

The effect of SMS reminder system training and cyberspace on adherence to medication regimen in patients with a diabetic foot ulcer in Golestan province in 2019

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ABSTRACT

Introduction: Diabetes is one of the most common and costly diseases in the world, the most common complication of which is a diabetic foot ulcer. The best way to control this complication is to follow a proper diet and adhere to a medication diet. The SMS and Telegram system can be effective due to the elimination of time and place constraints and the establishment of an effective care relationship with the client. This study aimed to determine the effect of SMS reminders and cyberspace on adherence to the medication regimen and treatment regimen of diabetic patients in Golestan province.

Method: This experimental study was performed before and after, on 45 patients with diabetes in Gonbad Kavous in 2019. Simple random sampling was performed in three groups: SMS, Telegram and control group. The SMS and Telegram groups received a training program based on drug adherence for 12 weeks (3 messages per week). Data were collected using a demographic questionnaire and Morisky medication adherence scale and entered in SPSS21 software, then analyzed using descriptive and inferential statistical tests.

Results: ANOVA showed no significant difference between the three groups before the intervention ($p=0.95$). But after the intervention, a significant difference was observed in the 3 groups ($p= 0.03$) in which the rate of adherence to the drug regimen was higher in the Telegram and cyberspace groups.

Discussion and Conclusion: According to the findings, SMS and Telegram service can be used as a new and effective method in forming nutritional behaviours and adhering to the medications. Therefore, the findings of this study can be used to educate diabetic patients in clinics and medical centers.

Keywords: Diabetes, Drug Adherence, Diet, SMS Reminder, Cyberspace Reminder

INTRODUCTION

Diabetes is a chronic and common disease that has become widespread in the world today and has been considered as a medical problem (1). The prevalence of diabetes in the world is increasing dramatically. There are currently 370 million diabetics in the world, which is projected to reach 552 million by 2030 (2). By 2050, this rate will reach two billion people or 21.8% of the world's population. Diabetes will have serious complications if not controlled (3). Among all these complications, diabetic foot ulcer needs more attention and is the most important complication of this disease. If left untreated, it can lead to infection, gangrene, amputation, and possibly death (4). Every 4 years, 4 million patients in the world develop diabetic foot ulcers, and every 30 seconds, one person in the world loses their foot due to diabetes (5). While it is estimated that more than 50% of these cases can be prevented by the patient himself. The prevalence of diabetic foot in Iran is 20% and the rate of amputation is about 30.6%. Chronic diseases are not curable but can be controlled with continuous care (6). Today, most care is done at home after discharge, in which the patient plays the main role (7). The patient should be more focused on checking and controlling the symptoms of the disease, adhering to the medication regimen and maintaining a healthy lifestyle (6). In most chronic diseases, medication has been the first line of medical intervention and patients are obliged to follow these instructions. Drug adherence is a degree of a person's voluntary behaviour or the use of drugs at the right time and the right amount of it (8). Non-adherence to the medication regimen may have various

reasons, which can include forgetfulness, lack of motivation, lack of proper understanding of physician instructions, medication side effects, religious considerations, lack of medication information (9). Therefore, to use drugs correctly and on time, patients must have appropriate medical information (10). However, just having information is not enough. Sometimes different barriers affect patients' non-compliance to medications. Many people live in rural and remote areas who have not accessed many facilities. Sometimes people due to old ages and mental occupations cannot take drugs on time (11). Sometimes a person may become frustrated with the treatment of his/her disease over time and his/her adherence will decrease. Since for various reasons, people are not very willing to participate in face-to-face training classes, it is possible to apply new technology to use non-face-to-face training reminders to make them follow medication instructions (12). One of the new communication technologies is a cell phone, which is an integral part of daily life today. The cell phones have many services, of which SMS and internet-based messaging applications are the most basic of them (13). These services can send instant and fast short text messages at any time and any place that can be a convenient and simple method with the lowest cost (9). Internet-based messaging applications are the other features of cell phones, in addition to text features, it is also possible to transfer images, sounds and different kinds of information in the shortest time. Telegram is the most popular social media in Iran. Approximately 25% of people in the world use virtual networks (14). To the extent that 42% of the

