

The Effects of Resilience Training on the Self-Efficacy of Patients with Type 2 Diabetes: A Randomized Controlled Clinical Trial

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ABSTRACT

Background: In view of the effect of self-efficacy on empowerment of patients and the role of resilience in the psychological adjustment and physical health of patients, the present study was conducted to examine the effect of resilience training on the self-efficacy of patients with type 2 diabetes.

Methods: This double-blinded controlled clinical trial was carried out on 143 diabetic patients in the diabetes clinic in Shiraz between June 2016 and January 2017. Patients were selected using a simple sampling method and randomly divided into control (n=71) and intervention (n=72) groups. The intervention group received 6 sessions of training workshops on resilience skills. The control group received the routine educational pamphlets. The subjects completed diabetes self-efficacy questionnaire before, immediately after, and one month after completion of the intervention. Data were analyzed using SPSS version 16.0. Repeated measure ANOVA, t-test, and Chi-Square tests were used. $P < 0.05$ was considered statistically significant.

Results: Based on the results of the repeated measures ANOVAs, the overall score of self-efficacy was found to be significantly increased in the intervention group. Compared with the control group, the intervention group reported significantly higher levels of self-efficacy immediately after the intervention ($P < 0.001$) and one month later ($P < 0.001$).

Conclusion: Training programs in resilience skills improves the self-efficacy of patients with type 2 diabetes. The results of this study support the use of resilience training in diabetics; it provides the health professionals and policymakers with an increased understanding of how to recognize the resilience skills for the improvement of self-efficacy.

Trial Registration Number: IRCT2016022726790N1

KEYWORDS: Diabetes mellitus, Resilience, Self-efficacy, Type 2

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INTRODUCTION

As the most common metabolic disease, type 2 diabetes is considered as one of the most important concerns in healthcare in developing and developed countries.^{1,2} The prevalence of the disease is increasing in the world and it can influence people of all ages, genders, ethnicities, and social classes.³ According to the World Health Organization, education is at the core of diabetes prevention and treatment.⁴

Self-efficacy is an important component in improving diabetes self-management skills.⁵ Research conducted in this area suggests that self-efficacy in diabetic patients is not satisfactory.^{6,7} However, it seems that education can enhance the patients' self-efficacy, and if patients reach desirable levels of it, they will be able to manage their diseases well and prevent complications, thus improving their quality of life.⁸ Previous studies reveal that high self-efficacy in diabetic patients is associated with life satisfaction, better adaptation, reduced depression, and proper control of diabetes.^{9,10} The concept of self-efficacy has been derived from the social cognitive theory of Bandura. It refers to an individual's beliefs and judgments about his/her own ability to carry out tasks and functions. Self-efficacy means the belief that one can carry out certain activities successfully and expect the good results that will follow.¹¹ Previous research has investigated effective factors and interventions in improving the self-efficacy of diabetic patients.^{10,12-14}

A potentially important factor that has received inadequate attention is resilience. Studies have revealed a strong relationship between low levels of resilience and development of diabetes.¹⁵ Resilience involves positive adaptation in response to adverse conditions. People acquire the ability to deal with challenges of family and social life effectively through the process of resilience.¹⁶ When facing adverse events, resilient persons are more likely to reject negative thoughts about themselves or their abilities. Resilience is a broad construct including a combination

of positive traits or behaviors that facilitate the successful management of adversity or stressors in a person's life.¹⁶⁻¹⁸ This construct has grown over the past decades. However, there is a controversy about the usefulness of this construct in psychology.^{19,20} Throughout research on resilience, the operationalization of this construct has considerably varied within the literature. This has been viewed both as a criticism and a positive attribute of resilience studies. Although some studies have argued that variation in defining the key components of resilience has limited the generalization and interpretation of the results, others have believed that some variation in methodology is essential in developing our knowledge of this construct.²¹

Despite these inconsistencies in the research on resilience, several studies have suggested factors that have consistently been shown to promote successful coping with overwhelming stressors or shown to be related to mental health in the general population. These factors include self-awareness,^{16,22} positive thinking and optimistic outlook,^{16,17} good problem-solving skills,^{17,19} and stress management.^{17,23,24} The positive effects of resilience on some chronic diseases, such as heart disease²⁵ and joint pains,²⁶ have been studied and proved; yet, a review of the literature shows that no study has examined the impact of resilience in diabetic patients.

