Comparing the Effect of Acceptance and Commitment Therapy and Reality Therapy on Hemoglobin A1c in Type 2 Diabetic Patients

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Abstract

Introduction: Hemoglobin A1c (HbA1c) is the most important marker for monitoring long-term blood Glucose level control in diabetes. Currently, psychological approaches along with medical science play a significant role in the symptoms of diabetes. The present study compared the effectiveness of Acceptance and Commitment Therapy (ACT) and Reality Therapy (RT) on HbA1c level in Type 2 Diabetic (T2D) patients.

Method: This semi-experimental study was conducted on 100 patients referred to diabetes clinics in Torbat Heydarieh, 2020. For this purpose, 60 patients were selected using the available method and were randomly allocated into two experimental groups and one control group (equally 20 people in each group). Data collection tools included the blood glycosylated hemoglobin test and demographic information. Data analysis was done using SPSS and covariance analysis.

Results: Findings revealed that there is a significant difference between the HbA1c scores of ACT, RT with control groups in T2D patients. The mean of HbA1c after the intervention in the ACT group significantly decreased compared to the RT group ($P < 0.05$).

Conclusion: The results of this study showed that ACT is more effective in T2D patients than RT. Therefore, this technique can be used in order to improve the control indicators of T2D patients.

Keywords: Type 2 Diabetes Patients, HbA1c, Acceptance and Commitment Therapy, Reality Therapy

Introduction

Diabetes disease is caused by impaired insulin secretion or insulin action or both, and is characterized by high blood Glucose [1]. T2D refers to a group of metabolic diseases whose common feature is an increase in blood glucose levels due to a defect in the secretion of Insulin, a defect in its function or both, and it is estimated that by 2030, the number of people suffering from it will reach more than 366 million people [2, 3]. Meanwhile, the number of people with diabetes in Iran has been reported as 7.7% [4].

In the etiology of type 2 diabetes, the role of environmental factors is prominent [2]. Studies have shown that the occurrence of long-term complications in diabetes patients such as heart, eye, kidney, psychological, personal, family and social communication complications are common [5]. Moreover, research showed that the progression of type 2 diabetes complications and the high costs of treating this disease is mainly caused by improper control of glycosylated hemoglobin [6]. Hemoglobin A1c (HbA1c) is a protein that is clinically recognized as the most important marker for monitoring long-term blood sugar

control. If the fasting sugar level or A1c is close to diabetes, a 75-gr sugar tolerance test is also recommended [7].

Experts in this field believe that although behaviors such as a proper diet may cause a decrease in glycosylated hemoglobin, due to the chronic nature of diabetes, as long as a person with diabetes measures blood sugar, concerns will reappear [8] and as long as negative emotions related to diabetes appear, the patient's condition becomes unfavorable, and for this reason, psychological treatments are an effective step in eliminating the concerns of patients. A very important point in the field of treating patients with T2D is to recognize and investigate approaches to increase the motivation of these patients to increase life satisfaction, perform persistent self-care and self-monitoring behaviors, as well as methods to reduce stress caused by death in these patients. This is where the importance of psychological approaches becomes important in the effectiveness of these variables [9]. Furthermore, studies showed that the medical model alone does not respond to many needs and problems of people with diabetes [10], because many factors such as psychological and emotional problems prevent the implementation and continuation of medical care [11]. Therefore, for the treatment of diabetes, in addition to medical treatments, there are several psychological treatments, including cognitive-behavioral therapy [12], humanistic therapy, and therapy based on acceptance and commitment (ACT) [13].

One of the most effective therapies in this field is the ACT method [14]. This therapy was created by Hayes in 2016 and is a part of the third wave behavioral therapies, which instead of focusing on changing the form, content, or frequency of thoughts and feelings, changes their function [15]. Paying attention to factors such as acceptance, commitment and movement in the path of values are among the areas that distinguish this intervention from other psychological approaches and can provide significant help to patients [16]. The most important principle in ACT is to draw a person's full attention to the current moment-to-moment experience, accepting current experiences without any judgment [17] and creating the ability and psychological flexibility to perform constructive and effective activities in line with meaningful personal values despite the existence of many sufferings [18].

