WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 6.805
Volume 5, Issue 11, 1010-1019. Research Article ISSN 2277– 7105

UTILITY OF HbA1c LEVELS FOR DIABETIC PATIENTS IN A RANDOM STUDY AT OWAISI HOSPITAL AND RESEARCH CENTRE

Dr. Syeda Zaineb Humaira Hussaini*[1], Dr. Syeda Zaineb Kubra Hussaini[1], Dr. Syed Najmul Hassan[2]

[1]Pharm-D(Post Baccalaureate), Deccan School of Pharmacy, Darussalaam, Hyderabad, Telangana, India.

[2]Professor and Head of Department of General Medicine, Deccan College of Medical Sciences, Owaisi Hospital & Research Centre.

Article Received on
06 Sept. 2016,

Revised on 26 Sept. 2016,
Accepted on 16 Oct. 2016

DOI: 10.20959/wjpr201611-7246

***Corresponding Author**
Dr. Syeda Zaineb Humaira Hussaini
Pharm-D(Post Baccalaureate), Deccan School of Pharmacy, Darussalaam, Hyderabad, Telangana, India.

ABSTRACT

Background: Diabetes mellitus is a growing health problem, particularly in developed countries. Of both Type 1 and Type 2 Diabetes mellitus, Type 2 diabetes is the most common form of diabetes and constitutes the majority of cases worldwide. Glycated hemoglobin (GHB), reported as HbA1c, has been used to monitor glycemic control in patients with diabetes. The concentration of HbA1c depends on both the concentration of glucose in the blood and the lifespan of the erythrocyte. Because erythrocytes are in the circulation for approximately 4 months, HbA1c represents the integrated glucose concentration over the preceding 2 to 3 months. **Objective:** To find out the control of Diabetes using HbA1c Levels in randomly selected patients with hyperglycemia at admission. **Methods:** A hospital based random study of utility of HbA1c levels in diabetic patients at Owaisi Hospital and Research Centre. The study was conducted in 100 patients of either sex aged > 18 years. Subjects with a FBS >110 mg/dl, PLBS >150 mg/dl, diabetic diet and previously diagnosed with Type 1 and Type 2 Diabetes were included in the study. Patients were further excluded for unwillingness to provide oral informed consent or to undergo further testing for HbA1c level, FBS, PLBS if required and pregnant females were excluded. Patients who had hemoglobin of 13 g/dL or less (male) or hemoglobin of 12 g/dL or less (female), were also excluded from this study because of the possible influence of all these factors on HbA1c and insulin. HbA1c was measured for all patients randomly. **Results:** A

total of 100 patients of which 51% were males and 49% were females. Based on the Fasting Blood Sugar values, the majority of patients had their values in the range between 131-140mg/dl and >160mg/dl. Based on the Post-Lunch Blood Sugar values, the majority of patients had their values >160mg/dl. Based on the HbA1c Levels, 10 patients had HbA1c levels < 7%(Non-Diabetic), 16 patients had HbA1c levels 7-8%(Good Control), 39 patients had HbA1c levels 8-9%(Fair Control), 35 patients had HbA1c levels 10% and Above(Poor Control). **Conclusion:** Random study of 100 patients suffering from diabetes mellitus, at Owaisi Hospital and Research Centre was done. Of them 4% patients were detected Denovo and 7% patients were Type 1 Diabetes mellitus and 89% patients were Type 2 Diabetes mellitus. 97% patients were on insulin and 32% patients were on oral hypoglycemic agents. However, HbA1c levels can be useful for Health care providers for early initiation of diagnosis and treatment of Diabetes.

KEYWORDS: Glycated hemoglobin, Diabetes Mellitus, Fasting blood sugar.

INTRODUCTION

Diabetes mellitus is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period.[1] Symptoms of high blood sugar include frequent urination, increased thirst and increased hunger. If left untreated, diabetes can cause many complications.[2]

Acute complications can include Diabetic ketoacidosis, nonketotic hyperosmolar coma, or death. Serious long-term complications include heart disease, stroke, chronic kidney failure, foot ulcers and damage to the eyes.

