

# The effect of spiritual education on anxiety, depression and glycemic control in type 2 diabetic patients: a randomized controlled study

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**A** – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation, **E** – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

**Summary Background.** Common mental and psychological disorders in people with diabetes include anxiety and depression, which strongly affect the lives of diabetic patients and management of this disease.

**Objectives.** We aimed to evaluate whether spiritual education has any impact on depression and anxiety disorders and blood sugar control in patients with type 2 diabetes mellitus.

**Material and methods.** A randomized control trial was carried out on 146 patients with type 2 diabetes mellitus who referred to the diabetes outpatient services of the Imam Reza Clinic in Shiraz. Eligible patients were randomly assigned to the experimental group (73 subjects) and control group (73 subjects). The subjects in the experimental group were trained over four 45-minute sessions for two weeks, and they practiced daily for four months. The control group received routine clinical care. Anxiety and depression were measured by validated questionnaires. The HbA<sub>1c</sub> index was also used to evaluate the control of blood sugar.

**Results.** The results of the study showed a significant reduction in the mean of overt anxiety ( $p < 0.001$ ) and covert anxiety ( $p < 0.001$ ) in depression ( $p < 0.001$ ) and hemoglobin HbA<sub>1c</sub> ( $p < 0.001$ ) in the experimental group during the study. There was no difference in the control group.

**Conclusions.** Spiritual training for patients with type 2 diabetes mellitus can lead to a reduction in anxiety and depression. Therefore, it is recommended that spiritual training should be used as an intervention to reduce anxiety and depression and control blood sugar in patients with type 2 diabetes mellitus in addition to clinical interventions.

**Key words:** type 2 diabetes mellitus, spirituality, spiritual therapies, anxiety, depression, blood glucose.

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## Background

Diabetes mellitus is one of the most common diseases which significantly affects a person's life due to its chronic nature [1]. This disease affects the lives of many people around the world. The prevalence of diabetes in 2017 was 451 million in the age group 18–99 years and is predicted to reach 693 million by 2045 [2]. Statistics show the high prevalence of the disease and its high growth in Iran. According to research conducted in 2011, more than four million Iranian adults had diabetes mellitus [3]. As soon as the disease is diagnosed, psychological and social pressures appear. One of the most significant psychological pressures for those with diabetes is depression and anxiety [4]. Globally, it is estimated that 5% of adults suffer from depression. This complication is significant in patients with diabetes. According to statistics, one in four patients with diabetes has depression with clinical symptoms [5]. These effects are mainly caused by decreased metabolic control, reduced quality of life, lack of adherence to proper diet, increased health care costs, re-

duced drug adherence and high mortality, and these factors also exacerbate depression [6]. Conversely, treatment of depression with counseling and medication has noticeable effects on blood sugar level [5]. The results of the studies indicate an increased risk of depression and anxiety in diabetic patients [7]. Patients with anxiety disorders and depression go through more unfavorable periods of the disease and are more likely to become chronic and have reduced performance [8]. Research has shown that anxiety and depression affect the severity of type 2 diabetes mellitus through reduced quality of life and self-care [9]. The mortality of diabetics who also suffer from depression and anxiety is higher than those only dealing with diabetes [9]. According to research, spirituality intervention has a positive effect on a patient's mood and mental health [10] and it is a beneficial for patients with chronic disorders [11]. Diabetes patients define spirituality as a connection with one's inner self, existence of meaning in life and a connection with others, nature and a higher being (God) [12]. Studies have shown that people with chronic diseases such as diabetes use psychological support



like spirituality as a way to deal with illness, create a sense of meaning and purpose in life, reduce emotions of suffering from illness and despair and improve self-care and management of disease-related problems [13, 14]. It has also been shown that spirituality is a mechanism to combat the disease and is related to the control of a patient's blood sugar level [15]. Religion and spirituality, according to their internal teachings, play a role in improving the self-management function of diabetic patients [12, 16]. This article is an attempt to examine and provide a solution to reduce psychological pressure on the patient.

## Objectives

This study was conducted to evaluate whether spiritual education has any impact on depression and anxiety disorders and blood sugar control in patients with type 2 diabetes mellitus.

## Material and methods

### Study design

This study is a random control test with a control group and a pre- and post-intervention experimental group, which was performed after receiving approval from the ethics committee of the Shiraz University of Medical Sciences between January 2018 and June 2019. Written consent was obtained from the participants.

### Setting

This study was conducted within the diabetes outpatient services of the Imam Reza Clinic, affiliated with the Shiraz University of Medical Sciences, in southern Iran.

