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Effects of Face-To-Face and Online Training on Self-Care of Middle-Aged and Elderly People with Type 2 Diabetes: A Comparative Study

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Abstract

BACKGROUND: Self-care training is one of the strategies used to control diabetes. There is some ambiguity about the appropriate method for educating middle-aged and older adults about self-care.

AIM: This study aimed to compare the effects of face-to-face and online training on self-care levels in middle-aged and older adults with type 2 diabetes.

MATERIAL AND METHODS: In a randomised clinical trial, 84 middle-aged and older adults with type 2 diabetes who had been referred to the Diabetes Clinic of Esfarayen in Iran, were evaluated. Patients who meet the inclusion criteria were randomly assigned into two groups. Diabetes self-care education (DSCE) was provided using a face-to-face training method in one group and using online training method in the other group. The summary of diabetes self-care activities (SDSCA) questionnaire was completed at baseline and 1 month after training.

RESULTS: The mean and standard deviation of self-care scores before and 1 month after training were 43.16 ± 14.94 and 65.76 ± 10.65 in the face-to-face training group, and 37 ± 10.75 and 56.82 ± 12.06 in the online training group, respectively. The differences in the self-care scores were significant both before and after the intervention in the two groups ($p < 0.05$). Although the difference was greater in the face-to-face training group than in the online training group, it was not statistically significant ($P > 0.05$).

CONCLUSION: Both face-to-face and online training had a similar effect on the self-care levels in middle-aged and older adults with type 2 diabetes. Therefore, both training methods could be used as effective techniques to meet the needs and educational requirements of middle-aged and older adults with type 2 diabetes.

Introduction

Elderly is emerging as an important and global phenomenon today due to population growth. World Health Organization (WHO) announced that older adults accounted for about 7% of the total population in Southwest Asia (including Iran) in 2000, and this figure will reach 15% by 2030 [1]. The United Nations has stated that the total population of older adults in the world was approximately 737 million in 2009. The number is expected to reach 2 billion in 2050, with two-thirds of the population living in developing countries [2]. Statistical surveys in Iran also indicate the rapid growth of the elderly population [3]. According to the 2011 census in Iran, the population over the age of 60 years was 6,159,676 and the population aged over 65 years was 4,296,769 [4]. On the other hand, aging significantly increases the risk of elderly people to chronic illness. Recent studies indicate that 80% of elderly people suffer from at least one chronic illness that puts them at greater risk of disability and death compared to others [3], [4], [5]. Nearly 40% of the elderly people in the community experience some of the constraints of chronic illness [5]. One of the most common and chronic illnesses among elderly people is diabetes. The disease has been exhibiting an alarming outbreak over the past

decade and is rapidly rising, up to 50% [6]. The WHO predicted that around 300 million people worldwide would develop diabetes until 2025 [7]. It is one of the most important causes of mortality and disability in older adults [8]. Middle age refers to the age of between 45-60 years [9]. The mortality rate for middle-aged people with diabetes is twice more than that of non-diabetic (healthy) people at the same age [10].

The International Diabetes Federation (IDF) in 2015 estimated that 1 out of 11 adults were diagnosed with diabetes (415 million) and one out of two adults (46%) was not diagnosed with diabetes. Twelve per cent of global health cost is spent on diabetes ($ 673 billion). Three-quarters (75%) of people with diabetes live in low-income and middle-income countries. Also, it has been revealed that 1.5 million people died in 2012 due to diabetes. The population of adults over the age of 65 years with type 2 diabetes in the United States is projected to reach 70 million in 2030 from 35 million in 2000 [11]. In terms of the importance of the disease, diabetes mellitus is the most important cause of blindness among people aged 25-74 years and is the leading cause of amputation in the United States. Also, 35% of people with chronic renal failure and dialysis have diabetes. Moreover, the patients with diabetes are twice more likely to experience a stroke than healthy people, so that diabetes and its related complications are the third leading cause of death in the United States [12].

One of the ways to control diabetes and reduce its complications is self-care training. The self-care promotes the quality of life and helps reduce costs. The American Diabetes Association states that people with diabetes should be trained to treat themselves to delay the onset of diabetes-related complications [7]. One of the methods for patients' education is e-learning, which is the use of computers and the internet. To enter the site for access to educational content, there are courses and communication tools that in turn can be considered convergence of education and the internet [7], [8]. In the current society, the internet has increasingly been considered as a highly practical tool, and there is an increase in the number of people who receive their health information through the internet. This suggests that the internet may be of help in changing the behaviour of the community to prevent and control type 2 diabetes. Internet-based education is well known for the prevention and treatment of chronic diseases [13]. Another way of teaching is face-to-face training, which is one of the most common methods of education in the healthcare system. This method allows for two-person discussions and a change in behaviour. However, this method of training needs to spend more time, and it is impossible in crowded centres [14]. Unlike face-to-face interactions, web-based interventions can target a wider audience without adding more per-user fees and is available to users all day long [13].

