Diabetes Control and Complications in Private Primary Healthcare in Malaysia

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Summary

This Diabcare-Asia project was initiated to study the status of diabetes care and prevalence of diabetic complications in Asia and this study was done to evaluate the above in primary private healthcare in Malaysia. A total of 49 private clinics participated in this study from which a total of 438 patients were included and analysed.

The majority of patients (96.5%) had type 2 diabetes mellitus and 81.4% had BMI ≥ 23 kg/m². Only 12.0% of the patients had their HbA1c measured in the preceding 12 months. As for glycaemic control only 20% of the patients had HbA1c < 7% and 11% had FPG < 6.7 mmol/L. As for lipid levels, only 12.3% of the patients had total cholesterol < 4.8 mmol/L; 30.9% had HDL – cholesterol > 1.2 mmol/L and 49.8% had triglycerides < 1.7 mmol/L. Despite the high proportion of patients having dyslipidaemia, only 12.4% of the patients were on lipid lowering therapy. As for blood pressure, 55.9% of the patients had systolic pressure ≥ 140 mmHg and 40.9% had diastolic pressure ≥ 90 mmHg. However, only 32.4% of the patients were on antihypertensive medication. Only 37.4% of the patients admitted to adhering to diabetic diet regularly and 32.0% exercised regularly. As for glucose monitoring only 6.9% of the patients did home blood glucose monitoring and 6.2% did home urine glucose. There was also a high complication rate with the commonest being neuropathy (30.1%) followed by background retinopthy (23.5%), albuminuria (22.9%) and microalbuminuria (20.4%).

In conclusion, the majority of diabetic patients treated at the primary care level were not satisfactorily controlled and this was associated with a high prevalence of complications. There is an urgent need to educate both patients and health care personnel on the importance of achieving the clinical targets and greater effort must be made to achieve these targets.

Key Words: Diabetes care, Diabetes complications, Glycaemic control, Hypertension, Dyslipidaemia

Introduction

Diabetes mellitus is a common disease in Malaysia affecting 10.5% of the adult population in 1996[1] and the prevalence has increased from 0.65% in 1960[2]. It is a cause of several complications such as retinopathy, nephropathy and is also associated with macrovascular diseases such as coronary artery and cerebrovascular diseases. The development of diabetic complication is related to metabolic control[3,4] and the risk of developing these complications can be reduced by improving metabolic control[5,6]. Knowledge on the status of diabetes care and prevalence of diabetic complications in this country is important to evaluate and provide a baseline to improve the quality of diabetes management. For this reason, the Diabcare-

Asia project was initiated in 1997 in 6 countries in Asia (including Malaysia). The Diabcare-Asia project was designed similar to Europe Diabcare project which started many years before and provided large-scale, simple yet standardized information from thousands of patients from numerous centres all over Europe. From the first Diabcare-Asia project in 1997, we had reported on status of diabetes management in Malaysia based on information collected from patients' records in 29 public hospitals throughout the country[7]. The Diabcare-Asia project in 2001 was carried out in primary healthcare facilities and this report is on the diabetes control and complication status in the diabetes population managed by urban primary private healthcare (general practitioner) in Peninsular Malaysia.

Materials and Methods

Study Design
The study was carried out in 49 private (General Practitioner's) clinics in Peninsular Malaysia (Table I) and the study population comprised of patients registered in the private clinics for the management of diabetes for more than 12 months. Initially, a total of 609 clinics were randomly selected from all the clinics in the particular towns and letters of invitation were sent to them. However, only 49 clinics responded and agreed to participate in the study. Each clinic was asked to invite at least 10 of their patients for the study. Letters of invitation were sent to the patients by the private practitioners to ask them to come in a fasting state for an examination by the study team at a specified date in the clinic or a specified centre. After history taking and physical examination by the study team, blood was taken for glucose, HbA1c, lipids and creatinine determination. Urine was also taken for microalbuminuria or albuminuria test.

Data Handling and Statistical Analysis
All data were entered into a Statistical Analysis System (SAS, Version 6.12, SAS Institute Inc. USA) by electronic scanning (TELE form Elite, Version 5.2, Cardiff Software, USA) and data validation was carried out by both the scanning software and the SAS System. The data were tabulated and only descriptive statistical analysis was performed.

Assays
HbA1c
Blood samples for HbA1c were collected using Bio-Rad HbA1c sample preparation kit. All samples were stored at 2-8⁰C before analysis and analysis was performed by automatic high-pressure liquid chromatography (Bio-Rad VARIANT™, Bio-Rad Laboratories, Hercules, California, USA)

Glucose
This was measured by the glucose-oxidase method using a Beckman glucose analyzer.

Triglycerides, Total Cholesterol, High Density Liporotein Cholesterol
The assays were done by enzymatic method using reagents from Bio Merieux (France) by Hitachi 705 chemistry analyzer (Japan).

Creatinine
The assay was done by calorimetric method using reagents from Boehringer Mannheim (Germany) by Hitachi 705 chemistry analyzer (Japan).

