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Original Article

Effectiveness of Solution-based Therapy on Self-Compassion and Reducing Blood Glucose in Elderly Patients with Type 2 Diabetes

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Abstract

Background and Objective: One of the problems of diabetes in the elderly is the likelihood of another condition that makes it more difficult to control blood sugar. This study aimed to investigate the effectiveness of solution-based therapy on self-compassion and blood glucose reduction in elderly patients with type 2 diabetes.

Materials and Methods: This quasi-experimental study was conducted based on a pretest-posttest design with a control group and follow-up. The statistical population of the study consisted of 60-75-year-old patients with type 2 diabetes referring to Iranian Diabetes Association treatment centers in Tehran, Iran. A total of 36 patients were selected and randomly assigned into two groups of experimental and control. The data were collected using a self-compassion questionnaire and glycated hemoglobin test (HbA1c). The HbA1c test was also administered two months after the end of the training to follow-up and evaluate the sustainability of the treatment effects. The data were analyzed in SPSS software (version 26) through repeated measure ANOVA.

Results: The results showed that the solution-based therapy increased self-compassion in the posttest phase ($P<0.01$), and the effect of treatment was maintained after two months ($P<0.01$). Moreover, solution-based therapy reduced blood glucose levels in the posttest phase ($P<0.01$) and retained the effect of treatment after two months ($P<0.01$).

Conclusion: It can be concluded that solution-based therapy has effects on self-compassion and hyperglycemia in elderly patients with type 2 diabetes; moreover, it can be used in treatment centers to improve the status of patients with diabetes.

Keywords: Blood sugar, Elderly, Self-compassion, Solution-based therapy, Type 2 diabetes

Background

The elderly population is increasing due to remarkable reasons, including reductions in mortality owing to advances in medical sciences, health, and education, which enhance life expectancy across countries [1]. The world population grows 1.7% each year, whereas the population growth of those who are 65 years and above is estimated at 2.5%. This gap drives the age composition of the world toward aging [2]. Aging is a phenomenon that is associated with various biological, psychological, and social aspects [3]. The prevalence of non-communicable diseases, such as diabetes, increases with age and reaches its maximum in the elderly [4]. Diabetes is one of the most common metabolic disorders, especially in the elderly, which has debilitating and dangerous effects on any of the vital organs of the body. Due to a defect in insulin secretion, a person's blood glucose level may rise significantly, the most common of which is glucose intolerance or hyperglycemia [2].

For this reason, individuals are affected by short- and long-term complications of diabetes [5]. According to the world health Organization statistics, the number of adults with diabetes reached 300 million in 2015, and it is predicted that in some races, 50% of the population will develop this disease [6]. The prevalence of diabetes in the elderly is 8%, which is three times more than that of a young age [7]. Since about 22% of the Iranian elderly have diabetes, the study of diabetes is of great importance in the Iranian elderly [8].

Various therapeutic approaches have been utilized to promote life expectancy, well-being, and self-compassion; moreover, efforts have been taken to reduce blood glucose in elderly patients with diabetes [9]. One of the types of postmodern

treatment models is short-term solution-based therapy. Although the history of solution-based treatment is relatively short, this approach has become popular in recent years among mental health counselors and practitioners worldwide [10]. Short-term solution-based therapy is a non-pathological approach for treatment that focuses more on the positive and healthy aspects of life rather than problems and illnesses [11]. In this approach, contrary to the problem-oriented perspective, instead of focusing on the issues, the emphasis is on finding solutions [12]. In solution-based therapy, a problem is conceptualized as a problem exception. If the exceptions are reinforced and identified, the solution to the problem can then be brought efficiently and effectively.

The emphasis on the solution-based therapy of learning and what works for each individual has made this approach an attractive option for people who are struggling to form a productive relationship with the therapist [13]. Various studies have confirmed the efficacy of short-term solution-based therapy in ameliorating symptoms of depression and anxiety disorders [14].

Given the increasing number of patients with diabetes and major complications, and considering the blood glucose reduction in the elderly with diabetes, it seems that many of these diabetic elderlies do not have sufficient knowledge and skills to manage these problems properly. Such problems can be alleviated if proper solution-based training and group solution-based therapy are provided to the elderly with diabetes.

