Degree of Control of Type II DM in Kirkuk City Using HbA1c

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Abstract:

Background: Diabetes mellitus is a major cause of morbidity and mortality. In the Arab region, the overall prevalence of DM in the Kingdom of Saudi Arabia is (23.7%) among people with age between 30 and 70 years. The prevalence of diabetes in the United Arab Emirates, Bahrain, and Kuwait were (20.1%), (14.9%) and (12.8%), respectively. Several large clinical trials have demonstrated that tight blood glucose control correlates with a reduction in the microvascular complications of diabetes. The American Diabetes Association (ADA) has designated HbA1c level of ≤ (7%) as a goal of optimal blood glucose control, and the American Association of Clinical Endocrinologist has further recommended HbA1c level of ≤ (6.5%). Despite the evidence from large randomized controlled trials establishing the benefit of intensive diabetes management in reducing microvascular and macrovascular complications, high proportion of patients remain poorly controlled. Poor and inadequate glycemic control among patients with type 2 diabetes constitutes a major public health problem and major risk factor for the development of diabetes complications. Glycemic control remains the major therapeutic objective for prevention of target organ damage and other complications arising from diabetes.

Aim of the study: To estimate the proportion of the patients with poor glycemic control and determine factors associated with poor glycemic control among patients with type 2 diabetes in Kirkuk city.

Materials and Methods:A cross-sectional study conducted on 500 patients with type 2 DM, were randomly selected who were attended outpatient clinic in Azadi teaching hospital or private clinic over a period of 12month in 2014. A pre-structured questionnaire sought information about sociodemographic, clinical characteristics, self-care management behaviors, medication adherence, and attitude towards diabetes. Weight, and height were measured. Available last readings of hemoglobin A1c(HbA1c), were abstracted from patients' records. Poor glycemic control was defined as HbA1c > (7%).

Results:Of the total 500 patients, (74.2%) had HbA1c > (7%). In the multivariate analysis, increased duration of diabetes,increased Body Mass Index(BMI),low education level,hypertension,type of treatment, non-adherence to diabetes self- care management behavior,poor medication adherence, were significantly associated with increased odds of poor glycemic control.(pvalue<0.005).

Conclusions and recommendations: Results indicate that duration of diabetes, age, obesity and morbidity are risk factors for poor glycemic control. Patients with these characteristics may need additional therapies and targeted interventions to improve glycemic control. Regular checking of RBS, adherence to treatment, 30 minute exercise and followinghealthy diet are important attitude of patients towards DM for good glycemic control. An educational program that emphasizes lifestyle modification with importance of adherence totreatment regimen, regular exercise and dietary regimen would be of great benefit in glycemic control.

Key words: Type II DM, Kirkuk city and HbA1c.

Introduction:

Diabetes mellitus is probably one of the oldest diseases known to human, it was first reported in Egyptian manuscripts about 3000 years ago[1].

Type 2 DM (formerly known as non-insulin dependent DM) is the most common form of DM characterized by hyperglycemia, insulin resistance and relative insulin deficiency [2].

It is estimated that 366 million people had DM in 2011; by 2030 this would have risen to 552 million, the number of people with type 2 DM is increasing in low and middle-income countries and 4.6 million deaths occurs annually due to DM[3].

The incidence of type 2 DM varies substantially from one geographical region to the another as a result of environmental and life style risk factors [4].It ts predicted that the prevalence of DM in adult will increase in the next 2 decades and much of the increase will occur in the developing countries where the majority of patients are aged between 45 and 64 years [5].

In the Golf region, the prevalence of type 2 DM increased due to urbanization and other life style changes such as predominance of obesity, in a study the overall prevalence of DM in Saudi Arabia was (23.7%)[6].

Despite evidence from large randomized controlled trials establishing the benefit of intensive diabetes management in reducing micro vascular and macro vascular complications [7], a high proportion of patients with type 2 DM remains poorly controlled[8].

Poor and inadequate glycemic control among patients with type 2 DM constitute a major public health problem and major risk factor for the development of diabetic complications, glycemic control remains the major objectives for prevention of target organ damage and other complications arising for diabetes[9].

Glycosylated hemoglobin (HbA1c) level estimation is an indicator of the status of glycemic control in patient with DM over the previous 3 months [10].

The American Diabetes Association (ADA) has designed HbA1c level of (7%) as a goal of optimal blood glucose control [11] and the American Association of Clinical Endocrinologist has further recommended HbA1c level of less than (6.5%)[12].

The UK Prospective Diabetes Study found that in type 2 DM, each percentage point reduction in HbA1c was associated with (35%) reduction in microvascular complication and a (7%) reduction in all-cause mortality [13].

The Aim of this study is to investigate the extent of glycemic control as measured by HbA1c in patients with type 2 DM in Kirkuk city and to assess the relationship between various clinical and demographic factors with glycemic control.

Patients and Methods:

This is a cross-sectional study conducted at the period from 1st January 2014 to the 1st January 2015, we randomly select500 patients with type 2 DM, who were coming for follow up at outpatient clinic in AzadiTeaching Hospital or private clinics.