members of social networks are rural people. Among all these people who are members of social media, 71% are members of the Telegram groups (15). Upcoming research has been conducted in this field. The results of the study of Jafari et al. Showed that sending educational messages via cell phone has a significant effect on increasing the awareness of diabetic patients (16). Using cyberspace as well as sending text messages has an important effect on increasing the self-care of diabetic patients because the use of cell phones is a cheap, practical and useful method in remembering patients' treatment methods (17). Sending SMS reminders and using cyberspace as one of the methods of patients' follow-up in nursing care improves the quality of life of patients by increasing their awareness and motivation (18). The use of cyberspace and the Internet is considered as a method of self-care (19). Using these mobile facilities can be both a reminder and a supportive tool to encourage patients to be more active in their health planning. Since the most proper approach for a diabetic person not to afflict diabetic foot ulcers and amputation is to prevent it, remembering the medication tips as an important way of prevention can help diabetics. Whereas today technology has provided many possibilities for communication and most people have these possibilities, Telegram and SMS can be one of the best ways to remind people of significant tips. Hence the present study was performed on the effect of SMS reminders and cyberspace on adherence to medication regimen in patients with diabetic foot ulcers.

MATERIALS AND METHODS

This study was an empirical study before and after on 45 diabetic middle-aged people in Gonbad Kavous in 2019. The research environment of this study was the "Novin diabetic foot wound dressing center" in Gonbad Kavous, which is a private center. Sampling was done from March to August 2019. The final sample size which was based on Parsai et al. (2020) study with an effect size of 1.1, 95% test power at a significance level of 0.05 was 45 people (1). A total of 45 people were considered in 3 groups: SMS (15 people), Telegram (15 people), and control (15 people). Sampling method was simple probability sampling among those who met the inclusion criteria: 1) in the age group over 40 years, 2) willingness to participate in the study, 3) having a cell phone based on the Android operating system, 4) Familiarity with the SMS and Telegram system, 5) Using the SMS service, 6) Ability to read the text message by the patient or patient caregiver, 7) having no chronic mental diseases. Then those who were eligible for entry was divided into three groups: Telegram, SMS and control group by drawing lots from the sampling list. In case of incomplete questionnaires and unwillingness to continue cooperation in the study, they were excluded from the study. A two-part questionnaire was used to collect data. The first part included demographic information on age, sex, education, and years of the disease. The second part included questions based on the Maurice drug compliance

questionnaire. This questionnaire had 8 items, the first 7 items were yes and no and the last one was a 5-questions Likert. A score of 0 indicates high adherence, 1 and 2 indicate moderate adherence and above 2 demonstrates weak adherence (20). The reliability of this questionnaire was approved by Cronbach's alpha coefficient of 0.78 In Mokhtari (2014) study, and Cronbach's alpha coefficient of 0.80 in Khooshyar study (2014) (21, 22). The questionnaire was completed in person before and after the intervention by the researcher in the center of Gonbad Kavous city. Before the educational intervention, patients in three groups of SMS, Telegram and Control, Demographic Profile Questionnaire and Maurice Drug Adherence Questionnaire were given to patients for pre-test and a mobile phone number and a landline number were taken from them. If a Telegram message was not received from the patient after 3 days of sending the message, the researcher called him or send him educational messages by another number. For the intervention groups, for 12 weeks, three educational messages per week were sent in the form of SMS. And three messages in the form of photos and educational videos were sent to the Telegram of individuals per week. The content of the training program was related to medications and linked issues. Then the questionnaires were completed by SMS, Telegram and control groups during 1 month, 2 months and 3 months after the intervention. To comply with ethical considerations, after obtaining a license from Golestan University of Medical Sciences and obtaining the consent of health center officials, the objectives of the study were explained to patients and oral consent was obtained to participate in the study. They were also assured that their information would remain confidential. In the study, no one was excluded from the research samples. The collecting data were analyzed by using SPSS statistical partition software version 21, descriptive statistics (table, mean, standard deviation) and inferential statistics. ANOVA was done at a significant level of 0.05.

