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(RESEARCH ARTICLE)

Glycosylated hemoglobin test awareness and practice among patients with type 2 diabetes mellitus

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Abstract

Glycosylated hemoglobin test (HbA1c) is the gold standard biochemical marker of glycemic control among patients with diabetes mellitus (DM). Despite, the public awareness created by Government and private organizations regarding the prevention of diabetes complications, most patients with DM never heard of HbA1c. Hence this study aimed to assess knowledge and practice about glycosylated hemoglobin test and its association with selected demographic variables among type 2 diabetic patients. Totally 200 patients (121 male and 79 female) with type 2 DM were selected by using convenience sampling technique, who met the inclusion criteria. The data were collected through an online form using a structured questionnaire after obtaining informed consent. After collection, data was analyzed and summarized. The overall mean and standard deviation of knowledge regarding glycosylated hemoglobin test was 47.4±16.67. Mean and standard deviation of good knowledge was 81.32±6.38, for average knowledge level 57.66±6.93 and for poor knowledge 35.34 ± 5.81. Among them, 97 (48.5%) patients had done the HbA1c test and only 23 (11.5%) were known about the result of the test and it was ranged between seven to ten percent. There was a significant association between the level of knowledge with selected demographic variables such as education and duration of DM at $P<0.001$ and $P<0.05$ respectively. The results evidenced that most patients with DM had inadequate knowledge and poor practice regarding glycosylated hemoglobin test. It is very important to address about HbA1c test and its need for regular practice among patients, to monitor and combat DM effectively.

Keywords: Glycosylated Hemoglobin Test; Practice; Type 2 Diabetes Mellitus; HbA1c

1. Introduction

Type 2 diabetes mellitus (DM), is a major chronic and metabolic health problem, characterized by an increased level of blood sugar for a prolonged period [1]. It is a big threat to global health as it is rapidly emerging and raising its prevalence [2]. There are several studies that proved the prevalence of Type 2 diabetes is increasing, especially in India [3-5]. The number of people with DM in India has increased from 26 million in 1990 to 65 million in 2016. According to the 2019 National Diabetes and Diabetic Retinopathy Survey report released by the Ministry of Health and Family Welfare, the prevalence was found to be 11.8% in people over the age of 50. In the state level, Kerala has the largest number of diabetes patients followed by Tamil Nadu and Punjab, according to endocrinologists and diabetologists [6].

If diabetes is untreated, it may lead to many complications to human beings such as cardiovascular diseases, neurological damage, chronic kidney diseases, ophthalmic problems, foot ulcers, and hepatic coma [7, 8]. Several studies have reported that improved glycemic control can reduce the development and/or progression of diabetic complications [9].

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It is necessary to measure the glycemic level for the prevention of long term diabetic complications. The glycosylated hemoglobin test (HbA1c) is one of the most widely reliable, accessible, and acceptable outcome measures [10]. This test provides an index of average blood glucose level for the previous two to three months, most needed for all diabetic patients to have glycemic control [11]. All patients with DM need to aware of glycosylated hemoglobin test, its value, and importance according to the recommendation of the American Diabetes Association [12].

HbA1c is a form of hemoglobin that is chemically linked to a sugar mostly monosaccharides, which may be glucose, galactose, and fructose when it presents in the human's bloodstream. However, glucose is less likely to do so than galactose and fructose because 13% of fructose and 21% of galactose only linked, which may explain the rationale of the frequent usage of glucose as the primary metabolic fuel in humans [13, 14].

Care of chronic illness and self-care management is positively associated with health outcomes. Many studies have witnessed that most people with DM do not aware of glycosylated hemoglobin test or it's values [15]. There is an unclear view about whether the awareness level is associated with patient efficient self-management and positive health outcomes [16]. Several studies have been conducted on the effectiveness of diabetes counseling and education and it proved that there was a beneficial effect of education and motivation on diabetes control and reduction of complications, however many studies opportunities missed by physicians for providing diabetes education and counseling aimed at optimizing glycemic control [17].

Despite, the public awareness created by many organizations regarding the prevention of diabetes complications, most patients with DM have never heard of the term HbA1c or glycosylated hemoglobin test and do not know their HbA1c levels and target goal. Hence the study aimed to assess knowledge and practice about glycosylated hemoglobin test and its association with selected demographic variables among type 2 diabetic patients.

2. Material and methods

In a descriptive research design, a cross-sectional survey approach was used to assess the knowledge and the practices related to glycosylated hemoglobin test among the patients with Type 2 DM. The research was carried out in Chennai urban area, DM outpatients through the online questionnaire method. Totally 200 patients with type 2 DM were selected by using convenience sampling technique, who met the inclusion criteria.

The data was collected by using a structured questionnaire. The tool consists of demographic variables, structured questionnaire on knowledge assessment, and the checklist for assessing the practice. Demographic variables included age, gender, education, occupation, family type, family history of DM, duration of DM, and treatment methods adopted. Knowledge was assessed by using 12 items based on multiple-choice questions which were developed from various available literature related to glycosylated hemoglobin test.

The practice was evaluated by using a checklist showing 'yes' or 'no' responses and few open-ended questions. The validity and reliability of the tool was tested. According to the data plan, the data was collected from the patients with DM after obtaining informed consent. The scores were categorized as follows; they were below 50% indicates poor knowledge, 50 – 75% shows average knowledge and above 75% is considered as good knowledge. The collected data were analyzed by using descriptive and inferential statistics by using Statistical Package for Social Sciences(SPSS) package version 22, which includes number frequency, mean, standard deviation, and chi-square test for statistical analysis.

