STATUS OF GLYCEMIC CONTROL IN PATIENTS OF TYPE 2 DIABETES MELLITUS

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ABSTRACT

Objective: To determine the status of glycemic control in patients of type 2 diabetes mellitus.

Design: Cross sectional descriptive study.

Place and Duration of Study: Medical out-patient/ in -patient departments at Military Hospital Rawalpindi from January 2011 to December 2012.

Methods: Six hundred and fifty patients of type 2 DM fulfilling the required criteria were included in the study. Glycemic control of these patients was determined by estimation of blood glucose (fasting and random) and glycosylated haemoglobin (HbA1c). The patients were grouped in three categories good, fair and poor diabetic control having their HbA1c values of being 6-7%, 7.1-8% and more than 8.1% respectively. Statistical package for social sciences (SPSS) version 15 was used for analysis.

Results: Out of 650 patients 377 (58%) had poor glycemic control with mean HbA1c of 9.5% ± 0.95, 78 (12%) patients had fair control of glycemic control with mean HbA1c of 7.8 ± 0.25, and 195 (30%) patients had good glycemic control with mean HbA1c of 6.4 ± 0.17.

Conclusion: Majority of patients had poor control of their glycemic status which is an important indicator and predictor of both micro and macrovascular complications.

Keywords: Type 2 Diabetes mellitus, Glycosylated hemoglobin (HbA1c).

INTRODUCTION

Diabetes Mellitus refers to a group of common metabolic disorder that share the hyperglycemia, this being an important risk factor for the development of microvascular disease in patients with type 2 diabetes, as it is in patients with type 1 diabetes, as recorded in several observational studies[1,2]. Glycosylated haemoglobin HbA1c is an important tool used in the assessment of glycemic control of diabetic patients, it reflects the state of glycemia in the preceeding 8-12 weeks. The American Diabetes Association(ADA) in 1998 set the current goal for HbA1c below 7% (reference range 4.5-6.2%). In addition, improving of glycemic control also reduces microvascular outcomes, as illustrated by the various randomized trials such as United Kingdom Prospective Diabetes Study, Kumamoto study, ADVANCE trial, Veteran's Affairs Diabetes Trial and ACCORD trial[3,10-14].

Target HbA1c levels in patients with type 2 diabetes should be tailored to the individual, balancing the improvement in microvascular complications with the risk of hypoglycemia. Only limited clinical trial data (the long-term follow-up of the UKPDS) have demonstrated a macrovascular benefit with intensive therapy in patients with newly diagnosed type 2 diabetes[4,6,9]. Thus, a reasonable goal of therapy might be an HbA1c value of ≤ 7.0% for most patients. In order to achieve the HbA1c goal, a fasting glucose of 70 to 130 mg/dl (3.9 to 7.2 mmol/l) and a postprandial glucose (90 to 120 minutes after a meal) ≥ 180 mg/dl (10 mmol/l) are usually necessary[7,9-12]. The results of the ACCORD trial suggest that a target HbA1c of 7.0 to 7.9% (achieving a median of 7.5%) may be safer for patients with long-standing type 2 diabetes who are at high risk for cardiovascular disease than a target HbA1c of 6.0% (achieving a median of 6.4%). This target is supported by the results of a

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retrospective cohort study of approximately 48,000 patients with type 2 diabetes, aged 50 years and older, whose treatment had been intensified[5-9]. After a mean follow-up of approximately 4.5 years, all-cause mortality was highest in those with the lowest (less than 6.7%) and highest (9.9%) HbA1c values. HbA1c level of 7.5% was associated with the lowest all-cause mortality[10,13].

The main aim of this study was to determine the status of glycemic control in patients of type 2 diabetes mellitus. This will not only help in the treatment of the diabetic patients but will also assist in the future planning and prevention of complications because of this fatal disease by reducing the morbidity and mortality.

PATIENTS AND METHODS

This cross-sectional descriptive study was carried out from January 2011 to December 2012, at the Military Hospital Rawalpindi. Diagnosed patients of type 2 diabetes mellitus of age ≥ 35 years of both sexes were included in the study while patients with known diagnosis of type-1 DM, gestational diabetics, type 2 diabetics with serious comorbidities requiring hospitalization and patients of other types of diabetes mellitus e.g cushing's syndrome, acromegaly, were excluded. Six hundred and fifty patients fulfilled the inclusion criteria and were further evaluated. After obtaining informed consent, from all the patients fulfilling the inclusion criteria who reported at OPD/admitted in medical wards, detailed history was taken. It was followed by thorough physical examination and necessary investigations like blood glucose random, blood glucose fasting and two hours after breakfast and HbA1c to see the glycemic status on first visit.

All the information from the patients were entered into a predesigned proforma having all the relevant details. An operational definition of glycemic control was devised by classifying it into three categories i.e good glycemic control (HbA1c 6-7%), fair control (HbA1c ≥ 7.1-8%) and poor control (HbA1c ≥ 8.1). HbA1c was estimated using high performance liquid chromatography (HPLC).

All the data collected through the proforma had been analyzed through SPSS version 15. Mean and standard deviation (SD) was calculated for age, fasting plasma glucose, random blood sugar level and HbA1c, while frequency and percentage were calculated for gender and glycemic control.