Objectives

The present study aimed to answer the question of whether solution-based therapy affects self-compassion and can reduce blood glucose in elderly patients with type 2 diabetes.

Materials and Methods

This applied and quasi-experimental study was conducted based on a pretest-posttest design and a control group with follow-up. The study population consisted of 60-75-year-old patients with type 2 diabetes referred to the Iranian Diabetes Association in Tehran, Iran. The criteria for the selection of the sample size were the effect size of 0.25, alpha of 0.05, and power of 0.80 in both groups. The minimum sample size was estimated at 18 cases in each group. The sampling method was voluntary, and subjects were randomly divided into two groups. Accordingly, the total sample size was obtained at 36 individuals.

The inclusion criteria were: 1) minimum one-year duration of type 2 diabetes, 2) hemoglobin A1c level above 6%, 3) minimum diploma education, 4) no other psychological treatments, 5) lack of acute or chronic medical illnesses, such as epilepsy, heart, and respiratory failure, 6) lack of severe mental illnesses, 7) no current psychotropic drugs or substance abuse, and 8) no severe diabetes complications.

On the other hand, the patients who were absent more than two sessions during the therapeutic intervention, and those who had a significant level of stress due to unforeseen events were excluded from the study. It is worth mentioning that the control group received no interventions, and it was utilized to be compared with the experimental group and evaluate the changes in the two groups.

Regarding the ethical considerations, all participants were informed of the research objectives and procedures; moreover, if they were willing, they could participate in the study. Furthermore, the cases were assured of the confidentiality and anonymity of their information. After the end of the study, more effective treatments were given to those in the control group.

Self-compassion Scale

This 26-item scale was developed by Neff in 2003 to measure self-compassion. This questionnaire consists of six subscales, including self- kindness (n=5), self-judgment (n=5), common humanity (n=4), isolation (n=4), mindfulness (n=4), and over-identification (n=4) that measure the quality of a person's relationship with their experiences. The questions are scored based on a 5-point Likert scale from "almost never" (0) to "almost always" (4). It is worth mentioning that the subscales of self-judgment, isolation, and over-identification are scored in reverse [15]. Cronbach's alpha reliability coefficients for the whole scale were estimated at 0.92 and for the subscales ranged from 0.75 to 0.81; moreover, the retest reliability coefficient (two weeks interval) was determined at 0.93 [16]. In a study, Neff, Pistisungkagran, and Hsieh utilized this scale in Thailand, Taiwan, and the United States. The results showed that Cronbach's alpha coefficients for each country were 0.87, 0.95, and 0.86, respectively [17]. The Cronbach's alpha reliability coefficient of common humanity and mindfulness was obtained at 0.71; additionally, the corresponding values for self-kindness, isolation, and over-identification were estimated at 0.75, 0.72, 0.65, respectively. The correlation coefficient of this scale and self-esteem scale was also determined at 0.22 [18].

In this study, Cronbach's alpha reliability coefficient of the whole scale was estimated at 0.83. Moreover, the corresponding values of self-kindness, self-

judgment, common humanity, isolation, mindfulness, and over-identification were obtained at 0.79, 0.78, 0.76, 0.77, 0.78, and 0.80, respectively.

Glycosylated Hemoglobin Test

Glycosylated hemoglobin (HbA1c) is a protein that has been recognized clinically as the most important marker of long-term blood glucose monitoring. The HbA1c test is the best tool to evaluate long-term hyperglycemia in the last 5-6 months. This index is reported as a percentage and can be interpreted by any laboratory according to the normal range (score above 6.50 mmol/l). The advantage of using this test is that it can identify problems, such as high blood sugar after a meal or during the night that are not detected sometimes by a glucometer. This is the standard method of long-term blood glucose monitoring and evaluation. As plasma glucose levels increase steadily, non-enzymatic binding of glucose to this hemoglobin also increases. This change reflects how blood glucose levels have changed over the past 2-3 months since the average life span of erythrocytes is 120 days [19]. Therefore, the effectiveness of treatment and control of blood glucose was associated with a decrease in HbA1c. Blood glucose was measured daily at the end of the therapeutic sessions by the instructor and in the control group by the individual.

