



# An investigation of effectiveness of cognitive behavioral therapy on attitudes of insulin-dependent patients with type II diabetes towards continuity of treatment among the patients referring to Mahdieh Hospital of Tehran, Iran

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## Original Article

### Abstract

**BACKGROUND:** Today, type 2 diabetes mellitus (DM) is one of the most common metabolic diseases that is still on the rise. Present study aimed at investigation of effectiveness of cognitive behavioral therapy (CBT) on attitudes of the patients with type II DM taking insulin towards continuity of treatment, considering the increasing trend of this disease and the necessity of providing appropriate treatment facilities.

**METHODS:** The study was conducted in semi-experimental method based on pretest-posttest and control group design. The statistical population included all insulin-dependent patients with type II DM, who were clients of Mahdieh Hospital of Tehran, Iran, in 2014. The convenience sampling was used based on which, 30 patients with type II DM were divided into two experimental (15 subjects) and control (15 subjects) groups and they responded to the questionnaire developed by the author. Then, the experimental group members experienced eight 90-minute sessions of CBT, while the controls received no intervention. Analysis of covariance (ANCOVA) with the SPSS software was used to analyze data.

**RESULTS:** CBT led to increased cognitive, behavioral, and affective attitudes of the patients with type II DM who were taking insulin. Given the derived F, the difference between experimental and control groups was significant in terms of cognitive, affective, and behavioral attitudes ( $P < 0.01$ ).

**CONCLUSION:** Totally, our results emphasize the role of CBT in attitudes of patients with type II DM taking insulin towards continuance of treatment.

**KEYWORDS:** Cognitive Behavioral Therapy; Attitudes; Insulin; Diabetes

**Date of submission:** 17 Mar. 2020, **Date of acceptance:** 15 Sep. 2020

**Citation:** Abangah M, AleYasin SA, Asheghalhosseini S. An investigation of effectiveness of cognitive behavioral therapy on attitudes of insulin-dependent patients with type II diabetes towards continuity of treatment among the patients referring to Mahdieh Hospital of Tehran, Iran. *Chron Dis J* 2021; 9(1): 14-21.

## Introduction

Today, all developing and developed countries are experiencing epidemics of diabetes mellitus (DM), especially type II DM. Type II DM is one of the metabolic diseases associated with relative

or definitive defects of insulin, increased blood glucose, and disrupted metabolism of carbohydrate, lipids, and protein.<sup>1</sup>

World Health Organization (WHO) has predicted that DM in Iran will involve about 6.8% of the population by 2025. This disease is the most common cause of renal diseases, new cases of blindness, and non-traumatic limb amputation. Annually, more than 250 people die due to the problems resulted from DM,

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while 500 ones are at risk of heart attacks and strokes. Currently, in developed countries, per known patient, there is at least one unknown patient. While the situation is completely different in developing countries; there may be up to four other unidentified patients per known patient. Considering the global statistics on the percentage of patients with DM and the corresponding effective variables, it seems that in Iran, more than 4% of the population (i.e., about 3 million people) suffer from DM.<sup>2</sup>

The prevalence and incidence of this disease in most countries is still increasing with no stopping. The number of people with DM has risen from 118 million in 1995 to 220 million in 2010, and it is expected to reach 300 million in 2025.<sup>3</sup>

On the other hand, DM creates a series of issues for people with such disease. DM-induced stress not only has a negative psychological effect but also provides subjective effects. One of the most important effects is depression. Depression in patients with DM may be accompanied by anorexia, an irregularity in the diet, or the inability to receive insulin from the patient, making it difficult to treat and control DM. This issue in a defective cycle exacerbates one's emotional problems, including stress, depression, and anxiety. Therefore, recognizing the psychological problems of these patients, removing or reducing these problems, along with training to improve their quality of life (QOL) are an important part of comprehensive DM management.<sup>4</sup>

