Awareness of HBA1C Test and Its Association with Retinopathy among Diabetic Patents: A Statistical Sudy

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Doi:10.29072/basjs.202032

Abstract

Diabetic retinopathy refers to vascular disease in the retina of the eye that affects patients diagnosed with diabetes. The HbA1c test is closely related to retinopathy. Therefore, an early HbA1c test may prevent or reduce the retinopathy. In this study a self-administered online questionnaire was distributed in Basrah city among diabetics to assess their awareness of the HbA1c test and its relationship to detect the retinopathy. Out of 353 (208 female, 145 male) diabetics, 179 (50.70%) had poor awareness, 119 (33.71%) had moderate awareness and 55 (15.58%) had good awareness. The total awareness score with a mean ± SD of 5.4 ± 1.2, indicating that the lack of awareness about HbA1c was related to the age (P-value = 0.001), lower level of education (P-value < 0.0001) and to the lack of awareness that the patients received from their health centers (P-value = 0.031).

Article inf.

Received: 17/8/2020

Accepted 7/10/2020

Published 31/12/2020

Keywords:

HbA1c Test, Diabetic retinopathy (DR), Diabetes mellitus (DM), Statistical analysis

1. Introduction

Diabetes mellitus (DM) describes as one of the factors which affect the body's ability to process and use glucose for energy [1]. However, any insulin deficiency (in terms of excretion or action) leads to DM. The International diabetes federation (IDF) estimated the global diabetic population to be 425 million in 2017 and is set to rise to 628.6 million by 2045 [2]. Most diabetics suffer from diabetic retinopathy [3]. Diabetic retinopathy (DR) refers to vascular disease of the retina which leads to blindness. In the United States, DR is one of the leading causes of blindness in people between 20 and 60 years old [4]. With the spread of diabetes around the world, it is also expected prevalence of diabetic retinopathy exponentially [5].

Many diabetics do not realize the relationship of diabetic retinopathy to blindness. However, many studies are predicted that a patient's early knowledge of DR can help prevent blindness in the future. Lately, it has been observed that maintaining blood sugar control can help prevent DR [6]. One of the most important tests that the American Diabetes Association (ADA) recommends to control blood sugar is the HbA1c test [7]. The level of HbA1c test should be less than 6.5% as a goal to control blood sugar. On the other hand, higher levels of the HbA1c test were associated with complications and vascular insufficiency of the eye [8]. However, data about the association between the awareness of HbA1c tests and diabetic retinopathy are not available in most countries in spite of increasing the number of diabetic patients every year [8].Recent studies on DR have been published from Al-Nasiriya, Wasit and Kurdistan among diabetic patients [9, 10, 11]. To the best of our knowledge, no such study has been published on HbA1c test awareness, knowledge, and DR in Basrah, Iraq. This study aims to assess the awareness of HbA1c test and its relationship to detect the DR among diabetic patients in Al -Basrah city, Iraq.

2. Materials and Methods

2.1 Ethical clearance

Participation in the study was voluntary and identification information was not collected from the study subjects. The study included the age groups 20 - 60 and over for both male and female genders. Participants had to answer a Yes - No question to confirm their voluntary participation. After confirmation for participation, they were directed to complete the questionnaire.

2.2 Data collection

Data in this study was collected online through a survey over a span of three weeks from June 8th to June 30th, 2020. A self-administered questionnaire was distributed online, which also contained a brief introduction to the objective of the study and voluntary participation. A demographic section of the questionnaire contained information regarding: gender, age, educational level, receive awareness from health centers and smoking. Awareness and knowledge section about HbA1c test and DR has included a total of 11 questions: three of the questions about knowledge of DM, eight others questions for awareness about HbA1c testing and its relationship to detect the DR. After completing data collection, it was entered and saved in order to prepare it for analysis by utilizing the Statistical Package for the Social Sciences (SPSS) Version 20.

2.3 Statistical analysis:

Statistical analysis included the following:

1. Descriptive statistics was performed as frequency and percentage tables.

2. Compute the mean and standard deviation for the continuous data.

3. p - values of < 0.05 were considered to indicate statistical significance.

