



Research article

Effect of diabetes educational program on self-care and diabetes control among type 2 diabetic patients in Al-Baha–Saudi Arabia

Neimat Mahmoud Abd-Alrahman Ali Dinar¹, Ghassan Abd-Al lateef Mohammad Al Sammouri², Mohamed Abdalla Eltahir², Aida Ahmed Fadlala Ahmed¹, Hasen Jamaan Ahmed Alghamdi³, Abdulrahman Ali Alghamdi⁴ and Waled Amen Mohammed Ahmed^{5,*}

- ¹ Assistant Professor, Nursing Department, Faculty of Applied Medical Sciences, Albaha University, Saudi Arabia
- ² Lecturer of Nursing, Nursing Department, Faculty of Applied Medical Sciences, Albaha University, Saudi Arabia
- ³ Specialist Nurse, Health Educator at Diabetic center, King Fahad Hospital Al-Baha
- ⁴ Physician and Head of Diabetic center, King Fahad Hospital Al-Baha
- ⁵ Associate Professor, Nursing Department, Faculty of Applied Medical Sciences, Albaha University, Saudi Arabia

* **Correspondence:** Email: weliameen1980@hotmail.com; Tel: 00966508245369.

Abstract: *Background/objective:* The prevalence of diabetes mellitus in Saudi Arabia was dramatically increased from 3.4% in 1996 to 19.42% in 2012 and to 23.9% in 2013. The study aimed to determine the effect of diabetes educational intervention for patients with type 2 diabetes on self-care and diabetes control. *Methods:* This is a quazi experimental study was conducted on 61 patients, who met the inclusion criteria attending for follow up at Diabetic Center in King Fahd Hospital in Al-Baha. Data was collected using demographic data form, metabolic control parameter form, and diabetes self-care scale (DSCS) form. Data was analyzed using SPSS (statistical package for social science) version 22. *Results:* The included 61 diabetic patients were male (63.9%) and female (36.1%) attended to diabetic center at King Fahad Hospital in Al-Baha. They are about 37 ± 1.89 years old and mainly married 51 (83.6%). The diabetes education has been delivered to about 52.5% of patients by doctor, nurses or dietitian 34.4%. The metabolic control parameters among diabetic patients showed that glycosylated hemoglobin (HbA1c) has been significantly dropped from 8.66 to 7.73 after intervention and triglyceride significantly dropped from 152.62 to 150.57, other metabolic parameters were insignificantly decreased after intervention. The diabetes self-care scale was significantly improved after intervention, from 2.4 to 3.3. *Conclusion:* The diabetes education improved

metabolic control parameters among diabetic patients specially the glycosylated hemoglobin (HbA1c) and triglyceride. Furthermore, the used intervention improved self-care among diabetic patients after intervention.

Keywords: self-care; diabetic patients; blood sugar; control

1. Introduction

The prevalence of diabetes mellitus in Saudi Arabia was dramatically increased from 3.4% in 1996 to 19.42% in 2012 according to International Diabetic Federation (IDF) in Middle East and North Africa (MENA) and reached to 23.9% in 2013 as the seventh of the top ten countries of highest diabetes prevalence [1]. With the increasing diabetes prevalence, the diabetes related-complications have also increased. Of the aspects of diabetes care in Saudi Arabia, health education is the most deficient. The problems of diabetes care in Saudi Arabia include limited diabetes care centers, lack of specially trained personnel, poor compliance with therapy or diet, ignorance and wrong beliefs, food and dietary factors and gender-related problems [2].

There is an almost total deficit of both diabetes nurse educators and educational material in care settings; however, no evidence in Saudi Arabia studied the effectiveness of educational interventions given to the diabetic patients, instead of high prevalence of the disease in Saudi Arabia. Therefore, this study examined the effect of education intervention on self-care of patients with type 2 diabetes.

2. Methods

2.1. Design

This is a quazi experimental study aims to determine the effect of diabetes educational program for patients with type 2 diabetes on self-care and diabetes control.

2.2. Study population

The study includes diabetic patients who attended to the diabetes clinic, located in King Fahd Hospital, in the period from 04/2018 to 12/2018.

2.3. Sampling and sample size

A convenience sampling technique was utilized to pick 120, only 61 patients were recruited to participate in this study.

2.4. Inclusion and exclusion criteria

Being diagnosed with type 2 diabetes, is 20 to 40 years old, of good hearing, and understanding Arabic language, subjects to provide a blood sample for measurement of blood glucose, able to participate in all diabetes self-care activities.

2.5. Data collection technique and tools

After getting approval from the Ministry of Health and King Fahad Hospital, a data collection was started. The collection of data took place over 8 months started from 03/2018 to 12/2018. A pre and post information was obtained.