Among the many studies conducted in recent years on the causes, trends, prognosis, and treatment of DM, psychological factors have been particularly paid attention. These psychological factors can affect the attitude and motivation of patients to continue treatment.<sup>5</sup> In doing so, attitude is defined as durable system including an emotional component with a tendency to act, and a cognitive component. The former consists of

the emotions and affections about the subject and how to tend to act. The latter includes the thoughts on which one has a particular attitude, including facts, knowledge, and beliefs<sup>6</sup> as well as motivation which is involved with the energy to guide and continue a behavior.<sup>7</sup> Besides, motivation is defined as the desire to work hard in order to achieve the organizational objectives in such a way that such an effort is aimed at satisfying some of the individual needs.<sup>8</sup>

Amirkhani<sup>9</sup> proved effectiveness of self-care training and thus increased awareness, attitude, and functioning of the patients with type II DM compared to the controls in terms of caring foot and diet. The results of Ibrahim<sup>10</sup> showed that self-management training program was effective in improving knowledge, attitude, and practice of patients with type 2 DM.

In addition, Esmaili *et al.*<sup>11</sup> showed that regular cognitive behavioral therapy (CBT) sessions could improve lifestyle of the patients with type II DM and relieve their depression. They revealed that problem-solving training was effective on QOL and lifestyle of patients with type II DM and such an effectiveness would sustain up to three months after intervention.

Accordingly, the results of Gonzalez *et al.*<sup>12</sup> showed that CBT was effective in improving blood sugar control, self-management, and depression. The results of the study by Dilekler *et al.*<sup>13</sup> showed that the theory of planned behavior was effective in the treatment of type 2 DM.

Bittel *et al.*<sup>14</sup> argue that the patients with type II DM have an incorrect lifestyle and suitable diets and sport are not paid attention in their life. In this regard, CBT is the conventional therapeutic method which is able to decrease depression and improve lifestyle among such patients. In addition, psychological interventions have a deep impact on the patient's physical status for metabolic control of DM, indicating importance of psychological interventions for

effective DM control.<sup>15</sup>

Among treatments that involve psychological factors, we can point to the CBT. The goal of CBT is to reduce self-incriminating attitudes and improve positive trends and coping skills. In other words, this therapy is an intervention that generates behavioral and emotional changes by learning new ways of coping and recognizing thoughts in a problem-centered manner.<sup>16</sup>

The conducted studies focus on such issues as relaxation and biofeedback, and have rarely or very little concentrated on cognitive training and other necessary skills for an adaptive life. Besides, these studies mainly look for determining the effect of programs implemented on metabolic control of blood glucose and have paid no attention to other important indicators related to mental health such as depression. In addition to these shortcomings, most studies in this area have been accompanied by methodological defects, including inadequate sample sizes or poor statistical methods. The aforementioned issues confirm the necessity of appropriate therapeutic measures to control this type of DM disease in efficient ways with a focus on the mental aspect of the disease. It also needs urgent attention because of the large number of people affected and its complications. Hence, in the present study, we tried to investigate the effectiveness of CBT on the attitude of insulin-dependent patients with type II DM and find more motivation for continuation of treatment among patients referring to Mahdiah Hospital of Tehran, Iran.

## Materials and Methods

The study was conducted in a semi-experimental method based on pretest-posttest and control group design. The statistical population included all patients with type II DM taking insulin, who referred to Mahdiah Hospital of Tehran in 2014. Given that at least 15 individuals in each group are eligible for the experimental study, the

sample population and those willing to participate in the study included a sample size of 30 individuals selected by convenience and purposeful sampling. The convenience sampling was used based on which, 30 patients with type II DM were divided into two experimental (15 subjects) and control (15 subjects) groups and they responded to the questionnaire developed by the author. Then, the experimental group members experienced eight 90-minute sessions of CBT, while the controls received no intervention. Analysis of covariance (ANCOVA) with the SPSS software (version 19, SPSS Inc., Chicago, IL, USA) was used to analyze data.