Results

Patient Demography
A total of 455 patients participated in the study. However, 17 were excluded from the analysis due to incomplete data on basic patient information such as birth date, clinic, sex and visit dates, leaving 438 patients for the analysis.

Of the total number of patients, there were 52.0% males and 48.0% females. The majority of patients (96.5%) had type 2 diabetes mellitus and only 2.1% had type 1 diabetes. The mean (± SD) age of patients, age of onset of diabetes and duration of diabetes is shown in Table II.

Body Weight
The mean body mass index (BMI) of the patients was 26.4 ± 4.1 kg/m² with 81.4% of the patients having BMI ≥ 23 kg/m² and only a small proportion of the patients (0.2%) were on treatment for obesity.

Lifestyle Management
As for dietary management, 37.4% adhered to diabetic diet regularly, whilst 44.1% seldom and 18.5% did not adhere to the diet. Only 32.0% of the patient exercised regularly (≥ 3 times per week at least half an hour each time) whilst 28.1% seldom (1 –2 times per week) and 39.9% did not exercise.

Glycaemic Control

HbA1c
Only 12.0% of the patients had their HbA1c measured in the preceding 12 months. The mean (± SD) HbA1c as measured in this study was 8.8 ± 1.9%. Table III showed the proportion of patients with optimal, fair and poor control based on the American Diabetes Association (ADA)[8], European Diabetes Policy Group (EU)[9] and Asia-Pacific Type 2 Diabetes Policy Group (AP)[10].

Fasting Blood Glucose
The mean (± SD) fasting blood glucose in this study was 10.6 ± 3.6 mmol/L. Table IV showed the proportion of patients with optimal, fair and poor control based on the American Diabetes Association (ADA)[8], European Diabetes Policy Group (EU)[9] and Asia-Pacific Type 2 Diabetes Policy Group (AP)[10].

Lipids
The mean (± SD) plasma total cholesterol, HDL-cholesterol and triglycerides were 6.0 ± 1.2 mmol/L, 1.2 ± 0.6 mmol/L and 2.0 ± 1.2 mmol/L respectively. Only 12.3% of the patients had total cholesterol less than 4.8 mmol/L; 30.9% had HDL-cholesterol greater than 1.2 mmol/L and 49.8% had triglycerides less than 1.7 mmol/L. Of these patients, only 12.4% were on lipid lowering therapy – 10.9% on statin, 1% on fibrates and 0.5% were on other drugs.

Blood Pressure
Systolic blood pressure of 140 mmHg or more was found in 55.9% of the patients and diastolic blood pressure of 90mmHg or more was found in 40.9% of the patients. Only 32.4% of the patients were on antihypertensive medication of whom 11.4% were on β-blocker, 9.8% on angiotensin converting enzyme – inhibitor, 8.9% on diuretics, 7.5% on calcium antagonist, 2.1% on angiotensin receptor blocker, 0.7% on α-blocker and 1.9% on other drugs. Only 17.5% of the patients (treated and untreated) had BP < 130/80 mmHg.

Renal Function
Only 2% of the patients had serum creatinine greater than 2mg/dL. However, 20.4% of the patients had microalbuminuria (20-300mg/L) and 22.9% had albuminuria (30mg/dl or more).

Diabetes Complications

Eye
Background retinopathy was present in 23.5% of the patients; 12.6% of the patients had cataract; 5.3% had advanced diabetic eye disease and 3.7% had photocoagulation done.

Extremities
Foot pulse was absent in 11.4% of the patients; 8.9% of the patients had healed ulcers; 4.3% had acute ulcer or gangrene and 0.9% had leg amputation.

Others
Neuropathy was found in 30.1% of the patients; 2.5% of the patients had suffered a stroke, 2.1% had myocardial infarction or angioplasty or coronary artery bypass surgery and 0.2% had end stage renal failure.

Diabetes Treatment
Only 4.8% of the patients were not on anti-diabetic agents. The most common anti-diabetic agent used was sulphonylurea (73.5%); 33.8% of the patients were on biguanides; 6.2% were on glucosidase inhibitors and 1.4% were on thiazolidenedione. Insulin was used in 3.5% of the patients with the majority (60.0%) on twice daily injections; 13.3% on once daily injection and 26.7% on three times daily or more injections. The majority of these patients (71.4%) used the insulin pen to administer insulin whilst the rest (28.6%) used the conventional syringe.

Glucose Monitoring
Only 6.9% of the patients monitored their blood glucose at home and 6.2% monitored their urine glucose. On average these patients measured their blood glucose 11 times per month and urine glucose 7 times per month.

