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Original Research

Glycaemic control and associated factors among patients with diabetes at public health clinics in Johor, Malaysia

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ABSTRACT

Objectives: To determine the prevalence of glycaemic control and factors associated with poor glycaemic control [glycosylated haemoglobin (HbA1c) $\geq 6.5\%$] among patients with type 2 diabetes treated in public health clinics in Johor, Malaysia.

Study design: Cross-sectional study.

Methods: A review of all patients aged over 18 years and with a diagnosis of type 2 diabetes for >1 year. The National Diabetic Registry was used as the database for attendees at public health clinics in Johor Bahru between January and December 2013. A required sample of 660 was calculated, and a random sampling method was applied to acquire patient information across the 13 public health clinics in Johor Bahru. All relevant information (e.g. HbA1c, type of treatment and other parameters for glycaemic control) were abstracted from the registry.

Results: Sixty-eight percent of 706 patients had HbA1c $>6.5\%$, and mean HbA1c was 7.8%. Younger patients (72.3%) had poorer glycaemic control than older patients (63.0%), and most patients with poor glycaemic control were obese (79.2%). Approximately 31.7% of patients did not achieve the target blood pressure $<130/80$ mmHg, and 58.5% did not achieve the target lipid profile. Multiple logistic regression analysis revealed that age (<60 years), sex (male), duration of diabetes (>5 years), body mass index (obese), type of treatment (diet therapy vs combination therapy) and abnormal lipid profile were significantly associated with increased odds of HbA1c $>6.5\%$.

Conclusions: More than half (68%) of the patients with diabetes had HbA1c $>6.5\%$. This highlights the importance of providing organized care to manage patients with diabetes in the primary care setting, such as weight reduction programmes, proper prescribing treatment, and age- and gender-specific groups to ensure good glycaemic control.

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Introduction

The increasing prevalence of diabetes mellitus is of concern worldwide. According to a recent update by the International Diabetes Federation, more than 382 million adults aged 20–79 years had diabetes in 2013. The increasing prevalence has an indirect negative impact on developing countries in terms of population health and health care, economic development and social activities. Unfortunately, 80% of the population of developing countries are on the verge of diabetes.¹

The estimated prevalence of diabetes and impaired glucose tolerance are high for countries in South-East Asia, and are expected to rise further in the next two decades. It is estimated that there are more than 72 million adults with diabetes and 24.3 million adults with impaired glucose tolerance in South-East Asia, representing more than 60% of the world's population of people with diabetes.² Malaysia is no exception, and is one of the countries that has contributed to the increased prevalence of diabetes.

The 2011 National Health and Morbidity Survey reported that the overall prevalence of diabetes in adults aged >18 years in Malaysia was 15.2%. The prevalence of diabetes increases significantly with age. This translates into 2.6 million people aged >18 years living with diabetes.³ The high prevalence of diabetes leads to an increase in complications. It has been shown that poor control of diabetes results in high prevalence of micro- and macrovascular complications, such as neuropathy (19.0%), albuminuria (15.7%), background retinopathy (11.1%) and microalbuminuria (6.6%).⁴

In terms of diabetes management, a study in major government hospitals in Malaysia showed that the majority of patients had not received adequate care.⁵ Glycosylated haemoglobin A1c (HbA1c) had only been measured in 10% of patients, blood lipids had been measured in 22% of patients, and urine albumin had been checked in 30% of patients. A study in 2001 amongst general practitioners in Peninsular Malaysia showed that the majority of patients were not well controlled, and the prevalence of complications was high. Only 20% of patients had HbA1c <7%, 12.3% had total cholesterol <4.8 mmol/l and 44.1% had systolic blood pressure <140 mmHg. Neuropathy was the most common complication (30.1%), followed by background retinopathy (23.5%), albuminuria (22.9%) and microalbuminuria (20.4%).⁶

This inadequate care has a major influence on patients with diabetes. Unfortunately, these patients present with complications very early, instead of minimizing them with comprehensive diabetes management. Many factors influence the glucose level, some of which are variable factors and some cannot be changed. A study examined the control of six diabetes-related factors – HbA1c, blood pressure, total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol and triglycerides – among patients with diabetes in the Muscat region, Oman. Only 2.4% of patients were found to meet all six targets.⁷

Age and sex are among the factors that affect glucose control for patients.⁸ The HbA1c values of the 25% of participants with the highest values ranged from 8.7% to 12.7%. Those with poor glucose control were younger (aged <50 years).⁹ A study has shown that the percentage of patients

with HbA1c >8% was nearly doubled in patients aged 21–45 years compared with patients aged 65–80 years.¹⁰ In addition, one study found that the percentage of uncontrolled HbA1c was approximately 58% higher in females compared with males.⁷

Glycaemic control is generally much better in patients who have been diagnosed for <5 years.¹¹ A longer duration of illness is associated with a higher rate of poor glycaemic control, and this is worse in patients using a single oral hypoglycaemic agent.¹²

Various types of treatment can be prescribed for diabetes mellitus. It has been shown that diet-controlled therapy alone is not sufficient to control glycaemic levels, since the insulin treatment will benefit the diabetics because they suffered from insulin resistance.¹³ The percentage of patients with a poor HbA1c level is higher in patients using an oral hypoglycaemic agent alone compared with patients using combination therapy.⁷ Patients with HbA1c >8.5% are advised to commence insulin or combined therapy (insulin + oral hypoglycaemic agent) provided that they have good compliance with their diet and treatment.^{14,15}

Various clinical parameters such as blood pressure, lipid profile and body mass index (BMI) are monitored during follow-up of patients with diabetes. The study in Oman found that higher HbA1c is associated with high diastolic blood pressure.⁷ Meanwhile, an association was found with abnormal lipid profile, with higher total cholesterol and higher low-density lipoprotein cholesterol associated with high HbA1c.⁷

Most patients with comorbid illnesses have a low HbA1c of approximately 7.9%.⁷ The risk of microvascular and macrovascular complications of type 2 diabetes and cataract extraction is known to be strongly associated with hyperglycaemia, as measured by mean HbA1c. The risk is even higher among patients with diabetes who have microvascular complications with poor glycaemic control and abnormal HbA1c.¹⁶ By conducting this research, healthcare providers are able to determine the demographics of patients with diabetes who attend public health clinics, as well as their glycaemic control.

This population study was mainly undertaken in public health clinics, where most patients present early for screening and diagnosis. By conducting this research and having this information, an early intervention can be implemented for a particular group, which can minimize the prevalence of diabetes as well as its complications. Moreover, early intervention will help to reduce the burden of managing patients with diabetes in hospitals, as the ultimate aim is to reduce mortality and morbidity rates among patients with diabetes.

The aim of this study was to help identify the issues that exist among patients with diabetes in order to control their glycaemic level. This study also examined problems in public health clinics in terms of the management of patients with diabetes, specifically glycaemic control.

Based on the available data, this study will provide information about comorbidities among patients with diabetes, and will enhance, stimulate and facilitate diabetes research activities to reduce mortality and morbidity. This study differs from other studies because its sample population was specific to a certain population group and the sample size was large.

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