In total, eight 90-minute solution-based therapy sessions were conducted based on Molnar and de Shazer [20] every week for two months.

The HbA1c test was performed before the initiation of the intervention and after obtaining informed consent from the participants. Both groups completed a self-compassion questionnaire and were tested for blood glucose. Subsequently, the intervention group was subjected to eight sessions every week in medical centers affiliated to Tehran Diabetes Association, Tehran, Iran (Table 1). At the end of the sessions, two groups were subjected to blood glucose testing. Furthermore, at the end of the eighth session, both groups were asked to complete the questionnaires again, and the A1c test was administered one more time. It is worth mentioning that the A1c test was performed two months after the end of the training in order to follow-up and evaluate the sustainability of the treatment effects.

The data were analyzed in SPSS software (version 26) through descriptive statistics (frequency tables, graphs, and mean±SD) and inferential statistics (repeated measures ANOVA).

Table 1. Solution-based therapy sessions

Sessions	Content
1	Referrals and communication, introducing yourself as a consultant, and expressing the purpose of this research, introducing members by themselves, describing the framework of group rules. Trying to attend all meetings and the necessity of doing each session, giving a brief overview of the solution-based therapy and emphasizing especially on their ability to solve the problem. Assignment: Have the group members set a goal for themselves.
2	Focusing on the purpose and articulation of the problem at the beginning of the meeting, the task of the previous meeting was first reviewed, and then the members were asked to state their goals for the group. If the goals were ambiguous and unmeasurable, it was explained that the goals must be: 1. Positive and communicated in a therapeutic language 2. Pragmatic 3. Accurate to present 4. Achievable, be objective and specific 5. Be controlled by the therapist. Then, the members were asked to clearly describe their problem and examine the effects of the problem on various aspects of life, especially home and school. Only recently occurring problems were examined, and these exceptional moments were highlighted in which they did not have behavioral problems.
3	Focusing on the solution: After reviewing the session before the members, they were asked to find out their ability to find solutions to the problems and state what they will do if they take a small step to solve their problem. What are the possible solutions to their problem? Assignment: Members were asked to think about what situations or conditions, as well as behavioral problems they may or may not have and write them down for the next week and bring with them for the next meeting.
4	Summary of previous meetings: Each member should report on the work done outside the group and its outcomes. Each member should provide a list of solutions for themselves using the group members' own experiences. Helping clients identify and express positive exceptions in their relationships, summarize the contents, and determine the next meeting.
5	A brief presentation of the work done in the previous sessions by the group members. Expressing members' problems in communication and social functioning and getting other members solutions. Members were asked to describe their social relationships and rate their success in the community and relationships with others. Each member was asked to share his or her successful outdoor experiences. The consultant used the miracle question. Assignment: each member chose the best solution, executed it inside or outside the group, and announced the result.
6	The important word "instead" was used, the assignment of the previous meeting was reviewed, and the goals of the present meeting were stated. The purpose of the meeting was to give participants a different way of doing things than they are doing now, and to develop new senses of behavior, thinking and feeling using the critical word "instead," experiencing new behaviors and thoughts. For example, questions like behavior instead of what can you do? Assignment: Score from 1 to 11 on the level of achievement of their goals and provide them.
7	Rating questions, reviewing homework. To understand better the feelings and aspirations of the participants, and how well they are progressing, rating questions (from 0 to 10) were used to help us get closer to the end goal. These questions measure emotions, attitudes, emotions, and thoughts in a way that makes the client and counselor understand what the situation is. The therapist felt that moving up and down on this scale depends on him and is in control of himself.
8	Summary and Conclusion. After reviewing the assignment before the meeting, members of the group were asked to discuss the progress they have made continually. Moreover, they were asked to increase their ability to make changes because the solution to the problems lies within them, and they could solve their problems, then the post-test was run.

