

Relationship between Self Care Management with Glycemic Control in Type 2 Diabetic Patients

Abstract

Background: The purpose of this study was to investigate the relationship between self-care management and HbA1c level of the patients with type 2 diabetes in YAZD. **Methods:** This study was a cross-sectional study. The number of 376 diabetic patients referred to the Diabetes Research Center in Yazd entered the study. The data collection tool was a summary of Diabetes Self Care Activity questionnaire (SDSCA), which was collected through interviews with patients. Data analysis was performed using SPSS software V 16 and kruskalwallis and independent sample *t* tests. **Results:** The results showed that of 376 patients, 218 (%58) were women and 158 (%42) were male. The mean age of the participants in the study was 54.5 ± 10.9 years old and the mean duration of the disease was 9.53 ± 8.39 years. The mean HbA1C in the patients was $7.93\% \pm 1.38\%$. The mean of BMI was 28.93 ± 6 kg/ m². The mean of self-care score in the patients under study was 30.53 ± 11.4 . There was a significant relationship between the mean of self-care score, BMI, age and HbA1C (*P* value <0.05). **Conclusions:** According to the results of the study, it can be concluded that the level of self-care in patients with controlled diabetes mellitus (HbA1C <7%) is more than patients with uncontrolled diabetes mellitus (HbA1c $\geq 7\%$).

Keywords: Diabetes mellitus, diabetes self-care activity questionnaire, HbA1C

Introduction

Diabetes mellitus (DM) is a chronic progressive metabolic disease affects every organ, especially in the setting of poor glycemic control.^[1] Diabetes is associated with complications such as cardiovascular diseases, retinopathy, nephropathy, and neuropathy, which can lead to chronic morbidities and mortality.^[2,3] World Health Organization (WHO) estimates that more than 346 million persons worldwide have DM. This number increase above two times by 2030 without any intervention.^[4]

The importance of regular follow-up of diabetic patients with the health care team is of great significance in controlling any long-term complications. Tight metabolic control can delay or prevent the progression of complications of diabetes.^[5] However the care of diabetic patients are not only limited to adequate glycemic control but also addressing other matters such as adhering with medications and diet, being physically active and self-foot care.^[6] Askari, *et al.* showed that increasing the awareness of diabetic patients and improve.

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their attitudes toward the complications of diabetes and preventive activities such as nutrition and jogging programs improve biochemical parameters such as FBS, HbA1c, lipid profile of elderly patients with type 2 diabetes.^[7]

Diabetes self-care is an individual action for control of diabetes that includes treatment and prevention of complications.^[8]

Self-care behavior in order to improve quality of life of diabetic persons while reducing the chronic complications of diabetes is very important that emphasized by American Diabetes Association (ADA).^[9] Therefore, good and proper self-care behaviors increase wellbeing in accordance with patients' conditions.^[10]

There are seven subgroups behaviors in the field of self-care: Healthy eating, being active, monitoring blood glucose control, taking medications, problem solving, healthy coping, and reducing risk.^[11] The seven behaviors have a positive correlation with blood glucose control, decreasing complications, and improving the quality of life of patients with diabetes.^[12,13]

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Considering the importance of diabetes, high prevalence of disease in YAZD,^[14] high burden and cost of it, we therefore performed a cross-sectional study to evaluate the correlation between self-care management and HbA1c level of the patients with type 2 diabetes in YAZD.

Methods

Study population and data collection

This cross-sectional study was conducted 2017 on 376 subjects. They were selected from patients of Yazd diabetes research center by target-based sampling. Cochran's formula was used to calculate sample size. Considering 18000 active cases in the center and $\alpha = 0.05$ and $CI = 95\%$, the sample size 376 persons were determined.

The inclusion criteria were having a history of type 2 diabetes at least 1 year since the diagnosis and age between 20 and 70 years of age.

Also, the exclusion criteria were as follows: Complications of advanced diabetes mellitus such as stroke, kidney failure ($GFR \leq 60$), severe visual impairment, heart failure, chronic lung disease, patients with pulmonary tumors, and chronic mental illness.

After selecting samples, demographic data and medical history were collected by researcher. Patient's weight was measured with minimal dress by seca scale. Body height was measured without shoes to the nearest 0.5 cm. BMI (Body mass index) was calculated as weight (kilograms) divided by squared of the height.

A summary of Diabetes Self Care Activity (SDSCA) was used to assess self-care status. Its validity and reliability were confirmed in Iran.^[15]

The SDSCA is an 11-item self-report measure of diabetes self-management that includes items assessing the following aspects of the diabetes regimen: general diet (items 1 and 2), specific diet (items 3 and 4), exercise (items 5 and 6), blood glucose testing (items 7 and 8), foot care (items 9 and 10), and smoking (item 11).^[16]

Diabetic patients report on the frequency with which they perform various self-care activities over the previous 7 days. The first 10 items of the SDSCA has 7 Likert-type response options ranging from 0 to 7. Last item (about smoking) has two Likert-type response options [0 = (No), 1 = (Yes)]. Negative items^[4,11] were reverse-coded for analysis, and total scores were computed for each subscale by adding the item scores (possible range 0–71). High scores indicated a high level of self-care.