The rate of diabetes is increasing and participation of diabetic patients in self-care is becoming more important. In view of the effect of self-efficacy on empowerment of the patients' condition and the role of resilience in the psychological adjustment and physical health of patients, the present study aimed to examine the effect of resilience training on the self-efficacy of patients with type 2 diabetes. It is predicted that for persons with diabetes, resilience-related characteristics and responses might be important contributors to self-efficacy. The present research was, therefore, conducted to examine the effects of resilience training on the self-efficacy of patients with type 2 diabetes.

MATERIALS AND METHODS

This double-blinded controlled clinical trial was conducted in the south of Iran from June 2016 and January 2017. The participants of this study consisted of 143 patients with type 2 diabetes, admitted to the largest center for diabetic patients in Motahari Institute affiliated to Shiraz University of Medical Sciences (SUMS), Shiraz, Iran.

The sample size was calculated using the formula below using $\alpha=0.05$, $\beta=0.01$ and the mean ($\mu_1=63$, $\mu_2=52$) and standard deviation ($S_1=14.6$, $S_2=12.5$) based on the results of a previous study.²⁷ At least, a 112-subject sample size (56 subjects in each group) was determined for the study. By considering a 30% attrition rate, the final sample size for both groups was about 146 and it was raised to 150 (75 subjects in each group).

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2 (S_1^2 + S_2^2)}{(\mu_1 - \mu_2)^2}$$

$$n = \frac{(1.96 + 2.33)^2 (14.6^2 + 12.5^2)}{(11)^2}$$

The inclusion criteria of the study were being diagnosed with type 2 diabetes by an endocrinologist, being in the age range of 30-80 years, being willing to participate in the research, being literacy, and having a resilience score of less than 52, and a self-efficacy score of less than 134. The exclusion criteria of the study were inability to participate in the training program due to the severity of the disease or hospitalization, mental disorders and mental retardation, having graduated in a field related to medical sciences, absence in more than two training sessions, and participation in similar workshops.

Overall, 162 patients were assessed for eligibility. The subjects were selected based on the simple sampling method (selected from a random number table) among the records of all the diabetic patients available at the diabetes center. The patients interested

in participating in the research gave their written informed consent to complete the resilience and self-efficacy questionnaires. The individuals who obtained a resilience score of higher than 52 and a self-efficacy score of higher than 134 were excluded from the study (9 patients). Moreover, 3 patients were excluded from the study due to their lack of willingness to participate in the study. The remaining patients (150) were randomly divided into control ($n=75$) and intervention ($n=75$) groups using the software Random Allocation and randomized blocking with a random sequence of 25 sextuple blocks. During the study, 4 patients in the control group were excluded due to hospitalization and 3 others in the intervention group due to lack of participation in the sessions (Figure 1).

The outcome measures of the study consisted of demographic information, resilience, and self-efficacy. In addition to the socio-demographic assessment of age, gender, marital status, education level, employment, duration of being affected with type 2 diabetes, the following variables were measured:

Resilience of the subjects was measured using the Conner and Davidson Resilience Questionnaire. The questionnaire was designed in America in 2003. This tool can differentiate resilient people from non-resilient ones in clinical and non-clinical groups. The questionnaire contains 25 items, each rated on a 5-point scale, with higher scores reflecting greater resilience. The scores of the questionnaire ranged from 0 to 100. Internal consistency (Cronbach's alpha) for the full scale was 0.89. Test-retest reliability demonstrated a high level of agreement, with an intra-class correlation coefficient of 0.87. An assessment of the construct validity of the questionnaire using factor analysis yielded five factors. Moreover, its convergent and divergent validity was assessed in various groups.²⁸ This tool has been translated into Persian and its validity and reliability have been confirmed. An exploratory factor analysis showed the values of factor loading