All registered type 2 diabetic patients who were confirmed having type 2 DM and received treatment for DM were included in the study.

Patients were interviewed by the researcher using a standardized questionnaire after taking an informed verbal consent.

Data were collected regarding name, age, sex, level of education, duration of

diabetes and forms of treatment receive (oral hypoglycemic drugs, insulin or combination), also data included attitude of patients towards DM including(diet, regular exercise, adherence to medications and blood sugar self-monitoring).

Anthropometric measurement was done including weight(taken to the nearest 0.5 kg) and height(taken to the nearest 0.5 cm), Body mass index(BMI) was calculated (weight in kg/height in meter squared). BMI was used to classify the patients as normal (BMI<25kg/m^2), overweight(25-29.9kg/m^2)or obese(>30kg/m^2).

Blood pressure was measured using a standard sphygmomanometer; hypertension was defined as systolic BP≥130mmHg or diastolic BP≥80mmHG or regular use of antihypertensive drugs.

Glycosylated Hb (HbA1c) was measured for all patients using high performance liquid chromatography method, glycemic control was grouped in to 2 categories:

Controlled (HbA1c≤7%), and uncontrolled(>7%).

Data were entered and analyzed using SPSS version 15, the Chi Square test was used to assess the statistical significance of difference of categorical variables and a P value≤0.05 was considered statistically significant.

Results:

Participants' characteristic

Table 1shows the demographic data of total number of the cases, of 500 patient 243(48.6%) were male and 257(52.4) were female. The age distributionof the study was as below: 209(41.8%) patients were less than 50 years, 198(39.6%) were between 51-60 years and 93(18.6%) were more than 61years. Regarding the duration of DM 196(39.2%) were between 0-5 years, 154(30.8%) were between 6-10 years, 94(18.8%) were between 11-15 years and 56(11.2%) are more than 15 years. Regarding the educational level 261(52.2%) were illiterate, 101 (20.2%) were primary school graduates, 86(17.2%) had secondary school degrees and 52(10.4%) were tertiary degrees. Regarding the types of treatment 404(80.8%) of the patients were on oral hypoglycemic drugs, 34(6.8%) were on insulin and 62(12.4%) were on combined drugs. Regarding BMI; 221(44.2%) were normal weight, 195(39%) were overweight and 84(18.8) were obese. Longer duration of diabetes was significantly associated with poor glycemic control.

The effect of sex, age, BMI, level of education, blood pressure, duration of DM, type of treatment and self-care management behaviors on Glycemic control are shown in table 2 and 3.Of the total 500 patients, 371(74.2%) had HbA1c > (7%). The proportion of patients with poor glycemic control according to demographic, anthropometric, and clinical characteristics are displayed in table 2 and 3. Diabetes was more likely to be poorly controlled among those with increased duration of diabetes, lower level of education, higher BMI, hypertension, type of treatment and not adherent to diabetes self-care management behaviors who did not follow dietary regimens, did not practice any physical activity, which were not adherent for medications and did not regularly perform glucose monitoring.

Self-care management behaviors about half (47.8%) of patients did not follow diabetic meal plan as recommended by

the dietitians. (80.2%) of patients did not participate in physical exercise. Only (38.8%) of patients used to test their blood sugar regularly. More than half of the patients (62.8%) were highly adherent to their medications.

Table (1): Show the demographic data of total number of the cases.

Sex	No.	%
Male	243	48.6
Female	257	52.4
Age		
≤50years	209	41.8
51-60 years	198	39.6
≥ 61 years	93	18.6
Duration of DM		
0-5 years	196	39.2
6-10 years	154	30.8
11-15 years	94	18.8
≥ 15 years	56	11.2
Educational level		
Illiterate	261	52.2
Primary	101	20.2
Secondary	86	17.2
Tertiary	52	10.4
Type of treatment		
Oral	404	80.8
Insulin	34	6.8
Combined	62	12.4
BMI		
Normal	221	44.2
Overweight	195	39
Obese	84	16.8

Table (2): Effect of different variables on HbA1c level.

Variables	**HbA1c level**				**Total**		**P value**
	controlled ≤7		uncontrolled > 7		No.	%	
Sex							<0.01
Male	78	32.1%	165	67.9%	243	100	
Female	52	20.2%	205	79.8%	257	100	
Total	129		371		500	100	
Age							<0.001
<50	80	38.4%	128	61.6%	208	100	
51-60	38	19.2%	160	80.8%	198	100	
>61	11	11.7%	83	88.3%	94	100	
Total	129		371		500	100	
BMI							<0.001
Normal	99	44.8%	122	55.2%	221	100	
Over weight	20	10.3%	175	89.7%	195	100	
Obese	10	11.9%	74	88.1%	84	100	
Total	129		371		500	100	
Level of education							<0.001
Illiterate	47	18%	214	82%	261	100	
Primary	19	18.8%	82	81%	101	100	
Secondary	31	36%	55	64%	86	100	
Tertiary	32	61.5%	20	38.5%	52	100	
Total	129		371		500	100	
Blood pressure							<0.001
Normal	95	37%	161	63%	256	100	
High	34	14%	210	86%	244	100	
Total	129		371		500	100	
Duration of DM							<0.001
0-5	77	39.2%	119	60.8%	196	100	
6-10	38	24.7%	116	75.3%	154	100	
11-15	9	9.6%	85	90.4%	94	100	
١٥>	5	9%	51	91%	56	100	
Total	129		371		500	100	
Type of treatment							<0.05
Oral hypoglycemic	110	27.2%	293	72.8%	403	100	
Insulin	6	17.6%	28	82.4%	34	100	
Combination	13	20.7%	50	79.3%	63	100	
Total	129		371		500	100	

