Effect of Health Education Program for type 2 diabetic patients on diabetes control

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Abstract: Diabetes mellitus (DM) is a chronic, complex disease, requiring a continuous medical care, with multiple strategies for improving glycaemia control and reducing complications. The study is aim to develop and implement a health education program on type 2 diabetic patients to improve adherence to medications and self-care activities and to find its effect on self-care activities, Knowledge, attitude, adherence to medications and level of HbA1C, fasting and Postprandial Blood sugar. An interventional study carried out on 125 diabetic patients attending AIN SHAMS University diabetes clinic. Patients were subjected to three health education session where information about diabetes was provided. Knowledge, adherence to medications, self-care practice, attitude and glycemic control were assessed before and 3 months after the intervention program. After implementation of the educational program, there was highly significant difference after intervention as regards mean score of adherence to treatment(P value<0.001),mean score of knowledge (P value<0.001),mean score of self-care practice (P value0.007)and mean score of attitude (P value<0.001)also there were significant improvement as regards HbA1c level(P value<0.001). Educational intervention is an effective tool that implicated a significant change in patients' knowledge, self-care practice, adherence to medications and attitude that resulted in improvement in patient glycemic control.

Key words: Adherence, DM, Glycemic control, Health education, self-care practice.

Introduction

Diabetes is a complex, chronic illness re-quiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control. Ongoingpatient self-management education and support are critical to

preventing acute complica-tions and reducing the risk of long-term complications. Signicant evidence exists that supports a range of interventions to improve diabetes outcomes (**ADA, 2017**).

Health education play an essential role in glycemic control, failure of attending education program is responsible for frequent re-hospitalizations, disease complications and poor quality of life. (**Kirkman et al., 2002**

There are seven essential self-care behaviors in people with diabetes which predict good outcomes as healthy eating, being physically active, monitoring of blood sugar, adherent to medications, good problem-solving skills, healthy coping skills and risk-reduction behaviors. All these behaviors have been found to be positively correlated with good glycemic control, reduction of complications and improvement in quality of life. Despite this fact, compliance or adherence to these activities has been found to be low, especially when looking at long-term changes (**Shrivastava et al.,2013**).

Adherence which is defined as the extent to which a person's behavior in taking medication, following diet, and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider (**WHO, 2003**) play an important role in glycemic control as it has been demonstrated that there is an inverse relationship between taking a prescribed OHA and HbA1c level, with each 10% increase in OHA adherence associated with a decrease of 0.1% in HbA1c (**Rozenfeld et al., 2008**).

The current study was conducted to improve quality of life of our population and decrease morbidity and mortality from the disease.

Aim of the work

To develop and implement a health education program on type 2 diabetic patients in order to find out the effect of this health education program on self-care activities, Knowledge, attitude, adherence to medications and level of HbA1c.

Subjects and Methods.

An interventional prospective one arm study design was carried out between February 2015 and May 2017 at Ain Shams University Diabetes Out patient's clinic. The starting study subjects were 140 type 2 diabetic patients plus 10%for possible drop outs .The net number of subjects who completed the study was 125 patients. The patients had been selected according to the following criteria: Type 2 Diabetes Mellitus patients aged from 18 years and older, who are on oral antidiabetic drugs and duration of disease more than one year.

Ethical considerations

Approval from ethical committee of Ain Shams University and from the director of outpatient's clinics was obtained. An informed consent was taken from the patients. All participants had the right not to participate in the study or to withdraw prior to its completion and Confidentiality was ensured.

Methods of data collection:

A pilot study was carried out on 20 diabetic patients (not included in the final analysis) to test our tool and make necessary modifications.

Questionnaire was designed to include the following:

Part I: elicited Socio-demographic characteristic of the study sample such as

age, sex, occupation, marital status, level of education and biochemical measurements which include: measurement of HbA1C, fasting and postprandial blood sugar and anthropometric measurement as calculation of the body mass index (BMI)

-BMI: according to **WHO (2000)**

Underweight (< 18.5), normal weight (18.5–24.9), Overweight (25.0–29.9)

Class I obesity (30.0–34.9), class II obesity (35.0–39.9), class III obesity (≥ 40.0).

