ORIGINAL ARTICLE

Frequency of Control of Blood Glucose using Glycated Hemoglobin in patients suffering with Type 2 Diabetes Mellitus Presenting to Mayo Hospital Lahore.

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ABSTRACT

Background: Diabetes mellitus is a metabolic abnormality represented by raised glucose level in blood resulting from deficient insulin production or action. Raised blood glucose level is considered to have association with the development of complications of DM. They include complications due to involvement of small vessels affecting the eyes, kidneys and peripheral nervous system. Whereas complications due to involvement of larger vessels include ischemic heart disease, stroke and peripheral vascular disease. Improved blood glucose control reduces hyperglycaemic symptoms.

Aim: To determine the frequency of control of blood glucose in patients suffering with type II diabetes mellitus

Methods: The study was carried out in the outpatient department of Mayo Hospital, Lahore. The design of the study was Cross Sectional survey and completed in 1 year i.e., from July 2014 to June 2015.

Results: The results of the current study revealed that out of 250 cases 90(36%) were between 30-50 years and 160(64%) were between 51-65 years, mean±SD was calculated as 51.23±9.05 years. 140(56%) were male and 110(44%) were females. Blood glucose in normal range in patients suffering with type 2 diabetes mellitus was seen in 86(34.4%) while 164(65.6%) had no control of blood glucose. Out of 86 cases, 20(23.26%) had upto 15,000, 25(29.07%) had 16,000-35,000, while 41(47.67%) had >35,000 rupees income (per month). 9(10.46%) were illiterate, 5(5.81%) were primary, 15(17.44%) were middle, 11(12.8%) were Matric 22(25.60%) were Graduate while 24(27.91%) were masters.

Conclusion: The control of glucose level in blood in patients suffering with type 2 DM is very poor and needs special attention while educational and financial status are the potential effect modifiers.

Keywords: Type II diabetes mellitus, control of blood glucose, frequency, microvascular,

INTRODUCTION

Diabetes mellitus (DM) is a leading cause of morbidity and mortality worldwide[1].'Its global prevalence was about 8% in 2011 and is predicted to rise to 10% by 2030[2]. No larger studies have been done in Pakistan to estimate the of number of cases of DM that are present in a particular population at a specific time however, the National level DM prevalence surveys showed the prevalence of DM at 13.9% in Sindh and 13.14% in Punjab[3].

DM care is complicated which requires effective role of patients in the management of their disease.. Hyperglycemia, has the potential to cause serious complications due to its gradual onset and chronicity**[4].** The mechanisms causing diabetic complications include oxidative stress**[5]** caused by the excessive production of reactive oxygen species (ROS) and defects in the insulin signal transduction pathway in which ceramide, a bioactive sphingolipid, may have an important inhibitory effect**[6].**

Presently, appropriate and long lasting medical care intending at preventing acute complications, decreasing the risk of remote complications, as well as management of patient by himself and patient education are intended definitive in the treatment of type 2 diabetic patients**[7].** Patients who play a fundamental role in the management of their disease achieves better outcomes**[8].**

Study done by Shaikh MA, regarding the number of patients who were diabetic with controlled blood glucose level was conducted in Sindh, which showed only 26.8% of the patients having adequate blood glucose control**.[9]**

A recent study by Van Zyl DG**[10]** reveals glucose monitoring, 60.8% of patients had irregular and unsteady glucose monitoring, 37.2% had regular (either four- or six-hourly) monitoring and only 2% were monitored in relation to meals.

The purpose of the study was to determine the control of blood glucose in patients with type 2 DM in patients coming to a tertiary care hospital. The results of the study will be helpful for the diabetic patients by

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creating awareness of control of blood glucose levels, so that by controlling the blood glucose we can prevent complications thus decreasing the morbidity and mortality associated with this deadly disease.

MATERIALS AND METHODS

The study was conducted in Medical outdoor of Mayo Hospital, Lahore. Study design was cross sectional survey and completed in six months i.e., from July 2014 to June 2015. Sample technique was non-probability purposive sampling. 250 cases were enrolled who fulfill the inclusion criteria. The patients included were those who were having age 30-65 years ,of either gender or were diagnosed cases of DM type 2 on the basis of history and previous medical record (having elevated venous glucose on 2 separate occasions i.e,. fasting ≥126mg/dl, random>180mg/dl).Blood samples were taken to measure glycosylated haemoglobin (HbA1c). The blood samples were drawn and collected in vial containing Ethylenediaminetetra acetic acid (EDTA), an anti-coagulant. Patients were considered to have control of diabetes if the HbA1c was <7%. The frequency of control of blood sugar using HbA1c was calculated with 95% confidence level 5.5% margin of error and taking expected percentage of control of blood glucose level i.e. 26.8% in patient's type II diabetes mellitus[9].

Data was obtained and evaluated in SPSS version 17.0. Mean and standard deviation was determined for quantitative variable such as age. Frequencies and percentages were estimated for qualitative variables like sex and frequency of control of blood glucose in patients with diagnosed type 2 diabetes mellitus. Stratification for duration of diabetes, educational and financial status was done to control the effect modifiers.

