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THE EFFECT OF GOAL SETTING METHOD ON LEVEL OF PHYSICAL ACTIVITY AND GLYCEMIC CONTROL IN PATIENTS WITH DIABETES MELLITUS

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ABSTRACT

Aims: In this study we aimed to assess the effect of goal setting education on physical activity and glycemic control in patients with diabeted mellitus (DM).
Methods: In this randomized, double blind clinical trial, 128 diabetic patients were randomly divided into two groups. The first group received goal setting education, while the second group received no intervention as control group. Physical activity and fasting blood sugar (FBS) were measured before and after the intervention.
Results: After the intervention, the level of physical activity was significantly higher in the first group than the control group (P=0.001). Furthermore, the mean level of FBS at the end of inthervention was significantly lower in the first group than the control group (P=0.004).
Conclusions: Goal setting method could be considered as a therapeutic education method in diabetic patients in order to achieve higher physical activity and to control blood glocose level. However, further studies will be required to establish this educational method as a promising behavioural therapy in DM patients.

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Introduction

Diabetes mellitus (DM) is one of the most important chronic disease with a worldwide prevalence of 8.5% which can be associated with serious complications, such as blindness, kidney failure, and heart diseases [1]. Although vigorous efforts have been made to delineate the exact mechanisms of DM, there is still a gread uncertainty about risk factors of this disease. However, both genetic and enviromental factors including urbanization , air, water, noise pollution, cosumption of artificial foods, psychological and psychological stress and low physical activity may in part have a role in DM [2]. From another point of view, multiple longitudinal, epidemiological studies have provided valuable evidence regarding effects of DM as a chronic disease on economy [3]. Lifestyle is associated with the development of diabetes [4]. In this regard, accumulating lines of evidence have rencenty suggested that DM could be managed with modification of lifestyle [5]. Therefore, modification of lifestyle can be considered as therapeutic target for DM [5]. Similar to high prevalence of DM in the world, recent studies have revealed that this disease affect approximately 1.6 and 2 million people with age of more than 20 years in Iran in 2001 and 2005, respectively [6]. Furthremore, World Health Organization (WHO) estimated that this disease will affect more than 6 million peoaple in Iran by the year 2030 confirming the high prevalence of this disease in this country [7]. Physical activity is characterized by a wide variety of muscloskeletal movement which is accompanied by energy consumption and associated with health improvement [8]. In addition to effects of physical activity on glycemic control, epidemiological studies suggested that physical activity as an independent factor can reduce overall rate of mortality [9]. Moreover, previous studies have shown that appropriate levels of physical activity reduced 19% of adult deaths [10]. Lifestyle

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modifications play a pivotal role in the controlling of diabetes [5]. Multiple longitudinal, epidemiological studies have provided valuable insights into the association between DM and low physical activity and sedentary lifestyle [11]. Physical activity in diabetic people can increase the sensitivity of Insulin receptor located on different cells [12]. Furthermore, investigations on other diseases reported findings similar to those reported on prevention of DM [13]. In this setting, as outlined in evidence, 31.1% of individuals above 15 years in Iran are physically inactive, while some others reported only 15% of adults as physically inactive and 40% of them (31.6% of men and 48.6% of women) as a portion with low physical activity [13, 14]. It has been shown that health education is associated with an overall reduction in cardiovascular mortality [15]. Extensive studies in large groups of diabetic patients suggested that education based on behavioral principles can lead to increase of physical activity [16, 17]. In light of the discrepancy between existing epidemiological and preclinical data on the one hand and available clinical data about effects of continuous and goal setting based physical activity on the other, the investigation of different aspects of physical activity has the potential to substantially contribute to the treatment of DM [18, 19]. Althoug increased prevalence of DM is associated with sedentary lifestyle, obesity, and urbanization, consideration of similar destructive effects of these risk factors for general population shows importance of interventions such as healthy diets and appropriate physical activity [20]. A prolonged high levels of blood gluscose in DM patients may have a significant association with chronic complication [2].
Therefore, in this study we aimed to shed a light on effects of goal based education on physical activity, behavioral changes, and level of blood glucose in DM patients.