Following ethical considerations were taken into account in this study:

- Voluntary attendance of patients with type 2 DM in cognitive therapy sessions and informed consent to attend sessions
- Respecting the patients' privacy rights including anonymity and confidentiality
- Avoiding to expose patients to mental or physical stress or risk
- Having the right to choose patients in the decision to withdraw from the intervention
- Free training sessions

The CBT program was presented briefly as follows:

*Session 1:* Introduction, initial communicating, pretest implementation, making familiar with the principles and objectives of the sessions, identification of beliefs and problems, making familiar with the style of explanation, presenting the assignments, and receiving feedbacks

*Session 2:* Reviewing the summary of the previous session and the assignments, recognizing and defining the emotions, stating the purpose and rules of CBT, presenting the assignments, and receiving feedback

*Session 3:* Reviewing the assignments of previous session, training the cognitive model and making familiar with automatic thoughts and techniques to identify automatic thoughts, identifying cognitive distortions, considering thoughts as assumptions, presenting

assignment, and receiving feedback

*Session 4:* Training core beliefs and schemas, training techniques for identifying core beliefs and schemas, training self-efficacy concepts, resilience and emotion-regulation, expressing strategies for achieving these goals, presenting assignments, and receiving feedback

*Session 5:* Reviewing the assignments of previous session, training the techniques for increasing the resilience and self-efficacy, identifying the self-cognitive error, planning and setting goals, providing assignments, and receiving feedback

*Session 6:* Reviewing the assignments of previous session, training the techniques for assertiveness, empathy, and understanding others' emotions, decision-making skills, providing assignments, and receiving feedback

*Session 7:* Reviewing the assignments of previous session, training the techniques for avoiding negative thoughts, methods for identifying self-control methods, internal and external control centers, deep breathing stress reduction techniques, and receiving feedback

*Session 8:* Concluding and implementing the posttest post-test

Researcher-developed questionnaire was used to measure variables. This scale was employed as pretest and posttest questionnaires for the experimental group, and was derived from the attitude measurement scale as well as Heart Patients Adherence IMB Scale (HPAIMBS).<sup>17</sup> The reliability and validity of this instrument were calculated and proven after design. The subscales and questions associated with each subscale are presented in table 1.

**Table 1. Scale, subscales, and questions in this study**

Scale	Subscales	Related questions
Attitude	Cognitive	1-5
	Affective	6-10
	Behavioral	11-15

Questions 1-5 are based on the patient's belief on specifications of the attitude topic, the questions 6-10 are mainly based on emotions

and values, and the questions 11-15 emphasize on behavior and the way of individual behaving towards the topic. In order to gain score of each aspect, the scores obtained from questions of the related aspect were summed up. Besides, the scores were totally summed to calculate the total score of the questionnaire.

In terms of validity or reliability of the questionnaire used in this research, content validity was initially paid attention. The questionnaires were submitted to the respective experts and scholars and their views on how best to gain the validity were logged. After verifying the content and face validity of the research instrument, the reliability of the questionnaire was examined by 35 experts. Using the gathered data from questionnaire and SPSS software, the confidence coefficient was calculated by Cronbach's alpha for cognitive, affective, and behavioral subscales as 0.79, 0.81, and 0.84, respectively.

## Results

Table 2 presents the descriptive indicators of the variables separated by control and experimental groups.

As it can be seen from table 2, the mean values of affective attitude, cognitive attitude, and behavioral attitude of the experimental group members were increased in posttest. In addition, Kolmogorov-Smirnov (K-S) statistics showed normal data distribution. Next, the hypotheses were evaluated.

H1: CBT is effective on affective attitudes of insulin-dependent patients with type II DM towards continuation of treatment. The results of the regression line slope consistency test showed that the pretest and posttest regression slope of affective attitude was insignificant in both experimental and control groups ( $F = 1.57$ ,  $P < 0.21$ ). Therefore, it can be concluded that the slope of the pretest and posttest regression is equal within both groups. In order to examine this hypothesis, one-way ANCOVA was used after ensuring assumptions.