RESULTS

Comparing demographic characteristics in the three groups, the analysis of variance between the ages did not show a significant difference between the three groups ($p=0.57$) and the Chi-square test did not show a significant difference between the sexes in the three groups ($p=0.22$). Also, the Fisher test did not show a significant difference between the two groups in terms of education ($p=0.38$) and career ($p=0.09$) (Table 1).

Analysis of variance test (ANOVA) before the intervention did not show a significant difference between the three groups ($p=0.95$), but analysis of variance test after the intervention had a significant difference ($p=0.03$). Tukey's research test showed this difference between the two groups of SMS reminder test and Telegram with the control group (Table 2).

Table 1. Comparison of demographic characteristics of diabetic patients in intervention and control groups.

Groups Demography		SMS	Telegram	control	p-value
Age		56.8 ±7.52	56.47±12.2	53.4±8.8	0.57
Sex	Men	80%	54%	54%	0.22
	Women	20%	47%	47%	
Education	Primary School	11	7	8	0.38
	High School	1	3	3	
	Diploma	3	3	4	
	University	0	2	0	
career	Employee	1	4	1	0.09
	Freelance	11	4	8	
	Housewives	3	7	6	

Table 2. Comparison of SMS and Telegram reminders on adherence to the medication regimen before and after the intervention.

Groups Time	SMS	Telegram	control	p-value
Before the intervention	6.6±1.63	6.4±2.28	6.6±1.8	0.95
After the intervention	8.6±1.72	8.73±1.53	7.26±1.75	0.038

DISCUSSION

This study aimed to investigate the effect of SMS and cyberspace reminder on adherence to drug regimen in patients with a diabetic foot ulcer in Golestan province. Findings of the study showed that the highest change and increase in the score of adherence to the drug regimen was in the Telegram group compared to the SMS group. Therefore, it can be said that the Telegram has more influence on people due to visual, written and even audio facilities and has influenced them more. This finding is consistent with the results of Yasmin et al. (2020). The results of their study showed that after the intervention, the mean score of foot self-care behaviour in the experimental group showed a significant difference compared to the control group and the intervention improved the self-care behaviour of the foot in diabetic patients (23). The study of Bakhshian et al. (2016) on the effect of SMS education on self-care of patients with type 2 diabetes showed that due to the effectiveness of this method, it is necessary to use this method more than before (24). The study by Aligholipour et al. (2019) showed that education through MMS and Telegram has increased self-care and can be a new strategy to facilitate the education process for patients with chronic diseases such as diabetes (25). Shahid et al. (2015) also found in their study that cell phone intervention in diabetics reduced HbA1c levels and this would reduce the subsequent complications of the disease (26). Jayashree and lyengar examined the effect of using cell phones in-home care for diabetic foot ulcers in patients with positive results (27). The results of a study by Debon et al. on the subject of cell phone health programs for chronic diseases showed that these interventions could have a beneficial effect on the perception of patients with type 2 diabetes (28). Also, the results of the study of Goodarzi et al. In 2014 increased the favorable effect of an educational intervention with cell phones (29). These results were consistent with our study, while Zebina et al. In their study showed that sending SMS reminders will not have a significant effect on patients' performance (21, 30). Previews study suggests that education with new technologies may play a minor role in improving health, which is not consistent with the present study. The use of technologies and training can increase the ability of patients and their caregivers, thus reducing the stress in them (31, 32). Reviewing the results of this

study demonstrates that both Telegram and SMS methods can increase compliance. However, the impact of Telegram will be higher. Considering the influence of intervention tools, more appropriate and effective education can be selected to increase self-care and independence of individuals, and as a result, the cost and duration of hospitalization of the elderly will be reduced. Limitations in this study were the unwillingness of some people to cooperate, different responsibilities between people. To obtain more reliable and extensible results, it is recommended that this study be conducted over a long period and with more samples.

CONCLUSION

The results of this study showed that SMS and Telegram reminder methods increase adherence to medication regimen in diabetic patients. Therefore, due to the simple and accessible facilities of cell phones and the effectiveness of using cyberspace in nursing education, this method of continuous care can be used to improve and enhance the quality of treatment in diabetic patients.

Conflict of interest: The authors have not any conflict of interest.

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