ORIGINAL ARTICLE

HbA1c levels among Tertiary Health Care patients with type 2 Diabetes

AMBREEN FARRUKH[1], SADIA SHAFIQUE[2], AIZA SAJJAD[3], *SAEED NAEEM*[4]

ABSTRACT

Aim: To observe the levels of HbA1c in patients taking treatment for Diabetes Mellitus and to identify the diabetic patients at risk of developing complications of diabetes mellitus.
Method: The total number of 100 subjects were included in this study. The sample for this study was a subset of database collected to determine the level of diabetes control in patients of type 2 DM and taking medication for the control of diabetes. Lab results of HbA1c of 100 diabetic patients attending Diabetic Clinic of Sheikh Zayed Hospital, Lahore were collected during January 2018, along with information related to patient's age and gender. HbA1c was performed on fully automated auto analyzer Dimension RXL, after calibration and quality control steps. Results of HbA1c were grouped according to gender that is male vs female and according to age that is less than60 years and above 60 years. Statistical analysis was done using the latest version of SPSS.
Results: Mean HbA1c levels of 100 diabetic patients were found to be 8.13±1.55%.
63% of the patients showed HbA1c > 7% that is they are at higher risks of developing diabetic complications. The male patients were at 27.5% more risk of developing complications as compared to female patients.
Conclusion: Out of 100 diabetic patients who were attending diabetic clinic, 63 % had uncontrolled diabetes having HbA1c of >7.01% while only 37% patients had HbA1c < 7.01% .Thus it may be seen from these results that a majority of patients attending diabetic clinic for management of diabetes mellitus have uncontrolled diabetes mellitus and thus at a very high risk of developing diabetic complications
Keywords: Diabetes mellitus, HbA1c

INTRODUCTION

Diabetes Mellitus (DM), a metabolic syndrome, can be broadly categorized into two types; type 1 DM which is insulin dependent, seen in young patients under 40 years of age and type 2 DM, non-insulin dependent, above 40 years of age.

Type 2 Diabetes Mellitus is one of the fastest growing diseases worldwide affecting more than 8% adult population worldwide[1]. It is estimated that this will increase to 10% by the year 2030.

The current prevalence of diabetes in Pakistan is 11.77%. In males this prevalence is 11.20% while in females it is 9.19% [2].

The risk of complications related to diabetes mellitus in patients with Type 2DM is strongly associated with the level of blood glucose. Higher the blood glucose level, higher is the risk of complications. The long term complications of type 2 diabetes mellitus include microvascular complications which are diabetic retinopathy, diabetic nephropathy, diabetic neuropathy and macrovascular complications. Tighter glycemic control is shown to reduce the risk of microvascular and perhaps macrovascular complications of diabetes[3].

lycated hemoglobin A1c (HbA1c) has been used by clinicians as the gold standard to measure patients' glycemic control over the previous 2-3 months[4].

[1]Associate Professor Pathology, Abwa Medical &Dental College, Faisalabad
[2]Assistant Professor Pathology, Abwa Medical &Dental College, Faisalabad
[3]Internee at Biochemistry Department, Sh Z Hospital, Lahore
[4]Aitchison College Lahore, Research Attachment at Biochemistry Department, Shaikh Zayed Hospital, Lahore
Correspondence to Dr. Ambreen Farrukh Email: drambreenfarrukh@gmail.com

HbA1c develops when hemoglobin, a protein within red blood cells that carries oxygen throughout the body, joins with glucose in the blood, becoming 'glycated'. Raised levels of glucose in blood, result in the formation of higher than normal HbA1c.By measuring glycated hemoglobin (HbA1c), clinicians are able to get an overall picture of what average blood sugar levels have been over a period of weeks/months.

HbA1c level significantly correlates with blood glucose level. According to American Diabetes Association (2010) a normal person should have HbA1c level less than 5.7%, a level between 5.7% to 6.4% shows prediabetes while level above 6.5% is indicative of diabetes mellitus[5]. A level of HbA1c below 7% shows good glycemic control in diabetics while a level above 7% is indicative of uncontrolled diabetes mellitus[6]. Higher level of HbA1c in diabetic patients are associated with complications[7].

HbA1c enables clinicians to make treatment decisions to achieve favorable diabetes control with the aim of reducing or avoiding complications associated with hyperglycemia. However, some studies have suggested that younger people have higher levels of HbA1c compared to older adults with diabetes[8,9].

Despite high prevalence of diabetes, serious long term complications and established evidence-based guidelines for management, translation of practice recommendations to care is still deficient in Asian[10,11] and developed countries[12,13].

Available literature suggests that the management of diabetes in India is sub-optimal for the majority of patients[14]. Only 40–50% of individuals achieve the target for glycemic control, while lower numbers achieve targets for blood pressure and lipid control[15,16,17]. Studies from other countries have identified several provider and patient-related factors which can influence outcome measures in people with diabetes[18,19].

MATERIALS & METHODS

A total number of 100 subjects were included in this study. It was a subset of database collected to determine the level of diabetes control in patients of type 2 DM and taking medication for the control of diabetes. Lab results of HbA1c of 100 diabetic patients attending Diabetic Clinic of Sheikh Zayed Hospital, Lahore were collected during January 2018, along with information related to patient's age and gender. HbA1c was performed on fully automated auto analyzer Dimension RXL, after calibration and quality control steps. Results of HbA1c were grouped according to gender that is male vs female and according to age that is less than years and above 60 years.

