ORIGINAL ARTICLE

THE CHALLENGE OF PROPER GLYCAEMIC CONTROL AMONG PATIENTS WITH TYPE 2 DIABETES IN BANGLADESH

[1]Selim S, [2]Pathan F, [3]Saifuddin M, [2]Latif ZA, [4]Karim N

[1]Department of Endocrinology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, [2]Department of Endocrinology, BIRDEM General Hospital, Dhaka, Bangladesh, [3]Feni Sadar Hospital, Feni, Bangladesh, [4]Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia.

ABSTRACT

Introduction: Despite the numerous advances achieved in diabetes control and evaluation, the management of this complex disease remains challenging. This study was conducted with the aim of determining the level of glycaemic control among adult patients with type 2 Diabetes mellitus.

Method: The cross-sectional study was conducted in the diabetes care centers of the outpatient departments in Bangladesh. Adult patients with at least 2 years documented history of type 2 diabetes mellitus (T2DM) were recruited and data regarding the demographics, treatment they received and the level of glycaemic control was assessed.

Result: A total of 5140 diabetic patients fulfilling the inclusions criteria were recruited for the study. 9.90% of the patients were below 40 years of age and the majority (64.05%) of the respondents were from urban communities. Based on HbA1c levels, only 18.8% of the patients had good glycaemic control. Gender, educational level and the income seem to have a relationship with the level of glycaemic control.

Conclusion: Despite the medical advances in the management of diabetes, the glycaemic control of the majority (81.2%) of the T2DM patients are still very poor.

Keywords: Type 2 diabetes, glycaemic control, Bangladesh

INTRODUCTION

According to International Diabetes Federation (IDF), the prevalence of diabetes is expected to rise from 382 million in 2013 to 592 million by 2035 throughout the world and the majority (80%) of them will live in low and middle-income countries (1). Diabetes has become the seventh leading burden of diseases in South Asian countries putting an enormous pressure on fragile health systems in low-economic countries (2). In the South Asian region, Bangladesh has the second largest number of adults with diabetes (7.1 million adults, 8.2% of the adult population) (1). In the year 2010, 3.4 million people died of the consequences diabetes worldwide (3).

The studies have shown that the improved glycemic control in people with diabetes can reduce the risk of long-term complications. The Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS) have provided evidence for the benefits of tight and sustained glycemic control among type 1 and 2 diabetic patients (4, 5). All these studies have emphasized the need of maintaining the level of HbA1c of 6.5-7% for prevention of diabetes-related complications (4, 5). Despite the numerous advances achieved in

diagnosis, evaluation and management of this complex disease, achieving proper glycaemic control remains challenging. The epidemiological data suggest that in the majority of patients, the glycaemic control is poor (7-16). Even in the developed countries with strong health care systems, the status of glycaemic control is not very good and only 37.0% of adults with diabetes had HbA1c levels at the ADA goal of less than 7.0% according to the figures in 1999-2000 (16).

A study done in Pakistan in 2007 showed that only 51.4% of T2DM patients had HbA1c within the control level (>7%) and this figure

was 48.5% in 2005 (7). Edson et al. found that overall prevalence of inadequate glycemic control in Venezuela was 76% (8), which was greater than previous estimates from other studies including type 1 and 2 diabetic patients where it is 40% in Germany (9), 51% in Denmark (10) and 61% in Kenya (11). In African Seychelles, less than a quarter of all the patients with diabetes had proper glycaemic control (12) and in a study done by Tel Aviv in Israel, this figure was reported as 41.6% (12). Studies in India has shown that more than half of the patients with diabetes had poor glycemic control (HbA$_{1C}$ >2% points above the upper limit of normal and FBG >139 mg/dl) (14).

When the gravity and the cost of diabetes complications are considered, poor glycemic control among patients with diabetes is a concern. The previous study done in 2008 by Latif et al. has demonstrated that the glycaemic control among patients with diabetes in Bangladesh is not that different. This study demonstrated that 76.9% of the patients failed to achieve the recommended glycaemic target of <7% (13). This study was conducted with the objective of gathering information regarding the degree of glycaemic control among adult type 2 diabetic patients with current practice.

