Original Article

The Effectiveness of Peer Group-Based Training in Adherence to Treatment of Adults with Diabetic Foot Ulcer

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Abstract

Background & Objective: Adherence to treatment of patients with diabetic foot ulcer leads to successful treatment and a reduction in the severity of complications. The present study was conducted to investigate the effect of peer group-based training on adherence to treatment of adults with diabetic foot ulcers in Shiraz in 2020.

Materials & Methods: This quasi-experimental study was conducted on 70 patients (35 in the intervention group and 35 in the control group). The content of the education program was performed by the peer for the intervention group in 5 sessions of 45 minutes, and the routine education of the diabetes clinic was provided to the control group. Data collection tools included demographic characteristics questionnaire, Morisky Medication Adherence Scale (MMAS). Data were analyzed by the SPSS software version 22 using statistical tests (t-test, ANOVA and Chi-square) and the significance level was considered $p<0.05$.

Results: The mean score of adherence to treatment was significant immediately after the intervention, but there was no significant difference after one and three months.

Conclusion: Peer training of patients with diabetic foot ulcers could improve adherence to treatment. Therefore, health system policymakers may use this approach as an effective method in the care program of patients with diabetic foot ulcers and other diseases.

Keywords: Therapeutic Adherence and Compliance Peer group, Diabetic foot

Introduction

Diabetes is the most common chronic disease worldwide which causes major problems for the individual, family and community (1). Diabetes has attracted more attention due to its late and dangerous side effects and that it has affected millions of people around the world (2). The World Health Organization (WHO) has identified diabetes as a latent epidemic due to the growing cases worldwide (3).

People with diabetes in Iran make up 2–3% of the total population, and it is estimated that the cost of treating the disease will increase to $ 200 billion by 2030 (4).

Today, because of the availability of insulin and modern treatments for diabetes, the probability of patients surviving and consequently the risk of chronic complications including

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ocular, renal and cardiovascular involvement has increased. One of the most commonly overlooked complications of diabetes is diabetic foot ulcers (5).

Diabetic foot ulcer is the most common cause of hospitalization of diabetic patients and the most common cause of non-traumatic lower-limb amputation which leads to increased treatment costs (6).

Every year, more than one million people with diabetes lose their foot, which means that every 30 seconds, an amputation occurs due to diabetes (7).

Patients' adherence to self-care behaviors is directly related to the reduction of complications and mortality, so that adherence to self-care programs reduces the incidence of complications by more than 50% (8). Given the fact that many patients do not pursue their treatment, education could improve their adherence to treatment aimed at reducing the risk of foot ulcers and other complications (9). Education is an important aspect of disease management in diabetes that improves the quality of care, glycosylated hemoglobin, weight and, other health indexes and reduces treatment costs (10).

Education is performed in different ways, most important of which is peer training that improves health and creates a suitable environment for learning (11). Peer is a person belonging to the same social group whom people believe is similar in ability and may have strong motivational effects on learning (12). Numerous studies including Ghasemi et al. have confirmed the effect of peer group (13). Peers are better able to communicate with each other and encourage them to choose appropriate health behaviors because they can share their common strengths, weaknesses, and common experiences at the lowest cost (14).

Since the health of the lower limbs plays a decisive role in mobility and productivity and the feet are exposed to a variety of infectious, fungal, neurological, traumatic and chronic diseases, especially diabetes, special attention has long been paid to their care and treatment in developed countries. Patient education is one of the effective practices in this regard. The question is whether peer training is effective in adherence to treatment of patients with diabetic foot ulcers?

Materials & Methods

This quasi-experimental study was conducted on 70 patients with type 2 diabetes in Shiraz health center from August 2019 to February 2020. In the present study, 70 patients were selected through simple random sampling by random number table and were entered into the study after investigation of the inclusion and exclusion criteria. Inclusion criteria were willingness to participate in the study, confirmation of type 2 diabetes by an expert of endocrinology and metabolism, as well as based on fasting blood sugar and HbA1c recorded in the patient's file, and having a history of diabetic foot ulcer or diabetic ulcer during the study. Exclusion criteria were missing more than one education session, having acute disorders such as neuropathy, diabetic ketoacidosis, having mental and psychological disorders as well as chronic diseases including liver failure, heart failure, stroke and cancer. One of the other exit criteria is that they have not been trained recently and are not currently undergoing other training

According to a study by Moharamzad et al (15). and considering alpha = 0.05, and power = 90%, a 66-subject sample size was estimated for the study. Yet, the sample size was increased to 70 (n = 35 in each group) by considering the probability of loss.

$$n = \frac{(s_1^2 + s_2^2)}{d^2}(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2$$

Before starting the educational intervention, the patients were provided with complete explanation about the research methods and were required to sign written informed consent forms to participate in the study. Then, they were randomly divided into peer training and control groups.