3. Experimental Results

The study contains 353 of diabetic's patients. The majority of the respondents were female (n = 208, 58.92%) and the remaining were male (n =145, 41.08%). Most of the respondents were in age group of 31 - 40 years (n = 148, 41.92%). One-third of of the respondents who had a university degree and high school education (n = 148, 41.92%), (n=58, 16.43%), respectively, 14.44% of responses had elementary education (n=58), 16.43% of responses had intermediate education (n=51). More than half of the participants (247) does getting information about the importance of HbA1c form their health care. About smoking, most of patients were no smoking (n=301, 85.26%) and the remaining were smoking (n=52, 14.73%). Table 1 shows the results of demographic data.

Table 1: Demographic Data

Variable	No.	%
Gender		
Female	208	58.92
Male	145	41.07
Age		
Less than 20	9	2.54
21 – 30	115	32.57
31 – 40	148	41.92
41 – 50	63	17.84
50 – *over*	18	5.09
Education		
Elementary	58	16.43
Intermediate	51	14.44
High school	99	28.04
University	102	28.89
Other	43	12.18
Is the patient were getting some information about HbA1c from their health care		
No	247	69.97
Yes	106	30.02
Smoking		
No	301	85.26
Yes	52	14.73

The knowledge results of DM showed that it is less than half 152 of patients (43.05%) had DM between 1 - 5 years, 107 patients (30.31%) had DM between 6 -10 years and the other patients (n = 94, 26.62%) had DM more than 10 years. On the other hand, 131 patients (37.11) using oral treatment, 123 patients (37.11) using needle and the other using both (oral and needle) (n = 99, 28.04). Nearly two-thirds of 219 (62.03%) were recorded as controlling blood sugar. Table 2 is listed the results of DM.

Table 2: Knowledge of DM

Variable	No.	%
Duration of diabetes		
1 – 5 *years*	152	43.05
6 – 10 *years*	107	30.31
more than* 10 *years	94	26.62
Type of treatment		
oral	131	37.11
needle	123	34.84
both	99	28.04
Controlling blood sugar		
yes	219	62.03
no	134	37.96

Three-quarters of the participants (n =267, 75.63%) reported that the diabetes may cause blindness. However, most participants believed that the diabetics should be screen the eye as there is symptoms (n = 153, 43.34%). On the other hand, 215 of participants (60.90%) aware there is a relationship between diabetes and DR. Most answers indicate that the participants believed that controlling a blood sugar is sufficient to reduce or prevent DR, (n = 234, 66.28%). The majority of respondents were those who tested the DR between 1 – 3 years (n = 167, 47.30). Almost half of the answers (n = 189, 53.54%) indicated that the participants had a HbA1c testing between 1-2 years. On the other hand, many participants are not aware that an increased the HbA1c ratio is closely related to DR (n = 227, 64.30%). Also, most answers (n = 110, 31.16%) showed that the diabetes does not know the outcome of HbA1c test. Table 3 shows awareness about HbA1c testing and its relationship with the detected DR.

Table 3: Awareness of HbA1c testing and its relationship with the detected DR

Variable	No.	%
Diabetes (DM) may cause to blindness		
No	86	24.36
Yes	267	75.63
There is a relationship between DM and DR		
No	215	60.90
Yes	138	39.09
In your opinion, controlling a blood sugar is enough to prevented/reduced the DR		
No	119	33.71
Yes	234	66.28
Duration of do DR test		
During the current diagnosis	62	17.56
1 – 3 years	167	47.30
more than 3 years	124	35.12
In your opinion, how many times diabetics should examine the eye and retina		
Every six months	89	25.21
Every year	111	31.44
If there is symptoms on eye	153	43.34
Is the patient aware that the increased HbA1c ratio is closely related to DR		
No	227	64.30
Yes	126	35.69
Duration of do HbA1c test		
During the current diagnosis	52	14.73
1 – 2 years	189	53.54
more than 3 years	112	31.72
If the patient checks HbA1c, what is the recorded value		
4 % – 5.6%	97	27.47
5.7%	105	29.74

5.7 % – 6.4 % *I don't know*	41 110	11.61 31.16

Using bivariate analysis, the predictors were determined to aware about a HbA1c test and its association with the DR. The main indicators for prediction are the age and the level of education. Younger participants are more likely to be more aware and familiar about HbA1c test (P-value = 0.001). Moreover, the participants with a high level of education are more likely to know the meaning of HbA1c test (P-value < 0.0001). The participants were getting some information about HbA1c test from their health care are more likely to know the meaning of HbA1C test (P-value = 0.031) (see Table 4). The following variables were not predictive to know the awareness of HbA1c including gender and smoking.