### Participants

The participants in this study, between the ages of 20 to 55 of both genders, were diagnosed with type 2 diabetes mellitus. According to a study of the effectiveness of mindfulness-based stress reduction on blood sugar control, stress, anxiety and depression in patients with type 2 diabetes mellitus [17], the required sample size was estimated at 122 people (61 people in each group). This number increased 20% to 146 people due to the probability of attrition (73 in each group). 146 people were randomly assigned to the experimental group (73 subjects) and control group (73 subjects). In the present study, the inclusion criteria were diagnosis of type 2 diabetes mellitus confirmed by a physician, not being treated by psychological medications, not suffering from severe mental illnesses, such as psychotic disorders, and not taking psychotropic drugs or substance abuse. The exclusion criteria were hospitalization due to complications of diabetes, absent more than twice in the training sessions, occurrence of unpredicted events and unwillingness of the volunteer to continue in the project.

### Measurement

Data collection tools included Spielberger's covert and overt anxiety questionnaire (Spielberger State-Trait Inventory, STAI) and the Beck questionnaire. Blood samples were also taken to check blood sugar and HbA<sub>1c</sub> under the supervision of a laboratory physician. Spielberger's overt and covert anxiety questionnaire, known as the STAI questionnaire, is a valid and reliable tool and has been used extensively in clinical research and activities [18]. The overt anxiety scale (a situational-y-1 form of STAI) consists of twenty items that evaluate a person's emotions at the time of response. Overt anxiety is scored via a Likert scale ranging from 20 to 80 and was classified into mild (20–31), moderate to low (32–42), moderate to high (43–53), relatively severe

(54–64), severe (65–75) and intense anxiety (76–80). The covert anxiety scale (Feature-form y-2 of STAI) includes twenty items that measure the individual's general and normal emotions. Covert anxiety is scored via a four-point Likert scale (never before, sometimes, most often, almost always). In this scale, scores 20–31 show mild anxiety, 32–42 moderate to low anxiety, 43–52 moderate to high anxiety, 53–62 relatively severe anxiety, 63–72 severe anxiety, and 73 or higher indicates very severe anxiety [19]. This questionnaire was translated in Iran by Mahram et al. in 1993, and its psychometrics have been confirmed [20]. Beck's depression questionnaire was first developed in 1961 by Beck et al. Due to the importance of this tool in the diagnosis of clinical intervention, many psychoanalytical studies have been conducted based on its psychometric characteristics. This questionnaire includes twenty-one questions on the Likert scale scored 1 to 63. Scores 1–10 are normal, scores 11–16 are low depression, scores 17–20 require psychological counseling, scores 21–30 relative depression, and scores more than 40 are excessive depression [21]. In Iran, the Beck's questionnaire psychometrics were evaluated by Tashakkori and Mehryar in 1994. Its reliability coefficient was 0.78. In radiographic studies in 1975, as well as with Wahabzadeh in 1973 and Chegini in 2002, the validity of Beck's questionnaire was proven [22]. During the treatment of diabetes, HbA<sub>1c</sub> measurement is the best index of diabetes control. This hemoglobin shows the mean blood sugar levels over the last 8–12 weeks. Its measurement is checked once every three months. To determine HbA<sub>1c</sub> levels, 5 ml of blood was taken by trained personnel from the patients in the central laboratory while the patient was fasting. Patients with an index value of 4–6% have good glycemic control, 6–8% poor glycemic control, and more than 8% were considered to be uncontrolled [23].

### Intervention

The intervention group underwent four 45-minute training sessions over two weeks. Three sections of the sessions were spiritual with religious instruction by clerics, in addition to receiving regular treatment and care. The themes of these teachings included self-knowledge and self-awareness and recognizing one's strengths and weaknesses, desires, fears, needs, tendencies. Avoid negative thoughts and try to think positively to achieve peace and a better and happier life. A session was also held by the researcher on the subject of expressing feelings and the training of problem solving. At the end, a booklet and educational CD with spiritual topics and communication with God were prepared for them. Daily practices were performed to correct emotions, control emotions, express emotions and teach relaxation and stress management. This training and practice lasted four months. The patients were followed weekly and did the daily exercises. The control group only received routine clinical treatment and care. The questionnaires were completed in two stages, one before the intervention and the other after the intervention, by the participants of the control and experimental groups.

### Statistical methods

SPSS version 21 statistical software was used to analyze the data. In the present study, descriptive statistics were used to summarize the demographic characteristics in tables; to statistically analyze the data from the Kolmogorov–Smirnov tests (to check the normality assumption), we used the independent *t*-Test, paired sample test, variance analysis test for repeated measurements and Chi-square test at  $\alpha = 0.05$ . To investigate the significant difference between the two experimental and control groups, we used the Chi-square test to evaluate the demographic information (age, work situation, education, history of sedative use). The income level was evaluated by Fisher's exact test, and age was evaluated by the independent *t*-Test.

