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Prevalence and determinants of non-controlled diabetic patients in Primary Health care centers in Najran city, KSA

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Abstract
Objective: To estimate the prevalence of non-controlled diabetic patients and their main determinants at primary health care centers.
Methods: A cross-sectional study was carried out in a sample of 220 diabetic patients attending primary health care centers in Najran area. Data on medical care and patient characteristics were collected.
Results: The majority of the studied population were Saudian (83.6%). More than 70% of patients were older than 50 years old with a mean age of 58.45 ± 14.15 years. A total of 78.3% of patients were none controlled regarding their diabetes. In the multivariate logistic regression model, only saudian nationality and non-oral diabetes treatment were statistically associated with non-Glycemic control.
Conclusions: Although the primary health care centers offer a high standard of medical care, the findings of the present study showed that diabetic control is suboptimal.

Keywords: Diabetes mellitus, Primary health care, Glycemic control

1. Introduction

Diabetes mellitus (DM) is now considered one of the most common non-communicable diseases worldwide [1, 2]. It is highly prevalent for all age groups worldwide [3]. It is estimated that the number of people with diabetes worldwide was about 366 million in 2011and will increase to 552 million in 2030 (4). According to the International Diabetes Federation's (IDF) statistics released 75% of that figure will be from developing countries [3]. Five of the top ten countries estimated to have the highest prevalence of diabetes are from the Middle East and North Africa region (MENA).

Since the Diabetes Control and Complication Trial and the United Kingdom Prospective Diabetes Study demonstrated that excellent Glycemic control reduces Microvascular complications in types 1 and 2 diabetes mellitus, respectively [5, 6], Glycated hemoglobin has become an increasingly important measure of Glycemic control. Despite the strong consensus that excellent Glycemic control improves Microvascular outcomes in type 2 diabetes mellitus [7], there are limited numbers of patients with diabetes who can obtain good Glycemic control.

International studies showed that more than the two thirds of diabetic patients did not achieve target HbA1C level [8].

At the national level, a recent study was conducted in Saudi Arabia in which only 27% of the study patients reached the target HBA1C of <7% (9). Another study in primary care clinics showed similar results as only 24% of the patients achieved a HBA1C level of <7% [10]. Therefore the current study was conducted to evaluate Glycemic control and its main predictors among diabetic patient's type 2 at primary care in Najran area.

2. Methods

2.1 Study design

We conducted a cross-sectional study among adult patients with diabetes type 2 followed in primary health care centers in Najran.

2.2 Studied population

A representative sample of diabetic patients was included. To be considered in the study, patients needed to meet the following criteria:

- Be identified as having diabetes type 2
- Be at least aged 18;
- Male or female
- Have Fasting Plasma Glucose (FPG) and HbA1c measured at least twice during the last year

2.3 Definition of the main variables

- For each patient, we calculated mean of the two last HbA1c levels. We grouped patients into 2 categories according to the recent recommendation of the Canadian Diabetes Association [11].
  - Controlled, those who achieved and maintained a mean HbA1c ≤ 7%.
  - Not controlled, those who had a mean HbA1c higher than 7%.
- Medicines used for glucose control were categorized into three levels:
  - Insulin alone
  - Oral agents alone, and
  - Insulin with oral agents

- Clinical characteristics considered were systolic (SBP) and diastolic (DBP) blood pressure, total and HDL cholesterol, weight and height.
- According to their smoking status, patients were grouped into two categories: smokers and non-smokers.
- Hypertension was considered SBP or DBP greater than or equal to 130 mm Hg and 80 mm Hg, respectively. Total cholesterol or HDL greater than equal to 200 mg/dl and 45 mg/dl, respectively were defined as non-controlled.

2.4 Statistical analysis

Data were entered and analyzed using Statistical Package for Social Science program: S.P.S.S 17.0.

The Chi square test was used to evaluate the relationships between qualitative variables. A p value less than 5% was considered as significant.

Separate multivariable logistic regression models were used to identify the main predictors of poor glycemic control. A p value less than 5% was considered as significant for independent variables in the final model.