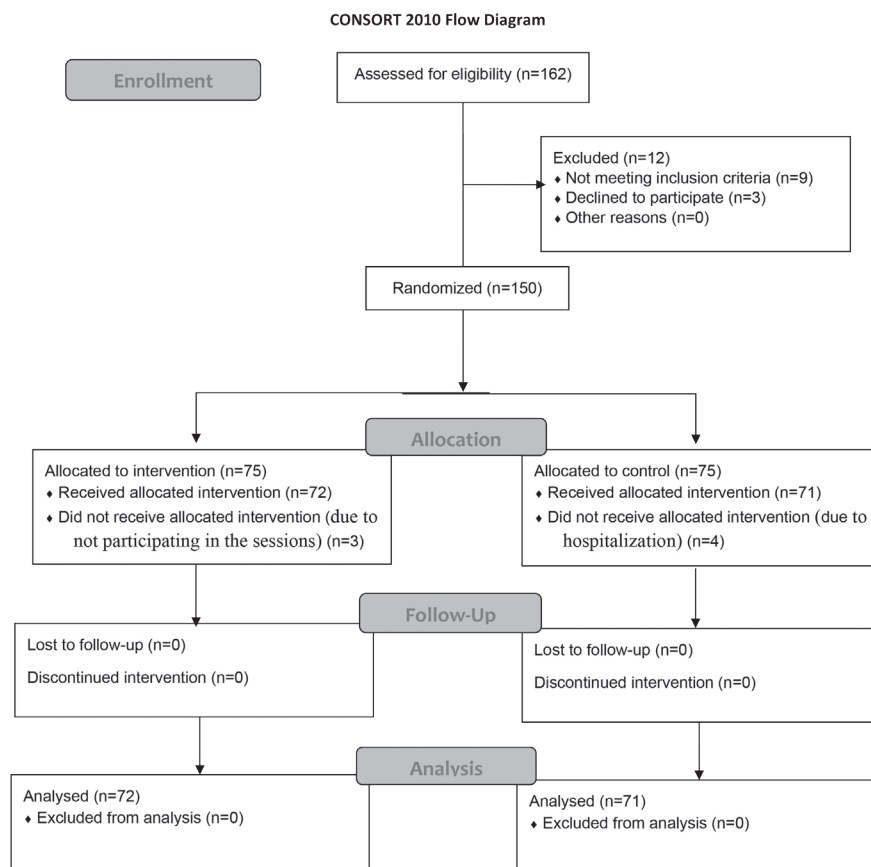


Figure 1: Diagram of the participants in the study

of the items were significant. The reliability of the instrument was assessed in terms of its internal homogeneity and the Cronbach’s alpha of the entire instrument was found to be 0.87.²⁹

In order to evaluate the self-efficacy of the diabetic patients, Diabetes Management Self-Efficacy Scale (DMSES), developed by Bijl et al. (1999), was used. This scale assesses the self-efficacy and ability of diabetic patients in various dimensions, including dietary adherence, level of physical activity, and blood glucose. It is composed of 20 questions, scored on an 11-point Likert scale.³⁰ The scores of this tool range between 0 and 200; based on their score, people are divided into three groups: high self-efficacy (134-200), moderate self-efficiency (66-133) and low self-efficiency (0-65).³¹ The validity of the Persian version of the questionnaire has been examined in a study conducted by Noroozi and Tahmasebi’s study conducted in 2014. The original English language version

of the questionnaire was translated into Persian using a forward-backward translation method. The validity of questionnaire was assessed through content validity ratio (score of 0.80 or higher) and factor analysis. The rotation matrix of the indices yielded 5 factors. The Kaiser–Meyer–Olkin measure of sampling adequacy was 0.88 and Bartlett’s test of sphericity was significant ($\chi^2=2914.2$, $df=190$, $P=0.001$). To test the reliability, we evaluated internal consistency by Cronbach’s alpha ($\alpha=0.92$). The construct validity of the instrument was determined using factor analysis and criterion validity. Criterion-related validity showed that the DMSES was a significant predictor of the diabetes self-management ($R=0.61$; $P<0.001$).³²

Patients in the control group received the routine educational pamphlets, including education on the prevention of diabetic foot, exercising, nutrition, and blood glucose control, while the patients in the intervention group received resilience skills trainings.