The total score of the questionnaire was 0-99. In order to determine the self-care status of diabetic patients, they were categorized in 3 groups: poor self-care with 0-33

score, moderate self-care with a score of 34–67, and good self-care with 68–99 score. cronbach's Alpha of the SDSCA questionnaire in this study was 0.62. The normality of variables assessed by kolmogorov-smirnov test.

Research ethics

This research was presented to the ethics committee of Shahid Sadoughi University of Medical Sciences and approved by the community medicine department. The ethics committee approved the study with the number IR.SSU.MEDICINE.REC. 1394.390. The patients were informed about the objective and nature of the study.

Statistical analyses

The sample size was calculated according $\alpha = 0.05$ and $\beta = 0.2$ and comparison of two proportion formula. Data analysis was performed using SPSS software Version 16. Data were reported as mean \pm standard deviation or frequency and Mann-Whitney, Kruskal Wallis, and Dunnett T3 chasing tests were used. *P* value less than 0.05 were considered statistically significant.

Results

In this study, 376 participants were included. The mean (\pm SD) age of subjects was 54.5 (\pm 10.9) years old. 218 (%58) were women and 158 (%42) were male. The baseline characteristics of studied groups are presented in Table 1.

Totally, % 62.5 and % 37.5 of the participants in the study had poor and moderate self-care scores, respectively.

The mean of self-care score in subgroups of variables such as age, duration of diabetes, BMI, HbA1C,

Table 1: Characteristic of diabetic patients

Variable	Mean (SD)/n	Min-Max/%
Duration of diabetes (years)	9.53 \pm 8.39	-1-30
BMI (kg/ m ²)	28.93 \pm 6	16.73-52.33
HbA1C (%)	7.93 \pm 1.39	5-12.5
Education		
Illiterate	66	17.8
Less than diploma	222	59
Diploma	64	17
Academic	24	6.4
Marital status		
Married	364	96.8
Wife's death	12	3.2
Smoking		
Yes	39	10.4
No	317	84.3
Quit	20	5.3
Treatment		
Oral medication	204	54.3
Insulin	40	10.6
Both	132	35.1

education level and type of treatment were significantly different ($P < 0.001$).

The comparison of the mean self-care score in the subgroups of the variables is shown in Table 2. The mean of self-care score was higher in patients with 40–45 years old, duration of diabetes ≥ 10 years, HbA1C ≤ 7 , BMI ≤ 25 than the others in each category.

The difference in the mean of self-care score for each of the diabetes-related complications was investigated separately Table 3, which only had a significant correlation between self-care score and nephropathy (P value = 0.02). The mean of self-care score in patient with nephropathy than the others.

Table 2: The comparison of the mean self-care score in the subgroups of some variables

Variable	Mean (SD) score of self-care	P
Sex		
Male	32.1±13.21	0.38*
Female	29.9±10.98	
Marital status		
Married	30.82±11.66	0.38*
Wife's death	31.83±20.55	
Smoking		
Yes	28.26±9.36	0.27*
No	30.82±12.34	
Complication of diabetes		
Yes	31±12.39	0.78*
No	30.65±11.49	
Age (years old)		
40≥	26.77±5.8	<0.001**
40-60	33.15±12.52	
≥60	28.16±11.941c	
Duration of diabetes (years)		
≥ 5 (n=151)	28.11±9.8	<0.001**
5-10 (n=95)	28.84±13.18	
≤10 (n=128)	35.14±12.5	
BMI (kg/ m ²)		
≥ 25 (n=109)	35.3±14.1	<0.001**
25-30 (n=134)	28.43±10.08	
≤30 (n=131)	29.12±10.7	
HbA1C (%)		
≥ 7 (n=106)	33.37±12.2	<0.001**
7-9 (n=189)	30.08±11.44	
≤9 (n=79)	28.58±12.34	
Education		
Illiterate (n=66)	25.12±9.73	<0.001**
Less than diploma (n=222)	31.97±11.49	
Diploma (n=64)	36.06±13.68	
Academic (n=24)	22.33±6.35	
Treatment		
Oral medication	28.81±11.01	0.003**
Insulin	33.9±14.11	
Both	33.07±12.28	

*Independent sample *t*-test. **Kruskal wallis test

Discussion

This study shows persons with lower HbA1c, lower BMI, and low educational level (diploma and high school subjects) had better self-care score than other group. Also, prolongation of DM, presence of nephropathy, age between 40 and 60, under insulin therapy predict better self-care score.