Considering the high mental pressure of patients with diabetes, it is necessary to perform psychosocial interventions for this group [19]. Studies show that disease avoidance is common among diabetic patients, and this is consistent with the principles of ACT therapy, which considers the main problem of not performing self-care practices to be experiential avoidant [13]. In various studies, the effectiveness of ACT on the physical symptoms of people with diabetes has been proven [20]. Another method that has recently attracted the attention of researchers is RT [21]. Glaser's RT approach is a relatively straightforward approach that trusts the client's ability to address their needs through a logical or realistic process [22]. In this therapeutic approach, people are helped to become aware of their wrong behaviors and inappropriate methods of controlling the environment, to evaluate the degree of closeness of their desires to reality, to identify behaviors that do not lead to improvement in life and to deal with them and to adopt appropriate

methods to change them [23]. In the RT method, patients are helped to examine their desires, needs, values, and ways to achieve their needs; In fact, its main purpose is to create a sense of responsibility, and in chronic diseases such as diabetes, which is the main burden of care on the patient's shoulders, it can be very important [24].

Due to the importance of glycosylated hemoglobin as the most reliable metabolic diagnosis of diabetes, which has been measured in most research in this field to determine the effect of a specific treatment method or to determine the degree of compatibility with the disease, and due to the lack of studies conducted in the field investigating the effectiveness of psychological treatments on the life of this patients, the present research investigated and compared the effectiveness of ACT and RT on the HbA1c level in diabetic patients.

Method

This research was a semi-experimental study with a pre-test and post-test design and a control group. The statistical population included 100 patients referred to the diabetes clinics of Torbat Heydarieh in 2020. For this purpose, 60 patients were selected by the available sampling method and randomly assigned to three groups of 20 people including ACT, RT and control groups.

The inclusion criteria included lower HbA1c (a lower score indicates more problems), age over 40 years, continuously attending meetings, not having obvious physical and psychological problems, and not being subjected to group ACT and RT. The exclusion criteria also included the presence of other serious medical diseases, being under psychological treatment, the presence of cognitive disorders or weakness in cognitive functions.

In this study, after obtaining the necessary permits from the University of Medical Sciences, the necessary coordination was made with the clinic management. Then the people who were willing to participate in the research were selected as samples. Necessary explanations were given to them about the objectives and the method of conducting the research. Informed consent was obtained from the volunteers and they were assured of confidentiality and privacy.

At the beginning of the study, after the participants were assigned to three groups of ACT, RT and control, the blood glycosylated hemoglobin test was taken from the three groups as a pre-test, and their HbA1c was checked and recorded.

Glycosylated hemoglobin test: HbA1c test is the best tool for long-term evaluation of blood sugar in the last 2-3 months. This index is reported as a percentage and can be interpreted by any laboratory according to the normal range (score higher than 5.5 mmol/L). The advantage of using this test is that it can identify problems such as high blood glucose levels after meals or during the night, which are sometimes not detected by glucometer measurements.

In the following, the experimental group based on ACT received treatments for nine weeks and twice a week and each session lasting for 90 minutes based on the treatment protocol of Bach and Moran [25]. The RT group received treatments for 10 weeks and twice a week and each session lasting for 90 minutes based on Glaser's treatment protocol [24],(Tables 1 and 2). The control group did not receive any intervention. After the implementation of the intervention sessions, the post-test was performed on all three groups. At the end, in order to

comply with ethical considerations, the control group was offered to undergo positive psychotherapy if they wished to.

Qualitative variables were settled as frequency and percentage, and quantitative variables were expressed as mean and standard deviation. Data were analyzed by using SPSS version 21 software and multivariate covariance analysis.

Table 1. Reality Therapy Protocol [24]

Session	Content
1	Introduction and general acquaintance with the format of sessions, creating psychotherapy, performing tests and designing the problem of registering a positive self-introduction on a page by clients.
2	Recognizing the five basic human needs, listing the basic needs with their own efforts and consultant's help and examining the importance of meeting these needs.
3	Asking for an overview of their current employment and cohabitation and investigating the causes.
4	Explaining about general behavior and its four components (action, thought, feeling, physiology) and teaching that a person is able to directly control action and thought, and the other two components of behavior can be done only indirectly by controlling action and thought.
5	Determining the degree of access or failure to use current behavior and action for employment and examining how their current behavior can help members achieve their goals and needs.
6	Receiving feedback from the previous session, helping people understand their current behavior and feelings, and downplay the past in their current behavior and emphasizing internal control over employment.
7	Familiarizing people with their responsibilities and helping them accept and increase their responsibility for choosing behaviors and strategies that lead to a tendency to despair and reduce happiness in employment.
8	Receiving feedback from the previous session, determining the importance of planning to get things done faster and better, and making the best use of time and learning proper planning to achieve other goals in a married life.
9	Familiarity with issues of change and commitment, and presenting tasks, however small, based on increasing self-esteem, valuable self-concept until the next meeting and getting a written commitment from members to implement it and not accepting any excuses.
10	Receiving feedback from previous sessions, reviewing and re-emphasizing members' acceptance of responsibility, helping individuals to replace internal control, facing reality, making ethical judgments about right and wrong behavior, being in the present and now, and finally processing change which leads to a decrease in anxiety and an increase in positive emotions.