Data was collected using interview and measurements for all participants. The tools include:

1. Demographic data form which includes information about patient identifying characteristics such as age, gender, level of education, and diabetes related information.
2. Metabolic control parameter form, which include the patient's metabolic variables such as blood glucose, blood pressure (BP), body mass index (BMI), weight, and height, a glycosylated hemoglobin (HbA1c), lipid profiles and waist circumference.
3. Diabetes self-care scale (DSCS) form which comprises of 35 things. It was established by Lee and Fisher in 2005 to measure self-care actions related to diabetes. It includes items related to several activities. All are 6-point Likert-scale with response choices extending from "Completely disagree" to "Completely agree". The Cronbach's alpha value was 0.80 [3].

2.6. Intervention

A six months intervention program consisted of health education for diabetic patients. It was delivered to the diabetic patients through lectures on diabetes and how to control blood sugar, and brochures, in addition to the follow up. The researcher and assistants delivered the intervention program of health education, which aimed to improve knowledge, and skills and controlling the blood sugar by monitoring body mass index blood sugar and HbA1c. The follow up of the participants was taken in place immediately after intervention, after two months, and then four months and the final follow up after six months using the same data collection tools.

2.7. Data analysis

Data was analyzed using SPSS (statistical package for social science). In order to analyze the identifying and disease related characteristics of patients, matched t-test was used to test whether there is a difference between pre-education and post education score averages of metabolic variables, percentages, standard deviation and scale.

2.8. Ethical consideration

Authorization was obtained from King Fahd Hospital in Al-Baha where study was conducted. Ethical approval was obtained from King Fahd Hospital Ethical Committee. Ethical approval was obtained from the ethical committee at Health Affairs at Al-Baha Region. The disclosure form is filled and signed by the author and attached with the manuscript.

3. Results

The total included participants in this study were 61 diabetic patients from both male (63.9%) and female (36.1%) attended to diabetic center at King Fahad Hospital in Al-Baha. They are about 37 ± 1.89 years old and mainly married 51 (83.6%), most of them have secondary (39.3%) or University (36.1%) education. The past history reported that only 14.4% of patients were smokers, never used alcohol, Table 1.

The Table 2 shows the diabetes criteria and clinical features on the included patients; 44.3% of patients have been diagnosed 6–10 years, and 26.2% more than 10 years. About 89.5% of patients have first or second relative family history. 31.1% have been hospitalized due to high blood sugar, and about half (55.7%) used both insulin and oral hypoglycemic agents to control blood sugar. The diabetes education has been delivered to about 52.5% of patients by doctor, nurses or dietitian 34.4%. The diabetes has been associated with other diseases in about 42.6% of patients.

The metabolic control parameters among diabetic patients were tested before and after intervention which showed that glycosylated hemoglobin (HbA1c) has been significantly dropped from 8.66 to 7.73 and triglyceride significantly dropped from 152.62 to 150.57, other metabolic parameters were insignificantly decreased after intervention, Table 3.

The diabetes self-care scale showed that the used intervention significantly improved self-care among diabetic patients after intervention, from 2.4 to 3.3. Table 4.

Table 1. Demographic characteristics of diabetic patients in King Fahad Hospital-Diabetic Center.

Variable	Frequency	(%)
Gender		
Male	39	63.9
Female	22	36.1
Marital status		
Married	51	83.6
Single	8	13.1
Divorced	2	3.3
Education Level		
Illiterate	3	4.9
Primary	12	19.7
Secondary	24	39.3
University	22	36.1
Smoking status		
Smoker	10	16.4
Non-Smoker	48	78.7
Ex-Smoker	3	4.9

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Variable	Frequency	(%)
Occupational status		
Freelance	8	13.1
Housewife	18	29.5
Retired	15	24.6
Worker	17	27.9
Unemployed	3	4.9
Age (years)		
20–25	7	11.5
26–30	0	0
31–35	17	27.9
36–40	37	60.7
Alcohol use status		
User	0	0
Non-User	60	98.4
Ex-User	1	1.6

Table 2. Features and disease criteria among of diabetic patients in King Fahad Hospital-Diabetic Center.

Variable	Frequency	(%)
Diabetes period		
1–5 years	18	29.5
6–10 years	27	44.3
11–15 years	0	0
> 10 years	16	26.2
Diabetes management type		
Oral antidiabetics	5	8.2
Insulin	13	21.3
Oral antidiabetics & insulin	34	55.7
Oral antidiabetics before and insulin now	9	14.8
Family diabetes history		
None	7	11.5
1st Degree relative	38	62.3
2nd Degree relative	16	26.2
Diabetes control frequency		
As the patient feels unwell	6	9.8
Once a month	16	26.2
Once in 2 months	27	44.3
Once in 3 months	5	8.2
Once in 6 months	7	11.5

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Variable	Frequency	(%)
Hospitalization due to blood glucose rise		
Yes	19	31.1
No	42	68.9
Diabetes-related education		
Yes	32	52.5
No	29	47.5
Provider of education		
Doctor	12	37.5%
Nurse	9	28.1%
Doctor& Nurse& dietitian	11	34.4%
Associated diseases with diabetes		
Have	26	42.6
Have not	35	57.4

Table 3. Metabolic control parameter among of diabetic patients in King Fahad Hospital-Diabetic Center before and after intervention.

