

# **Prevalence and risk factors associated with diabetic retinopathy among diabetic patients in Baba Gurgur Diabetic Center**

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# Prevalence and risk factors associated with Diabetic Retinopathy among diabetic patients in Baba Gurgur Diabetic Center

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## Background:

Diabetic retinopathy is one of the main causes of preventable blindness, so early detection and diagnosis play a great role in the management of Diabetic retinopathy to prevent uneventful blindness.

## Aim of the study:

To determine the prevalence of diabetic retinopathy among diabetic patients.

## Method:

A descriptive cross-sectional study was conducted among diabetic patients at Baba Gurgur Diabetic Center\_K1 Hospital \_in Kirkuk city from November 2019 to May 2020. The study included 750 patients, and the target goal was to determine the incidence and the risk factors for Diabetic Retinopathy.

## Result:

A total of 750 diabetic participants were involved in this study, with 55 years mean of age ranging from 23 to 80 years, 412 (54.9%) were male, and 338(45.1%) were female. A 115 (15.3%) patients were found with signs of Diabetic Retinopathy (Group A ) and 635 ( 84.7% ) with no signs of Diabetic Retinopathy( Group B ), there was no significant relationship between male and female ratio. In our study, DR increases significantly with age, below 30 years age group we didn't record DR and gradually increase the percentage of DR with age, most of the patients were in the age group 50 and more.

There was a significantly high level of mean HbAc1 (10.3 ) among the DR group in comparison to (8.5) in the non-DR group. Also, hypertension in our study group play a role in developing DR, a significantly high percentage of hypertension in the DR Group 60.9% (70) patients in comparing to 42.5% ( 270 ) patients in the non-DR Group was hypertensive, and regarding smoking also there was a strong relationship to the DR as we found 30.4% of the DR group were smokers in comparing to 22% in the non-DR group.

Regarding the type of diabetes, we noticed significant relation with type I diabetic, 22.6% (26 ) patients in group A have Type I diabetes in comparison to 16.2% (103 ) patients in Group B, while in our study there was no relation of DR to the education level of the diabetic patients.

## Conclusion:

Affair prevalence of Diabetic Retinopathy among Iraqi diabetic patients founded. High levels of HbA1c, hypertension and, smoking are strongly correlated with diabetic retinopathy. Our findings support enhanced governments' and healthcare providers' efforts in Iraq to ensure DR diagnosis and treatment and greater control of variables correlated with DR among diabetic individuals.

**Keywords:** Diabetic retinopathy, risk factors, Kirkuk.

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## Introduction

Diabetic retinopathy (DR) is one of the main causes of vision loss in working-age adults worldwide <sup>(1)</sup>. In 2015 among the global population with moderate or severe vision impairment (2.6) million are due to diabetic retinopathy <sup>(2)</sup>. In 2010, of an evaluated 285 million diabetes around the world, over 30% exhibits DR, and a third of them had vision-threatening diabetic retinopathy (VTDR), represents as proliferative DR (PDR), severe non-proliferative DR, or diabetic macular edema (DME) <sup>(3)</sup>. there is a few valid contemporary estimations of the global prevalence of DR, especially severe vision-threatening stages of the disease. Former studies showed a lot of variation in DR prevalence founded among patients with detected or undetected diabetes, in a study in India<sup>(4)</sup>. with percentages of 17.6%<sup>),</sup> while 33.2% In another study in U.S.A.<sup>(5)</sup>. Variations in population characteristics, study methodologies, and progression of DR classification made the direct comparing between studies are not easy.

In spite of the fact that the major risk factors for DR (e.g., increased blood sugar, high blood pressure ) have been studied in different epidemiologic researches and clinical trials, the pattern, consistency, and strength of these risk factors vary considerably. This is especially true in concern to severe stages of DR due to fact that individual studies, in general, lack the capacity to clear the relationships for PDR and DME. As a result, the magnitude of adjustable risk factors for these vision-threatening DR stays unknown. risk factors that have a great role in the progression of vision deterioration include the duration of diabetes, increased serum glucose, and high blood pressure <sup>(1)</sup>.

Previous studies addressing regional and ethnic disparities have looked into the prevalence and risk factors of DR extensively. In this paper, we summarize the frequency of DR and emphasize regional disparities in DR epidemiology from recent research, as well as the causal relationship between risk factors and DR.

