

Diabetes Control and Complications in Public Hospitals in Malaysia

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Summary

The 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 public hospitals in Malaysia and compare to a similar study done in 1998. A total of 19 public hospitals participated in this study from which a total of 1099 patients were included and analysed. The majority of patients (94.8%) had type 2 diabetes mellitus and 66.5% were overweight or obese. As for glycaemic control only 41.0% of the patients had HbA1c < 7% and 18% had FPG < 6.1 mmol/L. As for lipid levels, only 32.0% of the patients had total cholesterol < 4.8 mmol/L, 59.6% had HDL-cholesterol > 1.1 mmol/L and 51.1% had triglycerides < 1.7 mmol/L. Despite the high proportion of patients having dyslipidaemia, only 52.8% of the patients were on lipid lowering therapy. As for blood pressure, 15.0% of the patients had blood pressure < 130/80 mmHg. Although 75.9% of the patients were on antihypertensive medication only 11.3% had blood pressure < 130/80 mmHg. Only 54.8% of patients admitted to adhering to a diabetic diet regularly and 38.9% exercised regularly. As for glucose monitoring, only 26.8% of the patients did home blood glucose monitoring and 1.8% did home urine glucose testing. There was also a high complication rate with the commonest being neuropathy (19.0%) followed by albuminuria (15.7%), background retinopathy (11.1%) and microalbuminuria (6.6%). Compared to the 1998 study, there was some improvement in the percentage of patients achieving target levels and a reduction in the prevalence of complications. In conclusion, the majority of diabetic patients treated at the public hospitals were still not satisfactorily controlled and this was still associated with a high prevalence of complications. There is still 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 1996¹ and the prevalence has increased from 0.65% in 1960². 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 complications is related to metabolic control^{3,4} and the risk of

developing these complications can be reduced by improving metabolic control^{3,6}. 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 six countries in Asia (including Malaysia). The Diabcare-Asia project was designed similar to the Europe Diabcare project which started many years before and provided large-

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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 the status of diabetes management in Malaysia based on information collected from patients' records in 29 public hospitals throughout the country⁷. The Diabcare-Asia project in 1998⁸ was a cross-sectional study of diabetic patients in ten public hospitals in Malaysia and Diabcare-Asia project 2001 was carried out on diabetic patients from 49 primary care clinics in Malaysia⁹. Since the first report of Diabcare, the Ministry of Health Malaysia had undertaken steps to improve the care of diabetic patients in their hospitals such as setting up Diabetes Resource Centres, training of more diabetic nurse educators, making HbA1c test widely available and implementing standardized follow-up protocols. The Diabcare-Asia project in 2003 was carried out in public hospitals similar to Diabcare-Asia 1998 and this report is on the diabetes control and complication status in the diabetes population in the hospitals comparing with Diabcare-Asia 1998 data to determine any improvement in the status.

Materials and Methods

Study Design

The study was carried out in 19 public hospitals (Ministry of Health and University Hospitals) in Peninsular Malaysia (Table I) and the study population comprised of patients registered in the diabetes clinics for the management of diabetes for more than 12 months. Each clinic was asked to invite at least 50 of their patients who were chosen at random, to enroll into the study. Letters of invitation were sent to the patients by the clinics 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 HbA1c determination. Data from the patients' case records were also obtained and recorded in data collection forms.

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 2-8 °C before analysis and analysis was performed by automatic high-pressure liquid chromatography (Bio-Rad VARIANT™, Bio-Rad Laboratories, Hercules, California, USA)

Results

Patient Demography

A total of 1244 patients participated in the study. However, 145 (11.7%) were excluded from the analysis due to incomplete data on basic patient information such as birth date, centre ID (clinic), duration of treatment at centre, sex and visit dates, leaving 1099 patients for the analysis.

Of the total number of patients, there were 46.5% males and 53.5% females. The majority of patients (94.8%) had type 2 diabetes mellitus and only 4.0% had type 1 diabetes. The mean (\pm SD) age of patients, age of onset of diabetes and duration of diabetes is shown in Table II.

Body Weight and Abdominal Obesity

The mean body mass index (BMI) of the patients was 26.7 ± 4.4 kg/m² with 33.5% of the patients having optimal BMI (< 25 kg/m² for males and < 24 kg/m² for females) based on the Asia Pacific Type 2 Diabetes Policy Group Guidelines (12). In the 1998 Study, the mean BMI was 26.0 ± 4.3 kg/m² and 44% of the patients had BMI \leq 25 kg/m². As for abdominal obesity, 66.9% of males had a waist circumference of \geq 90 cm and 82.1% of females had a waist circumference of \geq 80 cm. The waist circumference was not measured in the 1998 study.