Metabolic control parameters	Normal value (hospital range)	Pre-test	Post-test	p-value
HbA1c	4.10–5.9mmol/L	8.66	7.73	0.001**
Total cholesterol	150–250mg/dl	186.11	182.44	0.10
Triglyceride	0–160mg/dl	152.62	150.57	0.04*
LDL	135–225u/L	174.57	171.47	0.18
HDL	35–45mg/dl	35.60	34.23	0.23
Systolic BP (mmHg)		127.50	127.75	0.88
Diastolic BP (mmHg)		80.81	79.56	0.32
Body mass index (kg/m ²)		31.34	30.90	0.56

(*) significant relationship

Table 4. Diabetes self-care among of diabetic patients in King Fahad Hospital-Diabetic Center before and after intervention.

Items	Before intervention (Mean \pm SD)	After intervention (Mean \pm SD)	p-value
1 I eat my meals at the same time everyday	2.16	2.6	0.45
2 I always eat my snacks	2.42	2.87	0.07
3 I keep bound to my diet when I eat out in the restaurants	2.74	3.86	0.04*
4 I stick to my diet when I go to invitations (to others, friends, meetings)	2.68	2.82	0.45
5 I keep bound to my diet even when the people around me bound I do not know I am diabetic.	2.88	2.90	0.76
6 I do not eat excessively	2.52	2.50	0.88
7 I do exercise regularly	2.70	2.80	0.34
8 I do my exercises even when I don't feel like exercising	2.72	2.85	0.29
9 I do exercise adequately	2.32	2.59	0.17
10 I measure my blood sugar	2.5	3.65	0.03*
11 I keep records of my blood sugar measurements.	2.45	2.90	0.38
12 I take my oral anti diabetic drugs as recommended	2.58	3.13	0.02*
13 I take my insulin injections as recommended	2.60	3.76	0.01*
14 I adjust my insulin dosage according to my blood sugar measurements.	2.46	3.43	0.03*
15 I keep a lump sugar with me when I'm out/away from home.	2.58	2.96	0.18
16 I eat a lump sugar when my blood sugar drops	2.54	3.86	0.01*
17 I regularly go and see my doctor	2.36	3.12	0.04*
18 I consult my doctor when my blood sugar level rises extremely.	2.42	3.08	0.04*
19 I consult my doctor when my blood sugar level drops extremely.	2.66	3.67	0.01*
20 I regularly check my feet.	2.66	2.89	0.06
21 I always wear shoes, by all means, outside of the house.	2.68	3.23	0.03*
22 I always wear a slipper or a house-shoe when inside the house	2.44	3.56	0.02*

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Items	Before intervention (Mean \pm SD)	After intervention (Mean \pm SD)	p-value
23 I always wear socks.	2.82	3.67	0.02*
24 I keep my toenails short and straight.	2.82	3.26	0.03*
25 I routinely take a shower (at least once in a week or more).	2.48	3.67	0.01*
26 I brush my teeth every day.	2.44	2.98	0.07
27 I carry a diabetes identification card on me.	2.30	3.78	0.08
28 I talk with the other diabetes patients about how they care for themselves.	2.43	3.41	0.01*
29 I consult nurses, doctors, and other health care providers/specialists about how to prevent complications.	2.62	3.16	0.03*
30 I read the hand-outs and brochures about diabetes, when given.	2.06	3.21	0.02*
31 I go to the library to get information on diabetes.	2.37	3.36	0.01*
32 I attend to a diabetes support group.	2.34	3.28	0.04*
33 I am a member of a diabetes journal.	2.14	3.39	0.02*
34 I do research on the internet to find information about diabetes.	2.05	3.42	0.01*
35 Use the things I learn to avoid any complications that can occur about diabetes.	2.64	3.89	0.01*

“Never (1)” “Sometimes (2)” “Frequently (3)” and “Always (4); (*) significant relationship

4. Discussion

This study evaluated effect of diabetes education on diabetes control and self-care among diabetic patients in Diabetes center at King Fahad Hospital in Al-Baha. Diabetes education considers an absolutely part of diabetic treatment, so self-care is the one of the main objectives of this treatment. The overall result of used intervention was improvement in diabetes control and enhancement in self-care skills. The diabetes criteria and clinical features on the included patients; the findings showed that about half of patients have been diagnosed more than 5 years. Most of patients have positive family history. The management plan for those patients was mainly insulin with oral hypoglycemic agents. The half of patients received diabetes education by doctor, nurses or dietitian. The majority of the study subjects are aging over thirty five years; so many studies revealed that as chronic disease this is reasonable as chronic diseases. Regarding the level of education, the Illiterate and primary level act 25%, educational level is a vital variable of learning and understanding to adopt a healthy behavior. The study findings also indicate that most of the study subjects are married.