Diabetes is due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced.[3] There are three main types of diabetes mellitus that is Type 1 DM, Type 2 DM and Gestational diabetes.

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which a T-cell-mediated autoimmune attack leads to the loss of beta cells and thus insulin. It causes approximately 10% of diabetes mellitus cases in North America and Europe.

Type 2 DM is characterized by insulin resistance, which may be combined with relatively reduced insulin secretion. The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor.

Insulin is the principal hormone that regulates the uptake of glucose from the blood into most cells of the body, especially liver, muscle and adipose tissue. Therefore, deficiency of insulin or the insensitivity of its receptors plays a central role in all forms of diabetes mellitus.[4]

If the amount of insulin available is insufficient, if cells respond poorly to the effects of insulin (insulin insensitivity or insulin resistance), or if the insulin itself is defective, then glucose will not be absorbed properly by the body cells that require it and it will not be stored appropriately in the liver and muscles. The net effect is persistently high levels of blood glucose, poor protein synthesis and other metabolic derangements, such as acidosis.

Diabetes mellitus is diagnosed by demonstrating any one of the following:

- Fasting plasma glucose level ≥ 7.0 mmol/l (126 mg/dl)
- Plasma glucose ≥ 11.1 mmol/l (200 mg/dl) two hours after a 75 g oral glucose load as in a glucose tolerance test
- Symptoms of high blood sugar and casual plasma glucose ≥ 11.1 mmol/l (200 mg/dl)
- Glycated hemoglobin (HbA_{1C}) ≥ 48 mmol/mol (≥ 6.5 DCCT %).[5]

Glycated hemoglobin is better than fasting glucose for determining risks of cardiovascular disease and death from any cause.

Abnormalities in fasting plasma glucose (FPG) and oral glucose tolerance test (OGTT) based on the diagnostic criteria are diagnosed as diabetes.[6] A new diagnostic criteria and hemoglobin A1c (HbA1c) was added to it as a diagnostic method of Type 2 diabetes.[7] [8] HbA1c displays high reproducibility compared with the FPG or OGTT, reflects the plasma glucose control condition for the most recent 2-3 month period, and offers the advantage of not needing to fast at the time of the test. In addition, HbA1c is also known as a better predictive factor for diabetic retinopathy and cardiovascular disease.[9] [10] Even though some reports suggest that HbA1c is useful in diagnosing diabetes,[11] other reports show that diagnostic usefulness is low because of the reduced sensitivity.[12] [13] Therefore, there is a controversy over whether HbA1c is useful as diagnostic criterion of diabetes.

OBJECTIVE

To find out the control of Diabetes using HbA1c Levels in randomly selected patients with hyperglycemia at admission.

MATERIALS AND METHODS

A hospital based random study of utility of HbA1c levels in diabetic patients at Owaisi Hospital and Research Centre. The study was conducted in 100 patients of either sex aged > 18 years. Subjects with a FBS >110 mg/dl, PLBS >150 mg/dl, diabetic diet and previously diagnosed with Type 1 and Type 2 Diabetes were included in the study. Patients were further excluded for unwillingness to provide oral informed consent or to undergo further testing for HbA1c level, FBS, PLBS if required and pregnant females were excluded. Patients who had hemoglobin of 13 g/dL or less (male) or hemoglobin of 12 g/dL or less (female), were also excluded from this study because of the possible influence of all these factors on HbA1c and insulin. HbA1c was measured for all patients randomly.