Table 2. ACT Group Protocol [25]

Sessions	Purposes	Content
1	Familiarity and building trust	Basic acquaintance with the authorities and establishing a relationship and building trust and conducting a pre-test
2	Explaining about diabetes and its types, review of treatments related to diabetes, its costs and benefits, psychological education	Review of treatments related to diabetes and its costs and benefits, psychological education, rest and hospitality, providing homework
3	Assessing patients' expectations of ACT	Discussion of their experiences, assessing the individual's willingness to change, assessing patients' expectations of ACT, and providing homework
4	Avoiding painful experiences and being aware of the consequences of avoidance	Explaining the concept of acceptance and its difference with the concepts of failure, despair, denial, resistance and... Expressing the permanence of the admission process and its non-intermittency, talking about the problems and challenges of accepting diabetes, explaining about avoiding painful experiences and awareness of consequences of avoidance
5	Introduction and understanding of self-reinforced fusion, application of cognitive fusion techniques	Introducing and understanding self-reinforced fusion, application of cognitive fusion techniques, intervention in the performance of problematic language chains and metaphors; Undermining your waste with thoughts and emotions.
6	Demonstrating separation between self and inner experiences and observed behavior as context.	Demonstrating separation between self and inner experiences and behaviors observed as context, weakening self-concept and self-expression in these exercises, training participants to focus on their activities such as breathing and walking
7	Identifying the values of patients' lives and specifying and focusing on these values and paying attention to their power of choice.	Identifying the values of patients' lives and clarifying and focusing on these values and paying attention to their power of choice, using mindfulness techniques with emphasis on the present.
8	Differences between values, goals, mistakes, and possible internal and external barriers to pursuing values	Explaining the differences between values and goals and common mistakes in choosing values, listing the most important values and possible obstacles in their pursuit by members and sharing with others, group discussion on values-related goals and characteristics of specific goals that can be evaluated and realistic and in line with personal values, identifying three of the most important values of the members and determining the goals of the follower, each of those values and identifying actions and behaviors to achieve those goals.
9	Review and summary	Understanding the nature of desire and commitment (commitment to action training): identifying behavioral plans in accordance with values and creating a commitment to act on them, expressing points about the concept of recurrence and readiness to deal with it, reviewing assignments and concluding meetings with clients

Results

The demographic variables of the participants showed that 30(50%) were men and 30(50 %) women. In terms of age, 14(23.33%) people were 31 to 40 years, 15(25%) people 41 to 50 years, 19(31.67%) people 51 to 60 years and 12(20%) people over 60 years. In terms of educational level, 16(26.67%) had diplomas degree and lower, 27(45%) had BA degree, 17(28.33%) had MA degree and above. The mean and standard deviation of the studied variables in the three groups have been separately presented in Table 3.

The presuppositions of the covariance analysis test were checked before the analysis. The normality of the data was investigated and the results of the Kolmogorov-Smirnov test are also shown in Table 3.

Box's test was performed to check the equality of the covariance matrix. The hypothesis of equality of covariance matrix was maintained (F = 0.088 and P> 0.05). The heteroscedasticity test of the variable variance of HbA1c in three groups was checked. The value of chi-square statistic is equal to 1.025 and P-value = 0.311. As

a result, the hypothesis of equality of variances has been met. As can be seen in Figure 1, the assumption of homogeneity of the slope of the regression line has also been observed for the HbA1c variable.

The results of analysis of covariance (ANCOVA) are presented in Table 4. According to the results, the HbA1c scores before the intervention had an effect on the HbA1c score after the test (in general, if the pre-test scores are effective, its value is controlled not to affect the final results). The results of the corrected model showed that after removing the effect of HbA1c pre-test scores and adjusting the effect of the confounding variable, a significant difference has been observed between the average scores of HbA1c after the intervention in the groups of control, ACT, and RT (F= 74.78, P < 0.05).