In this study, % 62.5 of subjects had poor self-care score and remainder intermediate score. Good self-care score is zero. This finding was in line with other researches^[10,17-19] that the majority of patients belong to low level self-care group. This show that poor self-care behaviors in DM patients exist nearly in all countries. Self-care in diabetes requires patients to modify their lifestyle and also cooperation with health care team.^[20]

Also this study concluded that there was a correlation between self-care behaviors and HbA1C levels that is agreement with previous research.^[6,10,17-19,21,22] Therefore Self-care behavior is necessary for patients with type 2 diabetes because help patients improve their blood glucose control. Another study investigated the difference between DM patients who performed only treatment orders and those who performed both healthy behavior and medical therapy found that self-care behaviors lead to better adherence to treatment than patients who perform medical therapy.^[23]

Negative association between BMI and self-care score was seen in our study. Effect of diabetes self-management education on reduction of HbA1c, fasting blood sugar, and BMI in DM persons is seen in a before and after trial^[24]

Table 3: Comparison of the mean self-care scores based on each of the complications in patientswith type 2 diabetes

Variable	n	Mean (SD) score of self-care	P
Retinopathy			
Yes	128	30.82±12.45	0.99
No	248	30.86±11.78	
Nephropathy			
Yes	112	33.14±13.5	0.02
No	264	29.88±11.19	
Neuropathy			
Yes	119	31.71±14.37	0.66
No	257	30.45±10.73	
Amputation			
Yes	2	23	0.3
No	374	30	
Foot ulcer			
Yes	32	32.68±10.53	0.2
No	344	30.68±12.13	
Laser therapy			
Yes	74	32.21±13.81	0.32
No	302	30.51±11.51	

Independent sample *t* test

that is in concordance with our results. It is rational to see lower BMI with increasing self-care behaviors such as eating a healthy and balanced food and regular physical activity. Although some studies reported no association between self-care score and BMI.^[17,22]

In our study, diploma and high school educated subjects had better self-care than who were illiterate or more educated (Academy/University). More educated level associated with good self-care in Ayele study^[17] and Sharoni study.^[22] Although no association was seen between self-care and educational level was seen in Shayeghian study.^[21] Number of academy/university and illiterate patients was lower than diploma and high school in our study. Other matters such as free time may be important in this regard. Also, it can be expected that the illiterate patients with diabetes might have difficulty to follow instructions regarding self-care activities.

Duration of DM above 10 years and presence of nephropathy were other factors that cause good self-care in our study. Duration of disease affected self-care behavior, but presence of complications is not significantly associated with self-care behavior in Manjula study.^[19] Another study showed that prolongation of DM and presence of diabetic complications cause good self-care scores.^[25] Negative association between length of diabetes and self-care activities was seen in Sharoni study.^[22] Due to chronic nature of disease, persons involve in self-care behavior with prolongation of disease during their lifetime. Also fear of complication of DM or progression of complications cause better self-care behaviors in subjects with diabetic nephropathy.

Middle age group had better self-care scores than other groups in this study. Other study reported no association between age and self-care behaviors.^[19,22] Although another study showed that age above 60 years had good self-care behaviors than age below 60.^[25]

In this study, group under insulin injections (with and without oral agents) had better self-care behaviors than oral agent group. Diabetes is a chronic and progressive disease, so insulin therapy needs during time after failure of oral diabetic agents. Therefore, it is rational to see better self-care scores in persons under insulin therapy. However, other studies reported no association between type of treatment and self-care scores.^[19,21,25]

In our study, no difference between female and male, patients income (low, moderate, and high income) and smoking status with self-care behaviors seen.

Ayele showed that middle income had better self-care scores than high income group.^[17] Also no significant relationship was observed between the total daily price of diet and waist circumference, BMI, FBS, HbA1c in another study.^[26]

However no difference in both sex regarding self-care behaviors reported in other studies.^[21,22,25]

The limitation in this study is difficulty to evaluate socioeconomic and cultural barriers such as poor access to drugs, high cost, patient satisfaction with their medical care, that is important in the field of self-care activity. Also, proper and sustainable education of persons for self-care programs may be essential, before involving them and their families for self-care activity.

In conclusion, people with diabetes due to chronic nature of disease should involve in self-care behavior during their lifetime that includes activities such as eating a healthy food, follow-up medical therapy, continuous glucose monitoring to adjust the diet, controllable activity level, and following the medication prescription.

Proper lifestyle strategies and self-care behaviors is an essential element in the prevention and control of diabetes that might cause severe complications.

Hence, cooperation of physician and diabetic nurse, and family support are essential in order to provide continuous education.

Conclusions

According to the results of the study, it can be concluded that the level of self-care score in patients with HbA1C <7% was more than patients with HbA1c ≥9%.

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Conflicts of interest

There are no conflicts of interest.

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