3. Results

The data were collected, analyzed and tabulated for interpreting the results. The study findings showed that, the frequency distribution of demographic variables among patients with DM. Among the total (200) study participants, 28 (14%) were in the age of less than 40 years, 56 (28%) were in the age between 40-50 years, 84 (42%) in 51-60 years and 32 (16%) patients were in the age of more than 60 years old. Most of the study participants were 121 (60.5%) male and the remaining 79 (39.5%) were female. Seventy-five patients (37.5%) had obtained higher secondary level education, 64 (32%) had graduated, 49 (24.5%) had schooled up to high school level and 12 (6%) had educated till the primary level. There were 43 (21.5%) homemakers, all were female. Few 14 (7%) were retired from the job, 28 (14%) were involved in the business, 79 (39.5%) were worked under private concerns and 36 (18%) were under Government organizations. Among the total patients, 114 (57%) were Hindus, 32 (16%) were Muslims, 38 (19%) were Christians and the remaining 16 (8%) were Jains. Regarding family type, 68 (34%) were in the nuclear family and 132 (66%) were in joint family system.

Totally 134 (67%) were having a family history of DM in which, 32 (16%) fathers, 61 (30.5%) mothers, 13 (6.5%) grandparents, and 28 (14%) both parents and grandparents were having the history of DM. The duration of DM ranged between one to five years for 84 (42%) patients and six to ten years for 62 (31%) patients. Thirty-one (15.5%) patients had DM for more than 10 years and 23 (11.5%) patients had DM for less than one-year duration. Among them, 132 (66%) were taking oral drugs, 31 (15,5%) were taking insulin injection, 28 (14%) were taking both oral and injection as a treatment method of DM.

The overall score of knowledge level interpreted in Table number one. Out of the 200 patients, 21 (10.5%) were having the good knowledge score between 75% to 100%, whereas 65 (33.5%) were having an average level of knowledge score between 50% to 74%, and 114 (57%) were having poor knowledge which means the score was less than 50%. These results evidenced that most of the patients did not have awareness regarding glycosylated hemoglobin test.

Table 1 Frequency distribution of knowledge level regarding HbA1c test (n=200)

Knowledge Level	Number (%)
Good knowledge	21 (10.5)
Average knowledge	65 (33.5)
Poor knowledge	114 (57)

Regarding the practice of HbA1c test, out of 200 patients with DM, 97 (48.5%) patients had done glycosylated hemoglobin test. Among them, 38 (19%) patients had done the test once, 23 (11.5%) patients for two times, 18 (9%) patients for three times, six (3%) patients for four times and remaining 12 (6%) patients had done for more than four times. Totally 62 (31%) patients had done the test within this year and remaining 35 (17.5%) patients did not aware when the test was done. Few of them 23 (11.5%) were known about the result of the HbA1c test and it was ranged between seven to ten percentage.

4. Discussion

The study on glycosylated hemoglobin test awareness and practice among patients with type 2 DM conducted in Chennai. In this current study, we determined that 0mly 10.5% of patients with DM had adequate knowledge and 33.5% had average information about the HbA1c test. The study conducted by Mohan et al (2005) on awareness and knowledge of diabetes in Chennai evidenced that among the self-reported diabetic subjects, only 40.6% (621/1529) were aware that diabetes could produce some complications. According to that study result, awareness and knowledge regarding diabetes was grossly inadequate in India [18].

The study conducted in the United States evidenced that 66% of the patients did not know their last A1c results, with only 25% able to accurately report the value [16]. In the current study, only 38 (19%) patients had done the test one time in their life and 17.5% of patients did not aware when the test was done. Another study conducted in Kenya proved that only 20% of patients had ever done at least once the glycosylated hemoglobin test. Among those who had done the test, the average level of HbA1c was more than 90% had > 8% as the high level. However, only 67.7% of patients interviewed in that study, had heard of the term HbA1c test [19]. The results were supported by a similar study conducted by Adenisa et al in Nigeria [20].

The report of our study showed that 11.5% were known about the result of the HbA1c test, in that most 76% were having poor glycemic control and it was more than eight percent. These results were supported by another study in which 40 patients who had undergone testing of glycosylated hemoglobin, most of them (90%) had poor glycemic control which means the HbA1c level was more than seven percent. This report suggested that people unaware of glycemic control and its complications [21].

The chi-square test proved in this research that there was a significant association between the level of knowledge with the selected demographic variables such as education and duration of DM at $P<0.001$ and $P<0.05$ respectively. This result was accepted by a similar study conducted on knowledge and practice of self-care management on diabetes mellitus among urban people in Tamilnadu [22].

The reason for poor awareness about the glycosylated hemoglobin test may be due to the nonliterate or cost of undergoing medical testing or carelessness in health matters. There is a necessity to increase patient's involvement and spreading valuable information about the HbA1c test as it is a reliable biomarker for the diagnosis and prognosis of diabetes. Every patient with DM must note that the HbA1c levels are directly proportional to the blood glucose levels [23]. HbA1c is not alone a useful biomarker of long-term glycemic control but also a good predictor of lipid profile; thus, monitoring of glycemic control using HbA1c could have additional benefits of identifying diabetes patients who are at a greater risk of cardiovascular complications. Thus, a single HbA1c test provides valuable information that can be used for the management of chronic diseases [24].

5. Conclusion

The results of the current study indicated that most of the patients with DM had inadequate knowledge and poor practice of glycosylated hemoglobin test and its values in Chennai city. This poor awareness may lead to increased susceptibility to the development of diabetic complications, and there is a high risk for not only severities of health issues, but also the potential for high healthcare costs among these patients. As a health care professional, it is our responsibility to bring changes in policy which should address the importance of the HbA1c test and its awareness among people in Chennai, to monitor and combat DM effectively.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

Suhail Hassan and Sahbanathul Missiriya declare that they have no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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