Low rates of diabetic patients reaching good control targets

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الخلاصة: أُجريت دراسة لشريحة نموذجية تتألّف من 404 من السكّريين الذين كانوا يترددون على العيادة الطبية لمستشفى جامعة الملك عبد العزيز في الفترة من حزيران/يونيو 1998 إلى كانون الثاني/يناير 2000، وذلك لتحديد معدلات بلوغهم المستويات المستهدَفة لغلوكوز الدم، وضغط الدم، وشحميات المصل، ومَنْسَب كتلة الجسم. وقد تمثّلت أكبر الصعوبات التي اعترضت هذا السبيل، في بلوغ المستويات المستهدَفة للبروتين الشحمي المنخفض الكثافة والهيموغلوبين الغليكوزي. وكان بلوغ مستويات ضغط الدم المستهدَفة أصعب بالنسبة للسعوديين منها بالنسبة لغيرهم. وكان عدد الإناث اللائي حققن المستويات المستهدَفة فيما يتعلق بغلوكوز الدم ومَنْسَب كتلة الجسم والبروتين الشحمي المنخفض الكثافة، أو جميع الأهداف، أقل بصورة ملموسة من عدد الذكور السعوديين وغير السعوديين الذين حققوا هذه المستويات. ومن الضروري بذل الجهود لزيادة الالتزام بالنظام الغذائي والنُظُم الدوائية، ولتحديد عوامل الاختطار في كل مريض ومعالجتها.

ABSTRACT A cross-sectional study was conducted of 404 diabetic patients attending King Abdulaziz University Hospital medical clinic from June 1998 to January 2000 in order to determine their rates of reaching target levels for blood glucose, blood pressure, serum lipids and body mass index. Greatest difficulty was found in reaching target levels for low-density lipoprotein and glycated haemoglobin. Target levels for blood pressure were harder to achieve for Saudis than non-Saudis. Significantly fewer females reached target levels for blood glucose, body mass index, low-density lipoprotein or all targets than males (both Saudi and non-Saudi). Efforts are needed to improve compliance to diet and drug regimens and to identify and treat risk factors in each patient.

Faibles taux de patients diabétiques atteignant de bons objectifs de contrôle

RESUME Une étude transversale a été réalisée chez 404 patients diabétiques consultant à la clinique médicale de l'Hôpital universitaire du Roi Abdulaziz de juin 1998 à janvier 2000 afin de déterminer le taux atteint pour les niveaux cibles en ce qui concerne la glycémie, la tension artérielle, les lipides sériques et l'indice de masse corporelle. La plus grande difficulté a été trouvée pour atteindre les niveaux cibles concernant les lipoprotéines de basse densité et l'hémoglobine glyquée. Il était plus difficile d'atteindre les niveaux cibles pour la tension artérielle chez les Saoudiens que chez les étrangers. Un nombre significativement moins grand de femmes que d'hommes (Saoudiens et étrangers) a atteint les niveaux cibles pour la glycémie, l'indice de masse corporelle, les lipoprotéines de basse densité ou toutes les cibles. Des efforts sont nécessaires pour améliorer l'observance du régime alimentaire et du schéma thérapeutique et identifier et traiter les facteurs de risque chez chaque patient.

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Introduction

With increasing longevity and other demographic changes, rising urbanization and further modernization, it has been estimated that the present global population of approximately 110 million people with diabetes mellitus (DM) will reach around 220 million by the year 2010 [*1*]. The majority of these patients have type 2 diabetes. The burden of complications and premature mortality resulting from diabetes constitutes a major public health problem for most countries [*2*]. Diabetic patients are at risk of developing microvascular complications (nephropathy, retinopathy, neuropathy) and have a 2- to 4-fold increased risk of developing cardiovascular diseases (CVD) [*3–5*]. The United Kingdom Prospective Diabetes Study has shown that blood glucose control decreases the overall microvascular complication rate by 25% [*6*]. Several studies have shown that controlling blood pressure and hyperlipidaemia, stopping smoking and reducing weight all decrease the CVD complication rate associated with DM [*7–12*].

The aim of this study was to determine the proportion of diabetic patients who reach target levels for blood glucose, blood pressure, serum lipids, body mass index, and all targets; and to identify any differences between Saudis and non-Saudis, or between males and females.