**Table 2. Descriptive indicators of the variables separated by control and experimental groups (n = 30)**

Variable	Status	Group	Mean $\pm$ SD	K-S Z	P
Affective attitude	Pretest	Experimental	14.80 $\pm$ 4.63	0.911	0.378
		Control	13.20 $\pm$ 1.69	0.731	0.660
	Posttest	Experimental	21.33 $\pm$ 2.32	0.567	0.905
		Control	13.07 $\pm$ 2.67	0.453	0.987
Cognitive attitude	Pretest	Experimental	18.33 $\pm$ 5.00	0.420	0.995
		Control	17.27 $\pm$ 3.63	0.759	0.612
	Posttest	Experimental	21.87 $\pm$ 2.50	0.986	0.285
		Control	16.47 $\pm$ 2.50	0.727	0.666
Behavioral attitude	Pretest	Experimental	14.67 $\pm$ 3.20	0.743	0.639
		Control	13.40 $\pm$ 2.56	0.692	0.725
	Posttest	Experimental	20.27 $\pm$ 2.15	0.713	0.690
		Control	11.80 $\pm$ 3.38	1.007	0.262

K-S Z: Kolmogorov-Smirnov Z test; SD: Standard deviation

Table 3 presents results of ANCOVA for the difference of experimental and control groups in terms of affective attitude. F-value of affective attitude in the posttest is 76.58, which is significant at the level of 0.001, indicating a significant difference between the two groups in terms of affective attitude.

To determine which group has a higher mean value in the posttest regarding the affective attitude after adjustment and control of the pretest scores, the corrected averages were as 21.09  $\pm$  0.62 and 13.31  $\pm$  0.62 for experimental and control groups, respectively.

It is noteworthy to mention that Bonferroni correction approach was used to estimate the final averages. Besides, according to table 3, the effect size indicates that group membership accounts for 74% of affective attitude changes.

Given the table 4, the mean value of experimental group in terms of affective attitude was greater than that of control group which is significant according to the F test in table 3. Therefore, H1 is supported and confirmed.

H2: CBT is effective on cognitive attitudes of insulin-dependent patients with type II DM

towards continuation of treatment. Analysis of variance (ANOVA) was also used here to examine H2. Before presenting results of this test, the results of F test to assess homogeneity of regression slope indicated that such a consistency was insignificant in terms of cognitive attitude between experimental and control groups (F = 2.16, P < 0.18).

Table 4 presents results of ANCOVA for the difference of experimental and control groups in terms of cognitive attitude. F statistics of cognitive attitude in the posttest is significant at the level of 0.001, indicating a significant difference between the two groups in terms of cognitive attitude. To which group has a higher mean value in the posttest regarding the cognitive attitude after adjustment and control of the pretest scores, the corrected averages were as 21.71  $\pm$  0.56 and 16.62  $\pm$  0.56 for experimental and control groups, respectively.

It should be noted that Bonferroni correction approach was used to estimate the final averages. Besides, according to table 4, the effect size indicates that group membership accounts for 60% of cognitive attitude changes.

**Table 3. Results of analysis of covariance (ANCOVA) for the difference of experimental and control groups in terms of affective attitude**

Experimental SSE	Error SSE	Experimental MSE	Error MSE	F	P	Effect size
278.530	151.860	278.530	5.620	76.580	0.001	0.740

SSE: Sum of squares error; MSE: Mean square error

**Table 4. Results of analysis of covariance (ANCOVA) for the difference of experimental and control groups in terms of cognitive attitude**

Experimental SSE	Error SSE	Experimental MSE	Error MSE	F	P	Effect size
309.361	128.440	309.361	4.760	40.110	0.001	0.600

SSE: Sum of squares error; MSE: Mean square error

The mean value of experimental group in terms of cognitive attitude was greater than that of control group which is significant according to the F test in table 4. Therefore, H2 is supported and confirmed.