-Glycemic control according to **ADA, 2016**

HbA1c: Patients with HbA1c<7 considered as having good glycemic control. HbA1C should be less than 8 mg/dl in diabetic patients with comorbid conditions and long duration of disease.

-FBS: patients with fasting blood sugar <130 was considered as having good glycemic control

-PPS: patients with post prandial blood sugar <180 was considered as having good glycemic control

Part II: Diabetes adherence. An interview questionnaire derived and modified from **Roland and Cyprian, 2012** .Questionnaire implemented in Nigeria and had been translated by the researcher into Arabic language and a pilot study was done for its validation on 10% of the sample size. The questionnaire assessed the adherence to diabetes medications it contained five questions, a mark of one was awarded for yes and zero for NO answer, participant scored 3 or more were considered adherent to medications.

Part III: Diabetes knowledge and attitude, an interview questionnaire

derived and modified from Michigan Diabetes research and training center

Knowledge questionnaire: It contained 13 questions about baseline knowledge of patients about the disease (importance of diet, blood glucose testing, exercise, complications of diabetes and foot care).One point was given for each correct answer a score of 8 and more was taken as having good knowledge **de Oliveira and Zanetti (2011).**

Attitude questionnaire: It contained 14 questions about their attitude towards importance of training of health care professional in communications and counseling skills, seriousness of disease, value of tight control of blood glucose level and patients autonomy. Scoring is based on completed items from strongly agree 4 points to strongly disagree zero point. The total scores ranges from 0 to 56 points. Scores of 40 and above indicate positive attitude towards the disease

Part IV: Diabetes self-care practice. An interview questionnaire derived and modified from summary of diabetes self-care activities (SDSCA). It contained 11 questions about (diet self-care, blood glucose testing, and exercise self-care and foot self-care practice). This questionnaire address self-care activities performed by the patient in the last seven days, the assessment is standardized in days per week with scores indicating the performance in self-care activities on a scale from 0 to 7 with mean scores above 4 indicate desirable self-care behavior **(Veras et al., 2014).**

The data collection phase:

The clinical work was divided into three parts; the (pre-intervention), the (intervention health education messages) and the (post-intervention) assessment.

The pre-intervention assessment:

Was done through the working days of outpatients clinic during it the patients filled the questionnaire and Blood samples were taken to measure (HbA1c level, fasting blood sugar and postprandial blood sugar) and also body mass index was calculated. At the end of the visit the researcher assess knowledge of patients by open discussion about what do they know about symptoms of hypoglycemia and how to deal with it and patients were given printed pictures to motivate them and asked to attend any of the next educational sessions to be informed about the results of their laboratory tests and to receive more information about special diet plan for diabetics.

Health education intervention program.

It includes information related to importance of adherence to diabetic drugs and life style modifications as healthy eating and exercise also information related to complications of diabetes and how to treat and avoid it. The message was provided by the researcher and took about an hour. Different educational methods were used including writing boards, videos and printed handouts. All the educational materials were available in Arabic language. The patients was informed about the results of lab investigations and time of next visit (3 months after the first one hour.

The post-intervention assessment: Done 3 months after the health education intervention program to repeat the different tests and measurements as in pre-intervention assessment.

Statistical analysis: The collected data were analyzed using statistical package for social sciences (SPSS) version 20.0 Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage. Paired t test was used to compare quantitative data before and after intervention for the same group.Chi-Square test was used to compare qualitative data between two groups. McNemar's test was used to compare qualitative data before and after intervention for the same group.Pearson's correlation coefficient (r) test was used for correlating data.

