



ORIGINAL ARTICLE

Glycemic control in diabetic patients in King Khalid University Hospital (KKUH) – Riyadh – Saudi Arabia



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KEYWORDS

Diabetic patients;
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Abstract Objectives: To evaluate glycemic control of diabetic patients at the King Khalid University Hospital (KKUH) in Riyadh, Saudi Arabia.

Methods: A cross sectional study was conducted among diabetic patients attending KKUH, Riyadh. Patients were identified through the hospital pharmacy records, over a one year period (January–December, 2009). A total of 20,000 patients were identified, and 1520 patients were selected by a simple random method. Medical charts were reviewed, the data were collected in a specially designed data sheet: and entered in a computer, and finally analyzed using a SPSS program.

Results: About 90% of patients were older than 40 years old and 90% were overweight or obese. Fasting blood sugar was above 7.2 mmol/L in 60% of the patients and random blood sugar was more than 10 mmol/L in about 70% of patients. The overall glycemic control as evaluated by HBA1C was acceptable in about 40% of the patients. Cholesterol level was normal in more than 70% of patients while triglyceride was normal in 56% of patients. In about half of the patients systolic blood pressure was not controlled, while in 27% the diastolic blood pressure was above the target level.

Conclusion: The control of diabetes and its associated cardiovascular risk factors in this hospital-based survey, in Riyadh is far from optimal. Further studies are needed to find out the possible causes for this defective care of diabetic patients.

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1. Introduction

Diabetes is a chronic illness with considerable morbidity and mortality (ADA, 2009; Beaton et al., 2004; Charpentier et al., 2003). It requires continuous medical care and patient self-education to prevent its acute and chronic complications (ADA, 2009). Cardiovascular disease, for example, is the major cause of morbidity and mortality among diabetic patients,

accounting for about 70% of hospitalizations and 70–80% of deaths (Goldberg and Capuzzi, 2001; Wingard et al., 1995). Also, microalbuminuria is an established predictor of the later development of nephropathy in both IDDM and NIDDM (Gall et al., 1995; Mogensen, 1984; Mogensen and Christensen, 1984; Parving et al., 1982; Viberti et al., 1982). Other potentially modifiable risk factors that increase morbidity and mortality among diabetics include hypertension, smoking, poor glycemic control (Rossing et al., 1996) and dyslipidemia (ADA, 2009). Over the years, intensive therapy has proved its efficacy in preventing the development of retinopathy, nephropathy and neuropathy in patients with IDDM as well as delaying their progression (Diabetes control and complication trial Research group, 1993; Diabetes control and complication trial/epidemiology of diabetes interventions and complications research group, 2003; Melsinger et al., 2008; Rossing et al., 1996). However, the adequacy of glycemic control is suboptimal in most clinical settings. A report (Saydah and Fradkin, 2004) indicated that only 37% of adults with diabetes mellitus achieved a level of HbA1C of <7%, only 36% had a blood pressure <130/80 mmHg and just 48% had a cholesterol level <200 mg/dL. Another study (Beaton et al., 2004) showed that only a small percentage of diabetics (37%) reached their respective goal for HbA1C, low density lipoprotein (LDL) (23%), and systolic blood pressure (41%) despite being tested for it.

The relationship between medical care and health status and outcomes in patients with type 2 diabetes has also been investigated. In the USA (Harris, 2000), it was found that the rates of health care access and utilization, screening for diabetes complication and treatment of hyperglycemia, hypertension and dyslipidemia are high; nonetheless, health status and outcomes are unsatisfactory. Almost half of U.S. adults with diabetes did not meet the recommended goals for diabetes care (Ali et al., 2013).

A recent study was conducted in Saudi Arabia in which only 27% of the study patients reached the target HbA1C of <7%, 16% attained the target blood pressure of <130/80 and 65% had a lipid profile above the optimal level (Al-Elq, 2009). Another study in primary care clinics showed similar results as only 24% of the patients achieved a HbA1C level of <7% (AlFadda and Bin Abdulrahman, 2006). Therefore, the current study was conducted to evaluate glycemic control of diabetic patients at the King Khalid University Hospital (KKUH) in Riyadh, Saudi Arabia. KKUH is a general hospital with an open access for all Saudis as well as non-Saudis King Saud University employers.

