive points can lead to the improvement of the negative body

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image of the participants (Yousufian, & Asgharipour, 2012). Also, obesity treatments, which are specifically limited to restrictive diets and exercise prescriptions, are only effective in losing weight for a short period, and many participants return to their original weight within five years (Lasikiewicz et al., 2014). Since the treatment of obesity through the mentioned methods is associated with significant complications and weight gain, The use of psychological interventions for weight loss is particularly valuable (Foaldund et al., 2011).

In the past years, interventions based on mindfulness in the treatment of chronic disorders have received the attention of researchers and mental health experts. Several studies indicate the positive effect of these interventions in clinical and normal fields (Bohlmeijer et al., 2010; Gotink et al., 2015). Mindfulness means paying attention to the present time in a specific, purposeful, and non-judgmental manner (Kabat–Zinn, 1990). Mindfulness means being in the moment with whatever is now, without judgment and without commenting on what is happening. That is the experience of pure reality without explanation (Segal, Teasdale & Williams, 2002). Mindfulness adds elements of cognitive therapy to therapy in which the perspective of decentralization facilitates one's thoughts. This type of defocusing approach is also used for emotions and physical sensations. In this method, participants are taught to consider their thoughts and feelings as a part of themselves or a reflection of reality (Teasdale et al., 2000).

In this regard, several studies have investigated the effectiveness of mindfulness-based cognitive therapy on psychological functions and have concluded that mindfulness-based cognitive therapy training increases self-efficacy (Kaviani, Javaheri, and Bahirai, 2017). Controlling or treating obesity (Etfeghi, Sabet, and Mirhashmi, 2019) and quality of life

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(Safarinia and Dortaj, 2018) have beneficial effects on patients with physical and mental problems. Also, this method, by combining the skill of cognitive therapy based on mindfulness and cognitive techniques, provides the conditions so that a person can observe his negative thoughts separately and imaginatively refrain from getting involved with stable patterns of negative thinking (Parsons et al., 2017). According to the materials mentioned in this research, by implementing cognitive therapy training based on mindfulness, the researcher seeks to answer the question of whether cognitive therapy training based on mindfulness is effective in self-efficacy and weight loss in patients with diabetes type 2?

Method

This study is a quasi-experimental study with a pre-test-post-test design with a control group. The statistical population of this research is made up of diabetic patients covered by the health and treatment network of Salas city, who periodically referred to this network during the implementation of the research. Using a convenience sampling method, participants were randomly assigned to an experimental group (n=15) and a control group (n=15). The inclusion criteria were informed consent to participate in the research, being overweight and diabetic type 2, and successfully answering the questionnaires. The exclusion conditions were not being overweight, not attending cognitive therapy sessions based on mindfulness, not being successful in answering the questionnaires, and not agreeing with the research conditions. Based on the sampling method, first, in the pre-test, a self-efficacy questionnaire and a researcher-made questionnaire of individual information were distributed among the sample subjects, and they were asked to answer the questions honestly,

[DOI: 10.21859/ijpb.16.1.6]

after correcting and scoring, the individuals whose self-efficacy scores were low and overweight were identified and placed in the experimental and control groups. After carrying out 8 sessions of mindfulness therapy based on the cognitive therapy protocol based on mindfulness in the experimental group. The post-test was performed for two experimental and control groups. One month after the post-test, both groups were re-evaluated in the follow-up phase. Another point is that the control group did not receive any kind of training and psychological interventions until the end of the follow-up period.

Instruments

In this research, the 8-question questionnaire of Stanford Institute was used to measure the self-efficacy or belief of patients with diabetes type 2 regarding their ability to perform regular self-care and blood sugar control, which includes eight options with a range of scores from one to ten on a Likert scale. Answers are graded from one (not at all sure) to ten (very sure). In general, the range of scores is considered between 8 and 80, and the design of items and scoring is based on the self-efficacy scale of diabetic patients of Stanford University, USA (Stanford Patient Education Research Center, 2008). The reliability of this questionnaire has been reported from .71 to .85 in various studies conducted in Iran (Rezasefat Balesbaneh et al., 2014). Based on this, it is considered a suitable tool for research and clinical purposes. It was confirmed from the method of content validity in terms of the reliability of the tool by determining the internal consistency using Cronbach's alpha coefficient through a preliminary study on (35 participants). The questionnaire consisted of seven sections. The first section is related to personal characteristics, occupation, parents ' education, and socioeconomic status, and the second to seventh

[DOI: 10.21859/ijpb.16.1.6]

sections were programmed with awareness questions and theoretical constructs of behavior, and digital scales were used to measure overweight. Finally, the data were analyzed using statistical software (SPSS-24). The data according to descriptive indices (mean and standard deviation) and inferential indices (multivariate covariance analysis) at a significant level of less than 0.05 were analyzed. The description of semantic therapy training sessions is shown in Table 1.