Many elderly patients with diabetes experience complications of this disease. Considering the importance of diabetes and prevention of complications and effective control of blood sugar and the need for self-care education as well as ambiguity about the appropriate method for educating middle age and elderly people, this study was conducted to compare the effects of face-to-face and online training on self-care levels in elderly and middle-aged people with type 2 diabetes.

Material and Methods

The present randomised clinical trial was conducted on middle-aged and older adults with type 2 diabetes who had been referred to the Diabetes Clinic of Esfarayen, Iran, in 2017. Due to the lack of a similar study, 15 people from each of the online training group and the face-to-face training group were selected for a pilot study to estimate the sample size. Using the results of the pilot study, the sample size was calculated to be 38 for each group. The study was conducted during the second half of 2017. To conduct this study, the researchers were referred to the Diabetes Clinic of Esfarayen with the approval of the ethics committee of North Khorasan University of Medical Sciences. The medical records of the relevant patients were delivered to the researchers in coordination with the clinic. Patients were selected using a purposive and convenience sampling method. The inclusion criteria were as follows: age ≥ 45 years; a history of at least 6 months of diabetes; minimal reading and writing skills and skills in using internet; no history of other chronic diseases including hypertension and cardiovascular disease; fluent in the Persian language; resided in the city of Esfarayen and able to communicate (i.e., there were no communication barriers, such as deafness or blindness). The exclusion criteria were death or hospitalisation during the study period; absent for more than two face-to-face training sessions; missed more than two online training sessions; and an unwillingness to voluntarily participate in the study. A brief explanation of the research objectives and methodology was given to the middle-aged and older adults before the intervention and written informed consent was obtained from all patients.

A total of 84 eligible patients were contacted using the phone number noted in their medical records. The necessary arrangements were made to provide the intervention, set the hours of the class, and obtain written consent from the participants. It is worth noting that no course had been previously held in the diabetes clinic. The research units were encoded from 1 to 82; patients with the odd codes were assigned randomly to the face-to-face training group (n = 42), and the even codes were assigned to the online training group (n = 42). The participants

completed a demographic profile and answered the summary of diabetes self-care activities (SDSCA) questionnaire before the intervention. The SDSCA self-report questionnaire contained 15 items about the self-care criteria of the patients over the past 7 days. It covered various aspects of the treatment regimen of people with diabetes: general and diabetic diet (five questions), exercise (two questions), blood sugar testing (two questions), use of insulin injections or anti-diabetic medications (one question), foot care (four questions), and smoking (one question) [15]. The SDSCA score for each behaviour, except smoking, ranged from 0 – 7; the score for smoking behaviour ranged from 0 to 1. A total adherence score, which ranged from 0 – 99, was obtained by adding each score [15]. In a study by Hamadzadeh et al., eight faculty members confirmed the content validity index (CVI) of the SDSCA questionnaire. The reliability of the SDSCA was evaluated using Cronbach's alpha, which was 0.88 [15].

The educational content of the training sessions was related to diabetes self-care education (DSCE) and included information on nutrition, exercise, foot care, adherence to the drug regimen, and self-monitoring of blood glucose. The materials were extracted from national medical and nursing books, including the risk assessment for heart attack, stroke and cancer, family care guides, which were reviewed and published by the Ministry of Health and Medical Education in 2017, and Nurse and Diabetes (National Disease Prevention and Control Program), Ministry of Health and Medical Education, Deputy of Health, Center for Disease Control, and the Department of Endocrinology and Metabolism [16].

The educational topics covered during the sessions were as follows. Session 1 discussed diabetes and its types, diagnosis, and symptoms. Session 2 discussed appropriate diet for diabetic patients (a diet with low fat and high fibre contents and a limited amount of carbohydrates), while session 3 provided information about the possible treatments for diabetes and methods of self-monitoring of blood glucose (twice-daily, pre-lunch/pre-dinner). Session 4 discussed the importance of exercise in patients with diabetes, while in session 5, foot care and the complications of smoking in patients with diabetes has been discussed. Session 6 provided information on how to inject and maintain insulin levels, and the necessary tests that are involved. The educational content was the same for both groups. The training for the online training group lasted 3 weeks. A training file containing videos and text was sent every 3 days through a social network. People were requested to send a message to the researchers after receiving and studying the file. To prevent the contamination of information, individuals were asked not to distribute the class content to other groups. Before starting the online training, the researchers made sure that the participants had a mobile phone and the skills to use it. The participants were then taught how to receive and study the files. One month after completing the training, a post-test questionnaire was given to both groups. The collected data were categorised and coded in tables and analysed with SPSS version 24 software. Statistical tests, such as chi-squared test, independent t-test, and paired t-test, Fisher's exact test, Mann–Whitney, Wilcoxon test, and McNemar's test were used for data analysis.