The intervention was designed based on the patients' needs and the existing literature in this field.^{16, 17, 19, 23, 24} The educational intervention consisted of six 4-hour sessions held over six weeks. The patients in the intervention group were divided into smaller groups of 15 to 17 members by the researcher to hold the training workshops.

The beginning of the first session was practically a needs-assessment session toward a better organizing of the interventions. After the assessment of the subjects' needs, each educational session was designed to include a variety of educational techniques intended to enhance the participant's learning and keep their attention (for example, visual aids, such as charts, film presentation, and Microsoft Power Point slideshows). Each session started with a lecture given by a psychiatric nurse. Then, the discussion and group training were performed, and a time was assigned for questioning and answering. The location of the training workshops was the conference hall of the center for diabetes patients. The training was provided by one of the psychiatric nurses. The goals and content of each of the six sessions are summarized in Table 1.

To encourage the patients to participate in the study, a free glucose test was given to all the patients, and at the end of the study, some free glucometers were given to some of the participants by lot. At the end of the last session and one month after the end of the intervention, the self-efficacy questionnaire was completed again by the two groups. Patients in the control group received the educational pamphlets on resilience skills at the end of the study. In the current study, the researcher assistant, who had no knowledge of the types of intervention collected the data, and the statistician who analyzed the data were blind to the study groups.

The study was approved by Research Ethics Committee of Shiraz University of Medical Sciences (code: 1394.7635). Before the intervention, all the patients were informed of the objectives of the study, confidentiality of their information, and signed the informed

consent form. The patients were also informed that they were free to withdraw at any point of the research and the time and place of the intervention were set by their agreement.

SPSS v. 16 was used for the statistical analysis of the collected data. In the beginning, compliance test for normal distribution with Kolmogorov–Smirnov test was applied. Student's t-test and Chi-square test were employed to investigate the differences between the two groups regarding demographic and clinical variables. Repeated measure analyses of variance were used to determine whether the improvements in the variable (self-efficacy) changed over time. The significance level was set at $P < 0.05$.

RESULTS

Overall, 143 patients remained in the study. The Kolmogorov-Smirnov test showed a normal distribution of quantitative variables, namely age and self-efficacy. The results of the analysis of the demographic data revealed that the majority of the participants in both groups were female (84; 58.7%). The mean age of the patients in the intervention and control groups was 56.18 ± 11.32 years and 57.59 ± 11.27 years, respectively. Most of the participants in both groups were married (108; 75.5%), and had secondary level of education (54; 37.8%). In terms of the duration of the disease, most of the patients were in the range of 3 to 10 months (91; 63.6%). According to the results of Chi-square tests, no significant difference was found between the two groups in terms of demographic characteristics ($P > 0.05$).

According to the results of independent t-tests, patients of the intervention and control groups were homogeneous in terms of their self-efficacy scores at baseline ($P = 0.05$). However, immediately and one month after the intervention, there were significant differences between patients in the two groups regarding self-efficacy scores ($P < 0.001$ for both times) (Table 2). Two-way repeated measures ANOVAs revealed that treatment was a significant factor in ratings of self-efficacy ($P < 0.001$). This means that, regardless