Table 1

Description of the Method of Teaching Cognitive Therapy Sessions based on Mindfulness

Meetings	Title	Activity
1	Automatic guidance	Exercises of the session of eating a raisin with the presence of the mind and meditation of the body
2	Dealing with obstacles	Exercises of the body inspection meditation session, ten minutes of presence of the mind on the flow of breathing
3	The presence of the mind in breathing and on the body during movement	Movement sessions with a conscious state of mind, breathing and stretching exercises, performing stretching and breathing movements with the presence of the mind, and then doing meditation in a sitting position focusing on the awareness of breathing and body.
4	Staying in the present	Exercises of a five-minute session of visual or auditory presence of mind, meditation in a sitting position, awareness of breathing, body, sounds, thoughts, and awareness without

[DOI: 10.21859/ijpb.16.1.6]

		specific direction, walking with the presence of mind, a three-minute space of breathing.
5	Acceptance and permission to attend	Exercises of sitting meditation session, awareness of breathing and body, emphasis on understanding how to react to thoughts, feelings, and physical sensations created, introducing a difficult position in the exercise and exploring its effects on the body and mind, and three minutes of breathing space.
6	Thoughts, not facts	Exercises of the sitting meditation session, awareness of breathing and body, in addition to introducing the problem related to the exercise and realizing its effects on the body and mind, three minutes of breathing space.
7	Self-care at its best	The form of meditation session exercises in a sitting position, awareness of breathing, body, sounds, thoughts, and emotions, three minutes of breathing space, and planning the problem that arose in doing the assignment and realizing its effect on the body and mind.
8	Using the learned to cope with mood situations in the future	Exercises of the meditation session, the end of the meditation

According to Table 1 in the form of 8 weekly in a total of 8 sessions of two-hour, one session every week was trained, and the data obtained for the pre-test, and the pre-test of both groups using covariance analysis of the software SPSS 24 were analyzed.

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Results

The samples of this study were diabetes type 2 patients. The samples (intervention and control groups) were identical in terms of gender and educational demographic variables. Descriptive statistics showed that the number of patients in the intervention and control groups was 30 participants (15 participants in the experimental group and 15 participants in the control group). The mean and standard deviation of the variables separating the experimental and control groups are presented in Table 2.

Table 2

Mean and Standard Deviation of Research Variables in the Two Groups

Variable	the level	group	Average	standard deviation
self-efficacy	pre- test	experiment	48.73	3.01
		Control	48.33	3.22
	post-test	experiment	62.66	4.33
		Control	48.53	3.22
weight loss	pre- test	experiment	73.46	4.03
		Control	77	3.7
	post-test	experiment	71.13	4.27
		Control	77.20	3.72

Table 2 shows the mean (and SD) of the pre-test self-efficacy and weight loss in the experimental group. In the experimental group, the mean (and SD) of the pre-test self-efficacy and weight loss was 48.73 (3.01), and 73.46 (4.03), and in the control group was 48.33 (3.22), and 77 (3.7), respectively. In the experimental group, the mean (and SD) of the post-test self-efficacy and weight

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loss was 62.66 (4.33), and 71.13 (4.27), and in the control group was 48.53 (3.22), and 77.20 (3.72), respectively.

For data analyses, both multivariate and univariate covariance analyses were used. Before these analyses, the assumptions of the MANCOVA including normal distribution, homogeneity of variances, homogeneity of variance-covariance matrices, and homogeneity of the regression lines were examined. The results of the Kolmogorov -Smirnov test indicated that all data followed a normal distribution (p>.05).

Table 3

Mean and Standard Deviation of Research Variables in the Two Groups

N		30	30	30	30
Normal Parameters	Mean	48.5333	55.6000	75.2333	74.1667
	S.D.	3.07081	8.10959	4.20741	5.00402
Most Extreme Differences	Absolute	.129	.138	.078	.143
	Positive	.129	.138	.069	.082
	Negative	-.071	-.117	-.078	-.143
Test Statistic		.129	.138	.078	.143
Asymp. Sig. (2-tailed)		.200	.149	.200	.120

To check the homogeneity of variances, Levene's test was used. The results obtained from Levene's Test indicate that the F value is not significant at the alpha level of 0.05 for all variables. Therefore, the assumption of homogeneity of variances is upheld. Box's M test was utilized to assess the homogeneity of the variance-covariance matrix in the post-test stages. The results of this analysis are presented in Table 4.

