

Glycaemic Control among Type 2 Diabetes Mellitus Patient Attending the Out Patient's Clinic at Parirenyatwa Hospital in Zimbabwe

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Abstract

Type 2 diabetes mellitus is the most common type of diabetes mellitus accounting for approximately 90% of all cases. Many diabetes mellitus patients experience difficulties following their treatment regimen causing low number of patients achieving glycaemic control target. Failure to achieve glycaemic control is associated with the development of complications. This study sought to determine the prevalence of poor glycaemic control and identify factors associated with glycaemic control among type 2 diabetes mellitus patient attending an out patient's clinic.

All type 2 diabetic patients aged 18 years and above attending the Parirenyatwa out patient's diabetic clinic during the study period who consented to participate in the study were consecutively enrolled. A questionnaire was administered, the patients' weight and height were measured. A blood sample was collected for glycosylated haemoglobin analysis using the enzymatic method.

A total of 180 type 2 diabetic patients were enrolled into the study of whom 69.4% were female. The median age was 60.0 years, median duration of disease was 6.0 years, median body mass index was 26.0 kg/m² and median glycosylated haemoglobin was 7.4. Poor glycaemic control was diagnosed in 60.9% of the patients. Gender (p value 0.016), duration (p value <0.001) and physical activity (p value 0.007) were significantly associated with glycaemic control.

The majority of the type 2 diabetic patients had poor glycaemic control. There is need of coming up with strategies to improve glycaemic control in type 2 diabetic patients attending the out patient's clinic. Gender, duration and physical activity were associated with glycaemic control.

Keywords: Diabetes mellitus, type 2 diabetes mellitus, glycaemic control.

Introduction

Type 2 diabetes mellitus is the most common type of diabetes mellitus which account for approximately 90% of all diabetes mellitus cases. The cornerstone of treatment of type 2 diabetes mellitus is healthy life style which includes adoption of healthy diet, increased physical activity, smoking cessation plan and maintenance of a healthy body weight. When the attempts to change life style are not adequate to control blood glucose levels oral medication is usually initiated for the treatment of hyperglycaemia with metformin used as the common initial medication worldwide (International Diabetes Federation 2017). However many patients experience difficulties following diabetes mellitus treatment regimen causing low number of patients achieving glycaemic control target (Odume et al. 2015).

The achievement of good glycaemic control among diabetes mellitus patients is a global concern (Odume et al. 2015). Studies regardless of country have demonstrated difficulty in achievement of glycaemic control (Pérez et al. 2014). However suboptimal glycaemic control results in microvascular and macrovascular complications (Mata-Cases et al. 2016). Data on glycaemic control amongst diabetes mellitus patients is necessary for the strategic planning on quality health service delivery (Adeniyi et al. 2016). The previous study at the Parirenyatwa Group of Hospitals amongst type 1 and type 2 diabetes mellitus reported that 55% of the patients had a glycosylated haemoglobin <7.0% (Chako et al. 2014). This study sought to determine the prevalence of poor glycaemic control and identify factors associated

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with glycaemic control among type 2 diabetes mellitus patient attending the out patient's clinic at Parirenyatwa Group of Hospitals in Harare, Zimbabwe.

Methods

Ethical consideration

The study was approved by the Joint Research Ethics Committee for the University of Zimbabwe College of Health Sciences and Parirenyatwa Group of Hospitals (JREC385/16). Informed consent was sought from all the type 2 diabetes mellitus patients who were enrolled into the study.

Study design and study site

The study was a cross sectional study in which all Type 2 diabetic patients attending the Parirenyatwa Group of Hospitals out patient's diabetic clinic between 1st of November 2016 and 30th April 2017 who consented to participate in the study were consecutively enrolled. Parirenyatwa Group of Hospitals is a tertiary teaching hospital located in the capital city of Zimbabwe Harare.

Study subjects

All type 2 diabetes mellitus patients aged 18 years and above attending the Parirenyatwa out patient's diabetic clinic during the study period were given information about the study. All the patients who consented to participate in the study were consecutively enrolled.

Data collection

A questionnaire was administered on all type 2 diabetes mellitus patients enrolled into the study to get demographic information. The diabetic clinic nurse measured the patient weight and height. A blood sample was collected into a 5ml ethylenediaminetetraacetic acid tube for glycosylated haemoglobin analysis (HbA1c). The blood sample was stored at 2 to 8°c and analysed for HbA1c within seven days on a Minday BS400 using the enzymatic method. The analyser was calibrated and control samples were analysed according to the manufacturer's recommendations.

Data analysis

The data was analysed using the Statistical Package for the Social Sciences version 16. Normally distributed data was analysed using mean and standard deviation whilst non-normal distributed data as median and interquartile range. The Chi squared test was used to assess for statistical significance in the percentage of glycaemic control status (good or poor glycaemic control) according to independent categorical variables. A p value of less than 0.05 was considered statistical significant.

Definitions

Type 2 diabetes mellitus was defined as a diagnosis made after 30 years of age which is treated with diet and oral hypoglycaemic agents with some of the patients eventually requiring insulin (Ministry of Health and Child Welfare Republic of Zimbabwe 2013). Good glycaemic control was defined as an HbA1c < 7.0% (American Diabetes Association 2017).