Methods

This was a cross-sectional study of diabetic patients at King Abdulaziz University Hospital (KAUH) medical clinic from June 1998 to January 2000. DM was diagnosed according to the World Health Organization criteria [*13*]. Patient's age, sex, nationality, type and duration of DM, presence of hypertension, blood pressure, body mass index (BMI, defined as weight in kg divided by height in m^2), serum triglycerides (TG), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and glycated haemoglobin (HbA1c) were recorded from the last clinic visit. If serum lipids and HbA1c had not been measured at the last visit, the most recent available measure was taken. Target levels were in accordance with those of the American Diabetes Association guidelines [*14*]: BMI < 27 kg/m^2, blood pressure < 130/85 mm Hg, TG < 2.3 mmol/L, LDL < 2.6 mmol/L, HDL > 1.1 mmol/L, and for HbA1c < 7%. Target levels reached by Saudis and non-Saudis and by males and females were compared.

Statistical analysis was performed using *SPSS* version 7.5. The mean ± standard deviation was determined for quantitative data, and frequency for categorical variables. For continuous variables, the Student *t*-test was used if comparing two

Table 1 **Proportion of diabetic patients reaching target levels**

Variable	No. of patients	%
Blood pressure (n = 182)	109	60
Body mass index (n = 404)	184	46
Triglycerides (n = 259)	91	35
Low density lipoprotein (n = 259)	47	18
High density lipoprotein (n = 259)	85	33
Glycated haemoglobin (n = 404)	108	27
All targets (n = 404)	36	9

Table 2 **Comparison of selected variables between Saudi and non-Saudi patients**

Variable	Saudis		Non-Saudis		*P*-value
	No.	%	No.	%	
Age (mean ± *s*) (years) (S = 192/NS = 212)	55.2 ± 10.3		51.6 ± 10.6		0.02
Sex (male:female) (S = 192/NS = 212)	1:1.2		1:2.5		0.01
Target blood pressure (S = 82/NS = 100)	43	52	66	66	0.04
Target body mass index (S = 192/NS = 212)	94	49	90	42	0.40
Target triglycerides (S = 111/NS = 148)	70	63	90	61	0.70
Target low-density lipoproteins (S = 111/NS = 148)	60	54	59	40	0.20
Target high-density lipoproteins (S = 111/NS = 148)	102	92	107	72	0.08
Target glycated haemoglobin (S = 192/NS = 212)	56	29	53	25	0.50
All targets (S = 192/NS = 212)	23	12	13	6	0.08

S = Saudis, NS = non-Saudis.
s = *standard deviation.*

groups. The chi-squared test was used to analyse group differences for categorical variables. A P-value < 0.05 was considered statistically significant.

Results

In total, 404 patients were studied; 40 (10%) had type 1 DM and 364 (90%) had type 2, with a mean duration of DM of 9.8 ± 7.8 years. As regards nationality, 192 were Saudis and 212 were non-Saudis. A predominance of females was noticed in the sample studied; the male to female ratio was 148:256 (1:1.7). The mean age was 53.39 years (range 29 to 85 years).

Of the 404 patients, 182 (45%) were hypertensive; 82 (45%) were Saudis, with a male:female ratio of 36:46 (1:1.3), and 100 (55%) were non-Saudis, with a male:female ratio of 40:60 (1:1.5).

Serum lipids were assessed in 259 of the 404 (64%) patients: the remaining patients were not known to be hyperlipidaemic and their serum lipids had not been assessed for more than 2 years. Of the 259, 111 (43%) were Saudis with a male:female ratio of 46:65 (1:1.4), and 148 (57%) were non-Saudis with a male:female ratio of 56:92 (1:1.6). As shown in Table 1, patients had greatest difficulty reaching target levels for LDL and HbA1c. The Saudi patients were older and had more difficulty reach-

Table 3 **Comparison of selected variables between male and female Saudi patients**

Variable	Males		Females		*P*-value
	No.	%	No.	%	
Age (mean ± *s*) (years) (M:F = 86:106)	58.3 ± 9.5		52.7 ± 10.2		0.008
Target blood pressure (M:F = 36:46)	17	47	27	59	0.270
Target body mass index (M:F = 86:106)	54	63	40	38	0.010
Target triglycerides (M:F = 46: 65)	31	67	40	62	0.600
Target low-density lipoproteins (M:F = 46: 65)	29	63	21	32	0.030
Target high-density lipoproteins (M:F = 46: 65)	40	87	44	68	0.100
Target glycated haemoglobin (M:F = 86:106)	32	37	24	23	0.030
All targets (M:F = 86:106)	16	19	8	8	0.010

M = males, F = females.
s = *standard deviation.*

ing target blood pressure levels than non-Saudis (Table 2). There was a significantly lower prevalence of females reaching target levels for blood glucose, BMI, LDL and all targets compared with males for both Saudis and non-Saudis (Tables 3 and 4).

