

Diabetic retinopathy pattern among Kurdish diabetic patients in the Kurdistan region of Iraq

Patrón de retinopatía diabética en pacientes diabéticos que asisten al Centro de diabetes Sulaimani

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Abstract

Background and objective: Diabetes has been reported to be quite prevalent all over the world. Blindness among diabetic patients has been reported to be related to diabetic retinopathy. By investigating diabetic patients attending the Sulaimani diabetic center, this study tries to specify the prevalence and diabetic retinopathy pattern among such patients.

Method: Diabetic patients who were presented at the Sulaimani diabetic center were chosen for obtaining knowledge on biodata information of patients, level and duration of diabetes disease and also gaining knowledge on eye examination findings. The examination of eye fundus was conducted with Volk +90 diopter lens by means of slit lamp microscope. The retinopathy was classified through the International Clinical Disease Severity Scale for Diabetic Retinopathy. All collected data were analyzed by Statistical Package for the Social Sciences version 22.

Results: A total of 393 patients consisting of 279 females and 114 males were examined. Their ages were ranged from 12 to 83 years with a mean of 56.1 years. About 7.6% of them were on insulin therapy, 69% took oral antihyperglycemic agents, 21.4% use a mixture of these therapies and the remaining 2% did not take any

treatments. Based on the results of this study, 33.2% of the patients had retinopathy, such that 5.6%, 6.4%, 5.6% and 5.6% of them had mild, moderate, severe non proliferative and proliferative retinopathy, respectively. Moreover, a strong association was observed between increased HbA1c level of diabetic patients and their apparent retinopathy. In addition, the pathological condition of maculopathy was observed in 5.6% of diabetic patients. In about 44% of the diabetic patients, high blood pressure was observed, of whom 8.7% represented to have cardiovascular diseases

Conclusion: The outcomes of this study demonstrated that the prevalence rate of diabetic retinopathy (DR) with long duration among Iraqi Kurdish diabetic patients is high. Diabetic retinopathy could cause visual disability. On the other hand, diabetes would increase the possibility of blindness as a result of other eye diseases like glaucoma and cataracts. Consequently, for more precise diagnosis and also decreasing the happened damages due to diabetes a standardized screening program must be applied.

Keywords: diabetes, diabetes duration, diabetic retinopathy, diabetic retinopathy pattern, diabetes prevalence

Resumen

Antecedentes y objetivo: se ha informado que la diabetes es bastante frecuente en todo el mundo. Se ha informado que la ceguera entre pacientes diabéticos está relacionada con la retinopatía diabética. Al investigar a los pacientes diabéticos que acuden al centro de diabetes Sulaimani, este estudio intenta especificar la prevalencia y el patrón de retinopatía diabética entre dichos pacientes.

Método: los pacientes diabéticos que se presentaron en el centro diabético Sulaimani fueron elegidos para obtener conocimiento sobre la información de biodatos de los pacientes, el nivel y la duración de la enfermedad de la diabetes y también para obtener conocimiento

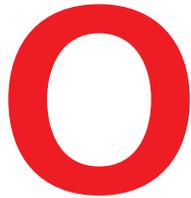
sobre los hallazgos del examen ocular. El examen del fondo del ojo se realizó con una lente de dioptría Volk +90 mediante un microscopio de lámpara de hendidura. La retinopatía se clasificó a través de la Escala de gravedad de la enfermedad clínica internacional para la retinopatía diabética. Todos los datos recopilados fueron analizados por Statistical Package para la versión 22 de Ciencias Sociales.

Resultados: se examinaron un total de 393 pacientes que constaban de 279 mujeres y 114 hombres. Su edad osciló entre 12 y 83 años con una media de 56,1 años. Aproximadamente el 7.6% de ellos estaban en terapia de insulina, el 69% tomó agentes antihiper glucémicos

orales, el 21.4% usó una mezcla de estas terapias y el 2% restante no tomó ningún tratamiento. Según los resultados de este estudio, el 33,2% de los pacientes tenían retinopatía, de modo que el 5,6%, el 6,4%, el 5,6% y el 5,6% tenían retinopatía media, moderada, grave, no proliferativa y proliferativa, respectivamente. Además, se observó una fuerte asociación entre el aumento del nivel de HbA1c de los pacientes diabéticos y su aparente retinopatía. Además, se observó el estado patológico de la maculopatía en el 5,6% de los pacientes diabéticos. En aproximadamente el 44% de los pacientes diabéticos, se observó presión arterial alta, de los cuales el 8,7% representaba enfermedades cardiovasculares.