RESULTS

1. Distribution of patients based on the gender

Table–1:

Gender	Male	Female
No. of patients (%)	51(51%)	49(49%)

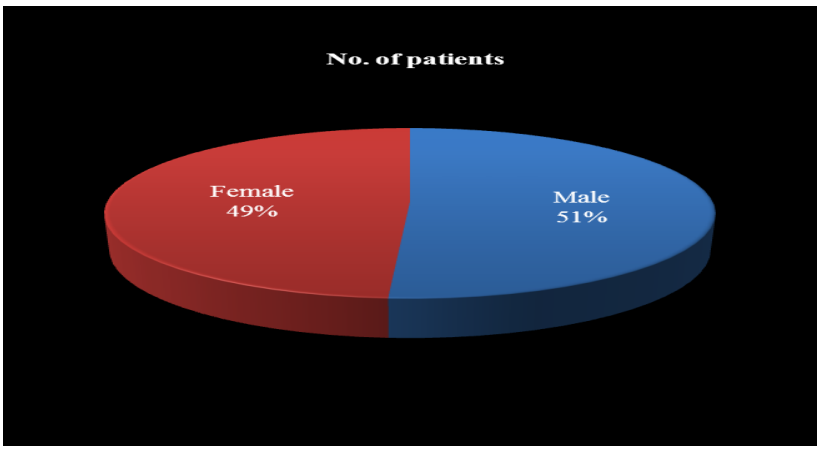

Fig. 1

2. Distribution of patients based on the age groups

Table-2:

Age(Yrs)	30-35	36-40	41-50	51-60	61-70	71-80		
Male	1	2	10	15	17	6		
Female	0	6	9	16	15	3		

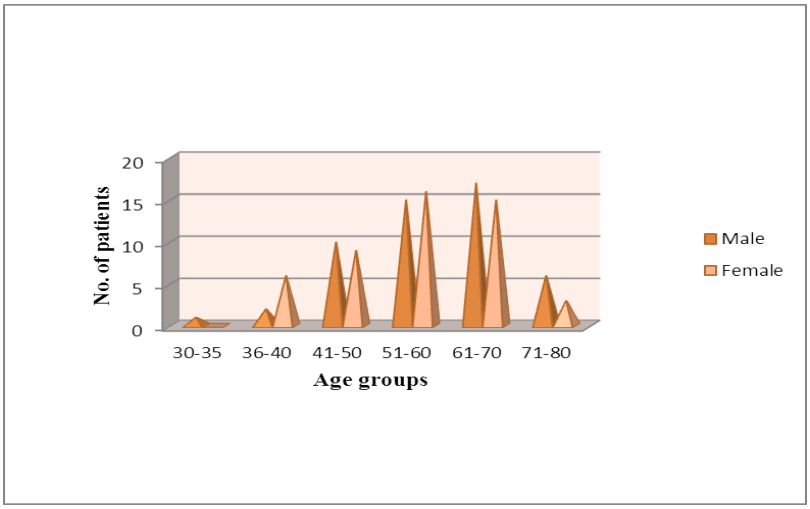

Fig. 2

3. Distribution of patients based on the complaints

Table-3:

S.no	Symptoms	Sex	No. of patients
1.	Polydipsia/Excessive thirst	M	9
		F	6
2.	Polyuria	M	12
		F	10
3.	Nausea/Vomiting	M	8
		F	4
4.	Weight Loss	M	7
		F	3
5.	Blurred Vision	M	5
		F	6
6.	Slow Healing Of Wounds	M	11
		F	8
7.	Abdominal Pain	M	6
		F	5

