

KNOWLEDGE OF HBA1C AMONG DIABETIC PATIENTS IN A RURAL TERTIARY HEALTH CARE CENTRE

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Abstract

Background: Patients with Diabetes mellitus are recommended to control their ABCs, i.e., HbA1c levels, Blood pressure, and LDL Cholesterol, to manage the disease and its complications effectively. Hence, diabetic patients need to be aware of the target HbA1c value. Studies have shown that self-knowledge of HbA1c values in diabetic patients is associated with better glycemic control and self-care practices. However, such data are limited in rural healthcare setups in India. Hence, the present study aims to determine the awareness and knowledge of HbA1c in a rural setting. The objective is to assess the knowledge of HbA1c among diabetic patients visiting the hospital and to determine the association between knowledge of HbA1c and glycaemic control. **Materials and Methods:** This cross-sectional observational study was conducted at a rural tertiary care hospital among 162 diabetic patients selected by purposive sampling. A questionnaire was used to assess knowledge about the HbA1c test. The biochemical test results obtained in the institute as part of diabetes management were used to assess glycemic control. **Result:** 32.7% of the participants were aware and 14.2% had good knowledge of HbA1c. Although good glycemic control was more among participants with good knowledge of HbA1c, this association was not statistically significant. **Conclusion:** The awareness of the HbA1c test was poor among the study population. Additionally, the general awareness of diabetic complications and the importance of follow-up consultation were unsatisfactory. Addressing the barriers to diabetic awareness and strengthening community and hospital-based health education programs is the need of the hour in our country, with a high prevalence of diabetes mellitus.

INTRODUCTION

Diabetes mellitus is a chronic non-communicable disease characterized by hyperglycemia, either due to insulin insufficiency or insulin resistance. Hyperglycaemia and dyslipidemia lead to vascular complications like chronic kidney disease,^[1,2] myocardial infarction, and stroke.^[1] Good glycemic control delays the development and progression of the complications of diabetes Mellitus.^[3,4]

The chronic care model (CCM) is the preferred approach in the management of diabetes mellitus. Self-care and health education are part of the 6 core components of the CCM.^[5,6]

Diabetes patients are advised to control their ABCs i.e. HbA1c levels, Blood pressure, and LDL (low-density lipoprotein) Cholesterol for effective management of the disease and its complications.^[7] The American Diabetic Association (ADA), and ICMR (Indian Council of Medical Research) guidelines for managing diabetes mellitus 2018,

recommend the HbA1c test during follow-up visits to assess glycaemic status.^[8,9] ADA advocates setting HbA1c targets that are patient-centric and individualized. Thus, awareness of their target HbA1c value and its significance among diabetic patients is important.

Berikai and colleagues reported diabetic patients who gained knowledge of HbA1c during the health education program had better glycaemic control.^[10] Awareness of the HbA1c target value, and the ability to recall previous values are associated with better self-care behavior.^[11] A study done in India showed that participants who were aware of HbA1c and their target had lower mean HbA1c levels than the unaware group.^[12] A study done in a medical college hospital in India showed that awareness of HbA1c in diabetic patients was only 11.5%, and 68.5% of the study participants were from urban areas.^[13]

General awareness and self-reporting of diabetes are shown to be low in rural areas as compared to urban areas.^[14-16] Studies about self-knowledge of HbA1c

among diabetic patients are limited in rural healthcare setups in India. So, in this study, we investigated the patients' knowledge about HbA1c levels in the rural tertiary health care center.

Objectives:

- To assess the knowledge of HbA1c among diabetic patients visiting the hospital.
- To determine the association between knowledge of HbA1c values and glycemic control among them.

MATERIALS AND METHODS

We conducted this cross-sectional observational study in a rural tertiary care hospital from July 2021 to October 2021. Institutional Human Ethics Committee (IHEC) clearance was obtained for the study. Purposive sampling was done and 162 diabetic patients who visited the institute for the management of diabetes mellitus were recruited after obtaining informed consent. The patients diagnosed with diabetes as per ADA criteria for at least 3 months before the present visit were included in the study. Patients with chronic kidney disease, severe anemia, and who had a blood transfusion in the past 3 months were excluded from the study.