Lifestyle Management

As for dietary management, 54.8% adhered to a diabetic diet regularly, whilst 39.9% seldom and 5.2% did not adhere to the diet. Only 38.9% of the patients exercised regularly (\geq 3 times per week at least half an hour each time) whilst 36.9% seldom (1-2 times per week) and 24.2% did not exercise. Only 8.6% of the patients were smokers and 5.6% consumed alcohol regularly (> 3 times/week).

Glycaemic Control

HbA1c

The majority of the patients (67.9%) had their HbA1c measured in the preceding 12 months. The mean (\pm

SD) HbA1c as measured in this study was $7.8 \pm 2.2\%$. Table III showed the proportion of patients with optimal, fair and poor control based on the American Diabetes Association (ADA)¹⁰, European Diabetes Policy Group (EU)¹¹ and Asia-Pacific Type 2 Diabetes Policy Group (AP)¹². The mean HbA1c in the 1998 study was $8.4 \pm 2.0\%$.

Fasting Blood Glucose (FPG)

Data on FPG was obtained in 82.6% of the patients. The mean (\pm SD) FPG in this study was 9.5 ± 4.0 mmol/L. Table IV showed the proportion of patients with optimal, fair and poor control based on the American Diabetes Association (ADA)¹⁰, European Diabetes Policy Group (EU)¹¹ and Asia-Pacific Type 2 Diabetes Policy Group (AP)¹². In the 1998 study, the mean FPG was 9.4 ± 3.9 mmol/L.

Lipids

Data on lipid levels was obtained in 80.1% of the patients. The mean (\pm SD) plasma total cholesterol, HDL-cholesterol and triglycerides were 5.4 ± 1.2 mmol/L, 1.3 ± 0.5 mmol/L and 1.9 ± 1.2 mmol/L respectively. Only 32.0% of the patients had total cholesterol less than 4.8 mmol/L; 59.6% had HDL-cholesterol greater than 1.1 mmol/L and 51.1% had triglycerides less than 1.7 mmol/L. Only 52.8% of the patients were on lipid lowering therapy – 46.9% on statins, 7.1% on fibrates and 0.1% were on other drugs. Of the patients treated, 68.7% still had total cholesterol ≥ 4.8 mmol/L; 41.4% still had HDL-cholesterol ≤ 1.1 mmol/L and 54.6% still had triglycerides ≥ 1.7 mmol/L. In the 1998 study, only 22% had total cholesterol less than 5.2 mmol/L; 63% had HDL-cholesterol greater than 1.1 mmol/L and 45% had triglycerides less than 1.7 mmol/L.

Blood Pressure

Data on blood pressure was obtained in 99.1% of the patients. Blood pressure of 130/80 mmHg or less was found in 15.0% of the patients. Of the total patients, 75.9% of the patients were on antihypertensive medication of whom 48.3% on angiotensin converting enzyme – inhibitor, 30.6% were on β -blocker, 27.7% on calcium antagonist, 18.0% on diuretics, 11.1% on angiotensin receptor blocker, 5.5% on α -blocker and 0.9% on other drugs. Only 11.3% of the treated patients had BP < 130/80 mmHg. In the 1998 study, 45% of the patients had systolic blood pressure of 140 mmHg or less and 74% had diastolic blood pressure of 90 mmHg or less.

Renal Function

Data on serum creatinine, proteinuria and microalbuminuria were obtained in 83.2%, 57.0% and

14.5% of the patients respectively. Only 7.2% of the patients had serum creatinine greater than 2mg/dL, 6.6% of the patients had microalbuminuria (20-300mg/L) and 15.7% had albuminuria (30mg/dl or more). In the 1998 study, 7% of the patients had serum creatinine greater than 2 mg/dL, 24% had microalbuminuria and 14% had albuminuria.

Diabetes Complications

Eye

Data on fundus examination was obtained in 55.0% of the patients. Background retinopathy was present in 11.1% of the patients; 16.2% of the patients had cataract; 5.4% had advanced diabetic eye disease, 10.8% had photocoagulation done and 0.8% had legal blindness. In the 1998 study, 37% had retinopathy, 51% had cataract, 3% had advanced eye disease and 8% had photocoagulation done.

Extremities

Data on feet examination was obtained in 34.7% of the patients. Foot pulse was absent in 1.5% of the patients; 5.4% of the patients had healed ulcers; 1.5% had acute ulcer or gangrene and 2.3% had leg amputation. In the 1998 study, 13% had healed ulcers; 3% had acute ulcer or gangrene; 1% had leg amputation and none had absent foot pulse.