3. Results

3.1 General characteristics

Table I showed the study population characteristics. The majority of the studied population were Saudian (83.6%). More than 70% of patients were older than 50 years old with a mean age of 58.45 ± 14.15 years (57.68 ± 15.55 years among males vs 59.03 ± 12.24 years among females; p=0.48). Only 7.3% of the studied population were smokers.

3.2 Health status

The levels of overweight and obesity were respectively 37% and 49.3%. High blood pressure was found in 35 % of the studied population Table II.

Mean total cholesterol was 163.22 mg/dl and 22 % of them had higher total cholesterol levels.

About 30% of the patient's systolic blood pressure was not controlled and in 5.5% of patients the diastolic blood pressure was above the target level.

3.3 Glycemic Control

The overall Glycemic control was evaluated through measurement of Hb A1C as it was mentioned previously, which was acceptable in 21.7% of the patients. The level of Glycemic control was better among: females, non saudian patients, normal systolic and/or diastolic blood pressure, normal total cholesterol levels and patients who take oral treatments table III.

3.4 Predictors of non-Glycemic control

A total of 78.3% of patients were non controlled regarding their diabetes. Table IV provides the results of Univariate logistic regression analysis which illustrates the non-adjusted factors associated with non-Glycemic control. The risk of non-Glycemic control was higher but with no statistical significance among males (OR=1.14; p=0.68). Compared to patients with normal blood pressure (systolic and /or diastolic), patients with high blood pressure were non significantly more likely to have non glycemic control (OR=1.77; p=0.12). Patients taking insulin treatment were more likely to have poor control compared with patients taking oral medications (OR=3.55; p=0.004). Similarly, patients with high level of cholesterol were significantly more likely to have non glycemic control (OR=2.84; p=0.03). Compared with young patients, those aged more than 50 years were non significantly more likely to have poor control (OR=1.01; p=0.96) and patients with number of clinic visits less than 3 were statistically associated with non-Glycemic control (OR=3.60; p=0.001). In the final multivariate logistic regression model, only saudian nationality and non-oral diabetes treatment were statistically associated with non-Glycemic control table V.

4. Discussion

The adequacy of Glycemic control in diabetes mellitus is a cornerstone in reducing morbidity and mortality of the disease (12, 13). This study estimated the proportion of patients with Type 2 diabetes who did not achieve target level of HbA1c. Poor glycemic control (HbA1c >7%) was present in 78.3 % of patients.

The poor level of glycemic control is a common phenomenon among Saudi diabetic patients. A recent study was conducted in Saudi Arabia at a national level including 28 health centers all over the Kingdom of Saudi Arabia in which only 27% of the study patients reached the target of HbA1C of < 7% (9). Recent studies in Kuwait and Pakistan showed similar results. In Kuwait, 66.7% of the studied population had HbA1c ≥8% (14). In Pakistan (15), 46.7% of patients had HbA1c >7.5%. In our study, this high rate of non-controlled patients could be explained in part by the non-observance of the prescribed treatment. This issue should be explored by a further studies to estimate the real rate of observance and its main determinants.

In the present study, patients with poor glycemic control were more likely to be prescribed combination of oral antidiabetic agents and insulin, which may indicate that physicians are attempting multitherapy to provide better disease control. The association between treatment with combination of oral anti-diabeticc agents and insulin and poor glycemic control is consistent with other studies [16, 17]. This finding reflects the fact of deteriorations of diabetes over time, and the need for higher doses or additional medications increases over time. Therefore, patients who were treated by combination therapy of oral anti-diabetic agents and insulin had more progressive disease which required more aggressive treatment to provide glycemic control, but this phenomenon could be attributed to delay in applying insulin in the treatment of patients with poor glycemic control.

In our study, gender was not associated with Glycemic control in concordance with other international findings [18].

The lack of a relationship between age and poor glycemic control in our study is not consistent with the findings of a number of studies which reported that younger age was associated with poor glycemic control [19, 20].