Awareness and knowledge of HbA1c among patients were assessed by telephonic interview using a questionnaire. The other socio-demographic details and relevant medical history and test results related to diabetes were obtained during the interview. Data from laboratory investigations (i.e., FBS, PPBS, RBS, and HbA1c) done in the institute as part of the management of diabetes in these patients were utilized to assess glycemic control.

Statistical analysis: Data was entered into MS Excel and analyzed using SPSS version 16. Descriptive analysis was done using percentages and mean and standard deviation (SD). Inferential analysis was done using the Chi-square test, where a probability value of less than 0.05 ($p < 0.05$) was considered significant.

RESULTS

The mean age of the study population was 51.5 ± 11.6 years. One-third were illiterate, and nearly three-fourths (77.2%) of the study participants were residing in rural areas [Table 1].

In the study population, the mean duration of diabetes is 5.97 ± 2.7 years, with 43.8% of them with a duration of 1-5 years [Table 2]. The mean age at diagnosis was 45.9 ± 10.6 years and the range were 20-68 years.

Awareness and knowledge of HbA1c: Awareness and knowledge of the HbA1c test in study participants were assessed using a questionnaire as shown in Figure 1. One-third of the participants were aware of HbA1c tests, but only 14.2% had good knowledge i.e. knew their target HbA1c.

Knowledge of HbA1c and its association with glycemic control: As the recent HbA1c values were

available for only 110 participants, for the rest 52 participants, PPBS, FBS, and RBS were considered to be categorized as good and poor diabetic control. Participants with HbA1c of $<7\%$ or any of the FBS/PPBS/RBS values $<126\text{mg/dl}$, $<200\text{mg/dl}$, and $<200\text{mg/dl}$ respectively were considered to have good glycemic control.

In the study sample, only 27 participants (16.7%) had good glycemic control and 135 (83.3%) had poor glycemic control. Among participants with good knowledge, 7 (30.5%) had good glycemic control, while in the poor knowledge group, 20 (14.4%) had good glycemic control. The percentage of participants with good glycemic control was higher among the good knowledge group. However, the difference observed between groups was not statistically significant [Figure 2].

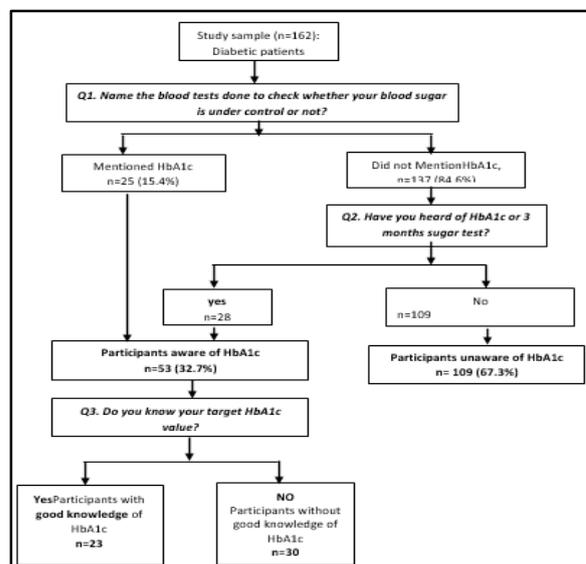


Figure 1: Awareness of HbA1c among study participants (n=162)

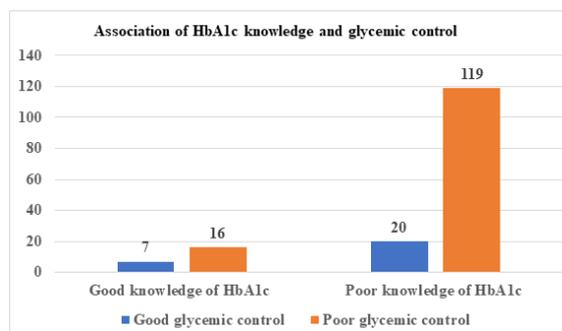


Figure 2: Association of Knowledge of HbA1c and glycemic control (n=162)

($p=0.0592$, $p > 0.05$ is not statistically significant)

Awareness of complications of diabetes, attitude towards their glycemic control, and practice concerning follow-up visits.