Conclusion. The results of the present study concluded that educational intervention is an effective tool that implicated a significant change in patients' knowledge, adherence to medications; attitude and self-care practice and consequently resulted in improvement of patient glycemic control.

According to calculated body mass index 83.2% of the participants were overweight or obese(40% were overweight and 43.2% were obese). This is in agreement with a study by **Mugharbel and Al-Mansouri (2014),** which showed that the prevalence of overweight and obesity was 40% and 32% respectively.

Another study by **Damian et al. (2017)** reported that 44.9% of their participants were overweight and 40.1% were obese, Another study by **Daousi et al., 2006** Showed that the prevalence of overweight and obesity was 86%.

Results and Discussion

Table (1): *Demographic and clinical data of the studied group*

Demographic data	Total (N=125)
Gender	
Male	19 (15.2%)
Female	106 (84.8%)
Age (years)	
[Mean±SD] Range	[52.92±5.38] 40-63
Education	
Illiterate	64 (51.2%)
Read and write	18 (14.4%)
Preparatory/secondary school/diploma	24 (19.2%)
University degree	19 (15.2%)
Occupation	
Unemployed	103 (82.4%)
Employed	22 (17.6%)
Marital status	
Married	118 (94.4%)
Widow	7 (5.6%)
Duration of disease in years	
[Mean±SD] Range	[5.98±2.00] 2-13
Diabetes medications	
Metformin	125(100.0%)
Sulphonyel urea	114(91.2%)
Repaglinide	11(8.8%)
BMI	
Normal weight	21(16.8%)
Overweight	51(40.8%)
Obese	53(42.4%)

Table (2) Adherence to diabetes regimen among the studied group before and after intervention.

		Before		After		McNemar's test	
		No.	%	No.	%		p-value
Total adherence score	Adherent	48	38.4%	102	81.6%	46.817	<0.001
	Non-Adherent	77	61.6%	23	18.4		

As regards self-reported adherence, in the current study adherence rate before intervention was 38.4%. This is consistent with the adherence rate of a study conducted by Shams and Barakat, 2010 which showed an adherence rate to prescribed medications of 38.9%.

The adherence rate is lower than the rate of a study by Grant et al. (2013) which showed adherence rate of 95.7%. And another study by Donnan et al. (2002) reported an adherence rate of

90%. And slightly higher than the adherence rate of a study by Andréa Pereira et al., 2015 which showed adherence rate of 22%. A systematic review on adherence to medications among diabetic patients showed that the average adherence to the oral hypoglycemic agents ranged from 36%-93% Mukherjee et al., 2013. The difference in adherence rate may be due to collecting sample from different health units, different sample size and different tools measuring adherence to diabetic medications

The current study results showed improvement in mean adherence score and adherence rate increased from 38.4% to 81.6%, after intervention by a health education program, this is in agreement with studies by Mansoor and Dowse (2006); Smith et al., 2007, which showed that Patients who received information about their disease and medication from healthcare providers are more adherent to their medications. On other hand Davari et al. (2014) showed that there was no statistically significant difference in adherence to medications before and after intervention by a health education program.

Table (3) Self-care practice of the studied group before and after intervention

		Before			After			McNemar's test	
		No.	%	Mean±SD	No.	%	Mean±SD		p-value
Total Self-Care score	Good practice	13	10.4%	24.86±10.44	30	24.0%	34.02±12.28	7.190	0.007
	Poor practice	112	89.6%		95	76.0%			

The present study sample showed that there was significant improvement in overall self-care activities. This is consistent with the following studies.Adouble-blind, randomized, controlled study by **Hamdiye Surucu et al. (2017)** showed that there is improvement in overall self-care in the intervention program.

A randomized controlled trial **by Jalilian et al. (2014)** showed that education program improve of self-care among diabetic patients. Similarly another A longitudinal study done by **Maia et al., 2016** showed improvement in self-care scores, there was a statistically significant improvement at the end of the educational program.

Table (4) Total knowledge of the studied group before and after intervention diabetic patients.