[DOI: 10.21859/ijpb.16.1.6]

Table 4

Results of the Homogeneity of Variance -Covariance Metrices Using Box's M Test

Box's M	3.426
F	1.054
df1	3
df2	141120.000
Sig.	.368

The results presented in Table 4 indicate no significant difference (P>.05) between the correlation matrices of the dependent variables among the research groups, and confirm the assumption of homogeneity of the variance-covariance matrix.

As seen in Table 5, the interaction between the group and the pre-test is not significant (P<.05). In other words, the data support the hypothesis of homogeneity of the regression slopes.

Table 5

Investigation of the Assumption of Homogeneity of the Regression Slopes

Stage	Variable	Source	Sum of squares	D.F.	Mean square	F	Sig.
Post - Test	self-efficacy	Pre-Test & Group	18.924	2	9.462	1.819	.184
	Weight Loss	Pre-Test & Group	.369	2	.184	.524	.599

As seen in Table 5, the interaction between the group and the pre-test is not significant (P<.05). In other words, the data support the hypothesis of homogeneity of the regression slopes. due to the

[DOI: 10.21859/ijpb.16.1.6]

assumptions are met, both multivariate and univariate covariance analysis were used to analyzing the data.

Due to the assumptions being met, both multivariate and univariate covariance analyses were used to analyze the data.
The results of multivariate covariance analysis indicate a significant difference in at least one of the dependent variables among the studied groups. Furthermore, based on the effect size in the post-test stage, it can be concluded that the independent variable accounts for 92% of the variance in the continuous variables. (P < .05; F = 156.70; Eta = .92).

Table 6
Results of Multivariate Analysis of Covariance (MANCOVA)

Stage	Index	Value	F	Hypothesis s df	Error df	Sig.	Partial Eta	Observed Power
Post-Test	Pillai's Trace	.926	156.707	2.000	25.000	.000	.926	.0001
	Wilks' Lambda	.074	156.707	2.000	25.000	.000	.926	1.000
	Hotelling's Trace	12.537	156.707	2.000	25.000	.000	.926	1.000
	Roy's Largest Root	12.537	156.707	2.000	25.000	.000	.926	1.000

The results of multivariate covariance analysis indicate a significant difference in at least one of the dependent variables among the studied groups. Furthermore, based on the effect size in the post -test stage, it can be concluded that the independent variable accounts for 92% of the variance in the continuous variables. (p < .05; F = 156.70; Eta = .92).

Based on the results of multivariate covariance analysis, it was determined that there is a significant difference between the control and experimental groups in terms of at least one of the dependent variables (Table 6). However, the pattern of this

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difference is not clear. Therefore, univariate covariance analysis was used to examine the different patterns, and the results are presented in Table 7.

Based on the results presented in Table 7, it is evident that the F statistic, with a value of 150.727, is significant for self-efficacy during the post-test stage. This result indicates a significant difference in self-efficacy between the groups studied during the post-test phase.

Also based on the results presented in Table 7, it is evident that the F statistic (87.878) is significant for Weight Loss in the post-test stage. This result indicates a significant difference in Weight Loss between the two groups studied during the post-test stage.

Table 7

Results of ANCOVA Analysis Comparison of Differences between Experimental and Control Groups in Self-efficacy and Weight Loss

Stage	Variable	Source	Sum of squares	df	Mean square	F	Sig.	Partial Eta Squared	Observed Power
Post-Test	self-efficacy	Group	833.522	1	833.522	150.727	.000	.853	1.000
	Weight Loss	Group	29.787	1	29.787	87.878	.000	.772	1.000

Based on the results presented in Table 7, it is evident that the F statistic, with a value of 150.727, is significant for self-efficacy during the post -test stage. This result indicates a significant difference in self-efficacy between the groups studied during the post -test phase .

Also based on the results presented in Table 7, it is evident that the F statistic (87.878) is significant for Weight Loss in the post -test stage. This result indicates a significant difference in Weight Loss between the groups studied during the post-test stage.

