ORIGINAL ARTICLE

Pattern and Knowledge of HbA1C Testing among Diabetic Patients at The Indus Hospital (TIH), Karachi

Munaza Ali[1], Muhammad Nadeem Ahmed Khan[1,2*] and Muhammad Junaid Patel[1]

[1]*Department of Internal Medicine, The Indus Hospital, Karachi, Pakistan*
[2]*Department of Internal Medicine, PNS Rahat Hospital, Karachi, Pakistan*

Abstract

Background: Diabetes Mellitus is a chronic illness that is characterized by high blood sugar levels and is associated with high mortality and morbidity due to its long-term complications. Glycosylated hemoglobin (HbA1c) is the gold standard test to assess glycemic control for a duration of three months. Therefore, awareness of diabetic patients regarding HbA1c is important for their appropriate management.

Objective: To evaluate the pattern and knowledge regarding HbA1c testing among diabetic patients.

Methods: Descriptive, cross-sectional study was conducted at the Department of Internal Medicine, The Indus Hospital (TIH), Karachi, From October 21, 2018, to April 20, 2019. After taking informed consent, a total of 380 diabetic patients fulfilling the inclusion criteria were interviewed by a resident in Internal Medicine. Besides demographic data, the recent value of HbA1c and knowledge of HbA1c were recorded on a predesigned questionnaire. The lab results of HbA1c were taken through the Health management informatics system (HMIS). SPSS software version 20 was used for data analysis.

Results: Out of a total of 380 patients, 131 (34.5%) were males and 249 (65.5%) were females. The mean age was 51.6±10.4 years. The majority of patients (64.5%) had no formal education. The mean BMI was 27.9kg/m^2. The mean duration of diabetes was 6.6+7.4 years. As far as knowledge about the HbA1c test was concerned, 14 patients (3.7%) had knowledge about the HbA1c test. 10 patients (2.6%) knew what the target HbA1c should be, 48 patients (12.6%) knew about the frequency of testing of HbA1c while 10 patients (2.6%) remembered their last HbA1c results. The patients who had knowledge about HbA1c were comparatively younger (mean age: 43.57 vs 51.98, p=0.003)

Conclusion: The results of the current study indicate the lack of awareness and knowledge of HbA1c testing among diabetic patients. It is also concluded that there is a need to create awareness among diabetic patients regarding the HbA1c test for their appropriate management.

Keywords: *Diabetes mellitus, complications, glycemic monitoring, HbA1C, knowledge.*

INTRODUCTION

According to International Diabetic Federation (IDF) [1], Pakistan ranks 3rd among the most prevalent countries with diabetes mellitus with an affected population of over 33 million, furthermore, Pakistan is placed at the top place for having the highest comparative diabetes prevalence rate in 2021 at 30.8%. Pakistan is also the country with the highest percentage of deaths under the age of 60 due to diabetes, with 35.5%.

Uncontrolled blood sugar level (HbA1c≥7%) leads to higher mortality and acute and chronic complications, for instance, kidney dysfunction, coronary artery disease, stroke, retinopathy, hypertension, and many other associated micro-and macro-vascular complications and early death [2-5].

In addition to anti-diabetic medication, patient compliance, awareness about the disease, patients' knowledge about their medicines, healthy eating options, exercise, self-monitoring of blood glucose levels and lifestyle modification play an integral role in the management of diabetes and prevention of its complications [6-9].

It is a common observation that many diabetic patients do not achieve desired glycemic control due to inadequate knowledge of the disease and lack of self-care. Health care professionals can help patients to make appropriate lifestyle changes and create awareness among them to improve their blood sugar control [10].

In patients with DM, Glycosylated hemoglobin (HbA1c) is the most reliable and regularly tested bio-marker for evaluation of glycemic control over a period of 3 months. A cut-off value of <6.5% indicates adequate glycemic control [11]. Considering the importance of HbA1c, a patient's awareness of recent and target HbA1c levels is a useful pre-requisite for the management of diabetes.