Discussion

CVD is a cause of death in 60%–70% of patients with type 2 diabetes, and a major cause of morbidity [*15–17*]. It is well known that hypertension, hyperlipidaemia and obesity increase the risk of CVD in diabetics as in non-diabetics [*12,18,19*]. The prevalence of hypertension in diabetics varies from 39% to 46% [*20–22*]. The United Kingdom Prospective Diabetes Study [*7*] has clearly shown that lowering blood pressure to < 130/85 mm Hg significantly reduces the incidence of stroke, diabetes-related deaths, heart failure, microvascular complications and visual problems. The Hypertension Optimal Treatment (HOT) trial has also shown that decreasing diastolic blood pressure to < 80 mm Hg has a cardioprotective effect in diabetics [*23*]. In our study, 60% of the diabetic patients reached the target level for blood pressure, with Saudis having greater difficulty in achieving this level than non-Saudis, and males compared to females.

A prevalence of obesity of between 31% and 39% in type 2 diabetics has been reported [*24–26*]. It has been found that obesity in diabetics is a major cause of CVD morbidity and mortality, and even moderate weight loss may successfully re-

Table 4 **Comparison of selected variables between non-Saudi male and female patients**

Variable	Males		Females		*P*-value
	No.	%	No.	%	
Age (mean ± *s*) (years) (M:F = 60:152)	55.8 ± 12.6		49.9 ± 9.21		0.03
Target blood pressure (M:F = 40: 60)	23	58	42	70	0.07
Target body mass index (M:F = 60:152)	36	60	54	36	0.02
Target triglycerides (M:F = 56: 92)	44	79	52	57	0.09
Target low-density lipoproteins (M:F = 56: 92)	35	63	29	32	0.03
Target high-density lipoproteins (M:F = 56: 92)	49	88	62	67	0.20
Target glycated haemoglobin (M:F = 60:152)	21	35	33	22	0.02
All targets (M:F = 60:152)	8	13	4	3	0.03

M = males, F = females.
s = *standard deviation.*

verse the majority of the changes seen in obesity [*12*]. In this study, target BMI was especially hard to reach in the female patients, a finding similar to that reported by Bo et al. [*27*]. Several studies have reported the prevalence of hyperlipidaemia in diabetics at 21%–43% [*28–30*]. Hyperlipidaemia not only increases the risk of CVD in diabetics patients, it also accelerates renal insufficiency [*31,32*] and may result in beta-cell dysfunction [*33*]. Recent studies have clearly indicated that the rate of CVD complications associated with DM can be considerably reduced through intensified treatment of hyperlipidaemia [*8–10*], with some preliminary evidence of a beneficial effect of lipid-lowering on renal function as well [*34*]. We found that 36% of the patients were not known to be hyperlipidaemic and had not had their serum lipid levels measured for 2 years. For the 259 patients whose LDL was measured, the target level was not easily reached, particular by females.

With the new knowledge from the Diabetes Control and Complication Trial (DCCT) and the United Kingdom Prospective Diabetes Study [*6,35*], it is clear that the degree of metabolic control influences the development of complications, particularly microvascular complications. A similar protective effect on macrovascular complications has not been demonstrated. Patients with type 2 DM are at increased risk of developing CVD and the value of intensive glycaemic control in these patients is unknown. We found that the target level for blood glucose (indicated by HbA1c) was reached in 27% of the patients, women having greater difficulty in achieving

this, which is similar to what has been reported by others [*27*]. It seems that eating habits in our region play a role in this poor control of blood glucose, in addition to poor compliance with medication and the use of herbal medicine in some cases. However, better control can be achieved by educating patients and increasing their motivation for treatment. These efforts must be on a large scale in addition to individual doctor–patient counselling.

We conclude that target levels for CVD risk factors and for blood glucose are difficult to reach in diabetic patients, especially in women, with little difference between Saudis and non-Saudis. Considerable effort from both health care providers and diabetic patients is needed to achieve target levels. Efforts to improve compliance with the diet and drug regimens, and to identify and treat risk factors for each individual patient, are required.

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