Conclusión: Los resultados de este estudio demostraron que la tasa de prevalencia de la retinopatía diabética (RD) con larga duración entre los pacientes diabéticos kurdos iraquíes es alta. La retinopatía diabética puede causar discapacidad visual. Por otro lado, la diabetes aumentaría la posibilidad de ceguera como resultado de otras enfermedades oculares como el glaucoma y la catarata. En consecuencia, para un diagnóstico más preciso y también para disminuir los daños ocurridos debido a la diabetes, se debe aplicar un programa de detección estandarizado.

Palabras clave: diabetes, duración de la diabetes, retinopatía diabética, patrón de retinopatía diabética, prevalencia de diabetes



One of the main metabolic disorders that could be specified through high levels of glucose in the blood resulting from preventing insulin release is diabetes¹. Based on the newest global information, more than 200 million people worldwide have diabetes. Through attacking some important organs like eye, diabetes mellitus (DM) would have adverse side effects on such organs. There are mainly two types of DM: insulin-dependent diabetes mellitus (IDDM) or type 1 and non-insulin dependent diabetes mellitus (NIDDM) or type 2. IDDM is a kind of diabetes mellitus which mostly happens during the age range of 10 to 20 years, while NIDDM would mostly happen in older patients. In general, diabetes mellitus is one of the most persistent progressive disorders with an acute metabolic and chronic vascular side effects².

It is noteworthy that one of the main causes of blindness and visual impairment among diabetic patients is diabetic retinopathy (DR) which is directly caused by increased incidence of diabetes³. It should be noted that the prevalence rate of DR among IDDM patients is higher than patients with NIDDM. The disease of eye induced from diabetes are the main causes of vision loss and blindness within the population of developing countries⁴. Diabetic

retinopathy could be characterized through some earliest signs such as microaneurysms hemorrhages of blot and dot exudate fluids. Despite significant advances in scientific understanding of diabetic retinopathy, the major treatments for this condition have largely remained the same for many years. The main affecting factors which could increase the possibility of DR occurrence include diabetes duration, hypertension, poor glycemic control, dyslipidemia, puberty, pregnancy and socioeconomic status⁵. There are mainly three major factors which could cause diabetic retinopathy: Changes in platelets, lesions in vessel walls, and changes in blood flow⁶.

Microvascular occlusion and microvascular leakage are the main pathological processes responsible for progression of diabetic retinopathy sight-threatening consequences. Diabetic retinopathy induced blindness could be prevented through an immediate diagnosis and conducting advanced treatment procedures. Due to the fact that the most significant cause of DR is hyperglycemia, for more appropriate following up diabetic patient and slowing down DR progression, it is recommended that the control of glycemic level should be conducted by decreasing the glycosylated hemoglobin (HbA1c) level⁷.

In some developed countries like North America, Wales, England and Ireland, DR is one of the main leading causes of blindness in about 8% of cases⁸. On the other hand, in some developing countries such as United Arab Emirate, Saudi Arabia and Pakistan, the prevalence rate of DR has been reported to be 20%, 18% and 16%, respectively^{9,10}. The achieved improvements in DR therapy especially in developed countries could not properly kept a large number of DR patients satisfied. For this reason, DR is still a dangerous threatening health problem¹¹.

In this regard, enhancing the knowledge about conducting essential regular examination on eyes for immediate diagnosis of disorder is required. This kind of disorder would be happening mostly due to patients' lack of awareness. However, because of the lack of or limited access to the retinal services and also eye hospitals or eye care providers in Sulaimani and its surrounding areas, this problem has become more challenging¹².

The main objective of the present study was to determine the prevalence and pattern of diabetic retinopathy observed in diabetic patients attending Sulaimani Diabetic Center, the Kurdistan region of Iraq. On the other hand, this study tried to recognize the most significant risk factors of diabetic retinopathy within the aimed population in order to conduct the most appropriate treatment for prevention and proper management of identified cases.

This was a cross-sectional descriptive survey of diabetic patients, which carried out in order to assess and establish the pattern and prevalence of diabetic retinopathy among diabetic patients who attended Sulaimani Diabetic Center located in Sulaimaniya city, the Iraqi Kurdistan. Moreover, the patients were consent to be examined over a three-month period, 2 days a week from March to May 2019.