Reference range[5]

normal value of HbA1c <5.7%
5.7% to 6.4% shows prediabetes and
> 6.5% shows diabetic
>7% indicative of uncontrolled diabetes mellitus.

Statistical analysis was done using the latest version of SPSS.Results of HbA1c were expressed as Mean ±SD. Age and gender based distribution of HbA1c was calculated

RESULTS

The study was carried out on 100 diabetic patients, 64 of whom were females while there were 36 males. The mean age of the patients was 50.11±11.8 years (Table1) .The mean HbA1c level of 100 patients being studied was found to be 8.13±1.55%. Out of total 100 patients, 37 patients had HbA1c below 7.01% and thus they had controlled diabetes mellitus and 63 patients had HbA1c >7.01% which shows uncontrolled diabetes mellitus.

Among the 63 patients with uncontrolled diabetes, 29 patients (46.1%) were male and 34 (53.9%) were female.

When comparison was made among male patients it was found that out of 36 male patients 29 (80.6%) patients had HbA1c >7.01% while out of 64 female patients, 34 (53.9%) had HbA1c >7.01% (Table2)

This showed that male patients have 27.5% more chance to develop complications of diabetes .

When distribution of HbA1c was done according to age it was found that out of 63 patients who had high HbA1c >7.01%, 47(74.6%) patients were in the age group of <60 years of age while 16(25.3%) patients were in the age group >60 years. (Table 3)

Table 1.Age and gender based distribution of HbA1c

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Gender	Male	36(36%)
	Female	64(64%)
Age Mean:50.11 ± 11.18	≤ 59	75(75%)
	60	25(25%)
HbA1c Result Mean: 8.13±1.55	≤ 6.50	24(24%)
	6.51 - 7.00	13(13%)
	7.01+	63(63%)

Table 2: Distribution of HbA1c according to gender.

HbA1c level %	**Gender**		Total
	Male	Female	
≤ 6.50	4(11.1%)	20(31.2%)	
6.51 - 7.00	3(8.3%)	10(15.6%)	13
7.01+	29(80.6%)	34(53.1%)	63
Total	36(100%)	64(100%)	100

Liklihood ratio = 8.07 P-value = 0.018

Table 3: Distribution of HbA1c levels according to age

HbA1c level %	**Age**		Total
	< 60	≥ 60	
≤ 6.50	21(28%)	3(12%)	24
6.51 - 7.00	7(9.3%)	6(24%)	13
7.01+	47(62.7%)	16(64%)	63
Total	75(100%)	25(100%)	100

Likelihood ratio = 5.04 P-value = 0.081

DISCUSSION

It was observed in the present study that 100 patients of type 2 diabetes mellitus had mean HbA1c levels 8.13±1.55% which is consistent with the studies done by Jawad et al (2012)[20] who found a mean HbA1c level of 8.2±2.0% among their patients.[20]. The mean age of the patients was 50.11±11.18 years in our study while mean age of the patients was 53.3±11.5 in studies done by Jawad et al (2012)[20] and 65.2 years in studies done by Aidin et al (2107)respectively[21]. Out of 100 patients 63 patients had HbA1c levels higher than 7.01% and 37% of the patients had HbA1c levels < 7.01% (Table 1), this high level of HbA1c showed that 63% of the patients, although taking treatment for diabetes, are at increased risk of developing complications associated with type 2 diabetes which is in agreement with the studies conducted by Virk et al (2016)[22] and Emanuela et al (2018)[23] who showed that complications of diabetes increases with the increasing levels of HbA1c.[22,23].

It was found in our study that 29 male patients out of 36 i-e (80.6%) had HbA1c levels>7.01% while 34(53.9%) out of 64 females with type 2 diabetes showed HbA1c higher than 7.01% . Similar results were shown in studies conducted by Qinglin MA et al (2016) who found that overall levels of HbA1c were higher in males than in female patients[24].

Out of 63 patients with higher HbA1c, 47 patients (74.60%) were in the age group <60 years of age while 16 patients (25.39%) were above the age of 60 years, which shows that younger age group had poor glycemic control which is in agreement with the studies of Jawad et al (2012) [20.] but differs with the study of Li Wu et al (2017) who demonstrated that HbA1c was negatively co-related with age after 60 years because of the physiological decrease in RBC count in advancing age[25].

CONCLUSIONS

The data of HbA1c levels of 100 diabetic subjects taking treatment for diabetes was studied and it was found that mean HbA1c level of 63 %of the patients was high >7.01% which shows uncontrolled diabetes. Only 37% patients had HbA1c less than 7%. Thus it may be seen from these results that a majority of patients attending diabetic clinic for management of diabetes mellitus have uncontrolled diabetes mellitus and thus at a very high risk of developing

diabeticcomplications. It is suggested that proper education of the patients should be done while attending diabetic clinic so that they can monitor their HbA1c levels. Younger patients with diabetes should make to follow up more regularly because it is found that 74.6 % of the patients were < 60 years of age having poor glycemic control.

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