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Discussion

This study was to investigate the effectiveness of cognitive therapy training based on mindfulness on self-efficacy and weight loss of patients with type 2 diabetes. The findings show that as a result of cognitive therapy training, there is a significant increase and decrease in self-efficacy and weight loss scores, respectively. Based on the results, it can be concluded that "cognitive therapy training based on mindfulness is effective on self-efficacy and weight loss". This research is consistent with the results of other research. By reviewing the subject literature and according to the results obtained from this research, it is possible to show the usefulness of interventions that can improve self-efficacy and weight loss with cognitive-therapeutic methods based on mindfulness. For example, the effectiveness of mindfulness increasing self-efficacy (Mize, 2015), hope (Aghabagheri, Mohammad Khani & Farahmand, 2012), psychological well-being (Brown, & Ryan, 2003), emotional regulation (Narimani et al., 2012), self-esteem and self-efficacy (Youssefian & Asgharpour, 2012), emotional tolerance (Kabat-Zinn, Lipworth & Burney, 1985) has been confirmed in different groups in previous research. Some researchers believe that mindfulness training creates beneficial changes in the quality of life and perceived stress, and this effect lasts over time and leads to an increase in self-efficacy and the hope of losing weight. Mindfulness training allows participants to stop dwelling on the past, blame themselves less for past events, and avoid making negative judgments about themselves and others.

The findings showed that mindfulness based on cognitive therapy increases psychological capital and its dimensions include resilience, self-efficacy, optimism, and hope for weight loss in diabetic patients. Mindfulness, based on cognitive therapy

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changes people's evaluation of various events and makes them have leave negative judgments about themselves and can effectively face stressful events and environmental conditions. Putting aside negative judgments about oneself effectively facing problems and increasing self-control can lead to increased self-efficacy. In addition, through mindfulness, people can recognize that focusing on some emotions is harmful and ineffective, and in this way, positive expectations for consequences and events increase in them. Positive expectation about outcomes and events leads to increased optimism. In general, optimism increases human motivation to adjust a healthy lifestyle. Mindfulness helps people to understand that negative emotions may occur, but they are not a fixed and permanent part of a person. This view can lead to the strengthening of hope in a person and make him/her pay attention to his/her role and agency and individual will in solving problems instead of responding to incidents and different paths to reach the goal. Think and give richness and meaning to your life. It seems that by practicing mindfulness, people can consciously and purposefully increase the capacity and ability of their controlled information processing system and also change their evaluation of surrounding affairs.

In automatic processing processes, a kind of unconsciousness occurs in which a person makes the least effort to process information and processes information inflexibly. Hence, it can be said that due to the emphasis on controlled processing and moment-to-moment attention in mindfulness training, people gain the ability to face internal and external stimuli directly without bias and negative judgment and with appropriate evaluation methods to face and cope with problems. Adopting the right way to solve problems leads to increasing resilience and reducing the effects of injury and the consequences of being

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overweight and helps a person to achieve positive adaptation and re-balance after a short period. In general, it can be said that in the current study, through mindfulness based on cognitive therapy, we could create this change in diabetic patients who use mindfulness as a way to better relate to life, give meaning and richness to their lives, and the ability to stand back and observe situations that have negative effects on themselves.By abandoning the automatic processing and trying to control the processes through re-understanding, they will control their mood and self-efficacy and increase their psychological capital.

As a result, it is possible to increase self-efficacy and lose weight by designing cognitive therapy and mindfulness training courses and sessions. In explaining this result, it can be said that the more society invests in the cognitive therapy and mindfulness of its patients, it leads to self-efficacy and weight loss of patients, and they can take steps for their progress with a more positive spirit. In explaining these results, it can be said that cognitive therapy and mindfulness as a group rehabilitation method help the participants to gain a new and deeper understanding of life and the circumstances encourage it and encourage them to continue their life more hopeful and easier and do not stop the events of life and increase their self-efficacy. Self-efficacy is a kind of answer to the question of whether I can handle my work or not. Training based on cognitive therapy and mindfulness can improve participants' self-efficacy by giving appropriate assignments and working on cognitions, emphasizing flexibility, clarifying knowledge and discussing that change is possible and that successful implementation of the exercises will increase participants' self-efficacy.Different methods of weight loss can be effective in increasing self-efficacy and acceptance of responsibility by officials (Khodayari Fard, Hijazi and

[DOI: 10.21859/ijpb.16.1.6]

Hosseininejad, 2013). Therefore, it is recommended that therapists and counselors use this method to increase self-efficacy and hope in diabetic patients and it is suggested that in future researches, the effect of this method on reducing psychological problems and various aspects of well-being (psychological, emotional, and social) should be investigated in diabetic patients and their families. Due to the limitations of this research, which limits the study to research time and type 2 diabetic patients, it is suggested that future researchers investigate the effect of mindfulness based on cognitive therapy on self-efficacy and weight loss and other changes according to the types of diabetic patients.

Ethical considerations, participants provided written informed consent to participate in the study. A meeting was also held for the control group.

Conflict of interest: The author of this article declares no conflict of interest.

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