METHOD

This cross-sectional study was conducted among the adult type 2 diabetes at the out-patient departments of Bangladesh and 5 other centres of Bangladesh Diabetes Somity (BADAS) in Dhaka, Bangladesh from January 2013 to December 2013 Ethical approval from the ethical approval committee of BADAS was obtained prior to the commencement of the study. T2DM patients who were having at least 2 years of records were selected to participate the study. The patients who fulfilled the inclusion criteria and who gave written informed consent were recruited. A semi-structured questionnaire containing items.

to elicit socio-demographic information and relevant information

about co-morbid illnesses was used. Height, weight, blood pressure

Table 1: Socio demography of the respondents (n=5140)

	Frequency (%)
Age	
<40 years	510 (9.90)
40-49 years	1698 (32.99)
50-59 years	1724 (33.54)
60-69 years	1066 (20.72)
≥70 years	145 (2.83)
Sex	
Male	2645 (51.46)
Female	2495 (48.54)
Residence	
Rural	1848 (35.95)
Urban	3292 (64.05)

Table 2: Distribution of the respondents by level of education and occupation (n=5140)

	Frequency
Year of schooling	
5	1895 (27.12)
6-12	2954 (57.47)
≥13	291 (15.41)
Occupation	
Student	16 (0.31)
House wife	2030 (39.49)
Farmer	1850 (35.41)
Service holder	956 (18.59)
Retired	112 (2.19)
Others	76 (1.48)
Habit of smoking	
Smoker	1081 (19.09)
Non-smoker	3793 (73.79)
Quitted	266 (7.12)
Habit of smokeless tobacco consumption	
Consumer	1496 (29.01)
Non-consumer	3392 (65.99)
Quitted	252 (5.00)
Habit of alcohol consumption	
Consumer	98 (1.9)
Non-consumer	5042 (98.1)
Quitted	08 (0.16)

was recorded. The respondents were requested to fast at least 8 hours and fasting venous blood samples were collected between 7-8 a.m. After 10-15 minutes of collection, blood samples were centrifuged for 10-15 minutes at 3000 rpm to obtain serum. Serum HbA$_{1C}$ was measured within a week of sample collection. Collected data were sorted and screened for any discrepancy. The edited data were then entered onto the template of SPSS® 17 and STATA® 12/IC and for decision tree analysis CART® was used.

RESULTS

The majority of the patients selected patients were between 40 to 60 years of age (66.53%), were males (51.46%) and were from urban background (64.05%). The details of demographic characteristics of the subjects are shown in Table 1. 57.47% of the subjects have studied up to college level reflecting a considerable level of education among patients with dia-betes in Bangladesh (Table 2). The majority of the females were hou-sewives, which constitute about 43% of the study population (Table 2). Among the study subjects, around 19% were smokers, 27.1% were tobacco consumers, and 1.3% were alcohol users (Table 2).

About 5% of the patients were only on medical nutrition therapy (MNT), 43% of the patients were on oral medication and 52% of the patients were on insulin therapy in combination with oral medication (Table 3). Irrespective of the duration of diabetes, only about 18.8% of the patients had desired glycaemic control (Table 4, 5). The level of glycaemic control was not related the duration of diabetes (Table 5). However, the educational status and the patient's income seem to have relation to the level of glycaemic control and women seem to have a better glycaemic control compared to men (Table 6).