Before starting the educational intervention, patients in both groups were asked to complete the questionnaire which included demo-

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graphic characteristics and Morisky Medication Adherence Scale (MMAS). At the end of the education sessions, both groups were assessed again through the same questionnaires one month and three months after the intervention.

The education program was designed and implemented in 5 sessions of 45 minutes for the intervention group by peer group. Due to the COVID-19 pandemic, a WhatsApp group was formed to coordinate questions and answers. The peer group was selected from patients (four patients). The peers were trained in the health center by the researchers through lecture, group discussion, and question and answer before sampling. Then, two of them with higher scores according to the evaluation checklist was selected and a justification program was presented for them in two 2-hour sessions. The most important educational items included diabetes, its symptoms, nutrition and medication, early and late complications, the causes of the complications, including foot ulcers, types of foot problems, foot care methods, prevention of diabetic foot ulcers, insulin-therapy, and how to inject insulin.

The intervention group was trained for 5 weeks (one session of 45 minutes per week) by two peers in four to five patients in the training room of the health centre, and at the end, there were Q &As and experiences were recounted. The training was performed through expressing experiences and group discussion by peer groups. The control group received routine education by the health center staff. For ethical consideration, an educational booklet was also provided to the control group at the end of the educational program. In order to confirm the content validity of the education program, the opinions of 5 endocrinologists and 10 nursing professors were used. The content of the education program was shown in Table 1.

Table1. Content of education program

Sessions	Duration	Objectives
1st	45 min	Acquaintance with diseases, symptoms, complications and prognostic tests
2nd	45 min	Methods of treatment, oral medication and injection
3rd	45 min	Proper diet and physical exercises
4th	45 min	Acquaintance with ulceration, foot care and characteristics of good shoes
5th	45 min	Conclusion and Q &A

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Data collection tools

Data collection tools were a demographic questionnaire (age, gender, occupation, education, marital status, etc.) and Morisky Medication Adherence Scale (MMAS).

Morisky Medication Adherence Scale (MMAS)

The Morisky medication adherence scale comprises seven two-point items (Yes = 0 and No = 1) and one five-point item (Never = 0, Rarely = 1, Sometimes = 2, Often = 3, Always = 4). A score of 6 or higher indicates adherence to the desired treatment (14).

The Persian version of MMAS has acceptable reliability and validity in Iranian patients. In a study, Moharamzad, et al., the reliability and validity of the 8-item Morisky Medication Adherence Scale (MMAS-8) were assessed in a sample of Iranian hypertensive patients.

In a study, the mean score of the tool was calculated as 5.57 with a standard deviation of 1.86. 54%, 31%, and 15% of patients had high, moderate, and low adherence, respectively. Reliability ($\alpha = 0.697$) and internal consistency of the tool were good ($r = 0.94$ and $P>0.001$). The overall score of the tool was equal to systolic and diastolic blood pressure ($P>0.001$). Chi-square test showed a statistically significant relationship between adherence level and blood pressure control. Sensitivity, specificity, positive predictive value, and negative predictive value were 92.8%, 22.3%, 52.9% and 76.7%, respectively.

Internal consistency was acceptable with an overall Cronbach's α coefficient of 0.697 and test-retest reliability showed good reproducibility ($r= 0.940$) (15).

Ethical considerations

Participants signed informed written consent to participate in the study. The present study was conducted in accordance with the principles of Helsinki Declaration. Participants were assured of the anonymity and confidentiality of their information. In addition, the study was approved by the ethics committee of Fasa University of Medical Sciences and registered with the ethics code IR.FUMS.REC.1399.069. Descriptive and inferential statistics were used to analyze the collected data. In descriptive statistics, the frequency distribution table and the report of mean and standard deviation were used. Then, the data were analyzed by SPSS software version 22 through statistical tests (independent t-test, paired t-test, chi-square) and the significance level was considered to be $p\geq0.05$.

Results

A total of 70 patients participated in the study. In the control group, 13 were female (37.1%) and 22 were male (62.9%), while in the intervention group, 10 were female (28.6%) and 25 were male (71.4%). The mean and standard deviation of participants' age in the control and intervention group was 55±9.9 and 57.1±11.3. According to the Kolmogorov-Smirnov test, there was no significant difference between the mean and standard deviation of participants' age, hospitalization history due to diabetic foot ulcer, the mean score of blood sugar, and other demographic variables (Table2).