Results

A total of 84 middle-aged and older adults were enrolled in the study (34 women and 8 men were in the face-to-face training group, and 31 women and 11 men were in the online training group). The mean age of the participants was 55.35 years; most participants were women (77.4%). Also, 61.9% had a primary level of education, and 96.4% were married. Other demographic and clinical information of the participants in the groups is presented in Table 1.

Table 1: Demographic and clinical profile of middle-aged and older adults with type 2 diabetes in the face-to-face and online training groups

Variables	Categories	Face-to-face training N (%)	Online training N (%)	P-value
Sex	Female	34 (81.34)	31 (74)	0.149
	Male	8 (19)	11(24)	
Duration of disease		6.96 ± 5.82	6.35 ± 4.07	0.816
Occupational status	Employee	9 (21)	21 (50)	0.01
	Housekeeper	19 (45)	14 (33)	
	Retiree	4 (10)	3 (7)	
	Free	10(24)	4(10)	
Marital status	Married	41 (98)	38 (95.0)	0.611
	The divorced and deceased spouse	1(2)	2 (5)	
Drug consumption	Oral medication	37 (88)	40 (95)	0.433
	Insulin	5(12)	2 (5)	
Familial history	Yes	22(52)	15(36)	0.272
	No	20(48)	27(64)	
Educational level	Uneducated	12 (29)	13 (31)	>0.99
	< High school	14 (33)	13 (31)	
	≥ High school	11 (26)	8 (19)	
	≥ Bachelor	5(12)	8 (19)	
Family relationship	Father	9 (41)	4 (27)	0.259
	Mother	6 (27)	8(53)	
	Sibling	6 (27)	3 (20)	
Economic level	Poor	11 (26)	10 (23)	0.99
	Average	25 (60)	24 (58)	
	Good	6 (14)	8 (19)	
Self-monitoring of blood glucose	Yes	23 (55)	20 (48)	0.511
	No	19 (45)	22 (52)	
Complications	Renal	1 (2.4)	0 (0)	0.369
	Ocular	6 (14.6)	10 (25)	
	Other	1 (2.4)	0 (0)	
	No	33 (80.5)	30 (75)	
Assistance to self-care	Spouse	13 (31)	6 (14)	0.026
	Child	8 (19)	5 (12)	
	Neighbor	2 (5)	1 (2)	
	Individual	19 (45)	30(72)	

Most patients in the face-to-face training group were housekeepers (45%), while 50% of the people in the online training group were employees; thus, the distribution of occupations was heterogeneous in the two groups. The Kruskal-Wallis test was used to evaluate the effect of occupation on the total DSCE score before training. There was no significant relationship between occupation and DSCE ($\chi^2 = 1.46$; P = 0.48).

There was a significant improvement in the self-care scores for adherence to diet for patients in both groups after training (P < 0.001). However, there was no significant difference in the scores for adherence to diet between the two groups before training (P = 0.15). The score was significantly higher after training in the face-to-face group compared with the online training group (Table 2).

Table 2: Comparison of self-care scores for adherence to diet in the face-to-face and online training groups

Diet	Before training	After training	T-value	P-value
Face-to-face training group	19.54 ± 7	25.47 ± 4.32	-6.09	< 0.001*
Online training group	17.55 ± 5.56	22.27 ± 4.78	-6.09	< 0.001*
T-value	1.42	3.18		
P-value	0.15**	0.002**		

*Paired t-test **Independent t-test.

The self-care scores for the exercise of the patients in both groups were studied before and after training (Table 3). The results showed that the scores improved significantly in both groups (P < 0.001). The score in the face-to-face training group both was significantly higher than in the online group before and after training (P = 0.003). To examine and control the effect of the exercise score before training, the difference in the exercise scores before and after training in both groups was assessed using the Mann-Whitney U test. There was no significant difference in the changes in exercise scores between the two groups after training (P-value = 0.56 and Mann-Whitney U test = 779).

