

## Frequency of diabetic retinopathy in Mosul

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### ABSTRACT

**Aim:** To study the frequency of diabetic retinopathy in a population of patients and to evaluate the medical risk factors underlying its development.

**Methods:** A case series study conducted at the out patient clinic of Al Jamhoury teaching hospital and at a private clinic in Mosul, during the period from Jan. 2005 to Dec. 2006. One hundred and seventy patients with diabetes were randomly selected by ophthalmologist. They were referred by physicians after they did diabetic profile by history and medical examination. The WHO definition of diabetic retinopathy was recommended, several risk factors were searched for during the evaluation of the patients.

**Results:** the prevalence of diabetic retinopathy was 32.35%, 20% in type I diabetes, and 80% in type 2 diabetes and surprisingly both of which had equal rate of retinopathy in this population. 80% did not know about the need of regular dilated fundus examination. The mean age was 50 years old ranging from 25-67 years, with 65% between the ages of 50-65 years old and the standard deviation was ( $\pm 10.95$ ). Male to female ratio was 1:1.5 with equal rates of retinopathy (29.4% vs 34.3%). The retinopathy rate was highest in the age group 50-59 years (37%). The rate of non-proliferative diabetic retinopathy, proliferative diabetic retinopathy and diabetic maculopathy were 18.8%, 12.9% and 14.5% respectively

The rate was higher among subjects with longer duration of diabetes, higher fasting plasma glucose, and cases with hypertension.

**Conclusion:** Public education is essential about the need for routine and regular dilated fundus examination for diabetic patients in addition to glycemic control; lowering diastolic blood pressure (in hypertensive patients) may be effective in lowering the incidence of retinopathy in compromised patients.

### الخلاصة

**الهدف:** معرفة العوامل المؤثرة أو العوامل الخطورة لاعتلال الشبكية لمرضى داء السكر في منطقة الموصل.  
**التصميم:** دراسة سلسلة الحالات.

**المكان:** العيادة الخارجية لمستشفى الجمهوري التعليمي والعيادة الخاصة.

**المشاركون:** ١٧٠ مريضاً مصاباً بداء السكري.

**النتائج:** وجد أن نسبة اعتلال الشبكية نتيجة داء السكر ٣٢% ليس له علاقة بنوع المرض علماً أن ٢٠% النمط الأول، ٨٠% النمط الثاني. ٨٠% من المرضى لا يعرفون مدى خطورة داء السكري على الشبكية، ٦٥% من المرضى تتراوح أعمارهم بين ٥٠-٦٠ سنة وان نسبة الإناث إلى الذكور هي ١:٥، وأعلى نسبة اعتلال الشبكية ٢٩،٤% في الذكور، ٣٤،٣% في الإناث و أن أعلى نسبة لاعتلال الشبكية للمرضى بين الفئة العمرية من ٥٠-٥٩ سنة بنسبة ٣٧% و أن نسبة اعتلال الشبكية غير التبرعمي لداء السكر واعتلالها التبرعمي واعتلال الشبكية الصفراء هو ١٤،٥%، ١٢،٩%، ١٨،٨% بالتتابع. إن اعتلال الشبكية يتناسب طردياً وفترة المرض و عدم السيطرة على داء السكر (ارتفاع السكر في الدم) و ارتفاع ضغط الدم.

The world health organization (WHO) estimated that there are currently about 150 million people with diabetes and this number will be doubled by the year 2025. Retinopathy is the most common complication in diabetic especially diabetes mellitus (type 1). Diabetes retinopathy (DR) is a leading cause of visual disability in the industrialized countries<sup>(1)</sup>. The causes of such morphological changes in diabetes could be grouped into three categories: biochemical, hemodynamic and humoral<sup>(2)</sup>. Of these, the biochemical changes related to prolonged hyperglycemic state (as evidenced by increased level of glycosylated hemoglobin) are important, and many studies confirmed the association between prolonged hyperglycemia and diabetic retinopathy<sup>(3-5)</sup>.

Other factors which were also implicated in the occurrence of the DR include, the duration of the diabetes<sup>(6)</sup>, types of the treatment<sup>(7)</sup>, associated hypertension<sup>(8,10)</sup>, proteinuria<sup>(11)</sup>, serum creatinine level<sup>(12)</sup>, serum cholesterol and triglycerides level<sup>(13,14)</sup>. Changes in lifestyle have also increased the risk of diabetes in many developing countries<sup>(15)</sup> and it is important that organized efforts are undertaken to address eye complications of diabetes.