Method

In this randomized, double blind, controlled study, 128 DM patients were enrolled from
Ghahjavarestan health center located in Isfahan, the central province of Iran. Inclusion criteria for this trial comprised of diagnosis of DM, age between 18 to 70 years, ability to do assigned physical activity as intervention , and absence of any complications of DM in a month preceding the study. The patients were excluded if they had diabetic complications, inability to exercise, and required emergency or supplementary treatment during the study. The protocol of the study was approved by Isfahan university of medical sciences and written informed consent was obtained from all of the patients.
Participants were randomly allocated into two groups. The intervention group (n=64) received 4 training classes weekly for one month. At the first session they were trained about the importance of physical activity and its role in the management of diabetes. At the end of this session, goal setting forms were distributed among the participants and then it was explained to them to how to complete these forms. In the next 3 sessions, the participants discussed about their goals for their physical activity level, the barriers against achieving these goals and how to overcome them. The control group (n=64) attended the Health Care Center of Ghahjavarestan and received the usual cares provided by the health personals. At the beginning of the study, age, sex , level of physical activity, and also fasting blood sugar (FBS) were measured in both groups of the study. The demographic characteristics were collected using a checklist. The physical activty level was measured using the short form of "International Physical Activity Questionnaire " which evaluates the physical activity level in the recent week . FBS was also measured in both groups at the beginning of the study. Finally, FBS and physical activity were also assessed in both groups at the end of the study.
Statistical analysis was performed using SPSS 20.0 (SPSS Inc., Chicago, IL, USA). Statistical comparison of demographic and clinical data between two groups of the study was performed using independent t-tes, Mann-Whithney test, and χ 2 test. FBS and the level of physical activity of both groups were compared at the beginning and the end of study using independent t-tes and Mann-Whithney test. All tests were two-tailed and P-values less than 0.05 were considered
statistically significant.

Results

The mean age of the intervention and control groups were 54.21±11.07 and 54.51 years, respectively (p=0.88). There were 51 women and 13 men in the intervention group and 49 women and 15 men in the control group (p=0.66). In the intervention group, 52 patients received pills and 12 patients received insulin for the control of diabetes, while in the control group, 51 patients received pills and 13 patients received insulin (P>0.05). Furthermore, at the beginning of the study, there was no significant difference between the two groups with respect to the mean of BMI (p=0.80). Table 1 summarizes the demographic characteristics of the studied groups of DM patients.
At the beginning of the study, the number of patients with sufficient physical activity level (more than 150 minutes of moderate physical activity or 75 minutes of intense physical activity) was not significantly different between the groups of study (P=0.76), but after the intervention, it was significantly higher in the intervention group than the control group (P=0.001). Similarly, at the beginning of the study, there was no significant differences in the levels of FBS between two group (P=0.48), but at the end of the study, the levels of FBS were significantly lower in the intervention group compared to those of the control group (P=0.004). Table 2 illustrates the differences between two groups of the study with regard to FBS and physical activity level before and after the intervention. In addition, diagram 1 illustrates the mean FBS of the two groups before and after the intervention.

Discussion

This study showed that physical activity level was significantly increased in DM patients using goal setting method which can be led to the better glycemic control in these patients.

The most important finding of this study was the better control of FBS in DM patients who received goal setting education compared to control group which is in line with those reported earlier about the effects of physical activity on the daily life and also the methods for an effective education to increase is physical activity [8]. Although FBS didn't show a significant difference between the two groups at the beginning of the study, after the study, FBS in the intervention group was significantly lower than that of the control group. Furthermore, at the end on study, the number of patients who had more than 150 minutes of physical activity per week were significantly increased in the intervention group. In a study conducted by Mireya Gamiochipi and similar to several other studies, the effect of lifestyle with or without medicine on control of diabetes was noted [5]. In this regard, the change in the lifestyle that means progressing towards a positive lifestyle plays a determining role. Physical activity is an important component of the healthy lifestyle and modifications to increase physical activity are valuable as they can be considered as an therapeutic intervention to improve many diseases such as diabetes [11]. In the previous studies, the reported level of physical activity was lower than those found in our investigation [21]. In our study, physical activity was initially low in both groups suggesting interventions that can increase the level of physical activity. Blake et al. [18] showed that if continuous education has a better effect on controlling behaviors. Moreover, in another study it was concluded that teaching is more effective in goal setting method [22]. Learning can be conducted in a variety of ways that one of them is learning by goal setting method.

