GLYCEMIC CONTROL (HBA1C) IN PATIENTS WITH DIABETIC RETINOPATHY

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ABSTRACT

Objective: the aim of this study is to determine the biochemical markers predicting the development of diabetic retinopathy and the relationship between them.Method: a blood samples were collected from 100 diabetic patients classified into two groups:

Group 1 consisted of 50 diabetic patients (30 females and 20 males) aged between 19-70 years without diabetic retinopathy (DR) proved by clinical evaluation performed by the ophthalmologist; Group 2 consisted of 50 diabetic patients (23females and 27 males) aged between 20-78 years with diabetic retinopathy proved by ophthalmologist.

They were attending a private ophthalmology clinic in Basrah during the period from 1st of February 2010 to the 1st of August 2010.

HbA_1C was measured using cation-exchange resin to separate HbA_1C from other types of HbA_1C and measured spectrophotometrically.

Key wards:- HbA_1C ,Diabetic retinopathy +ve , diabetic retinopathy –ve

INTRODUCTION

Diabetes mellitus is a heterogeneous group of syndromes characterized by an evaluation of fasting blood glucose that is caused by a relative or absolute deficiency in insulin. Diabetes is the leading cause of adult blindness and amputation and a major cause of renal failure, heart attack and strock.[1,2] Vascular disease is a common complication of diabetes mellitus, which include both macrovascular disease, may present as coronary artery, cerebrovascular or peripheral vascular insufficiency. And microvascular disease, due to abnormalities of small blood vessels, particularly affect the retina (diabetic retinopathy). The incidence may be related to inadequate glucose control.[3] The most widely used clinical test in diabetes is the measurement of blood glycated hemoglobin (also called

HbA1C),[4] which is a form of hemoglobin used primairly to identify the average, plasma glucose concentration over prolonged periods of time. It is formed in a non-enzymatic pathway by hemoglobin's normal exposure to high plasma levels of glucose. Glycation of hemoglobin has been associated with cardiovascular disease, nephropathy and retinopathy in diabetes mellitus. It gives an assessment of long-term glycemic control. In general, the reference range (that found in healthy persons), is about 4%-5.9%.[5] The American diabetes association (ADA) began to make treatment recommendations based on HbA1C following publication of the results of the diabetes control and complication trial (DCCT) in the 1990s. the HbA1C has become the gold standard for the therapeutic management of diabetes mellitus in research and in the clinical setting.[6] The ADA recommends that the

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goal of glycemic control is an HbA1C level less than 7%. Assuming a patient can achieve this goal without unduo risk of significant hypoglycemia and the physicians should reevaluate the treatment regimen with HbA1C values consistency more than 8%.[7] The aim of the present study is to determine the relationship between the glycemic control, manifested as HbA1C and the development of diabetic retinopathy.

MATERIAL & METHODS

This is a case-control study conducted during the period from the 1st of February 2010 to the 1st of August 2010. The subject included were divided into two groups: 1.Control group (diabetic without Retinopathy) (DR-): fifty patients without DR, included 27 males and 23 females, aged 20-72 years with a mean age of (44) years. All patients in this group were examined clinically by the ophthalmologist and proved to have no DR. They were selected from a private ophthalmology clinic in Basrah. 2.Diabetic group with retinopathy (DR+): 50 diabetic patients with retinopathy, consisted of 24 males and 26 females aged 20-70 years with a mean age of (53) years. This group was diagnosed previously to have diabetes mellitus and they were selected from a private ophthalmology clinics for checking of their disease control and treatment. The glycemic control was classified according to their HbA1C level in percentage %, depending on HbA1C measurement, as shown in table 1.

RESULTS

The results of the data analyzed are arranged according to the grouping of the subjects encountered in this study. The subject was classified into two groups:
Group I: diabetic without retinopathy.

Group II: diabetic with retinopathy.
Table 2:
The incidence of retinopathy increased with longer duration of diabetes. This difference was found to be statistically significant when tested by t-test ($p< 0.001$, Table 2).
The results showed that systolic blood pressure was a significant factor for the presence of any retinopathy ($p< 0.05$, table 2).
On the other hand the diastolic blood pressure showed no significant relationship to the presence of any retinopathy ($p> 0.05$, table 2).
Table 3:
As a glycemic indicator, higher levels of glycosylated hemoglobin HbA1C was found to be related to higher frequency of retinopathy. This difference was found to be highly significant ($p< 0.001$, table 3).
Table 4
According to HbA1C (glycemic assessment of 2-3 months) diabetic patients were further classified into two subgroups as in Table 4.
Fourty seven patients (94%) out of fifty in DR+ group were in the fair & poor control category, compared with sixteen (32%) patients from (DR –) group, with a highly significant difference ($p< 0.001$) .on the other hand 3 patients (6%) out of fifty in DR+ group were in the good control category, compared with 34 patients (68%) patients from DR- group, with a highly significant difference ($p<0.001$).
This means that most of the patients with DR+ were grouped into a fair and poor control category, (i.e HbA1C > 6.8%)