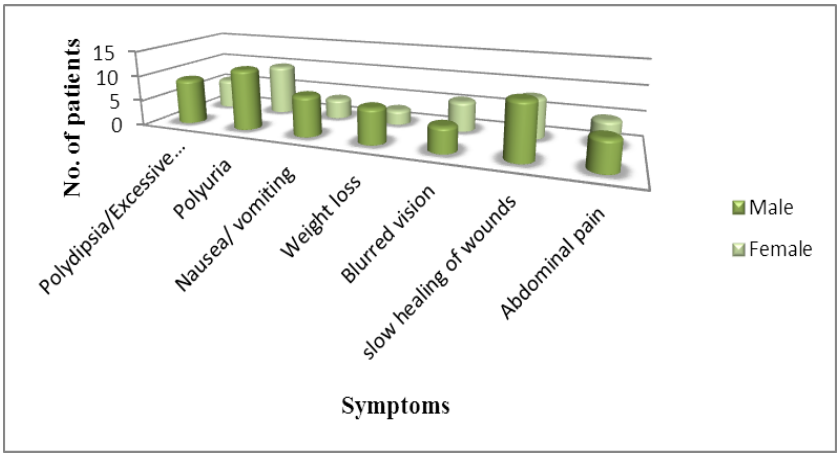

Fig. 3

4. Distribution of patients based on personal history

Table-4:

S.no	Personal History	Sex	No. of patients
1.	Tobacco chewer	M	13
		F	6
2.	Smoker	M	8
		F	0
3.	Smoker + Tobacco Chewer	M	19
		F	0
4.	Alcoholic + Smoker	M	5
		F	0
5.	Ex-Smoker	M	3
		F	0

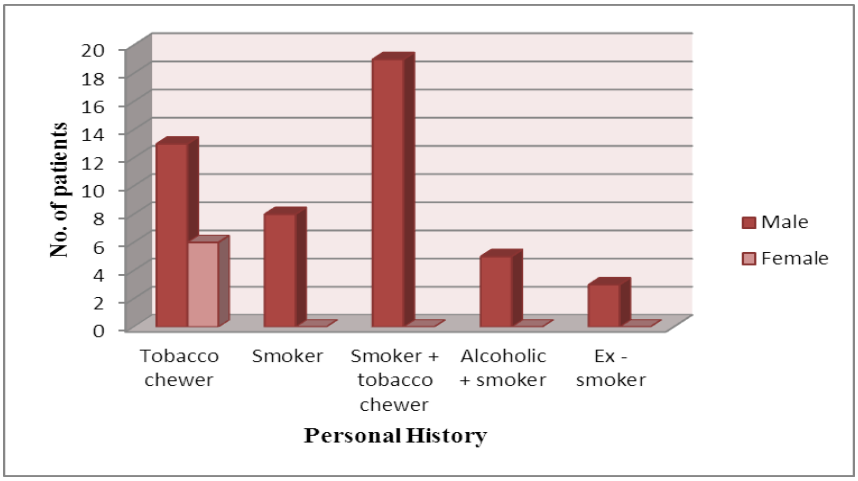

Fig. 4

5. Distribution of patients based on the co-morbidities

Table-5

Co-morbidities	Number	Percentage
Hypertension	28	28%
Diabetic complications	41	41%
Cardiovascular Diseases	20	20%
None	11	11%
Total (N=100)	100	100%

6. Distribution of patients based on HbA1c Values

Table-6:

HbA1c values	Number of patients
<7%(Non-Diabetic)	10
7-8%(Good Control)	16
8-9%(Fair Control)	39
10% and Above(Poor Control)	35

7. Distribution of patients based on the FBS

Table-7:

FBS(mg/dl)	80-90	91-100	101-110	111-120	121-130	131-140	141-150	151->160 160
Male	2	0	1	2	9	18	2	3 14
Female	1	1	3	5	6	13	2	1 17