Table 1: Content of educational program

Sessions	Goals	Content Caplan
1	Overview of the program and introduction of instructors and members to each other	Discussion on the definition and importance of resilience in people's mental health Filling informed consent, demographic questionnaire, resilience and self-efficacy
2	Acquisition of the self-awareness skill	Expressing the importance of self-awareness skills in the people life Investigating the effective factors in achieving self-awareness, and barriers achieve self-awareness Questioning and answering, group discussion
3	Problem-solving skill	Overview of previous sessions Stating the need for problem-solving skills in dealing with problems, application of problem-solving skills in life, stages of problem-solving technique Questioning and answering and group discussion Group training
4	Anger control skill	Overview of previous sessions Definition of anger, its effective factors, symptoms and effects of anger on health and life of people, ways to control and to cope with anger Relaxation techniques and the way to cope with anger Questioning and answering and group discussion Group training
5	Coping with stress skill	Overview of previous sessions Definition of stress and its causes, the effect of stress on health of people and the way to cope with stressful situations, techniques of stress management (deep breathing, meditation, mental imagery, muscle relaxation Questioning and answering and group discussion Group training
6	Positive thinking and optimism skill	Overview of previous sessions Stating the importance of positive thinking skills and optimism in life, training the positive thinking and discovering positive traits, focusing on strengths Learning techniques to replace rational and positive thoughts instead of irrational and negative thoughts. Questioning and answering and group discussion

of the effect of time, there were significant differences between the groups regarding marginal means of self-efficacy. Time was also found to be a significant factor in ratings of self-efficacy ($P < 0.001$). The results of the repeated measures ANOVA showed significant interactions (treatment×time) for self-efficacy ($P < 0.001$), indicating greater increase in the self-efficacy of the intervention group compared with the control group (Table 3).

Marginal means of self-efficacy before intervention: 61.92 ± 10.7 , control: 65.76 ± 13.24 , after (intervention: 130.8 ± 9.69 , control: 66.62 ± 13.27) and one month after (intervention: 154.59 ± 8.7 , control: 67.04 ± 13.3) the intervention

in the study groups are shown in Figure 2.

DISCUSSION

The results of the study revealed for the first time that training in resilience skills increases and improves the self-efficacy of type 2 diabetic patients. Findings of this study highlight the importance of measuring resilience in order to develop individual self-efficacy in diabetes populations.

Diabetes is very sensitive to stress effects. Stress in many diabetic patients disrupts the blood glucose control process. Research has revealed that poor control of diabetes and

Table 2: Comparison of demographic variables in the intervention (N=72) and control (N=71) groups

Variable	Intervention group N (%)	Control group N (%)	Total N (%)	X ²	P value*
Gender					
Female	47 (65.3)	37(52.1)	84(58.7)	2.56	0.11
Male	25(34.7)	34(47.9)	59(41.3)		
Marital status					
Single	1 (1.4)	0	1 (0.7)	2.56	0.46
Married	57 (79.2)	51 (71.8)	108 (75.5)		
Divorced	2 (2.8)	4 (5.6)	6 (4.2)		
Spouse not alive	12 (16.7)	16 (22.5)	28 (19.6)		
Education level					
Primary education	24 (33.3)	28 (39.4)	52 (36.3)	0.82	0.84
Secondary school	29 (40.3)	25 (35.2)	54 (37.8)		
High school certificate	15 (20.9)	14 (19.8)	29 (20.3)		
College or university degree	4 (5.5)	4 (5.6)	8 (5.6)		
Employment					
Employed	64 (88.9)	58 (81.7)	122 (85.3)	0.22	0.16
House keeper/unemployed	8 (11.1)	13 (18.3)	21 (14.7)		
Duration of illness					
<3 months	11 (15.3)	2 (2.8)	13 (9.1)	2.37	0.30
3-10 months	42 (58.3)	49 (69)	91 (63.6)		
>10 months	19 (26.4)	20 (28.2)	39 (27.3)		

*Chi-square test

Table 3: Comparison of the mean score of self-efficacy before, after and one month after the intervention in the intervention and control groups

Variable/ Time	group	Before intervention mean±SD	Immediately after mean±SD	One month after mean±SD	P value*		
					Effect of time	Effect of treatment	Time× treatment
Self- efficacy	Intervention	61.92±10.7	130.8±9.69	154.59±8.7	<0.001	<0.001	<0.001
	Control	65.76±13.24	66.62±13.27	67.04±13.3			
P value**		0.05	<0.001	<0.001			

*Two-Way Repeated Measures ANOVAs; **Independent *t*-test

stressful events are positively correlated.²⁵ One of the basic skills that can help a person in stressful situations is resilience. Despite the potential benefits of the interventions that could improve well-being and reduce stress in type 2 diabetic patients, there have been few studies of positive psychological interventions in this population. In a study, the researchers found a strong relationship between development of diabetes and increased stress on one hand and low and moderate levels of resilience on the other.¹⁵ However, the operationalization of the construct of resilience has considerably varied within the literature. For example, in a