DISCUSSION

Diabetes is a chronic illness that requires continuing medical care and patient's self-management education to prevent acute

complication and reduce the risk of long-term complication.[9,10] Diabetic eye disease is a major cause of blindness in all over the world and remains one of the most serious complications of diabetes mellitus. Retinopathy is the ocular complication of diabetes that most often lead to impaired vision.[11] Although diabetes mellitus is associated with many complication, it's control results in reduction of not only morbidity and mortality, but also economic burden of the disease.[12] A good maker of long-term glycemic control is the regular measurement of HbA1C as a part of the patient's follow-up once of every 3-4 months.[13,14] In the present study, with the glycemic indicator being used (HbA1C), most of the patients in (DR+) group were in the poor control category, as shown in Table (3). Indicating that poor glycemic control is a strong predictor for the development of DR. This finding is consistent with that stated by other studies in Iraq.[13,15]

Other studies, demonstrate a relationship between glycemic control (HbA1C) and a reduction of the micro vascular complication.[6,14,16] From what has preceded, our findings seems to mimic that of other studies.[17-20] which revealed a strong correlation between poor glycemic control and DR. Our findings were in agreement with the well established statement that the severity of retinopathy is strongly associated with the duration of diabetes.[21,22] In our study, only systolic blood pressure was associated with higher risk of developing and progression of retinopathy. This is in accordance with some studies.[23,24] However, diastolic blood pressure had no significant association to retinopathy development or progression.[25] From this study we conclude that Caring for diabetic patients should include screening for risk factor associated with retinopathy and controlling them to delay or prevent the development and or the progression of retinopathy. We recommended that HbA1C measurement should be available routinely in diabetic clinics, and it should be done routinely for every diabetic patient as recommended by the American Diabetes Association (ADA) at least twice per year in patients who have stable glycemic control, and 4 times per year in patients who are not meeting their glycemic control goals aiming to be < 7% to prevent the development and reducing the progression of complications.

TABLES

Table 1

HbA1C % stanbio lab data	Level of control	HbA1C %
A	Good	≤ 6.8
B	Fair-poor	> 6.8

Glycemic control according to HbA1C level (stanbio, 2003)
HbA1C is measured in whole blood samples by ion-exchange resin quantitative spectrophotometric determination[8]. Using a kit supplied from human (Germany).

Table 2

The assessment of medical risk factor of the studied groups in relation to the prescence or absence of retinopathy .

Medical risk factor

	DR-	DR+	t-test p-value
Duration (years)	6.6	11.4	***
Systolic B.P	117.5	131.5	*
Diastolic BP	76.7	76.8	Non sig.

Table 3

Biochemical parameter (glycosylated haemoglobin) of the studied groups.

	DR+		DR-		p-value
HbA1C	Mean $\pm$SD	Range	Mean $\pm$SD	Range	
	9.7$\pm$1.8	6-12.6	6.3$\pm$1.1	5-10	<0.001

Table 4

glycemic assessment according to the glycated hemoglobin of diabetic patients.

HbA1C%	DR-		DR+		p-value
	No.	%	No.	%	
Good control < 6.8	34	68%	3	6%	< 0.001
Fair and poor control > 6.8	16	32%	47	94%	< 0.001

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السيطرة الايضية (السكر التراكمي) لدى المصابين بالتهاب الشبكية السكري

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الخلاصة

الهدف : الهدف من هذه الدراسة هو تحديد العلامات البيوكيميائية التي تساعد في تطور اعتلال الشبكية السكري، والعلاقة بينهما.قد تم جمع عينات من الدم من ١٠٠ مريض سكري حيث تم تصنيفهم إلى مجموعتين :

المجموعة الاولى تألفت من ٥٠ مريض (٣٠ إناث و ٢٠ ذكور) تتراوح أعمارهم بين ١٩ـ٧٠ عاما الذين لا يعانون من اعتلال الشبكية السكري (DR-) ثبت من قبل التقييم السريري التي يقوم بها طبيب العيون؛

والمجموعة الثانية تتكون من ٥٠ مريض(٢٣إناث و٢٧ذكور) الذين تتراوح أعمارهم بين ٢٠ـ٧٨ سنة مصابين باعتلال الشبكية السكري (DR+). وكانوا يحضرون عيادة طب العيون خاصة في البصرة خلال الفترة من ١ فبراير ٢٠١٠ إلى ١ أغسطس ٢٠١٠.

وقد تم قياس HbA1c باستخدام راتنج التبادل الايوني لفصل HbA1c عن غيره من انواع HbA1c وبواسطة استخدام جهاز قياس الطيف الضوئي.

مفتاح الكلمات :خضاب الدم السكري (السكر التراكمي)، اعتلال الشبكية السكري الموجب ، اعتلال الشبكية السكري السالب

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