The findings of this study reveal the diabetes education improved metabolic control parameters among diabetic patients specially the glycosylated hemoglobin (HbA1c) and triglyceride, but not on

HDL, LDL, blood pressure or BMI. It seems that other elements are required for more effectiveness such as integrating education with other therapies for example physical activities with an appropriate diet. Total cholesterol and BMI reduction can be attributed to educational awareness whereby participants are urged to adopt and maintain good lifestyles and increase their physical activity levels in the form of exercise, the insignificantly change in BMI is justified by the short period of study. The finding of this study is similar to that done in Croatia, and Iran [1,2,4]. North Carolina Research supported the use of diabetes self-management education to improve patient knowledge and outcomes. Results of the study showed an increase of knowledge of healthy eating and physical activity, but there was not a significant change in participants' blood glucose, blood pressure, or weight [5].

Furthermore, the used intervention improved self-care among diabetic patients after intervention. The self-care includes the diet, preventing hypoglycaemia by Carrying sugar cubes, Blood glucose self-monitoring, Exercise and Foot care. In detail Diet issue was discussed because it creates the cornerstones of regulating blood glucose and preventing obesity. The results of this study indicate that dietary issue was improved to a partial extent. So, blood glucose levels and obesity may cause problems later on. The improvement in the self-management of exercising and Foot care was notable. about foot care, to avoid the complication the study asked if they give attention to this, results were acceptable. Concerning checking the blood sugar which deciding the patient state, how to manage the level of glucose in the body, what to eat and or otherwise visit any health care facility. There was a significant improvement of blood glucose self-monitoring and this can significantly delay the progression or reduce the risk of long-term complications associated with type 2 diabetes [6]. In a meta-analysis, Findings showed the educational program was effective in improving the general health and quality of life of diabetics. Similar study by Randomized controlled trials from 80 respondents that done Ankara, Turkey [7] reflect the similar finding a pre and posttest design study in Japan which included 30 people with type 2 diabetes, who also had a complication of peripheral nephropathy. Improved Hgb A1c levels, self-efficacy, and self-management abilities [8]. Using tools such as: on-line patient registries, text messaging (SMS), email reminders and/or telephone call reminders, combined with frequent (bi-monthly) face to face follow-up with a nurse or healthcare provider may help the patient with medication adherence and to maintain lifestyle changes and medication adherence. According to studies, diabetes education combined with interactive reminders resulted with patient increased physical activity, improved blood pressure, and LDL cholesterol levels [9–11].

There were several limitations related to this study; the first limitation was the use of only one hospital in Al-Baha Saudi Arabia as place to conduct study, another limitation was limited time to collect data from patients which resulted in only 61 patients included. Thus, the findings of current study could not be generalized over the Saudi Arabia. But There is similar studied conducted with small sample size, for example the study that done by Kim H (2007) Impact of Web-based Nurse's Education on Glycosylated Hemoglobin in Type 2 Diabetic Patients, and also Kazawa K & Moriyama M (2013) in study entitled effects of a self-management skills-acquisition program on pre-dialysis patients with diabetic nephropathy, and Farrer O & Golley R (2014) in study feasibility study for efficacy of group weight management programmes achieving therapeutic weight loss in people with type 2 diabetes; the sample size was 26 [12–14]. Another limitation that this study included patients who were relatively young with longstanding diabetes (3/4 for more than 5 years), and most of them under treatment by both oral drugs and insulin.

It is recommended to conduct further researches with more representative sample which could reflect the situation and application of the used intervention to get more reliable findings. It is

recommended to include patients with diabetes of short duration, they might clearly reflect the situation. Consequently, the finding of this study could be helpful for clinical diabetes educators in identifying appropriate interventions, enabling their education in the appropriate clinical environment, and initiating effective approaches to deliver diabetes related information.

5. Conclusion

The diabetes education improved metabolic control parameters among diabetic patients specially the glycosylated hemoglobin (HbA1c) and triglyceride. Furthermore, the used intervention improved self-care among diabetic patients after intervention.

Acknowledgement

The appreciations are extended to the patients participated for their kind collaboration. This study was funded by a grant from the Deanship for Scientific Research at Albaha University. We would like to express the sincerest gratitude, indebtedness and appreciation to Deanship of Scientific Research, at Albaha University which supports our Project number 1438/107.

Conflict of interests

We declare that this study is an original work. We also declare that we have no conflict of interests related to it.

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