RESULTS

Out of six hundred and fifty patients 390 (60%) were male and 260 (40%) were female The age of male patients ranged from 36 years to 67 years with mean age of 52.94 ± 6.28 years, while that of female patients ranged from 37 years to 65 years with mean age of 49.08 ± 7.10 years, 39 (6%) were on diet alone, 403 (62%) were on oral hypoglycemic agents and rest 208 (32%) were using insulin alone or in combination with oral agents. Mean glycosylated hemoglobin was 8.33% (SD=0.25).

Out of 650 patients 377 (58%) were having poor glycemic control with mean HbA1c of 9.5% (0.95) with minimum of 8.10 and maximum of 12%. Their mean fasting blood glucose(FBG) and random blood glucose were 233.9±4.90 mg/dl and 323.75 ± 4.71 mg/dl respectively, 78 (12%) patients had fair control of glycemic control with mean HbA1c of 7.8% (SD=0.25) with minimum of 7.0 and maximum of 8%. Their mean FBG and

Table-1: Glycemic control status of patients (n =650).

Status	Number of patients	Mean HbA1c (SD)	Mean FBG	Mean RBG
Poor control	377(58%)	9.5±0.95	233.9 ±4.90	323.75±4.71
Fair control	78(12%)	7.8±0.25	154.4±4.72	231.91±4.06
Good control	195(30%)	6.4± 0.17	121.70±6.3	177.34±3.72

RBG were 154.4 ± 4.72 mg/dl and 231.91 ± 4.06 mg/dl respectively, 195 (30%) patients had good glycemic control with mean HbA1c of 6.4% (SD=0.17) and with their mean FBG and RBG of 121.70 ± 6.43 mg/dl and 177.34 ± 3.72 mg/dl respectively.

DISCUSSION

DM is the commonest endocrine syndrome which is characterized by hyperglycemia due to relative or absolute deficiency of insulin. Diabetes has got a worldwide distribution and over the time there is increase in its incidence which is expected to reach by around 340 million by year 2030[5-9]. Glycosylated hemoglobin (HbA1c) as a marker for average blood glucose levels over the previous months prior to the measurement is an important predictor of diabetes complications[10]. The role of improved glycemic control in reducing microvascular and neurological complications of diabetes was demonstrated in many observational and randomized controlled clinical trials[11]. The glycemic control of the patients in our study was not so satisfactory and was less than desirable in our study the mean glycosylated hemoglobin was 8.33%.

Seventy eight patients who had fair control of diabetes had mean HbA1c of 7.8% which was still more than the target value of good glycemic control. Majority of the patients i.e 377 (58%) were having poor glycemic control with mean HbA1c of 9.5%. This is an important indicator of various macro and micro-vascular complications of diabetes melitus due to poor glycemic control. In Asia the glycemic control is not so good as previous studies also showed that the mean HbA1c was more than 8%. The results of different previous studies are shown in table 2.

Many factors are responsible for this poor glycemic control of patients in our society such as gender poverty, poor literacy ratio, obesity, lack of exercise, poor compliance ,smoking, lack of health education and lack of access to the hospital etc. Physicians knowledge and their attitude are also the contributing factors[10-12]. Poverty, lack of early accesss to the hospitals and physicians may be some of the factors responsible for this poor glycemic control. Female patients mostly don't visit the hospitals and physicians until they are seriously ill as they need male support and permission in our society so most of them may be having diabetes mellitus diagnosed very late leading to uncontrolled hyperglycemia and poor glycemic control. Majority of our female patients were the families of army personnel and they live in villages so they have to come from distant rural areas for their treatment, that is also one of the reasons of their late diagnosis. Moreover lack of health facilities at rural areas, illetracy, poverty, poor awareness and lack of health education, and absence of facilities for early diagnosis and prompt treatment of diabetes mellitus are responsible for this poor glycemic control. It was also observed that the level of hyperglycemia and glycemic control got worse in direct propotion to the duration of diabetes mellitus as most of the patients with poor glycemic control were having diabetes mellitus diagnosed for more than ten years and above. This was also observed in previous studies and also in UKPDS[9-12].

Table-2: Previous studies of glycemic control.

Author	Year	Mean HbA1c
Afridi MAR et al[9]	2003	> 8%
Basit A et al[8]	2004	> 7%
Chuang et al[7]	2002	8.6%
Mehmood K et al[6]	2005	8.78%
Present study	2013	8.33%

Several aspects and limitations of this study should be considered. Firstly, our study represents a small portion of the diseased population. Secondly the population group under study belong specifically to Rawalpindi / Islamabad areas and surroundings with the majority of military background who differ in their diet, socioeconomic status, education, level of physical activity, access to health facilities, compliance of treatment and knowledge about the disease, therefore the frequencies thus noted

may be studied on a large scale and involving wide geographical area before applying the data to our community. Therefore timely diagnosis and treatment of diabetes mellitus is crucial in preventing complications.

CONLUSION

Due to so many factors, the glycemic control status of our diabetics was not adequate which is an important indicator of future complications due to uncontrolled hyperglycemia. For proper motivation and health education of the patients print /electronic media should play their role in health education and awareness of the public. Improving literacy rate, easy and cheap availability of facilities for early diagnosis and treatment of diabetes mellitus patients, regular exercise, cessation of smoking, diet control and improved compliance of patients is required for the prevention of complications.

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