Qualitative variables		Control		Intervention		Chi-square p-value
		Number	Percent	Number	Percent	
Gender	Female	13	1.37	10	6.28	0.445
	Male	22	9.62	25	4.71	
Marital status	Single	5	3.14	3	6.8	0.452
	Married	30	7.85	32	4.91	

Table 2. Frequency distribution of demographic characteristics of the participants in two groups of control and intervention

Gender	Female	13	1.37	10	6.28	0.445
	Male	22	9.62	25	4.71	
Marital status	Single	5	3.14	3	6.8	0.452
	Married	30	7.85	32	4.91	
Occupation	Employed	21	0.60	15	9.42	0.151
	Unemployed	14	0.40	20	1.57	
Education	<college	5	3.14	14	0.40	0.016
	>college	30	7.85	21	0.60	
Insurance coverage	Yes	27	1.77	29	9.82	0.550
	No	8	9.22	6	1.17	
Complementary insurance	Yes	20	1.57	20	1.57	0.999
	No	15	9.42	15	9.42	
Type of diabetic foot ulcer	1	9	7.25	11	4.31	0.697
	2	16	7.45	12	3.34	
	3	8	9.22	8	9.22	
	4	2	7.5	4	4.11	
Previous participation in education program	Yes	5	3.14	5	3.14	0.999
	No	30	7.85	30	7.85	
Source of responses	Patient	24	6.68	30	7.85	0.88
	Family	11	4.31	5	3.14	
History of smoking	Yes	7	0.20	12	3.34	0.179
	No	28	0.80	23	7.65	
Quantitative variables		Mean	SD	Mean	SD	T-test p-value
Age		0.55	9.9	1.57	3.11	0.442
Duration of illness		3.13	7.6	5.14	0.8	0.520
History of hospitalization		6.2	3.2	6.2	2.2	0.915
HbA1C		61.8	49.1	93.8	47.1	0.356

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The results of Table 3 showed that there was no significant relationship between the MMAS and demographic characteristics.

Table 3. Relationship between demographic characteristics and MMAS

MMAS					
Variables		**Number**	**Mean**	**SD**	**p-value Mann-Whitney**
Gender	Female	10	0.73	1.35	0.295
	Male	25	0.53	4	
Marital status	Single	3	1.33	1.13	0.236
	Married	32	0.52	1.40	
Occupation	Employed	15	0.38	1.26	0.580
	Unemployed	20	0.74	1.49	
Education	<college	14	0.66	1.32	0.768
	>college	21	0.54	1.46	

According to Table 4, adherence to treatment in the control group changed from 3.56 before the intervention to 3.23 immediately (P = 0.195), 3.2 one month (P = 0.221) and 3.45 three months after the intervention (P = 0.701). In contrast, in the intervention group, adherence to treatment increased from 3.29 before the intervention to 3.87 immediately (P = 0.018), 3.74 one month (P = 0.40) and 3.54 three months after the intervention (P = 0.392).

Adherence to treatment before the intervention did not differ significantly (P = 0.411). However, by eliminating the confounding effect of the previous measurement, a significant difference was observed between the control and intervention groups immediately after the intervention (P = 0.011). The rate of change in adherence to treatment immediately after the intervention (P = 0.007) was significantly different between the control and intervention groups. Cohen suggested that d = 0.2 would be considered a 'small' effect size, 0.5 represents a 'medium' effect size and 0.8 a 'large' effect size. This means that if the difference between two groups' means is less than 0.2 standard deviations, the difference is negligible, even if it is statistically significant.

Table 4. Comparison of the mean score of adherence to treatment between the intervention and control group before, immediately, one and three months after the intervention

	Control			**Intervention**				
Adherence to treatment	**Mean**	**SD**	**p-value[1]**	**Mean**	**SD**	**p-value[2]**	**p-value[3]**	**Effect size Cohen's d**

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Before intervention	3.56	1.43	---	3.29	1.39	---	0.411	0.19
Immediately after intervention	3.23	1.30	0.195	3.87	1.41	0.018	0.011	0.47
One month after intervention	3.19	1.30	0.221	3.74	1.59	0.140	0.076	0.38
Three month after intervention	3.45	1.40	0.701	3.54	1.67	0.392	0.607	
Immediate difference	-0/11	1.75	---	0.26	1.75	---	0.007	
One month difference	-0.37	1.76	---	0.46	1.79	---	0.076	
Three month difference	-0.34	1.50	---	0.59	1.39	---	0.319	

P-value[1] = Comparison of mean quality of life in control group at different times (ANOVA, Bonferroni post hoc test)
P-value[2] = Comparison of mean quality of life in the intervention group at different times (ANOVA, Bonferroni post hoc test)
P-value[3] = Comparison of mean quality of life between control group and intervention at different times (t-test, ANOVA, U Mann-Whitney post hoc test)

It could be concluded that the intervention was effective immediately after education and decreased over time and was not effective (Chart1).