Table (3): Effect of regular checking of RBS, adherence to treatment, 30 minute exercise and follow diet on HbA1c level**.**

	HbA1c level				**Total**		**P value**
Regular checking of RBS	**controlled ≤7**		**uncontrolled >7**		**No.**	**%**	<0.001
Yes	86	44.3%	108	55.7%	194	100	
No	43	14%	263	86%	306	100	
Total	129		371		500	100	
Adherence to treatment							<0.001
Yes	116	37%	198	63%	314	100	
No	13	7%	173	93%	186	100	
Total	129		371		500	100	
30 minute exercise							<0.001
Yes	61	61.6%	38	38.4%	99	100	
No	68	17%	333	83%	401	100	
Total	129		371		500	100	
Follow diet							<0.001
Yes	120	46%	141	54%	261	100	
No	9	3.8%	230	96.2%	239	100	
Total	129		371		500	100	

Discussion:

Knowledge of factors influencing glycemic control can be used by health professionals to provide targeted interventions to patients at greater risk of diabetes complications; glycemic control plays a key role in preventing long-term complications such as retinopathy, neuropathy and nephropathy.There are modifiable and non-modifiable factors contributing towards poor glycemic control which influence and increase the proportion of poor glycemic control among type 2 diabetics [(14)].

In this study the proportion of poor glycemic control among respondent was (74.2%), comparable studies done in the Middle East and gulf region showed similar result, a study done in Jordan and showed poor glycemic control in (65.1%)[(15)]. In Kuwait the proportion of poor glycemic control was (66.7%)[(16)],another study in Saudi Arabia reported a poor glycemic control in patients with type 2 DM to be (73%)[(17)], the above studies showed that in the eastern Mediterranean region has the same problem with high proportion of poor glycemic control, causes of high percentage of poor glycemic control in our study may be due to poor eating habits, non-adherence to medications, non-brand medications, low level of regular exercise and poor knowledge about DM.

Regarding patients characteristics, poor glycemic control was higher in female than male and this finding was documented by another study [(18)]which was statistically highly significant (p value < 0.001).The causes of higher degree of poor glycemic control among female may be explained by several cultural and social factors such as multiple pregnancies, high unemployment, over eating and physical inactivity.

Poor glycemic control was higher in elderly above 60 year; probably elderly patients has poor overall knowledge about their diabetes so there was a linear association between educational level and glycemic control[19] which was statistically highly significant (p value < 0.001).

This study showed that poor glycemic control was higher in patients who were overweight and obese compared to patients with normal weight, changes in HbA1c are mainly proportional to random blood glucose level and the level were higher in obese diabetic than non-obese diabetic [20]. Moreover other study mentioned that overweight and obesity are risk factors for poor glycemic control and there were convincing association between excessive weight gain and glycemic control [21] that was statistically highly significant (p< 0.001).

In this study higher level of education was associated with better glycemic control than patients with no or primary educational level, because of stronger problem solving and coping capacity arising from educational experience and this has been documented in another study[22] that was statistically highly significant (p value < 0.001). Hypertension is the commonest comorbidity associated with DM, both hypertension and DM are strong risk factors for cardiovascular diseases.Among patients in this study, high blood pressure was documented in (48%) of the patients and there was a significant relationship between high blood pressure and poor glycemic control, this has been shown in another study[23]which was statistically highly significant (pvalue < 0.001).

our study showed that longer duration of DM was related to poor glycemic control and this finding is consistent with 2 studies (p < 0.001)[13, 24].Longer duration of DM is known to be associated with poor glycemic control because of progressive impairment of insulin secretion with time due to B-cell failure, which makes the response to diet alone or oral agents unlikely. Effect of regular checking of RBS, adherence to treatment, 30 minute exercise and following healthy diet are associated with good glycemic control and this finding is consistent with 2 earlier studies (p value<0.001)[14, 15].

Conclusions and recommendations:

Results indicate that duration of diabetes, age, obesity, and comorbidity are risk factors for poor glycemic control. Patients with these characteristics may need additional therapies and targeted interventions to improve glycemic control. Regular checking of HbA1c, adherence to treatment, 30 minute exercise and following diet are important attitude of patients towards DM for good glycemic control. An educational program that emphasizes lifestyle modification with importance of adherence to treatment regimen, regular exercise and dietary regimen would be of great benefit in glycemic control.

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