The collected data includes the patients' bio-data, clinical type of diabetes mellitus, type of diabetic treatment (diet control only, oral medication or insulin injection), duration of the disease and presence of other systemic diseases such as hypertension, hyperlipidemia, and obesity social history like smoking and alcoholic. The conducted ocular examination included visual acuity measurement and then changed to log MAR; anterior ocular health assessment by bio microscopy. All of the patients had funduscopy (examining the retina) (mostly with pupillary dilatation), +90D lens with slit lamp using Tropicamide 1% to dilate the pupils. All of the patients who attended Sulaimani Diabetic Center participated in the assessment. However, patients who did not have any related symptoms were crossed out from the study.

Using the International Clinical Diabetic Retinopathy Disease Severity Scale (ICDRDSS)², retinopathy was graded as follows:

1. No retinopathy
2. Mild non-proliferative diabetic retinopathy
3. Moderate nonproliferative diabetic retinopathy
4. Severe non-proliferative diabetic retinopathy
5. Very severe non-proliferative diabetic retinopathy
6. Proliferative diabetic retinopathy.

All data obtained from the patients were entered fed into Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics was presented as mean standard deviation and frequencies as percentages. Moreover, multiple statistical contingency tables were administered and more suitable statistical tests were performed. Chi-square test was used for categorical variables (Fisher's exact test was used when expected variable was less than 20% of total variable). Independent sample t-test was used to compare two means. For all statistical tests, the level of significance (p-value) was set at ≤ 0.05 .

To take ethical considerations into account, a verbal consent process was conducted for all participants before their attendance in the interview and examination. In addition, the examination approval was obtained from Sulaimani Diabetic Center Hospital.

The demographic characteristics of diabetic patients are presented. Based on these results, the mean age of study participants was 56.1 years. Moreover, the number of women with diabetes was more than men. The majority of the patients belonged to the age groups 50-59 and 60-69 years.

Regarding the diabetic patients' lifestyle characteristics, the results showed that 6.1% of patients were smokers, and 12% were ex-smokers. Alcohol consumption rate was observed among 1.5% of the patients, and 3.1% were ex-drinkers. Also, obesity was seen in 9.2% of them.

The obtained data on from the clinical history of diabetic patients of this study showed that, 44% of them had hypertension, 8.7% had cardiovascular diseases and 10.9% had hyperlipidemia disorder.

Based on the obtained diabetes mellitus characteristics data, it was seen that the mean duration of being affected by diabetes mellitus was 5.5 years. However, most of the patients (63.1%) had been suffering from their disease for years. Moreover, 91.6% of them had an increased level of HbA1c. Most of the investigated patients (69%) experienced oral hypoglycemic agents for treatment.

The presence of apparent retinopathy among diabetic patients was reported to be 22.6%. Among the diabetic patients, the mean visual acuity in both left and right eyes was 0.3 ± 0.7 . Additionally, the normal visual acuity in the left and right eye was observed in 88% and 86.8% of them, while the low vision rates were 11.5 and 12.5%, respectively. Finally, in about 0.5% and 0.8% of them was legally blind in left and right eye, respectively. Apparent retinopathy was detected among 22.6% of diabetic patients. Mild non-proliferative diabetic retinopathy was observed in 5.6% of diabetic patients. Moreover, moderate nonproliferative diabetic retinopathy and severe nonproliferative diabetic retinopathy were 6.1% and 5.9%, respectively. proliferative diabetic retinopathy was observed in 5.9% of diabetic patients. Maculopathy was seen in 5.6% of the patients. Additionally, 10.2% of diabetic patients underwent the process of cataract surgery (See Table 5).

Regarding the distribution of demographic characteristics according to apparent retinopathy, there was no significant difference between diabetic patients of different age with and without apparent retinopathy ($p=0.1$) and gender ($p=0.9$) (See Table 6).

The results revealed no significant difference between diabetic patients with and without apparent retinopathy in terms of alcohol consumption, cardiovascular diseases-

es, hypertension, obesity and smoking ($p>0.05$). However, there was a significant difference between them regarding their hyperlipidemia, such that hyperlipidemia was more prevalent among patients with retinopathy (See Table 7).

According to the results, the patients with and without retinopathy were significantly different in terms of diabetes duration, HbA1c, and treatment type, such that retinopathy was more prevalent among patients with diabetes duration of 15 years, increased HbA1c, and consumption of oral hypoglycemic as a treatment (See Table 8).