Table 4: Predictors of awareness about a HbA1C test and its association with the DR

Variable	No.	%	P - value
Gender			0.673
Female	208	58.92	
Male	145	41.07	
Age			0.001
Less than 20	9	2.54	
21 – 30	115	32.57	
31 – 40	148	41.92	
41 – 50	63	17.84	
50 – *over*	18	5.09	
Education			< 0.0001
Elementary	58	16.43	
Intermediate	51	14.44	
High school	99	28.04	
University	102	28.89	
	43	12.18	

Ot□er			
Is the patient were getting some information ab from their health care		**Lc**	0.031
No	247	69.97	
Yes	106	30.02	
Smoking			0.899
No	301	85.26	
Yes	52	14.73	

Table 5 contains the results of awareness level score. Results confirmed that the mean awareness score was 5.4 ± 1.2. Where, the responses indicated that 179 (50.70%) of participants had poor level of awareness, 119 (33.71%) had moderate level of awareness and 55 (15.58%) had good level of awareness.

Table 5: The results of awareness level score

Variable	**Mean ± SD**	-
Awareness level score	5.4 ± 1.2	-
Awareness level score	**No.**	%
Poor level	179	50.70
Moderate level	119	33.71
Good level	55	15.58

4.3 Conclusions and Recommendations

Several studies have confirmed that increased the patient's knowledge about controlling blood sugar leads to a decrease the complications of diabetes [12, 13, 14]. Good control of blood sugar levels is associated with reducing / preventing the DR. Moreover, the HbA1c test is important to avoid complicated blood vessel complications associated with diabetes [15]. This study aims to assess the awareness of 353 diabetic patients about a HbA1c test and its relationship to detect the DR among diabetic patients. The results of this study indicated that 179 (50.70%) of responses had poor level of awareness, 119 (33.71%) had moderate level of

awareness and 55 (15.58%) had good level of awareness. More than half of the participants, 64.30%, did not know the meaning of HbA1c and its association with the DR. The lack of knowledge about HbA1c was related to lower level of education and to the lack of awareness that the patients received from their health centers. The data indicates that 69.97% of participants were do not getting any information from their health care. The results indicate that the patient should receive awareness information from their health centers. This information should be not only about the nature of complications of diabetes in the eye, but also about how to prevent them. Despite the majority of the patients were not know the meaning of HbA1c, they were aware that it is a blood sugar controlling could reduce or prevent the DR. Based on the findings in this study, the following are recommended:

1. Provide the necessary health education about diabetic retinopathy for all diabetics when they visit health centers.

2. Spreading health education messages about the need for HbA1c test due to the close association with retinopathy.

3. Do free HbA1c testing for the elderly, illiterate and unemployed patients in health centers.

4. Encourage the diabetic patients to talk about diabetic retinopathy with their doctors.

5. Presenting the most key points in this study to PHCC doctors in training centers and to write a pamphlet about HbA1c test and its association with retinopathy in order to be distributed to the patients.

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التوعية بإختبار الـ HbA1c وارتباطه بأمراض الشبكية بين مرضى السكري: دراسة إحصائية

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المستخلص

اعتلال الشبكية السكري هو أحد أمراض الأوعية الدموية التي تصيب شبكية العين عند مرضى السكري. يرتبط إختبار الـ HbA1c ارتباطًا وثيقًا باعتلال الشبكية. لذلك ، فإن الاجراء المبكر لاختبار الـ HbA1c قد يمنع أو يقلل من اعتلال الشبكية في المستقبل. في هذه الدراسة تم توزيع استبيان عبر الإنترنت في مدينة البصرة على مرضى السكر لتقييم مدى وعيهم باختبار الـ HbA1c وعلاقته باكتشاف اعتلال الشبكية. من بين 353 (208 إناث ، 145 ذكر) مصاب بالسكري ، كان 179 (50.70٪) لديهم وعي ضعيف ، 119 (33.71٪) لديهم وعي متوسط و 55 (15.58٪) كان لديهم وعي جيد. ايضا كان مجموع نقاط الوعي بمتوسط SD ± من 5.4 ± 1.2 ، مما يشير إلى أن نقص الوعي باختبار الـ HbA1c كان مرتبطًا بالعمر (P -value = 0.001) ، ومستوى التعليم الأدنى (P-value < 0.0001) فضلا عن قلة الوعي الذي تلقاه المرضى (مرضى السكري) من مراكزهم الصحية (قيمة الاحتمال = 0.031).