In order to investigate the maximum effect of research groups on changes in HbA1c, Bonferroni's post hoc test was used (Table 5). Based on the results, the greatest decrease in HbA1c has been observed in the ACT group.

Table 3. Mean of Studied Variables in Pre-test and Post-test and the Normality of Data

Group		Mean ± SD	Kolmogorov-Smirnov	
ACT		7.69 ± 1.09	0.15	0.20
RT	Pre HbA1c	7.65 ± 1.10	0.12	0.20
Control		7.66 ± 1.03	0.20	0.06
ACT		5.88 ± 0.94	0.22	0.07
RT	Post HbA1c	6.88 ± 0.96	0.17	0.12
Control		7.67 ± 0.96	0.17	0.12

Control group, $r^2 = 0.879$

RT group, $r^2 = 0.866$

ACT group, $r^2 = 0.557$

$y = 1 + 0.87*x$
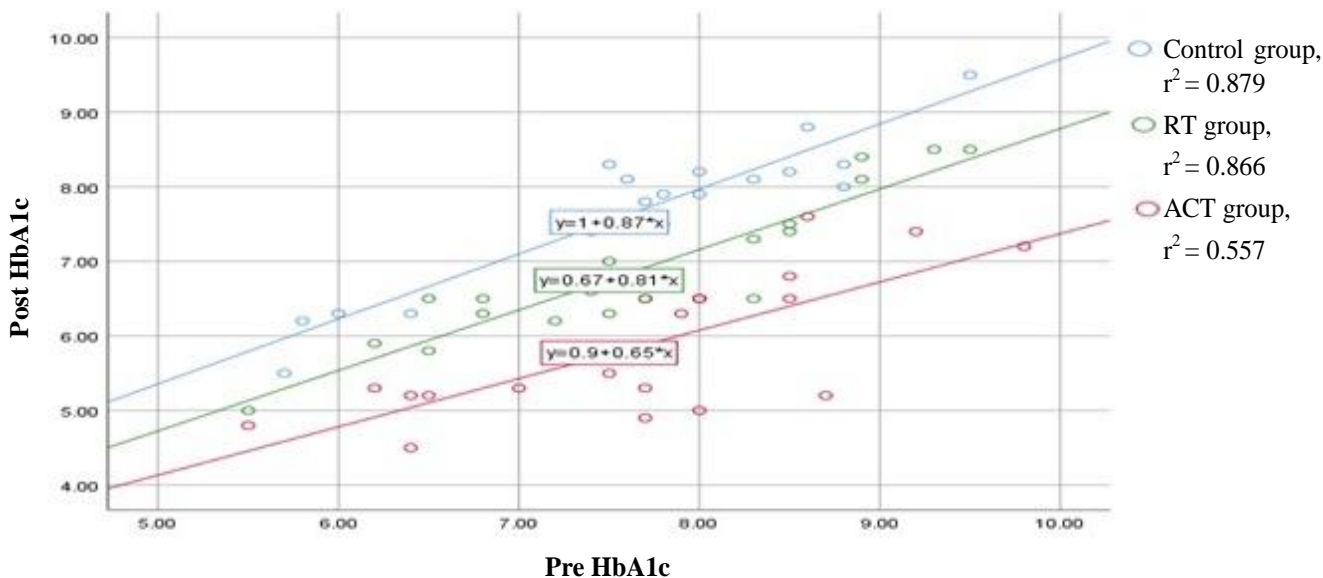
$y = 0.67 + 0.81*x$

$y = 0.9 + 0.65*x$

Figure 1. Examining the similarity of the relationship between the HbA1c variable before and after the intervention among the three groups.