RESULTS

A total of 250 cases were enrolled who met the inclusion criteria to find out that how many of the patients with DM had their blood glucose in the normal range. According to the Age the patients were 90(36%) between 30-50 years and 160(64%) were between 51-65 years, mean±SD was calculated as 51.23±9.05 years (Table 1). Sex distribution of the patients was done which revealed that 140(56%) were male and 110(44%) were females (Table 1). Patients of DM with blood glucose in normal range was seen in 86(34.4%) while 164(65.6%) had no control of blood glucose (Table 1).

Table 1: Characteristics of the patients suffering from diabetes mellitus participated in study

Parameters	n	%age
Age (in years)		
30-50	90	36
51-65	160	64
Gender		
Male	140	56
Female	110	44
Blood Sugar Control Status		
Glycated Hemoglobin		
HbA1C < 7%	86	34.4
HbA1C > 7%	164	65.6
Total	250	100%

Stratification for frequency of normal blood glucose in patients suffering with type 2 diabetes mellitus with regards to duration of diabetes mellitus was recorded which shows that out of 86 cases(with controlled blood glucose), 46(53.49%) were between 1-5 years and 40(46.51%) were>5 years (Table 2).

Stratification of normal blood glucose in patients suffering with type 2 DM with regards to financial status shows that out of 86 cases,(with controlled HbA1C) 20(23.26%) had <Rs15,000, 25(29.07%) had Rs16,000-35,000 while 41(47.67%) had >35,000 rupees income (per month) (Table 2).

Stratification for frequency of control of blood glucose in patients suffering with type 2 diabetes mellitus with regards to educational status shows that out of 86 cases, 9(10.46%) were illiterate, 5(5.81%) were primary, 15(17.44%) were middle, 11(12.80%) were Matric 22(25.60%) were Graduate while 24(27.91%) were masters (Table 2).

Table 2 Stratification of characteristics of the patients having control of blood glucose levels

Parameters	n	%age
Duration of DM (in years)		
Less than 5	46	53.49
More than 5	40	46.51
Per month income in Rupees.		
<15000	20	23.26
15000-35000	25	29.07
More than 35000	41	47.67
Educational Status		
Illiterate	9	10.47
Primary	5	05.81
Middle	15	17.41
Matric	11	12.80
Graduate	22	25.60
Masters	24	27.91
Total	86	100%

DISCUSSION

The fundamental metabolic abnormality in DM is a high blood glucose level resulting from impaired insulin production or action. Hyperglycaemia is linked with the development of complications of DM. There are acute as well as chronic complications associated with DM[11]. Acute complications include Diabetic coma (Diabetic ketoacidosis, hyperglycemic hyperosmolar state or diabetic coma). Whereas chronic complications include microvascular complications causing retinopathy, nephropathy and neuropathy and macrovascular complications which causes cardiovascular disease, cerebrovascular disease and peripheral vascular disease[12]. Other chronic complications of diabetes include depression[13], dementia and sexual dysfunction.

Improved blood glucose control reduces hyperglycaemic symptoms thus causing reduction in complications. Monitoring the blood sugar level on a regular basis and analyzing the results is considered to be an essential part of management[14]**.** There are several benefits of regularly checking the blood glucose as it affects glycemic control. First, if the of blood glucose levels are very low or very high, the patient will alter his or her life style(i.e. nutrition ,exercise and medication) accordingly. If these, modifications are fruitful, blood glucose values will probably to be in the normal range most of the time. More regular blood glucose testing is an indicator of better self-care and is related with a number of other good health acts, such as doing exercise and having a healthy food, which then enhance glycemic control[15].

Self-monitoring of glucose level by diabetics is the most effective part of intensive glycemic control and is widely used in improving the glycemic control and healthy outcomes[16]**.** However, in our study we monitored HbA1c which was in accordance with the study done by Farmer AJ[17] which showed that self monitoring of blood glucose by non-insulin-treated patients, into self-care, did not lead to a significant improvement in glycaemic control compared with usual care monitored by HbA1c levels. While study done by Owen J. also exhibited that the use of glycated hemoglobin (HbA_{1c}) to monitor control of blood glucose is a central part in the management of patients with diabetes mellitus[18]**.** It is recommended that HbA_{1c} testing should be done at an interval of 2–6-months, in patients with uncontrolled diabetes. In those with controlled diabetes or on unchanging therapy, testing at an interval of 6–12 months is recommended[19]**.** In our study, type 2 diabetic patients with good financial and educational status showed increased frequency of control of blood glucose level, which was also seen in a study by Adams RJ[20]**.** Keeping in view the above facts, educational and financial status are also the potential effect modifiers while controlling the blood glucose levels. Other than frequent checking of blood glucose it is recommended that lifestyle modification be done in patients with type 2 diabetes which include diet as well as regular exercise[21]**.**

The reason behind this study was that this study may determine the control of blood glucose in patients with type 2 diabetes mellitus, the results of the study may be helpful for the diabetic patients by creating awareness of control of blood glucose levels, so that by controlling this morbidity can be prevented.

CONCLUSION

To prevent diabetes related morbidity and mortality, there is an intense need of dedicated self-care behaviors in several domains, including dietary modification, exercise, proper medications intake and blood glucose monitoring by the patients. We concluded that the frequency of control of blood glucose level in patients suffering with type 2 DM is very poor and needs special attention while educational and financial status are the potential effect modifiers.

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