Table 5. Ophthalmology outcomes of diabetic patients

Variable	Frequency (N)	Percentage (%)
Visual acuity-right mean \pmSD (0.7\pm0.3)		
Normal	341	86.8
Low vision	49	12.5
Near blindness	3	0.8
Visual acuity-left mean \pmSD (0.7\pm0.3)		
Normal	346	88.0
Low vision	45	11.5
Near blindness	2	0.5
No apparent retinopathy		
Yes	304	77.4
No	89	22.6
Mild Non-Proliferative Diabetic Retinopathy		
Yes	22	5.6
No	371	94.4
Moderate Nonproliferative Diabetic Retinopathy		
Yes	24	6.1
No	369	93.9
Severe Non-Proliferative Diabetic Retinopathy		
Yes	23	5.9
No	370	94.1
Proliferative Diabetic Retinopathy		
Yes	23	5.9
No	370	94.1
Maculopathy		
Yes	22	5.6
No	371	94.4
Cataract surgery		
Yes	40	10.2
No	353	89.8

Table 6. Distribution of demographic characteristics according to apparent retinopathy

Variable	No retinopathy		Retinopathy		P-value
	N.	%	N.	%	
Age					
<30 years	10	3.3	1	1.1	0.1*NS
30-39 years	14	4.6	1	1.1	
40-49 years	61	20.1	10	11.2	
50-59 years	105	34.5	33	37.1	
60-69 years	90	29.6	36	40.4	
\geq 70 years	24	7.9	8	9.0	
Gender					
Male	88	28.9	26	29.2	0.9*NS
Female	216	71.1	63	70.8	

*Chi-square test, NS=Not significant

Table 7. Distribution of lifestyle and clinical characteristics according to apparent retinopathy

Variable	No retinopathy		Retinopathy		P-value
	No.	%	No.	%	
Smoking					
Non-smoker	249	81.9	73	82.0	0.9*NS
Current smoker	19	6.3	5	5.6	
Ex-smoker	36	11.8	11	12.4	
Alcohol consumption					
None	290	95.4	84	95.5	0.9**NS
Current drinker	5	1.6	1	1.1	
Ex-drinker	9	3.0	3	3.4	
Obesity					
Yes	27	8.9	9	10.1	0.7*NS
No	277	91.1	80	89.9	
Hypertension					
Yes	131	43.1	42	47.2	0.4*NS
No	173	56.9	47	52.8	
Cardiovascular disease					
Yes	24	7.9	10	11.2	0.3*NS
No	280	92.1	79	88.8	
Hyperlipidemia					
Yes	25	8.2	18	20.2	0.001*s
No	279	91.8	71	79.8	

*Chi square test, **Fisher's exact test, S=Significant, NS=Not significant.

Table 8. Distribution of diabetes mellitus characteristics according to apparent retinopathy

Variable	No retinopathy		Retinopathy		P-value
	No.	%	No.	%	
Diabetes disease duration					
1-5 years	211	69.4	37	41.6	<0.001*s
6-10 years	66	21.7	32	36.0	
>10 years	27	8.9	20	22.5	
HbA1c					
Normal	30	9.9	3	3.4	0.05*s
Increased	274	90.1	86	96.6	
Type of treatment					
No	8	2.6	0	-	<0.001*s
Oral hypoglycemic agents	231	76.0	40	44.9	
Insulin	16	5.3	14	15.7	
Mixed	49	16.1	35	39.3	

*Chi square test, S=Significant

The information on the distribution of visual acuity decimals according to HbA1c level of diabetic patients demonstrated that visual acuity for left and right eyes was significantly lower among diabetic patients with increased HbA1c level (See Table 9).

Table 9. Distribution of visual acuity decimals according to HbA1c level of diabetic patients

Variable	Normal HbA1c	Increased HbA1c	P
	Mean \pm SD	Mean \pm SD	
Visual acuity – right	0.85 \pm 0.19	0.7 \pm 0.3	0.01*s
Visual acuity – left	0.84 \pm 0.24	0.71 \pm 0.31	0.02*s

Diabetic retinopathy is an expensive and progressive disorder which could be induced from chronic hyperglycemia condition and would be considered as a threatening factor to the vision health. The main pathogenesis of this disorder are capillary occlusion and microangiopathy^{14,15}. The prevalence of diabetes mellitus is borderless, somehow its development would be happening in both developed and developing countries¹⁶.