Table 4. Analysis of Covariance of HbA1c Variable in ACT, RT, and Control Groups

Group	Sum of square	df	Mean sum of square	F	P	Etha square
Corrected model	71.49	3	23.83	106.78	0.0009	0.85
Fixed effect	0.84	1	0.84	3.80	0.056	0.06
HbA1c pretest	39.13	1	39.13	175.36	0.0009	0.75
Group	33.38	2	16.69	74.78	0.0009	0.72

Table 5. Bonferroni's Post Hoc Test

(I) Group	(J) Group	Mean difference	SD	P	Confidence level	
					Lower bound	Higher bound
ACT	Control	1.82*	0.14	0.0009	1.45	2.19
RT		0.79*	0.14	0.0009	0.42	1.16
Control	ACT	-1.82*	0.14	0.0009	-2.19	-1.45
RT		-1.03*	0.14	0.0009	-1.40	0.66
Control	RT	-0.79*	0.14	0.0009	-1.16	-0.42
ACT		1.03*	0.14	0.0009	0.66	1.40

Discussion

The present study was done with the aim of comparing the effectiveness of two treatment methods of ACT and RT on the HbA1c in diabetic patients. The results showed that the effectiveness of ACT on HbA1c level in T2D patients is higher compared to RT. This result confirmed the findings of Shayeghian et al., [26], and Bani Hashemi et al., [27]. However, it was not consistent with the results of Khanbabaei et al.'s study, which found that RT is more effective than ACT on self-care behaviors in female patients with breast cancer [28]. They acknowledged that RT has been able to increase their self-care behaviors by increasing the acceptance level of patients. Considering that HbA1c is somehow dependent on people's attitude and can change according to people's attitude and behavior, perhaps in the follow-up phase, which required more time, the effectiveness of RT could be seen more, which was not done in this follow-up study. In the study of Asadi Khalili et al., [29] both ACT and RT methods showed the same effectiveness on social anxiety and life attitude in women heads of households. Also, in Behzadi et al.'s study [30], ACT and RT had a significant and similar effect on stress caused by death and HbA1c in the elderly with T2D.

In the explanation of the obtained results, it can be stated that this relative superiority is due to the fact that the focus of the treatment intervention based on acceptance and commitment as the third wave of behavior therapy is on thoughts and cognitions and RT focuses more on the individual's actions. ACT examines the thought process and the effect of dependence on ineffective thoughts and its role on the emotions and behaviors in individual. Therefore, the emphasis of this approach is on the thought process and its products, while for RT, the action of the individual is considered the center of intervention [27]. ACT increased the participants' awareness to accept and care more about themselves [28]. Taking care of things related to disease control, including being committed to a diet, regular blood glucose measurement, and other things, lead to the improved metabolism of the body and in this case, the permeability of the muscle cell membrane to glucose increases. During this process, the function of insulin in glucose metabolism is improved, which leads to an increase in the amount of glucose taken from the environment, and as a result, the level of glycosylated hemoglobin decreases [31]. Compared to RT, treatment based on acceptance and commitment forms an effort in clients to accept and cope with the obstacles of glycosylated hemoglobin balance, which results in the improvement of glycosylated hemoglobin levels. Metaphoric techniques of this treatment, homework and

mindfulness skills, solve the psychological problems of the participants and ultimately affect the amount of glycosylated hemoglobin in the blood [15].

In this study, RT was also able to reduce the level of HbA1c scores and be effective in learning responsible behaviors towards the disease, and as a result, prevent the occurrence of anxiety in the participants. In the group therapy sessions with the RT approach, the researcher did not play the role of detective and searcher and did not listen to the client's excuses, but tried to strengthen responsible behavior and successful identity by carefully paying attention to their current behavior and avoiding threatening cases and thereby create a healthy personality by reducing anxiety and worry. To achieve this goal, the greatest focus was on creating positive thinking and eliminating negative thoughts by using positive and energizing sentences and changing the patient's false beliefs [28]. Therefore, a significant difference was obtained compared to the control group, although it was less compared to the treatment group based on acceptance and commitment.

It was not possible to fully compare the subjects of the two experimental groups and one control group in terms of all possible influencing variables such as education, age, etc. and this issue has been reported as a limitation. Counselors and therapists of diabetes centers and clinics can use the treatment approach based on commitment and acceptance and RT in their therapy groups and training classes to improve the basic behaviors of care, in order to reduce the level of HbA1c and as a result increase the physical health of diabetic patients.

Conclusion

The results of this study suggest that ACT was more effective than RT in T2D patients. Therefore, this therapy can be used to improve the control indicators of T2D in order to prevent the complications of the disease.

Conflict of Interest

The authors of this study declare no conflicts of interest.

Ethical Approval

This article was extracted from a part of the PhD dissertation of the Islamic Azad University in the United Arab Emirates (UAE Branch) with the ethics code No IR.IAU.SRB.1401.037. In this study, all ethical considerations were observed.

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