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IMPACT OF EDUCATIONAL PROGRAM ON SELF-CONTROL OF BLOOD GLUCOSE AMONG PATIENTS WITH NON-INSULIN DEPENDENT DIABETES MELLITUS

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ABSTRACT

Introduction: The increase in diabetes incidence, combined with its long-term complications, will greatly increase in the burden of heath care. Therefore, education on self-care of person with diabetes and preventing its complications could reduce the burden of the disease in the future. This study aimed to assess the effect of diabetes self-care educational program on control of non-insulin dependent diabetes mellitus NIDDM using $HgbA_{1c}$ as a proxy indicator. **Methods:** This is a pre and post interventional study; it was conducted to determine the effect of diabetes education program given to patients with NIDDM on diabetes control. The study included 132 newly diagnosed patients divided into two groups, an interventional group with intensive follow-up and control group of standard follow-up group. The intervention consisted of three months health education for diabetic patients (13 weekly lectures). It aimed to improve knowledge, and skills about control of blood sugar. Data analyzed using SPSS (statistical package for social science). **Results:** The pre and post comparison of diabetic control within intervention group showed significant reduction of mean HbA_{1c} (%) before and after the intervention from 8.1 ± 1.8 to 7.5 ± 1.6 (P = 0.001). However, in the control group there is a slight non-significant increase in mean HbA1c (%) after 3 months of study beginning (P = 0.210). The comparison between groups at the time of outcome assessment (after 3 months), showed significant difference between groups (P= 0.003). **Conclusion**: This study demonstrated the importance of education and training for the NIDDM patients in regards to self-monitoring and control of blood glucose.

KEYWORDS: Self-monitoring; Diabetes mellitus; NIDDM; Education; Intervention; Saudi.

INTRODUCTION

International diabetic federation (IDF) stated that 366 million people have diabetes in 2011; by 2030 this will be risen to 552 million. The number of people with type 2 diabetes is increasing in every country.[1] The greatest number of people with diabetes are between 40 to 59 years of age, where 183 million people (50%) with diabetes are undiagnosed. Recognition of the importance of glycemic control in the prevention of the complications and morbidity of NIDDM has led to worldwide campaigns for modifications in lifestyle and an intensive search for better antidiabetic medications.[2]

In the Kingdom of Saudi Arabia (KSA), the rise in the prevalence of NIDDM started to gain attention years after rapid industrialization took place in the country.[3,4] Studies done since the late 1980s have shown an increasing trend among adult Saudis,[5,6] the last of which, conducted in a large cohort of patients assembled from 1995 to 2000, revealed that one of five adult Saudis had NIDDM.[3] The studies showed an alarming

prevalence of obesity at 40.0%, hypertension at 30% and coronary artery disease (CAD) at 6.2%.[7-9] A decade passed and a follow-up epidemiologic study was designed to assess the current status of the population and whether the efforts of the Ministry of Health and the healthcare community have borne fruit.

Knowledge of the diabetes epidemic in Saudi Arabia is limited. Data from a small-scale study showed that the prevalence of diabetes in Saudi Arabia is 3.4%.6. The most recent study done by IDF international diabetic Middle East and North Africa (MENA) in 2012, showed that more than 34.2 million people in the MENA region have diabetes mellitus; by 2030 this will rise to 59.7 million, and estimated the diabetes cause 356.586 deaths in the MENA region this year.[10] The study also showed that from total population in Saudi Arabia, which was 17,582,020 about 3,414,510 of them has diabetes, 241,710 is the number of adult with undiagnosed diabetes, the prevalence was 19.42%, the number of deaths due to diabetes is 29.966 people and the mean

heath care expenditure per person is 953.71 USD. The escalating in diabetes prevalence, combined with its long-term complications, will greatly increase in the burden of heath care. Therefore, education on self-care of person with diabetes and preventing its complications could reduce the burden of the disease in the future.[11]

This study aimed to assess the effect of diabetes self-care educational program on control of non-insulin dependent diabetes mellitus NIDDM using HgbA$_{1c}$ as a proxy indicator.

METHODS
This is a pre and post interventional study; it was conducted to determine the effect of diabetes education program given to patients with NIDDM on diabetes control. The study included NIDDM patients attended the Diabetic University Center located in King Saud Medical City. The study included 132 newly diagnosed patients divided into two groups, an interventional group with intensive follow-up and control group of standard follow-up group. Data about patients' characteristics such as age, gender, level of education, type of treatment, smoking and body mass index (BMI) were collected through a structured questionnaire. The outcome assessed by measurement of HgbA1 before and after educational program in intervention group and at the same time in control group. The intervention consisted of three months health education for diabetic patients (13 weekly lectures). It aimed to improve knowledge and skills about control of blood sugar. Data analyzed using SPSS (statistical package for social science). In order to analyze the identifying and disease related characteristics of patients, a paired t-test was used to test whether there

is a significant difference between pre-education and post education HgbA$_{1c}$. Study subjects obtained a written informed consent to participate in the study and the confidentiality was ensured through coding of patients' names.