Awareness regarding complications was assessed through the questionnaire as shown in Table 3. 17.9% were unaware of complications. 25.9% did not know

the organs affected by poor glyceic control. The glyceic control was poor (83.3%) in the study population, and only 47.5% came for regular follow-up as advised.

Source of information regarding diabetes mellitus and its management: Treating physicians was the only source of information about Diabetes Mellitus,

its complications, and the tests available in 66.6% of participants. The rest of the participants also mentioned other sources such as TV and radio, Newspapers/ magazines, the Internet, or Friends/ relatives. The community health worker i.e. ASHA, and Anganwadi workers were a source of information for only 8 (4.5%) of the study population.

Table 1: Socio-demographic details of the study participants (n=162).

Variables	Frequency	Percentage
Age in years		
<40	30	18.5%
40-50	44	27.2%
50-60	58	35.8%
60-70	30	18.5%
Gender		
Females	59	36.4%
Males	103	63.64%
Education		
Illiterate	56	34.6%
Schooling (1-10 std)	48	29.6%
Pre-university	29	17.9%
Graduate	20	12.3%
Postgraduate	9	5.6%
Occupation		
Unemployed	7	4.3%
Homemaker	50	30.9%
Farmer	48	29.6%
Labourer	7	4.3%
Self-employed	2	1.2%
Salaried	48	29.6%
Residential address		
Urban	9	5.6%
Semi-urban	28	17.3%
Rural	125	77.2%

Table 2: Diabetes mellitus-related history in the study population (n=162)

Variables	Frequency	Percentage
Duration of Diabetes mellitus in years		
<1	27	16.7%
1-5	71	43.8%
5-10	30	18.5%
>10	34	21%
Medications		
Oral hypoglycemic drugs	121	74.7%
Insulin	13	8%
Combined	25	15.4%
Not on medication	3	1.9%
Microvascular complication		
No complication	104	64.2%
Nephropathy	6	3.7%
Neuropathy	11	6.8%
Retinopathy	26	16.1%
Nephropathy and retinopathy	1	0.6%
Neuropathy and retinopathy	14	8.6%
Family history of diabetes mellitus		
Present	72	44.4%
Not present	90	55.6%
Other comorbidities		
Hypertension	54	33.3%
Cardiovascular disease	10	6.2%
Dyslipidemia	17	10.5%

Table 3: Awareness of diabetic complications, perception of glyceic control, and attitude toward follow-up visits (n=162)

Variable	Frequency	Percentage
“Why is it important to have blood sugar under control?”		
Aware of DM-associated complications	133	82.1%
Unaware of DM-associated complications	29	17.9%
Name the organs affected due to poor glyceic control.		

Mentioned none	42	25.9%
Mentioned 1-2 organs	62	38.3%
Mentioned 3/>3 organs	58	35.8%
Do you think your blood sugar is under control?		
Yes	114	70.4%
No	48	29.6%
Follow-up visits are done as per doctors' advice		
Regular Follow-up	77	47.5%
Missed sometime	42	25.9%
Missed often	43	26.5%
Reasons for missing follow-up visits		
Participants believed Frequent consultation is not necessary	38	23.5%
Work commitment	29	17.9%
Family commitments	6	3.7%
Financial constraints	7	4.3%
Covid restriction	5	3.1%

DISCUSSION

The awareness of HbA1c was poor among the study population, about 32.7% were aware of the test which is slightly higher than in a study done in an Indian setting¹³, in which 11.5% were aware of HbA1c. However, in the present study, out of 162 participants, only 14.2% were having good knowledge (knew their target value). The awareness of HbA1c and knowledge of the target value was less compared to another study in India where awareness of HbA1c was about 74.2% and 42% knew their goal.^[12] This may be due to more participants from the urban area compared to the rural area (14.9%) in that study. In contrast, the present study has only 5.6% of participants from the urban area and rest were from semi-urban and rural areas. So poor awareness about HbA1c is expected, as the general awareness of diabetes and its complications itself is documented to be poor in the rural areas.^[16]