Results

A total of 36 patients were included in this study, and they were assigned into two groups of experimental (solution-based therapy) (n=18) and control (n=18). Before performing repeated measures ANOVA, the results of M Box, Mauchly's, and Levin's tests were checked for assumptions. Since the M Box test was not significant for any of the research variables, the homogeneity of the variance-covariance matrices was correctly observed. Moreover, the non-significance of any of the variables in the Levin test showed the equality of inter-group variances, and the error variance of the dependent variables was equal in all groups. However, it was not significant for any of the variables. Therefore, the assumption of the equality of variances within subjects was observed in this study. Table 2 tabulates the mean±SD by the scores of the components of self-compassion and blood glucose score.

As can be seen in Table 3, there is a significant difference among pretest, posttest, and follow-up in terms of the self-compassion sub-scale scores in the experimental and control groups. In other words, a significant difference is observed among the scores of the steps (pretest, posttest, and follow-up) regarding self-compassion scores in these groups ($P<0.001$). Moreover, a significant relationship is found among the stages of the experimental group in terms of all self-compassion subscales. This indicates that the experimental group obtained higher mean scores in the posttest and follow-up stages, compared to the control group. These results show the increased effects of solution-based therapy on self-compassion scales in the experimental group, which reveals the improvement of self-compassion status.

Furthermore, a significant association was observed among the stages in the experimental group in terms of blood glucose score. This indicates that the case group obtained lower scores in the posttest and follow-up stages, compared to the control group. These results show the effect of solution-based therapy on blood glucose reduction in the experimental group, which displays the enhancement of blood glucose levels among the elderly. Furthermore, the Bonferroni follow-up test was used for pairwise comparison of the groups (Table 4).

According to the results obtained from Table 4, the self-compassion component scores of the experimental group in the posttest phase were relatively higher than those in the pretest. In other words, the experimental group experienced a significant improvement in self-compassion variables. The results also showed that self-compassion at the follow-up stage was significantly increased only in the experimental group; moreover, the experimental group obtained a significant decrease in blood glucose levels.

Table 2. Mean±SD of pretest, posttest, and follow-up of self-compassion variable in the experimental and control groups

Variable	Group	Pretest		Posttest		Follow-up	
		M	SD	M	SD	M	SD
Self-compassion	Experimental	69.22	4.73	81.36	8.30	81.77	8.41
	Control	67.16	6.37	67.77	6.26	68	6.45
Blood glucose	Experimental	7.22	1.09	6.68	1.01	6.64	1.02
	Control	7.16	0.84	7.11	0.85	7.11	0.85

Table 3. Repeated-measures ANOVA to compare pretest, posttest, and follow-up of self-compassion subscales in the experimental and control groups

Variables	Source of effect	SS	df	MS	F	P
Self-compassion	Time	1028.72	1.02	1002.40	34.25	0.0001
	Time*Group	812.90	1.02	792.10	27.06	0.0001
	Error	1021.03	34.89	29.26		
	Group	2600.92	1	2600.92	32.25	0.0001
	Error	3803.07	34	111.85		
Blood glucose	Time	2.24	1.03	2.17	8.37	0.006
	Time*Group	1.54	1.03	1.49	5.75	0.02
	Error	9.11	35.06	0.26		
	Group	2.13	1	2.13	0.86	0.35
	Error	83.82	34	2.46		

Table 4. Bonferroni follow-up test results for comparing self-compassion subscales

Variable	Stages	Posttest	Follow-up	P-value
Self-compassion	Pretest	-6.38	-6.69	0.001
	Posttest	-	-0.30	0.75
Blood glucose	Pretest	0.29	0.31	0.02
	Posttest	-	0.01	0.89

Discussion

This study aimed to investigate the effectiveness of solution-based therapy on self-compassion and blood glucose reduction in elderly patients with type 2 diabetes. The results of the present study showed that solution-based therapy had an impact on the self-compassion of older patients with type 2 diabetes. Accordingly, the results were in line with the findings of the studies conducted by Viner et al. [21], as well as Gingerich and Peterson [22].