RESULTS
This study included 132 diabetic divided equally into intervention and control groups. Similar background factors were found in both groups, where males, above 40 years old, Saudi and non-smoker patients constituted the majority of study participants. Patients with high BMI and insulin use represented 68.2%, 27.3% and 59.1% in the intervention group; while they represented 71.2%, 31.8% and 56.1% in the control group respectively. In regards to these background variables, no significant differences detected between intervention and control groups (table 1).

The pre and post comparison of diabetic control within intervention group showed significant reduction of mean HbA$_{1c}$ (%) before and after the intervention from 8.1±1.8 to 7.5±1.6 (P = 0.001). However, in the control group there is a slight non-significant increase in mean HbA1c (%) after 3 months of study beginning (P = 0.210) (table 2).

The comparison of mean HbA$_{1c}$ (%) between groups at the baseline assessment before intervention showed no significant difference between groups (P= 0.490). The comparison between groups at the time of outcome assessment (after 3 months), showed significant difference between groups (P= 0.003) (table 3).

Table (1): Distribution of background variables in study and control groups

Background variable		Intervention group (%)	Control group (%)
Age group	≤ 40 years old	26 (39.4%)	27 (40.9%)
	> 40 years old	40 (60.6%)	39 (60.1%)
Gender	Male	36 (54.5%)	35 (53.0%)
	Female	30 (45.5%)	31 (47.0%)
Nationality	Saudi	44 (66.7%)	46 (69.7%)
	Non-Saudi	22 (33.3%)	20 (30.3%)
Educational level	Primary or less	10 (15.2%)	22 (33.3%)
	High school	24 (36.4%)	24 (32.7%)
	University or more	32 (48.4%)	20 (37.0%)
Smoking	Yes	14 (21.2%)	11 (16.7%)
	No	52 (78.8%)	55 (83.3%)
BMI	Normal	21 (31.8%)	19 (28.8%)
	High BMI	45 (68.2%)	47 (71.2%)
Insulin using	Insulin users	39 (59.1%)	37 (56.1%)
	Non-insulin users	27 (40.9%)	29 (43.9%)

Table (2): Pre and post differences in diabetic control within groups

Study groups	Diabetic control		P value
	Mean HbA$_{1c}$ (%) before in intervention	**Mean HbA$_{1c}$ (%) after intervention**	
Interventional group	8.1±1.8	7.5±1.6	0.001
	Mean HbA$_{1c}$ (%) at the beginning of study	**Mean HbA$_{1c}$ (%) after 3 months**	**P value**
Control group	7.9±1.5	8.0±1.4	0.210

Table (3): The differences in diabetic control between study groups

Interventional program	Diabetic control		P value
	Mean HbA1c (%)$_{1c}$ (%) in intervention group	**Mean HbA1c (%)$_{1c}$ (%) in control group**	
At the baseline assessment	8.1±1.7	7.9±1.3	0.490
After 3 months of study	7.5±1.6	8.0±1.5	0.003

DISCUSSION
Because of heterogeneity of data in studies assessed the self-control in diabetic patients, the importance of self-control of blood glucose among NIDDM is controversial.[12] In this study the pre and post comparison of diabetic control within intervention group showed significant reduction of mean HbA$_{1c}$ after the intervention from 8.1±1.8 to 7.5±1.6. However, in the control group there is a slight non-significant increase in mean HbA$_{1c}$ after 3 months of study beginning. Similar results were found by study conducted by Barnett et al., where a statistically significant reduction of 0.25% in HbA$_{1c}$ was detected in self-control group. It is less than reduction reported in this study which estimated to be 0.6%.[13]

Different findings were showed by the ESMON study, where newly diagnosed NIDDM patients subjected to intensive educational intervention. It demonstrated that non-significant difference in HbA$_{1c}$ was found between groups. However, in ESMON study, the treatment plan of patients was not depended on self-control strategy and it found no differences between patients in the use of oral hypoglycemic medications.[14] In addition, another randomized controlled trail found non-significant effect of the intensive education program in regards to self-control training of NIDDM patients.[15]

In the present study, the comparison of mean HbA$_{1c}$ between groups at the baseline assessment before intervention showed no significant difference between groups, which reflected the comparability of study groups. The comparison between groups at the time of outcome assessment showed significant difference of 0.5% in HbA$_{1c}$ between intervention and control groups. Thus, the impact of education program showed substantial effect on the control of blood glucose among NIDDM patients.

CONCLUSION
This study demonstrated the importance of education and training for the NIDDM patients in regards to self-monitoring and control of blood glucose. It found a significant reduction in HbA$_{1c}$ in the group subjected to intensive educational program.

CONFLICT OF INTEREST
The authors declare no conflict of interests and no sponsoring was received for conduction of this study.

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