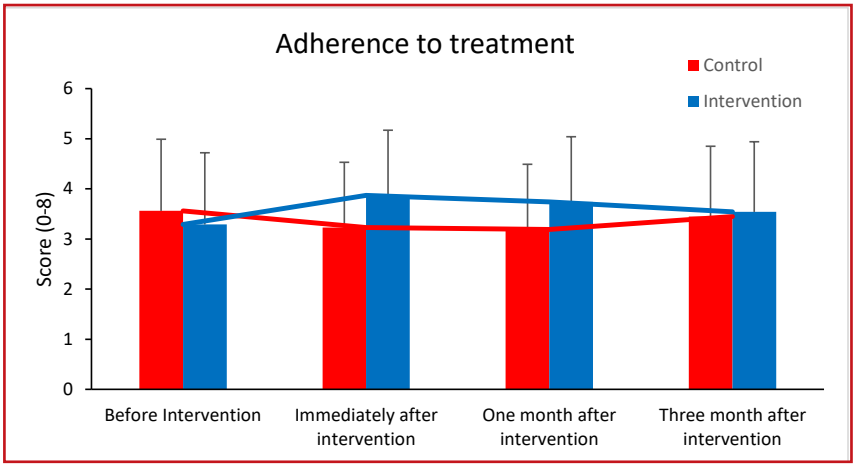

Chart1. Comparison of adherence to treatment between control and intervention groups before, immediately, one and three months after intervention

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Discussion

Diabetic foot ulcer is the most common cause of hospitalization of diabetic patients and the most common cause of non-traumatic lower limb amputation which leads to increased treatment costs (16). The aim of this study was to determine the effect of peer training on adherence to treatment of adults with diabetic foot ulcers in Shiraz.

The results of the present study showed that there was no significant relationship between adherence to treatment and demographic characteristics (age, marital status, employment and education), which were consistent with the results of Khani Jeyhooni (2020) (17), Kim (2020) (18), Shamsi (19), Dadkhah Tehrani (20), Demoz (21), Mohsenikhah (22) and Sharifirad (23). However, the results of the present study were inconsistent with the results of Tanharo et al. (8), where adherence to treatment was directly related to some demographic variables such as having diabetic foot, family history of diabetes and heart and kidney diseases. It seems that patients with diabetic foot ulcers or a family history of diabetes were more likely to seek treatment because they were more aware of diabetes and its complications.

Based on the results of the present study, the mean score of adherence to treatment in the control group before and after the intervention did not show a significant difference, while in the intervention group, adherence to treatment immediately after the educational intervention was significantly different. One of the principles of diabetes control is adherence to the treatment recommendations, which leads to improved blood sugar control and a decrease in glycosylated haemoglobin (24). The results of a study showed that 4-11% of diabetic patients never take the prescribed medication, and 12-22% of diabetic patients refuse to take their medication during the first three months of medication. They also refrain from taking blood pressure and fat medications, which play an important role in reducing cardiovascular events (25).

AlQarni et al. (2019) and Sweileh et al. (2014) showed that 57% and 42.7% of patients did not have good adherence to treatment, respectively (26, 27). On the other hand, these results do not confirm the results of some studies such as Mashrouteh et al. (28).

Among the various strategies to increase adherence to treatment of diabetic patients, the role of education and knowledge about patients is very important for their families and treatment team. As mentioned by Rezai Asl (2015) (29), education was considered an important tool in achieving the desired adherence. A study by Ali et al. (2017) (30) suggested that patients' beliefs about their disease are important and showed that educational interventions would affect patients' adherence to treatment, out of which peer training was of particular importance.

In a study, Sadeghi et al. (2019) showed that peer training could increase diet adherence in the elderly with hypertension. Peer training in the elderly with hypertension, without the need for special facilities could be an effective measure to improve the diet adherence and better control of blood pressure (31), which was consistent with the results of the present study.

In this regard, the results of the study by Tanharo et al. (2017) showed that 62.82%, 33%, and 2.96% of patients have poor, moderate, and good adherence to treatment, respectively. 52% of patients had diabetic foot ulcer and adherence to treatment was inversely related to diabetic foot ulcer. The adherence to treatment in patients with diabetes was significantly low (7).

Strengths and limitations

This is the first study to investigate the effect of peer training on adherence to treatment of patients with diabetic foot ulcers in Shiraz. It was performed on diabetic patients in one of the diabetes clinics of Shiraz so the target population was limited. In this regard, it is recommended to study other population with a larger sample size. Due to the COVID-19 pandemic, it was

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not possible to hold courses in person and the educations were performed virtually. Although the results of the study showed the effectiveness of the education program, face-to-face education is highly recommended in future studies.

Conclusion

The results showed that peer training could affect self-management of chronic diseases such as diabetes by creating a supportive environment; therefore, emphasizing behaviour change in adherence to treatment, which is an important factor in preventing the complications of chronic diseases, control and treatment through peer training would be more effective. However, this support needs to be long-term and continuous. Therefore, it is recommended that policy makers of the health care system use this educational approach in care programs for other diseases.

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Conflict of Interest

The authors report no conflicts of interest in this research.

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