The findings of this study demonstrated that the prevalence of DM among women is a bit more than men, which may be due to the fact that some female patients were pregnant during the study. In accordance with the available data, the worldwide prevalence of NIDDM is commonly more than IDDM, which is in line with the results obtained in the present study. The prevalence rate of retinopathy among the diabetic patients was 22.6%, which is higher in comparison with the results of a study done by Nahla et al¹⁷, while the findings of our study was close to those obtained in the study conducted by Ala¹².

Additionally, the findings of the current study could prove the outcome of some investigations carried out by American Academy of Ophthalmology on the matter of diabetic retinopathy within the Middle East region. Based on the comprehensive investigation done by American Academy of Ophthalmology, the higher rates of prevalence of diabetes in the world is seen in the Middle East which includes the following countries of Bahrain, Kuwait, Lebanon, Oman, Saudi Arabia, Iraq, Iran and United Arab Emirates. Moreover, the prevalence of diabetic retinopathy ranges from 19% in the UAE to 64% in Jordan. However, the diabetic retinopathy in the present study was lower than Jordan, Kuwait and Yemen with a prevalence rate of 64%, 40% and 55%, respectively¹⁸.

The mean age of patients within this study reported to be about 50 years. Additionally, patients without retinopathy had a lower mean age. Based on the derived information, in patients with prolonged diabetic disorders the rate of development of retinopathy is higher. As could be seen from the reported results, the presence rate of retinopathy among patients with long and less disease duration is not the same. On the other hand, there is a strong association between diabetes mellitus duration and retinopathy. Somehow, the presence of diabetic retinopathy in patients in the third decade and above was higher. About the low vision and blindness, it could be seen that elderly diabetic individuals are more likely to be affected with this kind of disorders¹⁹. The results demonstrated an obvious and parallel association between the development of retinopathy and disorder duration.

The prevalence of severe NPDR, PDR or macula edema was seen to be about 25% among the patients. The main risk factors for advancement of disease to proliferative diabetic retinopathy (PDR) are improper glycemic control and duration of diabetes²⁰. However, lengthening the diagnosis process of diabetes disease would enhance the possibility of progression of disease to the diabetic retinopathy. In this regard, improving diagnostic equipment and also utilizing professional clinicians could provide a more accurate and adequate intervention²¹.

It should be noted that not only DM patients would be at risk of blindness and low vision, but some other impressive factors would cause this kind of disorders. In some of the patients, media opacity induced ocular comorbidity was the main cause of inability to assess the fundus. In spite of the fact that macular edema could cause low vision, the possibility of visual acuity for being less than 20/200 is not high. However, these patients would need laser treatment and low vision rehabilitation²². Macular edema could cause an accumulation of fluid within the macular center. At the present study, the presence of macular edema was observed in some of the diabetes patients. Some predictors of visual loss among patients with diabetes mellitus include old age, proteinuria, diabetic retinopathy severity and baseline poor glycemic controls²³.

In this study, 44% of the patients were diagnosed with systemic hypertension which compounds the vascular leakage further compromising vision. However, the proper control of blood pressure and tight glycemic would significantly decrease the risk of development as well as progression of retinopathy²⁴. Additionally, in some cases, it has been demonstrated that the appearance of diabetic retinopathy would be caused by hypertension²⁵. In the present study; however, such an association was not found.

Due to the fact that the time period between the onset of diabetes mellitus and retinopathy progression is high, there is always a way for screening patients, immediate diagnosis and instituting prompt intervention even when there is no need for doing this procedure. The essential retinopathy screening must be carried out during the first three years of IDDM diagnosis and shortly after the NIDDM diagnosis with annual follow up eye examinations in both types of diabetes^{26,27}.

Immediate diagnosis and proper treatment of DR is one of the main stages which should be done for preventing severe and moderate vision loss in diabetes mellitus. In this regard, there is a high requirement for screening protocol to be established in the Sulaimani diabetic centers and hospitals and create DR awareness systems for preventing both diabetes and its development. However, providing a more precise and comprehensive information on DR, trying to equip eye clinic and also making eye clinic attendance more convenient for patients would improve medical care for this category of patients.

This study has discovered the high prevalence rate of diabetic retinopathy among Kurdish diabetic patients in the Kurdistan region of Iraq. One of the main causes of visual disability is diabetic retinopathy. There is a dire need for a precise screening program for facilitating immediate diagnosis and quick appropriate treatment in any diabetic center. Population-based educational programs on diabetes and diabetic retinopathy and continuous medical education trainings in diabetes management can improve diabetes care and self-management and prevent eye complications.

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