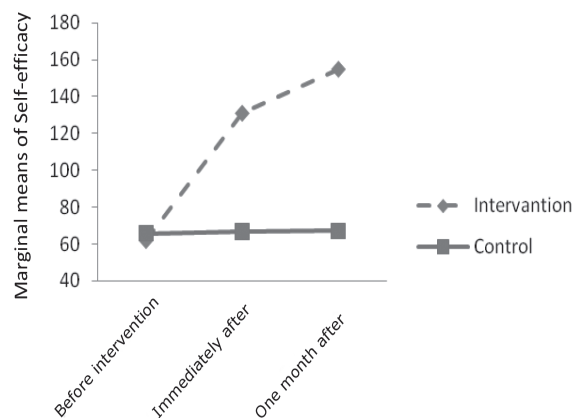


Figure 2: Marginal means of before intervention, immediately after and one month after the intervention in the study groups

study, the researchers trained their adolescent subjects in positive emotions, realistic optimism, and cognitive flexibility in order to increase resilience skills in them, and they found that training in resilience skills led to increased self-esteem and reduced violence.³³ Findings of another study demonstrated the effectiveness of psychosocial resilience training for the cardiac health. In the above-mentioned study, the researchers examined the effects of teaching positive emotions skills, cognitive flexibility, social support, life meaning, active coping, and therapy strategies such as relaxation training and social support building on increasing resilience in patients with heart diseases.³⁴ In the same line, findings of another study showed that resilience-based diabetes self-management education improved psychological and physiological health in patients with type 2 diabetes.³⁵

In the present research, based on the needs of the patients and findings of the studies conducted in this area,^{16, 17, 19, 23, 24} self-awareness skills, problem solving, anger control, coping with stress, positive thinking skills and optimism were used for diabetic patients. There is no consensus on the main components of resilience, but the significant findings of the present research showed that the skills taught led to increased resilience in patients. Findings of this study suggest the importance of including routine use of resilience skills in the management of type 2 diabetic patients.

The results of the study showed a significant increase in the self-efficacy scores of the intervention group in the post-test, which were reflected in large effect sizes. The results also remained stable at 1-month follow-up. Overall, in resilience skill training, patients learn to use coping strategies more and it might enhance their self-efficacy. This illustrates that the skills taught in the present study can be especially effective in increasing resilience in patients. Thus, the findings of the study can expand our horizons about the concept of resilience.

The present findings lend support to

the notion that training in resilience skills increases self-efficacy in diabetic patients. This fact can be used to improve the control of disease in people with diabetes. According to a study, resiliency training approach in people with type 2 diabetes improved their physical health status.³⁶ This is in line with the results of the present study and confirms the positive influence of resilience skills on self-efficacy. The findings of the present study are also in agreement with the results of another study that showed that higher self-efficacy was correlated with better self-care behavior.^{37, 38}

Overall, considering the findings of the present research and those of the previous studies,³⁹ one can claim that resilience training can enhance the self-efficacy in patients with type 2 diabetes mellitus.

One limitation of the current research was the smaller number of males compared to females, though the groups were homogeneous in terms of gender. Another limitation of the study was not investigating the effect of training in resilience skills on disease control in patients, for example, investigating their blood glucose index. It is recommended that future studies should be conducted with larger sample sizes and longer follow-up periods.

CONCLUSION

As the prevalence of type 2 diabetes follows an increasing trend which imposes a higher economic burden on the community, and considering the low cost of the method used in the study, it is suggested that health policymakers should employ the tested method in health programs. According to the findings of the present study, providing short-term group training in resistance skills can prove useful. This study supports the use of resilience strategies for diabetic population; it provides health professionals and policymakers with an increased understanding of how to recognize and foster resilience skills for the improvement of self-efficacy. Further studies are needed to confirm the long-term effects of this resilience-based educational intervention.

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