In this method, patients initially set a goal for their physical activity level and then during the weekly sessions the barriers to reach their goal will be reviewed and eliminated. The sustainability of behavior among participants seems to be associated with reduction in the amount of forgetfulness that occurs during the time course. Therefore, teaching methods in which patients are controlled with a continuous observation may be more more efficient than the other methods. In this intervention, people learnt to record their physical activity that increased their incentive to continue the program. Therefore, this educational program is simple and costeffective.

In conclusion, goal setting method could be considered as a therapeutic education method in diabetic patients in order to achieve higher physical activity and to control blood glocose level. However, further studies will be required to establishe this educational method as a promising behavioral therapy in DM patients.

Conflict of interest

The authors report no conflicts of interest.

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Table 1. Demographic and clinical characteristics of the intervention and control groups.

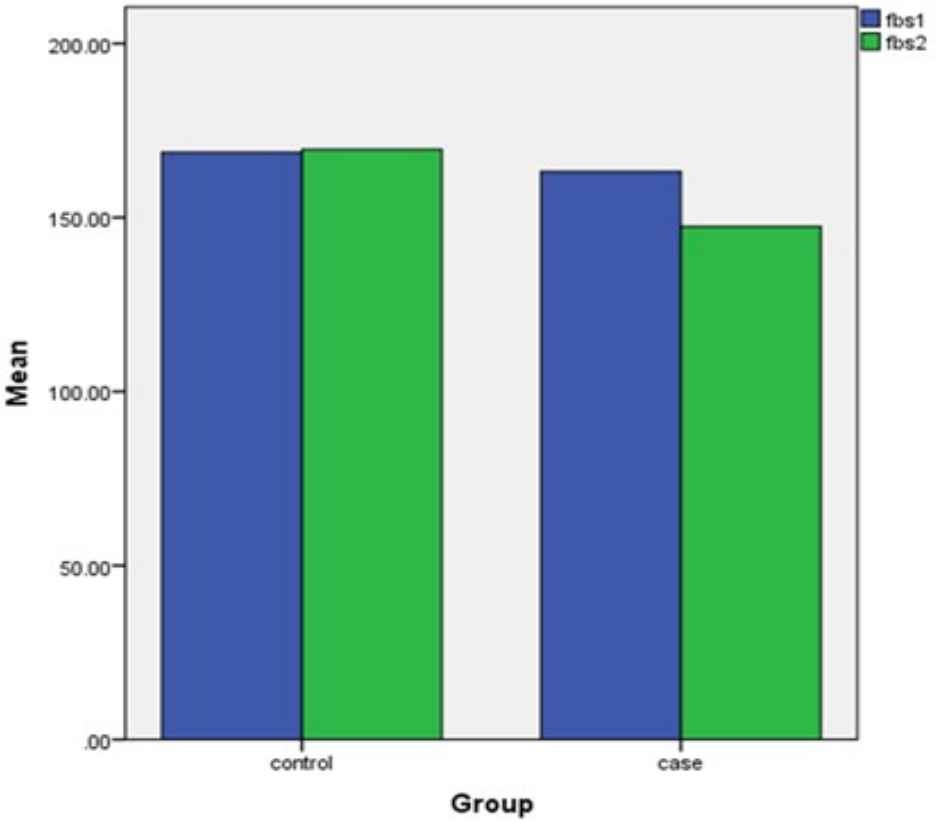
Characteristics		Intervention group	Control group	P-value
Age (years)		54.21±11.07	54.51±11.98	0.88
Gender	Male	13(20.3%)	15(23.4%)	0.66
	Female	51(79.7%)	49(76.6%)	
Treatment	Insulin	12(18.8%)	13(20.3%)	0.82
	Others	52(81.2%)	51(79.7%)	
BMI		28.32±3.32	28.17±32.3	0.80

BMI: Body mass index.

Table 2. Fasting blood sugar and physical activity before and after the intervention in both groups of the study.

Variables			Control group	Intervention group	P-value
Before intervention	FBS		168.68±48.35	163.23±40.17	0.48
	Physical activity	Sufficient	34(53.1%)	32(50%)	0.76
		Unsufficient	30(46.9%)	32(50%)	
After intervention	FBS		169.54±50.04	147.40±33.17	0.004
	Physical activity	Sufficient	34(53.1%)	48(75%)	0.001
		Unsufficient	30(46.9%)	16(25%)	

Figure 1. The mean level of fasting blood sugar before and after the intervention in both groups of the study.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