This study has some limitations such as poor recording in the charts which were missing some important variables such as level of education and smoking status. Another limitation is that glycemic control can be affected by other factors that were not studied here, such as the duration of diabetes and especially the patient's compliance.

5. Conclusion

Although the primary health care centers offer a high standard of medical care, the findings of the present study showed that diabetic control is suboptimal.

There is a really need for further studies to find out the level of patient's compliance and the possible other causes of the poor glycemic control in order to take the necessary and adapted intervention measures.

Table 1: General characteristics of the Studied Population

Variable	Number	Percentage
Gender (n=218)		
Male	117	53.7
Female	101	46.3
AGE (n=220)		
< 50	59	26.8
>= 50	161	73.2
Marital Status (n=220)		
Married	210	95.5
Not married	10	4.5
Nationality (n=220)		
Saudian	184	83.6
Not Saudian	36	16.4
Education level (n=145)		
Analphabet	51	35.2
Primary	41	28.3
secondary	29	20.0
University	24	16.6
Smoking status (n=219)		
Smoker	16	11.4
Non smoker	203	88.6

Table 2: Anthropometric and clinical characteristics of the studied population

Variable	Number	Percentage
Body Mass Index BMI(n=219)		
Normal	30	13.7
Overweight	81	37.0
Obesity	108	49.3
Blood Pressure (n=219)		
High	77	35.1
Normal	142	64.9
Diabetic treatment (n=221)		
Oral alone	127	57.5
Insulin alone	84	38.0
Combination oral + Insulin	10	4.5
Hb A1C (n=221)		
< 7	48	21.7
>=7	173	78.3
Number of visits (n=212)		
< 3	93	43.9
>= 3	119	56.1

Table 3: Distribution of the Studied Population According to their Glycemic Control Status (Controlled Hba1c ≤ 7%, Uncontrolled Hba1c >7%)

HBA1C	≤7%		>7%		P
	n	%	n	%	
Nationality (n=220)					
Saudian	35	19.0	149	81.0	0.02
Not Saudian	13	36.1	23	63.9	
Gender (n=218)					
Male	24	20.5	93	79.5	0.68
Female	23	22.8	78	77.2	
Marital status (n=220)					
Married	44	21.0	166	79	0.30
Not married	4	40.0	6	60	
Blood pressure (n=219)					
Normal l	35	24.6	107	75.4	0.11
High	12	15.6	65	84.4	
BMI (n=219)					
Normal	7	23.3	23	76.7	0.21
Overweight	22	27.2	59	72.8	
Obesity	18	16.7	90	83.3	
Number of visits (n=212)					
< 3	14	15.1	79	84.9	0.03
≥ 3	32	26.9	87	73.1	
Treatment (n=221)					
Oral	38	29.9	89	70.1	0.03
Insulin	9	10.7	75	89.3	
Oral + Insulin	1	10.0	9	90.0	
Cholesterol (n= 213)					
< 200	42	25.3	124	74.7	0.03
>= 200	5	10.6	42	89.4	

Table 4: Factors associated with poor Glycemic control: univariate analysis

Variable	OR	p
Nationality		
Not Saudian	1	
Saudian	2.40	0.02
Gender		
Female	1	
Male	1.14	0.68
AGE		
<55	1	
>=55	1.01	0.96
Marital status		
Not married	1	
Married	2.51	0.16
Number of visits last year		
≥ 3	1	
< 3	3.60	0.001
Treatment		
Oral	1	
Insulin	3.55	0.004
Oral + Insulin	3.84	
Total Cholesterol (mg/dL)		
< 200	1	
≥ 200	2.84	0.03
Blood pressure		
Normal	1	
High	1.77	0.12

Table 5: Factors associated with poor Glycemic control: Multivariate analysis

Variable	OR	CI 95%
Nationality		
Not Saudian	1	
Saudian	2.43	0.03
Treatment		
Oral	1	
Insulin	3.59	0.005
Oral + Insulin	3.23	

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