2. Methods

A cross sectional study was conducted among diabetic patients attending the King Khalid University Hospital, Riyadh. Patients were identified through the hospital pharmacy records of prescription of insulin and oral hypoglycemic agents (OHA) over a one year period (January–December, 2009) whether they are followed up in primary health care clinics (PHCC) or specialty clinics. Criteria for inclusion were adult patients >18 years of age of both sexes, both Saudi and non-Saudi, on diabetic treatment. A total of 20,000 patients were identified, and 1520 patients were selected by simple random method.

Medical charts were reviewed and the following data were collected in a specially designed data sheet: age, sex, nationality, body mass index (BMI), blood sugar level (fasting and postprandial), HbA1C, blood pressure level, lipid profile, type of drug treatment and presence of complication.

The goals for adequate glycemic control in this study were specified by 2009 American Diabetes Association (ADA) guidelines as follows: HbA1C <7%, low density lipoprotein (LDL) <2.6 mmol/L, high density lipoprotein (HDL) >1 mmol/L, triglyceride <1.7 mmol/L, systolic blood pressure <130 mmHg, diastolic blood pressure <80 mmHg, fasting blood sugar (FBS) 3.9–7.2 mmol/L and postprandial blood sugar <10 mmol/L.

Data were entered in a computer, and analyzed using the SPSS program and were presented as percentages. The chi square test was used for evaluating the relationship between variables; a *p* value less than 0.05 was considered significant.

3. Results

Characteristics of the diabetic patients are shown in Table 1. About 90% of patients were older than 40 years old and 90% were overweight or obese. Most patients were followed in primary care clinics (93%). Although 1520 medical charts were reviewed, some data were missing; for example BMI was available for only 1377 patients.

Fasting blood sugar was more than 7.2 mmol/L in 60% of patients and about 70% had random blood sugar more than 10 mmol/L. The overall glycemic control was evaluated

Table 1 Characteristics of the diabetic patients (*n* = 1520).

	No.	%
<i>Sex (n = 1518)</i>		
Male	694	45.7
Female	824	54.3
<i>Age (years) (n = 1516)</i>		
<40	124	8.2
40 to <60	773	51
60+	619	40.8
<i>Nationality (n = 1513)</i>		
Saudi	1398	92.4
Non-Saudi	115	7.6
<i>BMI (n = 1377)</i>		
<18.5	4	0.3
18.5–24.9	148	10.7
25–29.9	443	32.2
30–39.9	648	47.1
40+	134	9.4
<i>PHCC follow-up</i>		
Specialty clinic	1413	92.9
	107	7.1
<i>FBS (mmol/L) (n = 1493)</i>		
<7.2	595	39.9
≥7.2	898	60.1
<i>RBS (mmol/L) (n = 1445)</i>		
<10	438	30.3
≥10	1007	69.7

PHCC: primary health care clinic; BMI: body mass index; FBS: fasting blood sugar; RBS: random blood sugar.

Table 2 Glycemic, lipid, and blood pressure control in patients.

Variable	No.	% (Valid)
<i>HbA1C (n = 1249)</i>		
<7%	496	39.7
7–8%	299	23.9
8.1–9%	193	15.5
9.1–10%	112	9.0
>10%	149	11.9
<i>Total cholesterol (mmol/L) (n = 1348)</i>		
<5.2	960	71.2
≥5.2	388	28.8
<i>Triglyceride (mmol/L) (n = 1335)</i>		
<1.7	756	56.6
≥1.7	579	43.4
<i>LDL (mmol/L) (n = 61)</i>		
<2.6	15	24.6
≥2.6	46	75.4
<i>HDL (mmol/L) (n = 59)</i>		
>1	32	54.2
≥1	27	45.8
<i>Systolic B.P. (mmHg) (n = 1515)</i>		
<130	764	50.4
≥130	751	49.6
<i>Diastolic B.P. (mmHg) (n = 1515)</i>		
<80	1098	72.5
≥80	417	27.5

Table 3 The relationship between HbA1C and socio-demographic characteristics.