H3: CBT is effective on behavioral attitudes of insulin-dependent patients with type II DM towards continuation of treatment. ANOVA was also used here to examine H3. Before presenting results of this test, the results of F test to assess homogeneity of regression slope indicated that such a consistency was insignificant in terms of behavioral attitude between experimental and control groups ( $F = 1.42, P < 0.23$ ).

Table 5 presents results of ANCOVA for the difference of experimental and control groups in terms of behavioral attitude. F statistics of behavioral attitude in the posttest is significant at the level of 0.001, indicating a significant difference between the two groups accordingly.

In order to determine which group has a higher mean value in the posttest regarding the behavioral attitude after adjustment and control of the pretest scores, the corrected averages were as  $20.40 \pm 0.74$  and  $11.67 \pm 0.74$  for experimental and control groups, respectively. It should be noted that Bonferroni correction approach was used to estimate the final averages. Besides, according to table 5, the effect size indicates that group membership accounts for 72% of behavioral attitude changes.

The mean value of experimental group in terms of behavioral attitude was greater than that of control group which is significant

according to the F test in table 5. Therefore, H3 is supported and confirmed.

## Discussion

The findings of this study showed that CBT was effective on cognitive, emotional, and behavioral attitudes of patients with type 2 DM and the emergence of motivation to continue treatment. Our findings support the first hypothesis and it can be argued that CBT is positively and significantly effective on affective attitude of insulin-dependent patients with type II DM towards continuation of treatment and motivation for that.<sup>10,15,17-20</sup>

The findings also support the second hypothesis and it can be confirmed that CBT is significantly effective on cognitive attitude of insulin-dependent patients with type II DM towards continuation of treatment and motivation for that.<sup>10,19-25</sup>

Finally, our findings support the third hypothesis, as well. Accordingly, it can be declared that CBT is significantly effective on behavioral attitude of insulin-dependent patients with type II DM towards continuation of treatment and motivation for that.<sup>12,15,19-21</sup>

In explaining these findings, it can be argued that CBT with attitudinal and behavioral change techniques can motivate individuals and change their cognitive patterns and, based on the content of treatment, positive effects can be achieved on patients' attitudes. CBT is a problem-oriented treatment that addresses cognitive definitions, false testimonies, and low self-esteem.

**Table 5. Results of analysis of covariance (ANCOVA) for the difference of experimental and control groups in terms of behavioral attitude**

Experimental SSE	Error SSE	Experimental MSE	Error MSE	F	P	Effect size
413.669	214.920	413.669	7.960	68.360	0.001	0.720

SSE: Sum of squares error; MSE: Mean square error

In doing so, Markowitz *et al.*<sup>26</sup> argue that the treatment aims to reduce the self-incriminating attitudes, increase positive testimonies, and improve coping skills. In other words, CBT is an intervention that generates behavioral and emotional changes by learning new ways of coping and recognizing thoughts in a problem-centered manner.

Generally, present study showed that CBT played an important role in the attitude improvement of insulin-dependent patients with type II DM and more motivation for continuation of treatment. Considering the effect of CBT on improving the attitude toward continuation in patients with DM, this treatment can be presented as a recommended approach besides medical treatments in hospitals.

Present study faced several limitations including lack of similar research in Iran and even abroad as well as the inability to generalize the results of present research to other statistical population.

CBT is proposed to be considered as an efficient method to increase the motivation for continuance of treatment. It is also recommended to emphasize the advertisements on television networks and presentation of a program for introduction of this therapeutic approach.

Finally, this approach is suggested to be implemented in group form because it has such advantages as modeling, observational learning, empathy, reception, support, and help from other members of the group.

### Conclusion

According to the research findings, CBT has a positive effect on the attitude of insulin-dependent patients with DM towards the continuation of treatment.

### Conflict of Interests

Authors have no conflict of interests.

### Acknowledgments

First of all, thank God Almighty for helping us in this research. I would also like to thank the staff of Mahdiah Hospital.

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