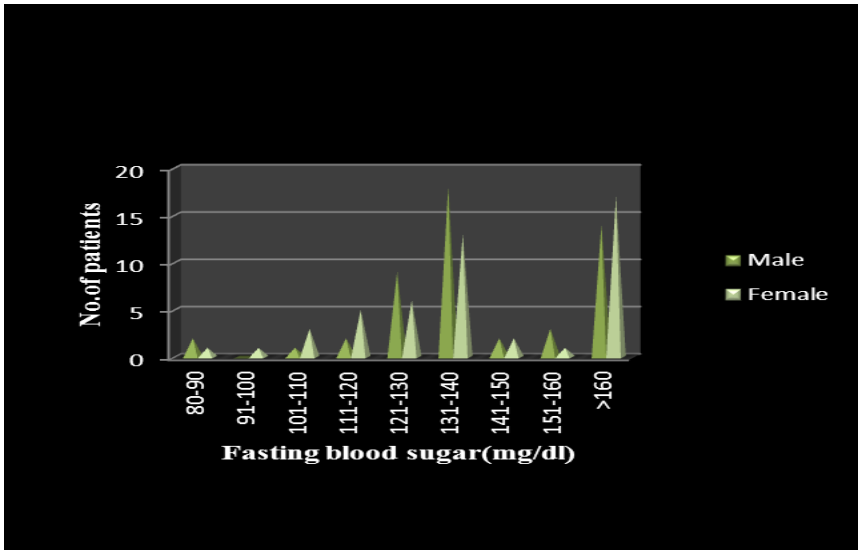

Fig. 5

8. Distribution of patients based on the PLBS

Table-8:

PLBS(mg/dl)	80-90	91-100	101-110	111-120	121-130	131-140	141-150	151->160 160
Male	0	0	0	0	2	1	1	3 44
Female	1	0	2	1	1	2	1	2 39

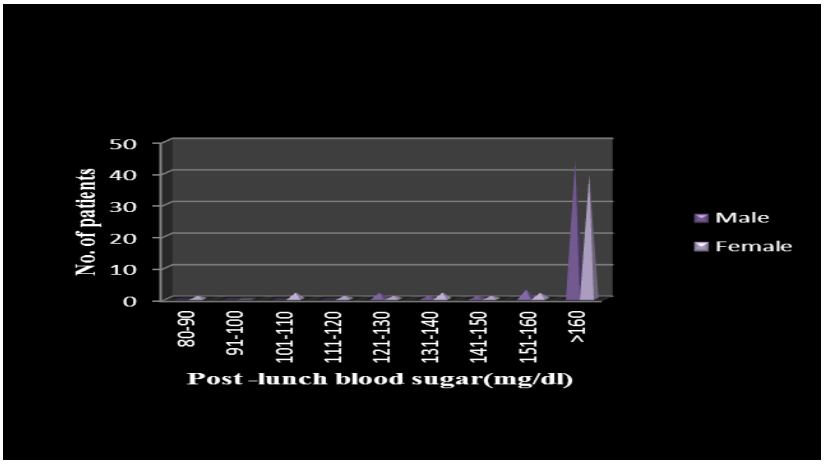

Fig. 6

9. Distribution of patients based on HbA1c

Table-9:

HbA1c (%)	<6	6-6.9	7-7.9	8-8.9	9-9.9	10-10.9	11-11.9	>12
Male	1	3	10	17	2	2	4	12
Female	1	5	6	12	8	0	5	12

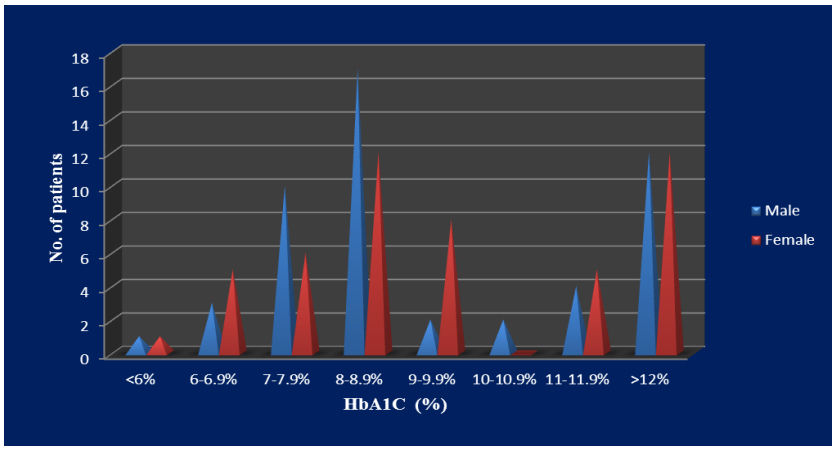

Fig. 7

A total of 100 patients of which 51% were males and 49% were females. The majority of patients were in the age group between 30 and 80 years. Major presenting complaints were Polyuria and slow healing of wounds.