Others

Neuropathy was found in 19.0% of the patients; 5.3% of the patients had suffered a stroke, 10.2% had myocardial infarction or angioplasty or coronary artery bypass surgery and 1.1% had end stage renal failure. In the 1998 study, 61% had neuropathy, 6% had suffered a stroke, 12% had myocardial infarction or angioplasty or coronary artery bypass surgery and 1% had end stage renal failure.

Diabetes Treatment

Data on treatment was obtained in 97.5% of the patients. Only 13.3% of the patients were not on oral anti-diabetic (OAD) agents. The most common anti-diabetic agent used was biguanides (66.9%); 63.9% of the patients were on sulphonylurea; 14.1% were on glucosidase inhibitors, 3.1% were on thiazolidenedione and 14.1% were on meglitinides. Only 22.5% of the patients were on monotherapy, 36.5% were on two classes of OAD agents, 10.4% on three classes of OAD agents and 0.6% on more than three classes of OAD agents. Insulin was used in 28.1% of the patients with the majority (70.0%) on twice daily injections; 21.5% on once daily injection and 8.4% on three times daily or more injections. Of these, 12.7% of the patients were

on insulin alone and 14.4% were on combination of insulin and OAD agents. The majority of these patients (72.0%) used the insulin pen to administer insulin whilst 26.3% used the conventional syringe. As for other treatment, 38.9% of the patients were also on anti-platelet mainly aspirin. In the 1998 study, 2.6% of the patients were on diet treatment only. The most common OAD agent was sulphonylurea and 33.1% of the patients were on sulphonylurea only; 57.3% of the patients were on two or more classes of OAD agents. Only 10.8% of the patients were on insulin only and another 3.7% were on combination of insulin and OAD agents. The majority were on twice daily injections (60.3%); 15.1% on once daily injection and 13.0% on three or more injections. Only 27% of the patients used the insulin pen whilst the rest used the conventional syringe.

Glucose Monitoring

Data on glucose self-monitoring was obtained in 96.8% of the patients. Only 26.8% of the patients monitored their blood glucose at home and 1.8% monitored their urine glucose. On average these patients measured their blood glucose 10.9 times per month and urine glucose 12.1 times per month. In the 1998 study, only 12.0% monitored their blood glucose and 15.7% monitored their urine glucose. On average, these patients measured their blood glucose 10.5 times per month and urine glucose 9.6 times per month.

Discussion

The aim of this study was to determine diabetes control, diabetes management and complications in diabetic patients attending diabetes clinic in major government hospitals and to compare with a similar study done in 1998. The majority of the patients were Type II patients (94.8%) and most of these patients (66.5%) were obese. This was almost similar to the figures in the 1998 study. As to the diabetes control, most had unsatisfactory control (59% had HbA1c \geq 7.0%). This was an improvement in glycaemic control, as in the 1998 study 73% had HbA1c \geq 7.0%. With regards

to lipid level, 48.9% had triglycerides level of \geq 1.7mmol/L and 68.0% had total cholesterol level \geq 4.8mmol/L. This was also an improvement compared to the 1998 study. There was also a high prevalence of renal dysfunction with 7.2% had serum creatinine greater than 2 mg/dL, 6.6% microalbuminuria and 15.7% proteinuria and other complications such as retinopathy (11.1%) and neuropathy (19.0%). Compared to the 1998 study, there was some reduction in the prevalence of complications though still high. The findings showed that the majority of the patients were unsatisfactorily controlled. It was not surprising that the prevalence of complications was also high, as studies have shown that better metabolic control reduces the development of diabetic complications^{5,6}. Despite the importance of glycaemic control, it was surprising to note that few patients practiced self-monitoring of the blood glucose (26.8%) or urine

Table I : List of hospitals which participated in the study

1. Hospital Universiti Sains Malaysia
2. Hospital Kuala Terengganu
3. Hospital Dungun
4. Hospital Tengku Ampuan Afzan
5. Hospital Kuala Lumpur
6. Hospital Tengku Ampuan Rahimah
7. Hospital Kajang
8. Hospital Seremban
9. Hospital Melaka
10. Hospital Muar
11. Hospital Sultanah Aminah
12. Hospital Ipoh
13. Hospital Angkatan Tentera Lumut
14. Hospital Pulau Pinang
15. Hospital Sungai Petani
16. Hospital Alor Star
17. Hospital Kangar
18. Hospital Umum Sarawak
19. Hospital Queen Elizabeth

Table II : Mean (\pm SD) of age of patients, age of onset of diabetes and duration of diabetes.

	Mean (\pm SD) Present	Mean (\pm SD) 1998
Age of patients (years)	55.8 \pm 11.4	56.0 \pm 11.7
Age of onset of diabetes (years)	44.9 \pm 12.0	45.3 \pm 11.9
Duration of diabetes (years)	10.8 \pm 7.9	11.0 \pm 7.4

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