		Before			After			McNemar's test	
		No.	%	Mean±SD	No.	%	Mean±SD		p-value
Knowledge	Good	56	44.8%	7.14±4.04	113	90.4%	9.98±2.54	57.272	**<0.001**
	Poor	69	55.2%		12	9.6%			

In the current study the level of knowledge improved after an intervention health education program. This is in agreement with randomized controlled trial of a structured health education program for British Pakistanis with type 2 diabetes mellitus by **Hawthorne (2001)** which showed that nearly everyone improved their knowledge score after 6 months of

intervention. Similarly, another randomized clinical trial study done by **Pereira et al. (2012)** showed an increase in the level of knowledge in the intervention group. Another study by **MakkiAwouda et al. (2014)** showed similar finding.

Table (5) Attitude of the studied group before and after intervention.

Attitude of diabetic patients		Before		After		McNemar's test	
		No.	%	No.	%		p-value
Total Attitude score	Positive attitude	17	13.6%	40	32.0%	10.999	**<0.001**
	Negative attitude	108	86.4%	85	68.0%		

In the present study there was a significant difference before and after intervention (p value **<0.001**) by a health education program this is consistent with **Naglaa and Mohamed (2010)** which showed that attitude significantly increased after intervention by a health education program. **Rahaman et al. (2017)** showed an improvement in overall total score of attitude after intervention by a health education program.

Table (6) Correlation between KAP, adherence and HbA1c among the studied group after intervention

		Total Self-Care after	Total Knowledge after	Total Attitude after	HbA1c after	Total adherence after
Total Self-Care after	r		.378**	.706**	-.375**	.273**
	p-value		0.000	0.000	0.000	0.002
Total Knowledge after	r	.378**		.440**	-.704**	.495**
	p-value	0.000		0.000	0.000	0.000
Total Attitude after	r	.706**	.440**		-.491**	.351**
	p-value	0.000	0.000		0.000	0.000
HbA1c after	r	-.375**	-.704**	-.491**		-.566**
	p-value	0.000	0.000	0.000		0.000
Total adherence after	r	.273**	.495**	.351**	-.566**	
	p-value	0.002	0.000	0.000	0.000	

As regards the correlation between knowledge, attitude, self-care activities and HbA1c, the present study results showed that there is positive correlation between knowledge, attitude and self-care activities and HbA1c, these findings are in agreement with **Naglaa and Mohamed (2010)**, *Ahmed et al., 2015,* **Taha et al., 2016; Rahaman et al. (2017)** which showed that there was a statistically significant relation between Knowledge, attitude, practice and HbA1c.

Al-Maskar et al., 2013; Ng et al. (2012) showed that there was a statistically significant correlation between the level of knowledge and practice and also between attitudes and practice, Similarly there was a weak but statistically significant correlation between knowledge and attitude scores,HbA1c was not significantly correlated with any of the three scores.

Table (7) Glycemic control by HbA1c before and after intervention among the studied group

HbA1C of Diabetic patients	Before		After		McNemar's test	
	No.	%	No.	%		p-value
<7	28	22.4%	35	28.0%		
7 -	23	18.4%	63	50.4%		
8 -	51	40.8%	16	12.8%	43.799	<0.001
9 -	19	15.2%	11	8.8%		
≥10	4	3.2%	0	0.0%		

In the current study there was a statistically significant difference in HbA1c before and after intervention this is consistent with **Al Nohair (2013), Zariban et al. (2014);** *Ahmed et al. (2015)* which showed that Self-care education leads to improved HbA1c level.On other hand this finding is inconsistent with **Uitewaal, et al. (2005)** found that health education program has no obvious beneficial effect on glycemic control or cardiovascular risk profile. The variance in glycemic control between the current study and the previous one may be due to using different cut off point for glycemic control as some studies were using cutoff point <6.5 for HbA1c, also some of them depended only on fasting blood glucose.

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