Numerous studies have been conducted in various parts of the world including Pakistan, to assess the knowledge of the diabetic patients regarding HbA1c and their results show the knowledge about HbA1c among diabetic patients ranges from 22 to 74%.

The aim of our study was to evaluate the pattern and awareness of HbA1c testing among diabetic patients

Corresponding author: Muhammad Nadeem Ahmed Khan, Department of Internal Medicine, The Indus Hospital, Karachi, Pakistan; Email: dr_mnakhan@hotmail.com
Received: February 22, 2022; Revised: April 15, 2022; Accepted: April 22, 2022
DOI: https://doi.org/10.37184/lnjpc.2707-3521.4.19

visiting Indus Hospital, Karachi which will help devise a strategy for patient education.

MATERIALS AND METHODS

After approval from the Institutional Review Board (IRB), this descriptive, cross-sectional study was carried out at the Department of Internal Medicine, The Indus Hospital, Karachi over a period of six months from October 21, 2018, to April 20, 2019. The results from a previous study showed that 60.9% of patients had knowledge of their HbA1c [12]. The sample size was calculated using open epi software. The calculated sample size was 380 patients at a 95% confidence interval and precision of 5%. Diabetic patients of either gender, giving informed consent, attending Indus Hospital's diabetes and internal medicine clinic for 6 months or more were included in the study. While diabetic patients refused to give consent, those with end-stage renal disease, haemoglobinopathies, or those who received a blood transfusion in the past 6 months were excluded from the study. After taking informed consent, the patients were interviewed by a resident of Internal Medicine on the day of their routine appointment. Demographic and clinical data including age, gender, education, monthly income in rupees, height in m^2, weight in kgs, Body Mass Index in kg/m^2, duration of diabetes in years, the recent value of HbA1c and knowledge of HbA1c was recorded on a Performa.

The Performa was reviewed by a research expert in which patients were asked four questions regarding HbA1c:

1) Do you know what the HbA1c test is?
   i) Yes ii) No
2) What is the frequency of testing HbA1c?
   i) know correctly ii) do not know
3) What is your target HbA1c?
4) What is your last HbA1c?

The lab results of HbA1c were taken through the Health management informatics system (HMIS). SPSS software version 20 was used for data analysis. Mean and standard deviation was calculated for quantitative variables. Frequency and percentage were calculated for qualitative variables. Effect modifiers were controlled through stratification of age, gender, BMI, education status and duration of diabetes. Group comparison was performed by Chi-square test or Students T-test as relevant. P-value <0.05 was considered to be statistically significant.

RESULTS

Out of a total of 380 patients, 131 (34.5%) were males and 249 (65.5%) were females with a male to female ratio of 1:1.8. The age ranged from 23 to 81 years with a mean age of 51.6±10.4 years. The mean BMI was 27.9+5.4kg/m^2. The mean duration of diabetes was 6.6+7.4 years. The mean HbA1c value was 7.9+10.1. The results of descriptive statistics are summarized in Table **1**.

Table 1: Clinical characteristics of diabetic patients (n=380).

Parameters	Number of patients	Percentage
Last HbA1c test		
Controlled	50	13.2
Uncontrolled	330	86.8
Knowledge about the HbA1c test		
Aware	14	3.7
Unaware	366	96.3
Knowledge about target HbA1c value		
≥6.5	10	2.6
≥6.5	1	0.3
Unaware	369	97.1
Knowledge about the frequency of HbA1c testing		
Aware	48	12.6
Unaware	332	87.4
Knowledge about the last HbA1c result		
Aware	10	2.6
Unaware	370	97.4

When the patient's knowledge regarding HbA1c was compared with BMI, duration of diabetes and years of education, the results were found to be statistically significant. However, no association was observed between age, knowledge of the last HbA1c result and awareness of the patients (**Table 2**).

Table 2: Correlation of knowledge about HbA1c with patients' characteristics (n=380).