In explaining this finding, it can be stated that since patients participated in therapeutic sessions, they learned to regard the problems as issues that can be solved; moreover, they were informed of the possible solutions and presented their solutions in the meetings. Solution-based therapists believe that patients can develop effective behaviors; however, their ability to influence the patients is blocked by their negative thinking [22]. This approach seeks to attract the attention of clients when they are well aware of their problems, thereby helping them observe things differently. Mental health can be one of the biggest struggles in life, and one must focus on positive thoughts to have good mental health. Solution-based therapy improves mental health and positive mood in patients by making them feel good about themselves and showing their strengths and successes. Furthermore, this kind of therapy enhances patients' satisfaction and positive moods by making them feel good about themselves and demonstrating their strengths and successes [23]. Similarly, solution-based therapy focuses on problem-solving, and the causes of the problem are not addressed much. Accordingly, in this method of treatment, there are various solutions for how to deal with the problems, which emphasize the patient's strengths and abilities.

The patients learn not only how to cope with the problems and disabilities, but also how to use other strengths to help solve the problems and adopt a new approach to overcome difficulties. This is very helpful in improving their self-esteem and satisfaction [24]. Solution-based therapy has effects on reducing blood glucose in elderly patients with type 2 diabetes. These findings are in line with the results of a study conducted by Bhaloo et al. [25].

It can be stated that the solution-based therapy model views clients as competent professionals capable of solving their problems. Moreover, this model regards the treatment as a process by which clients and therapists reconstruct desirable realities. In the same vein, in therapy sessions, the therapist focuses on times when the problem is not present, and the same situations as the problem solution can be generalized to the current condition of the patient, thereby making a positive feeling in patients to recover [26]. Other benefits of solution-based therapy include encouraging individuals to look for abilities that they have not utilized recently. That those skills are useful for dealing with their problems makes them feel better and more satisfied, thereby improving and enhancing their mental health.

Solution-based therapy is one of the short-term therapeutic approaches that provides the clients with faster treatment outcomes. Therefore, it is useful for those who seek faster recovery and more favorable conditions [27]. It should be noted that the simple, effective, and improved techniques of this treatment model can be easily taught to all clients. Since the emphasis is on finding different solutions to the problems, it provides the clients with a different perspective towards problems and reinforces a sense of hope for the future in them. Accordingly, group solution-based therapy was effective in reducing blood glucose in elderly patients with type 2 diabetes.

One of the limitations of the study was the difficulty in responding to the questionnaire for the elderly due to their old age. Moreover, this study was conducted among the elderly without chronic physical and psychological illnesses. Therefore, the results should be generalized with caution. Accordingly, it is recommended that future investigations be conducted on more older adults to obtain more definite results. It is also suggested to evaluate the effectiveness of this intervention program on the elderly with physical illnesses, as well as important variables of life, self-concept, and cohesion in this population.

Furthermore, health centers can take useful steps towards maintaining and promoting the physical and mental health of the elderly by introducing this method to families. As the elderly population grows, given the age and vulnerability of the elderly, as well as the importance of improving their lives and health, health professionals should consider strategies for improving life and reducing adaptation problems. According to the results of this study, a solution-focused program accompanied with relaxation, breathing, and joyful exercise programs, including low-cost, safe, and non-invasive interventions, can reduce blood glucose levels and increase the self-compassion of the older people. Therefore, it should be used to improve the lives of the elderly.

Conclusions

It can be concluded that solution-based therapy has effects on self-compassion and blood glucose reduction in elderly patients with type 2 diabetes. Moreover, it can be used in treatment centers to

improve the status of patients with diabetes.

Compliance with ethical guidelines
All ethical principles were considered in this study, and the participants were informed about the research objectives and procedures. Moreover, informed consent was obtained from them, and they were assured about the confidentiality of their information. Additionally, they were allowed to leave the study whenever they wish, and if desired, the results of the research would be available to them. This study was extracted from a Ph.D. dissertation in Health Psychology submitted to Kish International Branch, Islamic Azad University, Kish, Iran (IR.HUMS.REC.1398.340). The study protocol was approved by the Ethics Committee of the Hormozgan Branch, Islamic Azad University, Hormozgan, Iran.

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Authors' contributions
Conceptualization [Zari Ahmadi]; Methodology [Saeideh Bazzazian]; Investigation [Biouk Tajeri]; Writing-Original Draft [Zari Ahmadi]; Writing-Review and Editing, Author names [all author]; Funding Acquisition, [all author]; Resources, [all author]; Supervision, [Asadollah Rajab].

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Conflicts of Interest
The authors declare that they have no conflict of interests.

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