## Results

In this study, 146 patients with type 2 diabetes mellitus were examined. Table 1 shows the demographic information for the two experimental and control groups. There was no significant statistical difference in terms of demographic information between the experimental and control groups. Before the intervention, the mean ± SD values of HbA<sub>1c</sub> among the participants of the experimental and control groups were 7.80 ± 1.09 and 7.90 ± 1.14, respectively, and the difference between them was not statistically significant (*p* > 0.05). After the intervention, the mean ± SD values of HbA<sub>1c</sub> among the experimental and control groups became 7.03 ± 0.88 and 7.94 ± 1.12, respectively, with a significant statistical difference (*p* < 0.001). The results indicate an improvement in the amount of HbA<sub>1c</sub> (*p* < 0.001) in the experimental group. However, it did not change significantly in patients in the control group.

Before the intervention, the mean ± SD values of depression in the experimental and control groups were 18.58 ± 9.59 and 18.00 ± 8.86, respectively, and the difference between them was not statistically significant (*p* > 0.05). After the intervention,

the mean ± SD values of depression among the participants in the experimental and control groups became 4.73 ± 1.97 and 18.34 ± 8.88, respectively, with a significant statistical difference (*p* < 0.001). The results indicated a significant reduction in the level of depression (*p* < 0.001) after the educational intervention in the experimental group. However, the rate of depression in patients in the control group did not change significantly.

Table 2 displays the level of overt and covert anxiety in the experimental and control groups separately. As a result, the level of overt and covert anxiety in the experimental group (*p* < 0.001) was significantly reduced. Table 3 shows the frequency of distribution of overt anxiety, and Table 4 represents the frequency of distribution of covert anxiety. Table 5 also shows the frequency of distribution of depression in patients before and after intervention, and the rate of overt and covert anxiety in most patients before the intervention was “moderate to high”. The levels of depression in most patients were “relatively depressed”, “need counseling” and “low depressed” before the intervention, but after the intervention, the prevalence of overt and covert anxiety was “moderate to low” and “mild”; the rate of depression also changed to “natural”.

**Table 1. Comparison of demographic variables in the experimental and control groups**

Subtype	Demographic variables	Frequency (%)			<i>p</i>
		Interventional group	Control group	Total	
Gender	male	29 (39.7)	27 (37.0)	56 (38.4)	0.734
	female	44 (60.3)	73 (63.0)	90 (61.6)	
Level of education	< diploma	40 (54.8)	31 (42.5)	71 (48.6)	0.192
	diploma	27 (37.0)	30 (41.1)	57 (39.0)	
	> diploma	6 (8.2)	12 (16.4)	18 (12.3)	
Occupational status	housewife	37 (51.4)	31 (42.5)	68 (46.9)	0.568
	unemployed	7 (9.7)	8 (11.0)	15 (10.3)	
	manual worker	13 (18.1)	14 (19.2)	27 (18.6)	
	employee	10 (13.9)	17 (23.3)	27 (18.6)	
	retired	5 (6.9)	3 (4.1)	8 (5.5)	
Income	one million	36 (49.3)	31 (42.5)	67 (45.9)	0.476
	between one and three million	31 (42.5)	38 (52.1)	69 (47.3)	
	more than three million	6 (8.2)	4 (5.5)	10 (6.8)	
Admissions	once	17 (23.3)	22 (30.1)	39 (26.7)	0.667
	twice	20 (27.4)	22 (30.1)	42 (28.8)	
	three times	12 (16.4)	11 (15.1)	23 (15.8)	
	more than three times	20 (27.4)	13 (17.8)	33 (22.6)	
	never	4 (5.5)	5 (6.8)	9 (6.2)	
Anxiety history	divorce	9 (12.3)	6 (8.2)	15 (10.3)	0.396
	family members with disease	9 (12.3)	5 (6.8)	14 (9.6)	
	death of family members	5 (6.8)	9 (12.3)	14 (9.6)	
	none	50 (68.5)	53 (72.6)	103 (70.5)	
Age	M ± SD	experimental group	3.67 ± 0.7		0.386
		control group	3.57 ± 0.62		

**Table 2. Comparison of the mean of anxiety before and after training between the experimental and control groups**

Group	Time	Before	After	M ± Difference	<i>t</i>	<i>p</i>
State (apparent) anxiety	case	48.94 ± 8.92	30.30 ± 2.24	-18.64 ± 8.34	19.07	< 0.001
	control	48.61 ± 8.53	48.79 ± 8.31	0.17 ± 0.78	1.93	0.057
	<i>p</i>	0.820	< 0.001	< 0.001		
Trait (hidden) anxiety	case	44.37 ± 7.24	25.97 ± 2.71	-18.40 ± 6.36	24.54	< 0.001
	control	43.57 ± 8.84	44.17 ± 8.47	0.60 ± 1.35	3.81	< 0.001
	<i>p</i>	0.663	< 0.001	< 0.001		