Engaging in physical activity was defined according to the American diabetic association minimum recommendation in adult diabetes mellitus patients of 150 minutes or more of moderate to vigorous intensity physical activity per week (American Diabetes Association 2017).

Results

A total of 180 type 2 diabetes mellitus patients were enrolled into the study of whom 125 (69.4%) were female. The median age was 60.0 (interquartile range 50.3-68.0) years, median duration of disease was 6.0 (interquartile range 4.0-12.0) years, median body mass index was 26.0 (interquartile range 24.0-29.0) kg/m² and median HbA1c was 7.4 (interquartile range 6.3-9.7) %. All the diabetic patients were non-smokers. Poor glycaemic control was diagnosed in 60.9% of the type 2 diabetes mellitus patients. Table 1 shows the factors associated with glycaemic control.

Variable	Good glycaemic control HbA1c <7.0%	Poor glycaemic control HbA1c ≥7.0%	p value
Gender			
Female	42 (33.6)	83 (66.4)	0.016
Male	29 (52.7)	26 (47.3)	
Duration of disease			
<10 years	59 (49.2)	61 (50.8)	< 0.001
≥ 10 years	12 (20.0)	48 (80.0)	
Physical activity			
Yes	42 (50.0)	42 (50.0)	0.007
No	29 (30.2)	67 (69.8)	

Table 1. Factors associated with glycaemic control

Discussion

Diabetes mellitus management main goal is to ensure optimal glycaemic control (Kassahun, Eshetie, and Gesesew 2016). HbA1c is a gold standard in the analysis of glycaemic control and it ensures optimal care of diabetes mellitus patients. HbA1c is a marker of average glycaemic levels over previous 8 to 12 weeks prior to the measurement and may be useful to monitor the effects of diet, exercise and drug therapy on diabetes mellitus patients (Musenge et al. 2014). Poor glycaemic control was diagnosed in 60.9% of the type 2 diabetes mellitus patients. Similarly a study in Nigeria in 2014 reported a prevalence of poor glycaemic control of 55% using HbA1c as an index of glycaemic control (Ufuoma et al. 2016). A study in Ethiopia in 2014 reported a prevalence of poor glycaemic control of 70.9% using fasting glucose as a marker of glycaemic control. In a study in Kenya between 2015 and 2016, 89.1% of the type 2 diabetes mellitus patient had poor glycaemic control (Ngoyo et al. 2016). The reported results from studies in Africa are far higher than those from developed countries (Kassahun, Eshetie, and Gesesew 2016), this can be attributed to knowledge difference of diabetes mellitus patients between developing and developed countries, difference in health care insurance access and primary care coverage (Ngoyo et al. 2016).

Poor glycaemic control in the majority of the type 2 diabetes mellitus patients is a cause of concern as poor diabetic control is associated with increased mortality in diabetes mellitus patients (Viana et al. 2013). There is a tendency to focus on the patient related obstacles resulting in failure to consider the issues which arise from attitudes, perception and behaviours of the healthcare providers. They are often delays in implementing appropriate interventions to achieve glycaemic targets (Blonde et al. 2017).

Gender was significantly associated with glycaemic control in the current study and similarly in a study in Kenya it was reported that gender is an important factor associated with glycaemic control (Ngoyo et al. 2016). However contrary to the association of gender with glycaemic control in the current study a study in Jordan in 2008 reported lack of association of gender with poor glycaemic control (Al-Akour, Khader, and Alaoui 2011). Clinical trials have also reported that women with type 2 diabetes mellitus have significantly higher HbA1c than men and fewer women than men achieve HbA1c targets but these results have not been replicated in other studies (Kautzky-Willer et al. 2015). Since achieving metabolic control is the treatment goal in type 2 diabetes mellitus patients there is need for the treatment to be closely monitored and individualized especially in women who had an observed vulnerability in this present study.

Diabetes mellitus patients with a duration of ≥ 10 years were more likely to have poor glycaemic control which is similar to an observation of previous studies which indicate that longer duration of diabetes mellitus is associated with increased HbA1c (Ufuoma et al. 2016). The increase in HbA1c can be attributed to the body's resistance to insulin which increase with increase in duration of diabetes mellitus (Verma et al. 2006). Furthermore it is postulated that there is progressive impairment of insulin secretion with time due to B cell failure which also makes the response to diet alone or oral agents unlikely (Khattab et al. 2010).

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Physical activity was associated with glycaemic control with those who did not exercise having a higher proportion of diabetic patients with poor glycaemic control in this study. Other studies have also reported the importance of exercise in predicting lower HbA1c (Ashur et al. 2016). In type 2 diabetes mellitus patients structured exercise interventions of at least 8 weeks duration have been demonstrated to lower HbA1c by an average of 0.66% (American Diabetes Association 2017).

The majority of the type 2 diabetes mellitus patients attending the out patient's diabetic clinic at Parirenyatwa Group of Hospitals had poor glycaemic control. There is need of coming up with strategies to improve glycaemic control in type 2 diabetes mellitus patient attending the out patient's clinic. Gender, duration and physical activity were associated with glycaemic control.

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