

Visual Functions Loss in Diabetic Retinopathy Patients

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Abstract: **Aim:** To evaluate visual functions loss in patients diagnosed with diabetic retinopathy at time of presentation. **Method:** A cross-sectional study was carried out among 37 diabetic patients who presented with diabetic retinopathy DR to the specialized center of ophthalmology in Mosul city at September and October 2021. The patients underwent assessment of distance and near best corrected visual acuity BCVA, objective and subjective refraction, contrast sensitivity, color vision. Slit lamp and fundus examination, macular ocular coherence tomography OCT when macular edema was found. Examination and grading of diabetic retinopathy performed with modified Early Treatment Diabetic Retinopathy Study classification (ETDRS – the modified Airlie House classification). **Result:** The majority of patients 33 (89.1%) were of the age group 50–70 years. 22 of them were females. only 7 patients were IDDM and the rest were NIDDM. Best corrected visual acuity was found to be 6/18 to 6/60 in the better eye and 6/60 and less in the worse eye. Color vision was reduced in 29.7% of patients while contrast sensitivity were found to be reduced or lost in 40.5% of patients. No retinopathy was found in only in 7 patients (18.9%) while proliferative diabetic retinopathy was found in 20 patients (54%) With advanced eye disease with severe vision loss was seen in 18.9%. **Conclusion:** Impairment of visual acuity, contrast sensitivity, and color vision correlated significantly with different grades of diabetic retinopathy. Hence early diagnosis and treatment of diabetic retinopathy can reduce significantly loss of visual functions in diabetic patients.

Keywords: Diabetic retinopathy .visual functions loss, Best corrected visual acuity.

INTRODUCTION

The American Diabetes Association (ADA) classifies diabetes mellitus as type 1 diabetes mellitus, formerly known as insulin- dependent diabetes mellitus (IDDM), and type 2 diabetes mellitus, formerly known as non- insulin-dependent diabetes mellitus (NIDDM). Type 1 diabetes mellitus results from the destruction of pancreatic β - cells, which usually leads to absolute insulin deficiency. This process can be either idiopathic or immune-mediated. Type 2 diabetes mellitus is characterized by insulin resistance that may or may not be accompanied by insulin deficiency. (American academy of ophthalmology, 2021)

Diabetic retinopathy is classified according to a severity of its clinical features.

In *non-proliferative diabetic retinopathy* (NPDR), intra retinal vascular changes are present but there is no development of extraretinal fibrovascular tissue; NPDR is staged as mild, moderate, or severe.

proliferative diabetic retinopathy is defined by the presence of retinal neovascularization resulting from diabetes- induced ischemia and is clinically staged as either early PDR or PDR with high-risk characteristics or advanced diabetic eye disease ADED.

Diabetic macular edema (DME), or swelling of the central retina, results from abnormal vascular

permeability and can develop in patients with any severity level of diabetic retinopathy. (John, F) Diabetic retinopathy is a leading cause of vision loss worldwide among patients aged 25–74 years, especially in developed countries (American academy of ophthalmology, 2021) Diabetic retinopathy occurs in approximately 7–29% of patients attending general medical practices. Approximately two-thirds of diabetics have an increased possibility of visual impairment after 35 years of suffering the condition, and are 25 times more likely to go blind, compared with other health conditions (Mitchell, P. et al., 1998). It was found that increased prevalence of diabetic retinopathy is associated with longer duration of diabetes mellitus in patients with both type 1 and type 2 diabetes mellitus. In the WESDR cohort study, after 20 years of diabetes mellitus, nearly 99% of patients with type 1 and 60% with type 2 disease demonstrated some degree of diabetic retinopathy. Proliferative diabetic retinopathy was found in 50% of type 1 patients who had 20 years' duration of disease and in 25% of type 2 patients who had 25 years' duration of disease. Furthermore, 3.6% of younger- onset patients (aged <30 years at diagnosis) and 1.6% of older-onset patients (aged 30 years or older at diagnosis) were found to have a visual acuity of 20/200 or worse. Such vision loss was attributable to diabetic retinopathy in 86% of the younger- onset patients and in 33% of the older- onset group. (C.D.C.P,

2018) Diabetic retinopathy is usually associated with change of main visual functions i.e., visual acuity, color vision and contrast sensitivity and this loss correlates with the grade of diabetic retinopathy. as the diagnosis of DR in our community usually delayed until become symptomatic with loss of visual functions so examination of these functions in diabetic patients is simple method can give a clue of the grade of retinopathy.

AIM OF OUR STUDY

Is to find the extend of visual functions loss in patient diagnosed to have diabetic retinopathy at the time of initial ophthalmological examination in the retina unit in Mosul city and to find the correlation between the severity of diabetic retinopathy and the degree of visual functions loss in these patients.