Group	Time	Categorization	Frequency (%)	
			Before	After
Experimental group		mild	2 (7.2)	48 (8.65)
		medium to low	13 (8.17)	25 (2.34)
		medium to high	38 (1.2)	
		fairly intense	18 (7.24)	
		intense	2 (7.2)	
Control group		mild	6 (2.8)	4 (5.5)
		medium to low	5 (8.6)	6 (2.8)
		medium to high	45 (6.61)	46 (63)
		fairly intense	15 (5.20)	15 (5.20)
		intense	2 (7.2)	2 (7.2)

Group	Time	Categorization	Frequency (%)	
			Before	After
Experimental group		mild	3 (1.4)	71 (6.98)
		medium to low	28 (8.34)	1 (4.1)
		medium to high	32 (8.43)	
		fairly intense	10 (7.13)	
Control group		mild	8 (11)	5 (8.6)
		medium to low	26 (6.35)	28 (4.38)
		medium to high	31 (5.42)	31 (5.42)
		fairly intense	7 (6.9)	8 (11)
		intense	1 (4.1)	1 (4.1)

Group	Time	Categorization	Frequency (%)	
			Before	After
Experimental group		normal	11 (1.15)	71 (100)
		mild depressed	25 (2.34)	
		need counseling	10 (7.3)	
		relatively depressed	19 (26)	
		major depressed	5 (8.6)	
		excessive depressed	3 (1.4)	
Control group		normal	14 (2.19)	13 (8.17)
		mild depressed	23 (5.31)	24 (9.32)
		need counseling	16 (9.21)	15 (5.20)
		relatively depressed	14 (2.19)	14 (2.19)
		major depressed	3 (1.4)	4 (5.5)
		excessive depressed	3 (1.4)	3 (0.4)

## Discussion

This study aimed to investigate the effect of spiritual education on anxiety and depression and better control of blood sugar in patients with type 2 diabetes mellitus. The results of the study showed a significant decrease in the level of depression and overt and covert anxiety in the experimental group compared to the control group after four sessions of spiritual training. The level of overt and covert anxiety was moderate to high before the intervention, but anxiety in the experimental group was mild and moderate to low after the intervention. The level of depression was also mild to relatively depressed before the intervention, but after the intervention, the level of depression changed to normal. The rate of blood sugar control, which was checked with the HbA<sub>1c</sub> index, improved to the desired level after the intervention. Therefore, it can be concluded that spiri-

tual training is a good way to reduce anxiety and depression. It can also help one to have better control over blood sugar levels. The results of many studies are consistent with the present study and have shown the positive effect of spiritual interventions. A study in 2019 revealed that spiritual care based on the "Ghalbe Salim" model could reduce the state and trait anxiety of mothers having premature neonates [24]. The results of studies by Kandasamy et al. (2011) and Amiri et al. (2018) showed that spiritual education in cancer patients can reduce stress, anxiety and depression [25, 26]. Some studies have also revealed that the treatment of depression and anxiety in patients with type 2 diabetes mellitus was facilitated by combining spiritual values and patients' beliefs [27, 28]. The study by Newlin et al. in 2008 revealed that spirituality and religiosity played a significant role in controlling the patients' blood sugar; this is in line with the results of the present study [29]. Therefore, according to these results, it can be concluded that spiritual training can be used in



improving life, especially in terms of stress – including depression and anxiety – and in controlling blood sugar levels. On the other hand, in the study of Zareipour et al., which was carried out in 2016, there was no relationship between mental health and blood sugar control [30], and in the study by Long et al. in 2018, there was no significant relationship between spirituality and control of body mass index and increased physical activity [31]. Different samples and cultural differences may explain the discrepancies. However, as mentioned, spiritual training can improve mental health and the control of blood sugar levels. In the present study, the patients were also followed for four months, and the difference in the results of this study can be attributed to the difference in interventions. Nurses and other health care providers must consider the spiritual dimension of health for empowering individuals and communities, especially patients suffering from chronic diseases such as diabetes, to achieve health and comprehensive well-being [32].

### Limitations of the study

The limitations of this study are the small number of people studied and the lack of access to people of different religions. Therefore, it is recommended that this research be carried out with a larger number of individuals and include other religions and denominations, even if other smaller studies have been carried out, as well as evaluating the long-term results.

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### Conclusions

As the results of this study showed, spiritual education is an effective way to help patients with type 2 diabetes mellitus, especially when it comes to depression, anxiety and blood sugar control. These findings are important in reducing psychological problems and improving disease management in individual with diabetes. Therefore, spiritual education as part of diabetes care programs should be considered by health care providers. It is recommended that the necessary steps should be taken to teach spiritual concepts to patients with diabetes.

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