Patients' Characteristics	Aware (n=14) (Mean ± SD)	Unaware (n=366) (Mean ± SD)	P value
Last HbA1c result	7.41 ± 1.6	8.39 ± 1.96	0.068
Age in years	43.57 ± 9.16	51.98 ± 10.36	0.369
Body Mass Index	26.85 ± 3.96	28.56 ± 5.77	**0.002
Year of Education	10.14 ± 3.28	3.46 ± 5.07	**<0.001
Duration of DM	11.04 ± 12.63	8.14 ± 7.05	**0.001

**Significant at p<0.01

Moreover, no significant association was observed between gender and knowledge of HbA1c as well (**Table 3**).

Table 3: Gender and Knowledge of HbA1c.

Knowledge of HbA1c	Yes, n=14 n(%)	No, n=366 n(%)	Total n(%)	P-value
Gender				
Male	7 (5.3)	124 (94.7)	131 (100)	0.254
Female	7 (2.8)	242 (97.2)	249 (100)	
Total	14 (3.7)	366 (96.3)	380 (100)	

DISCUSSION

Literature was reviewed to compare the characteristics of our study population with national and international data.

The mean age in our study was 51.67±10.43 years, which was comparable to studies carried out in Malaysia (53+10.91 years), India (53.5+11.4 years), Sargodha, Pakistan (50.77+9.67 years) and Kenya (53.1+0.92 years) [12-15].

Our study included 131 (34.5%) males and 249 (65.5%) females while there were more males (57.6%) than females (42.4%) in a Malaysian study [14].

The mean duration of diabetes was 6.6+7.4 years which was much lower than that reported in India, 9.3+7.2 years [13] but was in concordance with the study carried out at Sargodha (5.58 years) [12].

The mean HbA1c in our patients was 7.4+10.1 while that of patients at Sargodha was 9.00 [12].

Comparing the level of awareness about HbA1c with other studies, it was the lowest in our population at 3.7%. It was much lower than the figures of 22% reported at Jinnah Postgraduate Medical Centre, Karachi [16]. While in the Malaysian, Kenyan and Indian populations, the results were contrasting. The level of awareness in these countries was 60.9%, 67.7% and 74.2% respectively [13-15].

Similar to our study, the level of knowledge regarding HbA1c showed a positive association with higher education in the Indian and Malaysian populations while there was no association with gender, unlike our population [13, 14].

The possible reasons for such a low level of awareness about HbA1c in our study population might be poor literacy rate, low economic status and insufficient education of the patients by the health care providers. In contrast, the patients who were educated regarding self-management of chronic diseases had better functional status and less need for acute medical support as compared to those who lacked self-management [17]. Results from previous research show that cares are the fundamental source of diabetes information for their patients [18]. Similar to other studies [19, 20], our research also demonstrates a linear relationship between the duration of diabetes and knowledge of the disease among the patients.

CONCLUSION

This study shows a lack of knowledge about HbA1c in our population which in turn may lead to poor glycemic control, an increased susceptibility to develop diabetes-related complications and a subsequent increase in the healthcare costs. Keeping in view the results of this study, strategies to create awareness in patients should be encouraged in our clinical practice.

ETHICS APPROVAL

The study was approved by the IRD-IRB of The Indus Hospital (TIH) (reference #letter No. IRB-2018-04-013, Dated 19-07-2018). All procedures performed in studies involving human participants were in accordance with the ethical standards of the Helsinki declaration.

CONSENT FOR PUBLICATION

Written informed consent was taken from the patients.

AVAILABILITY OF DATA

The data are not publicly available due to privacy or ethical restrictions but can be presented on request from the corresponding author.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

AUTHORS' CONTRIBUTION

Ali M: conception and design of this study and revised it critically for important intellectual content. Data collection and supervised the statistical analysis, did literature search, interpretation of the results, drafted the manuscript and finalized it.

Khan MN: Acquisition of data and supervised the statistical analysis, did literature search, interpretation of the results, drafted the manuscript and finalized it.

Patel J: Conception and design of this work, supervised the whole study, did literature search.

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