Around 20% of people with diabetes projected to develop retinopathy<sup>(16)</sup>. A number of studies have shown marked difference in the prevalence of DR whether in type1<sup>(17-19)</sup> or in the type2 diabetes in different countries; however, reliable information on the magnitude and determinants of ocular manifestations of diabetes in many countries including Iraq is lacking.

Iraqi population (including Mosul population) had undergone rapid socioeconomic development and improvement in their life style in the past three decades. There has been marked decline in the communicable diseases and nutritional disorders. Non-communicable diseases like diabetes have increased owing to increase in the incidence of obesity, sedentary life style, smoking, consanguinity, stress and other factors. Diabetes has become a major emerging clinical and public health problem in Iraq.

The study of incidence and progression of DR and associated risk factors are important in the prevention of the development and progression of the problem<sup>(15)</sup>. The aim of the study is to demonstrate the frequency of DR in a randomly selected population of patients to evaluate the medical risk factors underlying its development. The specific objective is to distribute the study samples according to their ages and sexes, and to grade retinopathy among the studied sample.

### Patients and method:

This is a case series study including one hundred and seventy patients with the clinical diagnosis of diabetes. All patients have ocular media allowing detailed and accurate fundus examinations. Patients with media opacities were excluded from this study.

Those diagnosed and referred by many physicians to the ophthalmology unit for the examination of their ocular changes, during the period from Jan. 2005 to Dec. 2006 were included. The physician did the diabetic profile of the patients while the ophthalmologist reported the ocular profile, reporting any retinal changes as seen in the table (1)<sup>(20-21)</sup>. Patients' knowledge of ocular risks of diabetes and the need for routine examination was evaluated using medical history as to how far patients know the risk of affection of their eyes by diabetes. Several factors were considered in evaluation of the patients in order to identify the occurrence of the retinopathy. The referring physicians noted details including patient's age, sex, duration of diabetes, blood sugar profile, HbA1c levels, associated systemic complications, (nephropathies, neuropathies hypertension, hyperlipidemia, coronary artery diseases etc.) All subjects were sent to the ophthalmologist for ocular assessments.

Visions examined for each eye separately using Snellen distance vision chart at six meters. The anterior segments were examined by slit lamp and the pupils dilated by using tropicamide 1% and phenylephrine 10%. The retinal examination (+90D lens and indirect ophthalmoscope) was carried out after pupillary dilatation and different findings carefully recorded. Patients were classified

according to the grading in the worse eye. Table (1) shows a simplified grading scale utilized in our study. The collected data were analyzed by Z-test. Patients with photocoagulation scar were assigned to the proliferative group; any patients with corneal opacity or lenticular opacities, which precluded proper fundus examination, were excluded from the study. In the presence of PDR and /or clinically significant diabetic maculopathy, laser therapy was proposed. Patients with advanced diabetic eye complications that necessitate sophisticated surgical interventions were referred to an advanced center outside Iraq.

### Results:

The prevalence of DR was 32% (55 patients). Type 1 diabetes was found in 20%, while type 2 was found in 80%. Mean age was 50 years ranging from 25-67 years, and 65% of the patients were between 50-65 years and the standard deviation was ( $\pm 10.95$ ). The

retinopathy rate was highest among the age group of 50-59 years, which was (37%) and male to female ratio was 1:1.5, with different rate of retinopathy (29.4%vs 34.3%) as shown in table (2). The rate of non-proliferative DR, PDR, and diabetic maculopathies were (18.8%, 12.9% and 14.5%) respectively as shown in table (3).

The risk of retinopathies and its severity increased with increase in the duration of diabetes as shown in table (4). The rate was higher among subjects with longer duration of diabetes, highest fasting plasma glucose and in cases with hypertension. In our study 80% of the patients did not know about the ocular risks of diabetes and the need for routine dilated eye examination.

Laser treatment was performed on patients with CSME and patients with PDR. Six patients with PDR referred to the ophthalmic surgery out side Iraq.

Table (1): The grading scale

#### INTERNATIONAL CLINICAL DIABETIC RETINOPATHY DISEASES SEVERITY SCALE<sup>(20,21)</sup>

No apparent DR.....No abnormalities.  
 Mild non- proliferative DR.....Micro aneurysm only.  
 Moderate non- proliferative DR.....More than mild ,but less than severe.  
 Severe non- proliferative DR.....Any of the following;  
     **A:** 20 or more intra-retinal hemorrhage in four quadrants.  
     **B:** Definitous beading in 2 or more quadrants.  
     **C:** Prominent IRMA in one or more quadrants and no neovascularization.  
 Proliferative DR one or more of the following:  
     **A:** definite neovascularization.  
     **B:** Pre- retinal or vitreous hemorrhage.  
 IRMA: intra-retinal micro vascular abnormalities.