HbA1C	<7		>7		P value
	No	%	No	%	
<i>Sex</i>					
Male	235	43.6	304	56.4	0.013
Female	260	36.7	449	63.3	
<i>Nationality</i>					
Saudi	473	40.5	694	59.5	0.011
Non Saudi	20	26.0	57	74.0	
<i>Age</i>					
<50	137	34.4	261	65.6	0.008
≥50	358	42.3	489	57.7	
<i>BMI</i>					
<30	212	43.4	277	56.6	0.071
≥30	252	38.1	410	61.9	

through measurement of HbA1C, which was acceptable in about 40% of the patients, and the cholesterol level was normal in more than 70% of patients while triglyceride was normal in only 56% of patients. About half of the patient's systolic blood pressure was not controlled, while in 27% of patients the diastolic blood pressure was above the target level (Table 2).

When the relationship between socio-demographic characteristics and HbA1C was analyzed, there was a significant relationship between HbA1C and sex, nationally, and age in

which male, Saudi nationals, and older patients were better controlled than others Table 3.

4. Discussion

The adequacy of glycemic control in diabetes mellitus is a cornerstone in reducing morbidity and mortality of the disease (ADA, 2009; Beaton et al., 2004; Charpentier et al., 2003). More than half of the patients in the present study were not adequately controlled and this represents a serious problem because diabetes is a very prevalent disease (23.7%) in the Saudi community (Al-Nozha et al., 2004). This poor control of the disease, will no doubt result in an increasing prevalence of diabetic complications and high morbidity and mortality. Although the University Hospital offers a high standard of medical care, the findings of the present study show that diabetic control is suboptimal. Many factors may account for this, the first and foremost is poor patient compliance with treatment. In addition, others factors are lifestyle modifications and long wait times in the hospital appointment system, because the hospital does not have a well defined population and it offers medical care to all Saudis. Knowledge and application of published guidelines of diabetes management may not be optimal, which may also explain the poor control. Many earlier studies have reported similar findings (Beaton et al., 2004; Harris, 2000; Saydah and Fradkin, 2004)

In the current study lipid control was somewhat better than glycemic control as about two thirds of diabetic patients attained the goal for lipid control but it should be noted that only total cholesterol and triglyceride were reported as low density lipoprotein (LDL) and high density lipoprotein (HDL) were not available for most patients. This may represent a drawback in the care of diabetic patients. Goal attainment for diastolic blood pressure was better than systolic blood pressure (72.5% versus 50.4%). The high proportion of elderly patients in this study may account for this finding because the isolated systolic hypertension is more prevalent in the elderly. Such suboptimal control of blood pressure was also reported by others (Charpentier et al., 2003).

Glycemic control in males was found to be significantly better than females, and this can be due to the fact that; females are usually the caregivers for the entire family not only the husband and children but also mothers and mothers-in-law which increases their heavy domestic responsibilities. This feature could be a local phenomenon as other studies (Charpentier et al., 2003) found that sex was not associated with glycemic control.

Nationality was significantly related to glycemic control as Saudi nationals were controlled better than non-Saudis. So expatriates being away from their home country could contribute to this finding.

Age was another factor that affected diabetic control significantly because the older age group was better controlled compared to younger age groups. This could be due to the fact that younger person is more likely to have type 1 diabetes compared to older individuals with type 2 diabetes.

This study has some limitations such as poor recording in the charts which were missing some important variables. Another limitation is that control can be affected by other factors that were not studied here, such as the duration of diabetes.

5. Conclusion

The findings of this study at King Khalid University Hospital, Riyadh led us to conclude that the control of diabetes and its associated cardiovascular risk factors is far from optimal. There is a need for further studies to find out the possible causes for this defective care of diabetic patients and then to take the necessary measures to restore satisfactory control of the disease.

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