Table 3: Current modalities of treatment for diabetes (n=5140)

Current treatment	Frequency (%)	P value
MNT (Medical Nutrition Therapy) alone	253 (4.92)	0.004
MNT + Sensitizer	569 (11.07)	
MNT + Sensitizer + Secretagogue	1249 (24.29)	
MNT + DPP4 (Dipeptidyl peptidase-4 inhibitor) inhibitor	216 (4.20)	
MNT + Premixed Insulin	1093 (21.26)	
MNT + Split mixed Insulin	145 (2.82)	
MNT + Sensitizer + Basal bolus insulin	436 (8.48)	
MNT + Sensitizer + Premixed Insulin	931 (18.51)	
MNT + Sensitizer + Secretagogue + DPP4 inhibitor	185 (3.59)	
MNT + Sensitizer + Basal Insulin + GLP1 (Glucagon-like peptide-1) Analog	39 (0.79)	
Others	21 (0.41)	

Table 4: Duration of diabetes and status of diabetes control (n=5140)

Duration (Years)	HBA1C	
	Controlled	Uncontrolled
<5	72 (18.0)	327 (82.0)
5-10	75 (15.8)	401 (84.2)
>10	48 (17.0)	235 (83.0)
Test statistics	$\chi 2 = 0.7$; $p = 0.61$	

Table 5: Sugar profile of diabetic patients (n=5140)

Gender	Diabetes control status		HbA1c Mean (±SD) %
	Controlled N (%)	Uncontrolled N (%)	
Male	472 (9.19)	2249 (43.75)	9.89 ± 3.247
Female	496 (9.69)	2024 (56.25)	9.23 ± 2.741
Average	18.88		9.564± 2.994
Test statistics	$\chi 2 = 3.1$; $p = 0.07$		

Table 6: Distribution of factors, which are associated with HbA1c

	OR (95% CI)	P
Sex	0.53 (0.36, 0.77)	0.001
Residence	0.91 (0.58, 1.43)	0.678
Education	0.95 (0.91, 0.97)	0.002
Income	1.00 (0.99, 1.01)	0.183
Duration of DM	1.01 (0.98, 1.05)	0.489
Nagelkerke R Square	0.059	

DISCUSSION

The patients in Bangladesh has the accessibility to all types of medication including insulin and the modern drugs such as DPP4 inhibitors and GLP1 analogues. Despite the availability of latest management tools and medication for the management of diabetes, only about 18% of the T2DM patients in Bangladesh had desired glycaemic control (HbA1C ≥ 7%). Patient's gender, educational status and the patient's income seem to have an association with the levels of glycaemic control.

The benefits of tight glycaemic control are well known (5). Despite of clear evidence, many patients fails to reach an optimal glycemic target (17, 18). Even with the medical advances and availability of modern drugs and health care fascilites, managing diabetes has been a challenge throughout the world. It has been even more difficult in developing countries and almost similar findings have been reported in Bangladesh in previous studies (15). In neighboring India, the situation is little better than Bangladesh and Raheja et al. showed that more than half of the diabetic patients in India had poor glycemic control (16). Even in countries with highly educated people with strong health care systems, the level of glycemic control is not that different and in the USA, only 37.0% of adults had HbA1c levels at the ADA goal of less than 7.0% (19).

In a given community, various factors could influence the level of glycaemic control in patients with diabetes. Gender of the patient seems to have a significant relationship with the levels glycaemic control. A Finish study has demonstrated that male patients had better glycemic control than female patients (18). Apart from socioeconomic factors such as educational level and financial status, inadequate knowledge about diabetes has been reported to negatively affect behavior and self-care among diabetes patients (20). In contrast to the Finish study, the level of glycaemic control is better in females compared to males. The glycaemic control among educated and among patients with a higher income has been better. This probably could be due to the better accessibility and availability of health care for these categories of patients. According to available data, the majority diabetic patients do not receive sufficient diabetes education (21) and this probably in the main reason for the poor glycaemic control among patients with diabetes. These findings highlight the importance of the quality of the diabetes care and importance of diabetes education provided to these patients.

CONCLUSIONS

Despite the availability and having the accessibility of modern health care fascilities and drugs, glycaemic control is poor among patients with diabetes in Bangladesh. Although the women and the patients with a better education and income had slightly better glycaemic control, proper glycaemic control has been a challenge and has been a universal problem.

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