Table (2): the age distribution of patients

Age groups (in years)	Male No. & %	Female No. & %	Total	P-value
<30	4 (2.35%)	4 (2.35%)	8 (4.7%)	n.s
30-44	20 (11.8%)	27 (15.8%)	47 (27.6%)	n.s
45-60	29 (17.05%)	53 (31.15%)	82 (48.2%)	n.s
>60	15 (8.8%)	18 (10.61%)	33 (19.4%)	n.s
Total	68 (40%)	102 (60%)	170 (100%)	<0.05 j.s

Table (3): the grade of retinopathy among the studied groups.

Severity of diabetic retinopathy	No. & %	p-value
No DR	115 (67.6%)	<0.001(v.h.s)
NPDR	33 (19.4%)	<0.001(v.h.s)
PDR	22 (12.9%)	<0.001(v.h.s)
CSME	25 (14.7%)	<0.001(v.h.s)

v.h.s= very highly significant; No DR= free from diabetic retinopathy; NPDR= non proliferative diabetic retinopathy; PDR= proliferative diabetic retinopathy; CSME=clinically significant macular edema

Table (4): the distribution of retinopathy grades with the duration.

Durations	<1year	1-5 years	5-15 years	>15 years	Total
FREE	13 (92.9%)	58(82.9%)	35 (53.8%)	9 (45%)	115
NPDR	1 (7.1)	8 (11.4%)	18 (27.7%)	6 (30%)	33
CSME	1 (7.6%)	3 (5.2%)	21 (60%)	-----	-----
PDR	-----	5 (5.7%)	12 (18.5%)	5 (25%)	22
Total	14	71	65	20	170

## Discussion:

In order to reduce the visual disabilities and improve the quality of life of people with diabetes, information on DR is crucial. Since the study sample was randomly selected from cases (both newly discovered and old one) attending to other hospital and private clinics, it may roughly represents the prevalence rate of DR in Mosul province. People with diabetes and an opaque media in both eyes, because of either trachomatous, non-trachomatous corneal opacities or cataract are not more or less likely to have DR; hence excluding these patients should not have introduced systemic bias. The prevalence of DR in our study sample was 32%. Global projections suggest that 20% of diabetic cases will develop DR<sup>(22)</sup>. It is reported as low as 6.7% in South India<sup>(23)</sup>, 11.6% in Saudi Arabia<sup>(24)</sup> and 6.9% in China<sup>(25)</sup>. Studies in Ethiopia, France and Japan demonstrated higher rates<sup>(26-28)</sup>.

Our higher prevalence could be explained by the lack of proper screening programs in our population and bad control of diabetes, stress and lack of health coverage.

In Mosul, women had significantly higher rate of DR than men, as it seems that females may take care about their general health more than

males, which is similar to a study in Sweden where women had a higher rate than men<sup>(29)</sup>. Other studies have suggested insignificant differences in DR by sex<sup>(30-31)</sup>. The retinopathies rate increased with age until the age of 70 years; however, the small number of people with diabetes in this age group limits our ability to interpret the finding. Furthermore, the large number of cases with opaque media in this age group (due to cataract or corneal opacities) rendered examination impossible. The positive association between DR and duration of diabetes is noted in the literature. The retinopathy rate in Southern India was 7% in individuals with short duration of diabetes (less than 10 years), 26% in those with 10-14 years duration and 63% in those with 15 years and more duration of diabetes<sup>(32)</sup>. Similar observations were found in our study.

The diabetes maculopathies rate was 14.7% in our study. The rate of maculopathy was 6.4% in India<sup>(33)</sup>, and 8% in Japan<sup>(34)</sup>. In view of such high rate of macular involvement, resources for laser therapy should be planned with special focus on care of diabetic maculopathies.

The prevalence of DR was higher in those with hypertension, which is similar to other studies<sup>(35)</sup>. The use of laser treatment is very low compared to the actual need. This could increase the backlog of untreated retinopathy cases resulting in more visually disabled people with diabetes. The underlying causes of low use (lack of awareness, lack of access, or lack of resources) should be addressed through a comprehensive approach to improve screening and management of DR.

Our study also revealed the low level of patient's knowledge about the ocular hazard of diabetes and the need for routine dilated eye examination. Patients seen were directed by physicians to see an ophthalmologist as part of the study involved. Screening programs have to be outlined and highlighted by national health authorities.

#### Recommendation:

Public education is essential about the need for routine and regular dilated fundus examination for diabetic patients. In addition to good glycemic control, lowering diastolic blood pressure (in hypertensive patients) may be effective in lowering the incidence of DR in compromised patients.

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