PATIENTS AND METHOD

Preceding to data collection (an official permit) was collected from the Nineveh Health Directorate (NHD) to ease data collection from the patients in the specialised center of ophthalmology . also (informed oral consent) was collected from the center manager, workers and participants. This cross-sectional study was carried out at the retina unit in the specialized center of ophthalmology in Mosul city in the period of September and October 2021. The targeted Patients where those referred to the retina unit for retinal examination and were found to have any grade diabetic retinopathy with no other ocular pathology on the examination. They were 38 patients (15 male and 22 female) enrolled in the study. Patients having any other associated ocular pathology which was not attributable to diabetes, or having diabetic retinopathy which was diagnosed or treated previously, were excluded from the study.

Clinical examination included the following procedures:-

1. best-corrected distance visual acuities, were assessed using Snellen chart that was designed to be used at 6meters under normal room illumination.
2. Objective and subjective refraction was undertaken to achieve the best distance acuity correction.
3. Near vision was assessed with a continuous reading chart while wearing best refractive correction, and near addition in presbyopia subjects. The meter system was adapted to record near visual acuity.
4. Contrast sensitivity was assessed monocularly as well as binocularly using the Pelli–Robson chart at one meter distance, with best distance refractive correction and near addition in presbyopic subjects.
5. Color vision was assessed monocularly using the Ishihara test with pseudoisochromatic plate from waggoner diagnostic company with best refractive correction, and near addition if necessary.
6. Fundus examination done with HAAG STREIT 900 slit lamp with indirect biomicroscope using +90D and +78 D lenses
7. Ocular coherence tomography (OCT from Zeiss company) done for any patients found to have any macular edema on clinical examination

After the completion of the sample collection data tabulation enters into the Excel software program. Chi-square test was used for comparison between categorical (qualitative) variables. P-value ≤ 0.05 was considered significant throughout data analysis.

RESULT

The sample of the present study includes 37 patients. Out of the total sample 59.4% were females and the rest were males. 89.1 % of the patients fell in the age group 50-80 year old, and 10.8 % were under the age og 50 years old.

Table 1: Basic characteristics of study sample

Parameters		%
Sex		
Male	15	40.5
Female	22	59.4
Age group	Number of patients	%
10-20	1	2.7
21-30	0	0
31-40	0	0
41-50	3	8.1

51-60	17	45.9
61-70	10	27.0
71-80	6	16.2
Total	37	100

Table 2 demonstrate the type of the diabetes between the population sample, where 81. % Of

the patients were of type 2 diabetes and the remaining were of type 1.

Table 2: type of DM among population sample

Type of diabetes	Number of patients	%
IDDM	7	18.9
NIDDM	30	81.0

Table 3 demonstrate the visual acuity in the better and in the worse eyes. Most of the patients (32.4%) have visual acuity 6\18 in the better eye

while same number of the patients have visual acuity 6\60 in the worse eye

Table 3: visual acuity distribution among population sample

BCVA	Patients NO in better eye	Patients NO in worse eye	p- value
6\6	0	0	
6\9	4	1	
6\12	4	1	
6\18	12	7	
6\24	2	2	
6\36	4	2	
6\60	8	12	
CF	2	8	
HM	0	0	
LP	1	0	
NLP	0	4	

Most of the patients (67.5) have normal refraction while (18.9%) were myopes and (13.5%) were hypermetropies

Tablet 4: visual acuity in the patients

Type of Refractive Error	Number of patients
Normal refraction	25
Myopes	7
hypermetropies	5

Table 5 shows that 40.5% of the patients have normal contrast sensitivity while 27% have reduced or lost contrast sensitivity at the same time

70.2% of the patients have normal color vision test and the remaining have reduced or lost color vision

Tablet 5: contrast sensitivity and color vision distribution in the population sample

	normal	%	Reduced or lost	%
Contrast sensitivity	17	40.5	10	27.0
Color vision	26	70.2	11	29.7

Table 6 shows the distribution of the type of retinopathy among the patients where the majority of them (54.05%) appeared to have proliferative

diabetic retinopathy from those. (24.3%) have early proliferative diabetic retinopathy.

Tablet 6: Grade of retinopathy in patients' population

Grade of DR	No. of patients
NPDR	17
NDR	7
MILD NPDR	2

MODERATE NPDR	4
SEVERE NPDR	4
VERY SEVERE NPDR	0
PDR	20
EARLY PDR	9
HIGH RISK PDR	6
ADED	5

Table 7 shows the duration of diabetes among population where it appeared that most of patient (54.05%) have duration of DM more than 10 years

Table 7: duration of DM in patients

Duration of dm	No. of patients
< 1	5
1-5	5
5-10	7
11-15	8
16-20	6
>20	6

DISCUSSION

The sample of the present study includes 37 patients. Male account 40.5% and 59.4 % were females. Mean age was 48 years with duration of DM more than 10 years in 54.05% of the patients. The study had many limitations. The sample was very small and there was a lack of control group to evaluate the effectiveness of the intervention. The questionnaires were translated through face validity technique only.

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