On enquiring for addiction in the present population, it was found that majority of them were Smoker + Tobacco chewers in both Type 1 and Type 2 Diabetic patients.

Of the total population, majority had Diabetic complications as co-morbidities associated with Diabetes Mellitus.

Based on the Fasting Blood Sugar values, the majority of patients had their values in the range between 131-140mg/dl and >160mg/dl.

Based on the Post-Lunch Blood Sugar values, the majority of patients had their values >160mg/dl.

Based on the HbA1c Levels, 10 patients had HbA1c levels < 7%(Non-Diabetic), 16 patients had HbA1c levels 7-8%(Good Control), 39 patients had HbA1c levels 8-9%(Fair Control), 35 patients had HbA1c levels 10% and Above(Poor Control).

CONCLUSION

Random study of 100 patients suffering from diabetes mellitus, at Owaisi Hospital and Research Centre was done. Of them 4% patients were detected Denovo and 7% patients were Type 1 Diabetes mellitus and 89% patients were Type 2 Diabetes mellitus. 97% patients were on insulin and 32% patients were on oral hypoglycemic agents. So the reason for giving insulin to these patients was the presence of some complications like infections, Diabetic foot or surgeries. Type 1 Diabetic patients and the Denovo Diabetics were admitted for Diabetic ketoacidosis. However, HbA1c levels can be useful for Health care providers for early initiation of diagnosis and treatment of Diabetes.

REFERENCES

1. About diabetes. World Health Organization. Retrieved 4 April 2014.
2. Diabetes Fact sheet N°312. WHO. October 2013. Archived from the original on 26 Aug 2013. Retrieved 25 March 2014.
3. Shoback, edited by David G. Gardner, Dolores (2011). "Chapter 17". Greenspan's basic & clinical endocrinology (9th ed.). New York: McGraw-Hill Medical. ISBN 0-07-162243-8.
4. Insulin Basics. American Diabetes Association. Retrieved 24 April 2014.
5. Diabetes Care January 2010. American Diabetes Association. Retrieved 2010-01-29.
6. Genuth S, Alberti KG, Bennett P, Buse J, Defronzo R, Kahn R, et al. Follow-up report on the diagnosis of diabetes mellitus. Diabetes Care. 2003; 26: 3160–3167. [PubMed].
7. Cox ME, Edelman D. Tests for screening and diagnosis of type 2 diabetes. Clin Diabetes. 2009; 27: 132–138.
8. International Expert Committee. International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. Diabetes Care. 2009; 32: 1327–1334. [PMC free article] [PubMed].

9. McCance DR, Hanson RL, Charles MA, Jacobsson LT, Pettitt DJ, Bennett PH, et al. Comparison of tests for glycated haemoglobin and fasting and two hour plasma glucose concentrations as diagnostic methods for diabetes. BMJ. 1994; 308: 1323–1328. [PMC free article] [PubMed].
10. Selvin E, Marinopoulos S, Berkenblit G, Rami T, Brancati FL, Powe NR, et al. Meta-analysis: glycosylated hemoglobin and cardiovascular disease in diabetes mellitus. Ann Intern Med. 2004; 141: 421–431. [PubMed].
11. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33) Lancet. 1998; 352: 837–853. [PubMed].
12. Lorenzo C, Haffner SM. Performance characteristics of the new definition of diabetes: the insulin resistance atherosclerosis study. Diabetes Care. 2010; 33: 335–337. [PMC free article] [PubMed].
13. Selvin E, Zhu H, Brancati FL. Elevated A1C in adults without a history of diabetes in the U.S. Diabetes Care. 2009; 32: 828–833. [PMC free article] [PubMed].