Table I : Location and number of clinics which participated in the study

Location	No. of Clinics
Kota Bharu	7
Kuala Terengganu	6
Kuantan	2
Kuala Lumpur	11
Klang	3
Malacca	5
Seremban	5
Penang	1
Alor Setar	4
Kangar	2
Sungai Petani	3
Total	**49**

Table II : Mean (± SD) of age of patients, age of onset of diabetes and duration of diabetes

	Mean (± SD)
Age of patients (years)	54.1 ± 11.0
Age of onset of diabetes (years)	46.6 ± 10.9
Duration of diabetes (years)	7.8 ± 5.5

Table III : Proportion of patients with optimal, fair and poor HbA1c profile base on the various guidelines

Guideline	HbA1c Profile	Proportion of Patients
American Diabetes Association (ADA)	< 7%	20%
	7 – 8%	19%
	> 8%	61%
European Diabetes Policy Group (EU)	≤ 6.5%	13%
	6.6 – 7.5%	21%
	> 7.5%	67%
Asia Pacific Type 2 Diabetes Policy Group (AP)	< 6.5%	11%
	6.5 – 7.5%	23%
	> 7.5%	67%

Table IV: Proportion of patients with optimal, fair and poor fasting plasma glucose (FPG) profile based on the various guidelines

Guideline	FPG Profile	Proportion of Patients
American Diabetes Association (ADA)	< 6.7 mmol/L	11%
	6.7 – 7.8 mmol/L	14%
	> 7.8 mmol/L	75%
European Diabetes Policy Group (EU)	≤ 6.0 mmol/L	6%
	6.1 – 6.9 mmol/L	7%
	≥ 7.0 mmol/L	87%
Asia Pacific Type 2 Diabetes Policy Group (AP)	< 6.1 mmol/L	8%
	6.2 – 7.0 mmol/L	8%
	> 7.0 mmol/L	84%

Discussion

The aim of this study was to determine diabetes control, diabetes management and complications in diabetic patients managed by general practitioners. The majority of the patients were Type II patients (96.5%) and most of these patients (81.4%) were obese (BM1 ≥ 23 kg/m²). As to the diabetes control, most had unsatisfactory control (80% had HbA1c ≥ 7.0% and 89% had FPG ≥ 6.7mmol/L). With regards to lipid level, 50.2% had triglycerides level of ≥ 1.7mmol/L and 87.7% had total cholesterol level ≥ 4.8mmo1/L. There was

also a high prevalence of renal dysfunction with 20.4% microalbuminuria and 22.9% proteinuria and other complications such as cataract (12.6%) and neuropathy (30.1%). The findings showed that with the majority of the patients being unsatisfactorily controlled, it was not surprising that the prevalence of complications was also high, as studies had shown that better metabolic control reduced the development of diabetic complications [5, 6, 7, 8]. In view of the importance of glycaemic control, it was surprising to note that few patients practiced self-monitoring of the blood glucose (6.9%) or urine glucose (6.2%). Thus educating

patients on self-monitoring and encouraging them to undertake this task is essential in improving diabetes care. As for other factors affecting glycaemic control, 81.4% of the patients had BM1 ≥ 23 kg/m². This suggested that a majority of the patients were overweight or obese. Only 37.4% of the patients admitted to adhering to diabetic diet regularly and this could be another reason for the poor control. As for exercise, only 32.0% of the patients admitted to exercising regularly and this could be another reason for the high proportion of patients being overweight and having poor glycaemic control. A high proportion of patients had blood pressure readings higher than the target values (<140/90mmHg). Despite this, only 32.4% of the patients were on anti-hypertensive medication. This implied that many patients were not treated for hypertension suggesting that many practitioners were not aware of the target values for blood pressure control in diabetics. As United Kingdom Prospective Diabetes Study (UKPDS) had clearly shown, controlling blood pressure in diabetics reduced morbidity and mortality [11].

Similarly a high percentage of patients had dyslipidaemia (87.7% had total cholesterol ≥ 4.8 mmo1/L; 69.1% had HDL-cholesterol ≤ 1.2mmo1/L and 50.2% had triglycerides ≥ 1.7mmo1/L). However, only 12.4% of the patients were on lipid lowering therapy which also implied that many practitioners were also not aware of the target values for lipids in diabetics. Several studies has shown that lowering cholesterol in diabetics reduced morbidity and mortality [13, 14]. As for diabetic treatment, only 4.8% of the patients were not on anti-diabetic agents, the most common anti-diabetic agent used was sulphonylurea (73.5%), followed by biguanides (33.8%), glucosidase inhibitors (6.2%) and thiazolidenedione (1.4%). Only 3.5% of the patients were on insulin either alone or in combination with oral agents. Mustaffa et al[7] in their study in public hospitals in Malaysia found that only 2.8% of their patients were on diet treatment only, 80.9% were on anti-diabetic agents and 16.2% were on insulin either alone or in combination with oral agents. Eid et al[12] in another study in a teaching hospital found that only 4.3% of their patients were on diet treatment only,

90.0% were on antidiabetic agents and 8.1% were on insulin either alone or in combination with oral agents. Sulphonylurea was used in 70.1% of their patients, biguanides 69.2%, glucosidase inhibitors 20.9% and thiazolidene 1.9%. The lower percentage of patients on insulin in our study could be due to the fact that the patients were being treated by general practitioners and if the patients require insulin, the general practitioners would be more likely to refer them to hospitals where the specialists were.

In conclusion, the majority of diabetic patients treated at the primary care level were not satisfactorily controlled and this was associated with a high prevalence of complications. There is an urgent need to educate both patients and health care personnels on the importance of achieving the clinical targets and greater effort must be made to achieve these targets.

Diabcare-Malaysia Study Group

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