Table 3: Comparison of self-care scores for exercise in the face-to-face and online training groups

Exercise	Before training	After training	Z-value	P-value
Face-to-face training group	5.61 ± 4.17	7.76 ± 3.37	-3.7	*< 0.001
Online training group	2.9 ± 2.76	5.4 ± 2.65	-4.96	*< 0.001
Mann-Whitney U test	-2.95	-3.32	67	140
P-value	0.003**	0.001**		

* Wilcoxon ** Mann–Whitney

The mean self-care scores in both groups were significantly increased after training (Table 4). There was a significant difference in the self-care scores of the groups before the training. To control and compare the scores before and after the two training methods, the difference in the scores before and after the training was calculated using the Wilcoxon test. The mean difference was 22.59 ± 11.55 in the face-to-face training group and 19.82 ± 10.88 in the online training group; there was no significant difference between the two groups (z = 694 and P-value = 0.17).

Table 4: Mean self-care scores in the face-to-face and online training groups

Mean self-care score	Before training	After training	Z-value	P-value
Pace-to-face training group	43.16 ± 14.94	65.76 ± 10.65	5.59	< 0.001*
Online training group	37 ± 10.75	56.82 ± 12.06	5.44	< 0.001*
Mann-Whitney U test	606.5	483.5		
P-value	0.03	0.001		

* Wilcoxon ** Mann–Whitney.

Discussion

The present study was conducted to compare the effects of face-to-face and online training on the self-care levels in middle-aged and older adults with type 2 diabetes. The results showed that both approaches increased the self-care scores of the participants. After the intervention, the face-to-face training group showed a statistically significant increase in the mean self-care scores. This indicated the effectiveness of face-to-face training on changing the behaviour and increasing the levels of self-care in middle-aged and older adults with type 2 diabetes. In concurrence with this study, Azizi et al., showed that self-care education increased the control of drug complications and haemoglobin A_1c levels in patients with diabetes type1, which proved the effectiveness of training sessions [17]. The mean self-care scores in middle-aged and older adults with type 2 diabetes in the online training group were also compared before and after the intervention. Although the study period was short, the results showed there was a significant increase in the scores after the intervention, which suggested that online training was effective for increasing self-care levels. Noahi et al. examined the effect of e-learning on self-care knowledge, attitude, and performance of patients with type 2 diabetes in Kerman, Iran. The results indicated there was a significant difference in the mean scores in the three areas before and after the intervention, as well as a decrease in blood sugar and glycosylated haemoglobin levels after the intervention, which highlighted the effectiveness of online training [16]. A study by Ralston et al. also agreed with the results of the current study [18]. Studies have shown that self-care training programs using new educational models can promote the quality of life of older adults with diabetes type 2. It has been shown that self-care training improved the quality of life of older adults with diabetes, which agreed with the present study [19].

One of the aspects of self-care that was assessed in this study was adherence to the diet. Patients' self-reported adherence to the recommended diet in both groups was significantly improved after training. The self-care score for adherence to diet showed no significant difference between the two groups before the training but was significantly higher in the face-to-face training group after the training was completed. This result reflected the greater effect that face-to-face training had in improving the adherence to a recommended diet of the participants. This result was consistent with the findings reported by Norris et al., [20]. The study by Oshvandi et al. also is in line with the results of this study. The researchers examined the effect of self-care education using the teach-back method on self-care behaviours in patients with type 2 diabetes. The results showed that education increased adherence to diet and other self-care behaviours [21]. In line with the present study, Zamanzadeh et al., reported that

distance learning provided by nurses for patients with diabetes increased adherence to appropriate diets [22]. Another aspect of self-care that was investigated in this study was exercise and physical activity. The self-care scores for the exercise of the patients was determined in both groups before and after training and was found to significantly increase in both groups, which indicated the effectiveness of the training methods. Similar to this study, Naghibi et al., reported that the self-care score associated with exercise increased after training in patients with type 2 diabetes [23]. It has been indicating that self-care training increased a patient's adherence to physical activity, which agreed with the results of this study [24]. This study has some limitations. The small sample size of patients in the two groups was a limitation. Therefore, further larger studies are required to confirm the results. Another limitation was that it was not possible to have a long-term follow-up with the patients. It is recommended that future studies increase the follow-up period of the patients. Other limitations included the low literacy of elderly people with diabetes and the lack of adequate control over mobile phones and the use of social networks.

Based on the results of this study, face-to-face training and online training had the same effect on the level of self-care in middle-aged and older adults with type 2 diabetes. Therefore, face-to-face training and online training can be considered to be effective resources for improving self-care and promoting the health and well-being of elderly and middle age people.

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