Studies have reported a good association between knowledge of HbA1c and glycemic control.^[10,12,17] In this study, good glycemic control was seen in 30% of participants with good knowledge of HbA1c compared to 14.4% of participants with poor knowledge, but the association was statistically not significant. This may be due to the classification of good and poor control was not based solely on HbA1c but FBS, PPBS, and RBS values were also considered, as HbA1c values were not available for all the study participants. In most of the above-mentioned studies, the HbA1c values were compared between the groups. Another possible reason may be a small sample size, which warrants more studies concerning awareness of diabetes and its management to be done in rural settings.

In the present study, a majority (82.1%) of participants were aware of the association of complications of diabetes mellitus with glycemic control. However, 25.9% were not aware of the organs involved. It reflects the poor knowledge about the association of hyperglycemia with complications even among diabetes patients.^[15,16] Practice concerning follow-up consultation for diabetic patients was investigated, as HbA1c is one of the preferred tests for monitoring glycemic control during follow-up visits. Only about 47.5% came for

follow-up as per the doctor's advice, 25.9% missed some time and 26.5% missed often. The reason for missing follow-up visits included work commitment in 17.9% of cases and 23.5% of the participants thought that frequent visits were not necessary.

The glycemic control was poor in the study population. i.e. 83.3% had poor control, but 70.4% thought that they had adequate control of blood sugar levels. This perception reflects the poor attitude of the patients toward glycemic control. This will affect their follow-up consultation for monitoring the disease progress and make them prone to the development of complications early.

In this study source of information on diabetes, complications, and laboratory tests available was looked into, and all the participants mentioned treating physicians as the main source of information. Two-thirds of the study participants (66.6%) mentioned no other source such as TV and radio, Newspapers/magazines, the Internet, or Friends/relatives. The community health workers were a source of information for only 4.5% of the study population. This reflects the lacuna in the diabetic awareness and educational programs conducted at the community level in rural India.

Overall awareness levels on various aspects of Diabetes mellitus, including HbA1c, were very poor among the study participants. This can be a hindrance to the self-care management of the disease, which is essential to prevent complications.

CONCLUSION

Awareness and knowledge of HbA1c were poor in this rural-based study. Also, the general awareness of diabetic complications and the importance of follow-up consultation were not satisfactory. Diabetes mellitus is a growing concern in our country with a prevalence of about 9.6%¹⁸. The International Diabetes Federation (IDF) projects a 68% increase, from 90 million in 2021 to 152 million by 2045 among southeast Asian countries including India¹⁹. A chronic care model is a desirable approach for the management of diabetes. It includes health education of patients about the disease at the community level. Health workers who are primary contacts with the public should be better educated and engaged in

health education campaigns. Using mass media to advertise the various aspects of diabetes in a simple, understandable manner can also help in this regard. Further, addressing the barriers to diabetic awareness and strengthening the community-based and hospital-based health education programs is the need of the hour. Diabetes monitoring should be prioritized by making diabetes-related tests more affordable and easily accessible for the rural population.

REFERENCES

1. Klein R. Hyperglycemia and microvascular and macrovascular disease in diabetes. *Diabetes Care*. 1995;18(2):258-268. doi:10.2337/diacare.18.2.258
2. Prasannakumar M, Rajput R, Seshadri K, et al. An observational, cross-sectional study to assess the prevalence of chronic kidney disease in type 2 diabetes patients in India (START -India). *Indian J Endocrinol Metab*. 2015;19(4):520-523. doi:10.4103/2230-8210.157857
3. Diabetes Control and Complications Trial Research Group, Nathan DM, Genuth S, et al. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med*. 1993;329(14):977-986. doi:10.1056/NEJM199309303291401
4. Stratton IM, Adler AI, Neil HAW, et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. *BMJ*. 2000;321(7258):405-412. doi:10.1136/bmj.321.7258.405
5. Association AD. 1. Improving Care and Promoting Health in Populations: Standards of Medical Care in Diabetes—2021. *Diabetes Care*. 2020;44(Supplement_1):S7-S14. doi:10.2337/dc21-S001
6. American Diabetes Association. 5. Facilitating Behavior Change and Well-being to Improve Health Outcomes: Standards of Medical Care in Diabetes—2021. *Diabetes Care*. 2020;44(Supplement_1):S53-S72. doi:10.2337/dc21-S005
7. Patient education: The ABCs of diabetes (The Basics) - UpToDate. Accessed October 30, 2021. <https://www.uptodate.com/contents/the-abcs-of-diabetes-the-basics>
8. ICMR_GuidelinesType2diabetes2018_0.pdf. Accessed November 22, 2021. https://main.icmr.nic.in/sites/default/files/guidelines/ICMR_GuidelinesType2diabetes2018_0.pdf
9. American Diabetes Association. 6. Glycemic Targets: Standards of Medical Care in Diabetes—2021. *Diabetes Care*. 2020;44(Supplement_1):S73-S84. doi:10.2337/dc21-S006
10. Berikali P, Meyer PM, Kazlauskaitė R, Savoy B, Kozik K, Fogelfeld L. Gain in Patients' Knowledge of Diabetes Management Targets Is Associated With Better Glycemic Control. *Diabetes Care*. 2007;30(6):1587-1589. doi:10.2337/dc06-2026
11. Willaing I, Rogvi SA, Bøgelund M, Almdal T, Schiøtz M. Recall of HbA1c and self-management behaviors, patient activation, perception of care and diabetes distress in Type 2 diabetes. *Diabet Med J Br Diabet Assoc*. 2013;30(4):e139-142. doi:10.1111/dme.12121
12. Kumpatla S, Medempudi S, Manoharan D, Viswanathan V. Knowledge and Outcome Measure of HbA1c Testing in Asian Indian Patients with Type 2 Diabetes from a Tertiary Care Center. *Indian J Community Med Off Publ Indian Assoc Prev Soc Med*. 2010;35(2):290-293. doi:10.4103/0970-0218.66858
13. Prabhu M, Kakhandaki A, Chandra KRP, Dinesh MB. A Hospital-Based Study Regarding Awareness of Association Between Glycosylated Haemoglobin and Severity of Diabetic Retinopathy in Type 2 Diabetic Individuals. *J Clin Diagn Res JCDR*. 2016;10(1):NC01-NC04. doi:10.7860/JCDR/2016/15834.7014
14. Joshi SR. Diabetes Care in India. *Ann Glob Health*. 2015;81(6):830-838. doi:10.1016/j.aogh.2016.01.002
15. Mohan V, Prathiba V, Pradeepa R. Tele-diabetology to Screen for Diabetes and Associated Complications in Rural India. *J Diabetes Sci Technol*. 2014;8(2):256-261. doi:10.1177/1932296814525029
16. Scopus preview - Scopus - Document details - Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. Accessed November 23, 2021. <https://www.scopus.com/record/display.uri?eid=2-s2.0-84995814366&origin=inward&txGid=396532707853ae801b083271770e9a8a>
17. Willaing I, Rogvi SA, Bøgelund M, Almdal T, Schiøtz M. Recall of HbA1c and self-management behaviours, patient activation, perception of care and diabetes distress in Type 2 diabetes. *Diabet Med*. 2013;30(4):e139-e142. doi:10.1111/dme.12121
18. IDF-Atlas-Factsheet-2021_SEA.pdf. Accessed April 4, 2022. https://diabetesatlas.org/idfawp/resource-files/2021/11/IDF-Atlas-Factsheet-2021_SEA.pdf
19. IDF Diabetes Atlas 2021 | IDF Diabetes Atlas. Accessed April 4, 2022. <https://diabetesatlas.org/atlas/tenth-edition/>