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## **Study Objectives are to :**

- Identify incidence of retinopathy among Baba Gurgur diabetic patients.
- Recognize the risk factors related to diabetic retinopathy.
- Clarify the relation of HbA1c level control with diabetic retinopathy.

## **Patients and materials**

The research was conducted at the Baba Gurgur Diabetic Center, which is belonged to the K1 hospital in Kirkuk city and serves patients from all around Kirkuk region. The program which has been opened in 2018 and currently receives roughly 20-30 diabetic outpatients per day.

### **Design of the research:**

A cross-sectional descriptive study was undertaken at the outpatient of Baba Gurgur Diabetic Center in Kirkuk city from November 2019 to May 2020.

### **Sampling:**

750 adult diabetic patients (type I and II) (416 male and 334 female) volunteered to take part in the study. Before collecting data, permission was acquired from the hospital and laboratory's administrative authorities.

### **Ethical approval:**

Approval on this study was obtained by the Research Ethics Committee of the Iraqi Ministry of Health ( Health Directory of Kirkuk ).

### **Exclusion criteria:**

- Severely ill patients who could not participate.
- Participants with corneal opacity or mature cataracts in both eyes that fundus examination could not be done for them.
- Patients with iris adhesion or any problem that prevents pupil dilatation.
- Diabetic patients with severe visual impairment in both eyes were excluded from the study.

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## Data collection tool

We prepared the questionnaire after discussing the study's goals and the questionnaire's content to the participants; verbal consent was obtained, and they were interviewed in-depth regarding socio-demographic information, with the data collection divided into four sections.

**part 1:** Demographic and socio-behavioral characteristics of the

participant patients as (age, sex, smoking, type of Diabetes, duration of the disease, and level of education according to Iraqi cultural office 2010. Where classified following educational level:

A-primary (illiterate and primary school),

B-Secondary (secondary and intermediate school),

C-Tertiary (university and higher education).

**Part 2:** In the Centre laboratory, blood samples were taken by phlebotomy in order to assess HbA1c using the AFIAS-6 (Automated Fluorescent Immunoassay System) <sup>(6)</sup>.

All HbA1c data were expressed as a relative concentration percent (aligned outcome) in the (Diabetes Control and Complication Trial) DCCT.

**part 3:** patients' Blood pressure was measured by using a sphygmomanometer in the sitting position in the right arm and recorded. Then other readings were taken after 5 min, and the mean of the two measurements was taken as blood pressure.

**Part 4:** ocular examination: Patients were referred to the ophthalmic department at Baba Gurgur Diabetic Center and examined for best-corrected visual acuity with a Snellen chart, then the pupils were dilated with tropicamide (1%) and slit-lamp examination using 90 Volk lens to determine the signs of diabetic retinopathy.

Using the Early Treatment Diabetic Retinopathy Study (ETDRS) grading standards, which define diabetic retinopathy as the presence of 1 or more retinal microaneurysms or retinal blot hemorrhages with or without more severe lesions (hard exudates, soft exudates, intraretinal microvascular abnormalities, venous beading, retinal new vessels, preretinal and vitreous hemorrhage.

The patients in the study were divided into 2 groups, group A includes those with any level of DR( diabetic Retinopathy ) signs and group B includes those with non-DR.

### Statistical analysis:

Using the SPSS version 20.0 software program, data were coded, imported into a Microsoft Excel sheet, and analyzed. The descriptive technique comprised the calculation of frequencies, means, percentages, and standard deviation, while the analytic part included in the group comparisons using the Chi-square test. It was considered significant if the (p-value) was less than 0.05.

### Results

This study included 750 diabetic patients, with an average age of 55 years and a range of 16 to 80 years. 412 (54.9%) were male, and 338(45.1%) were female. 115 (15.3%) was found with signs of Diabetic Retinopathy, 635 84.7% with no signs of Diabetic Retinopathy there was no significant relationship between male and female ratio as we show in the table (1).

**Table (1): Gender relation to Diabetic Retinopathy.**

Gender	Group A DR		Group B non-DR		Total	P-value
		%		%		
Male	59	51.3%	353	55.6%	412	0.395
Female	56	48.7%	282	44.4%	338	0.395
<b>Total</b>	115	15.3%	635	84.7%	750	

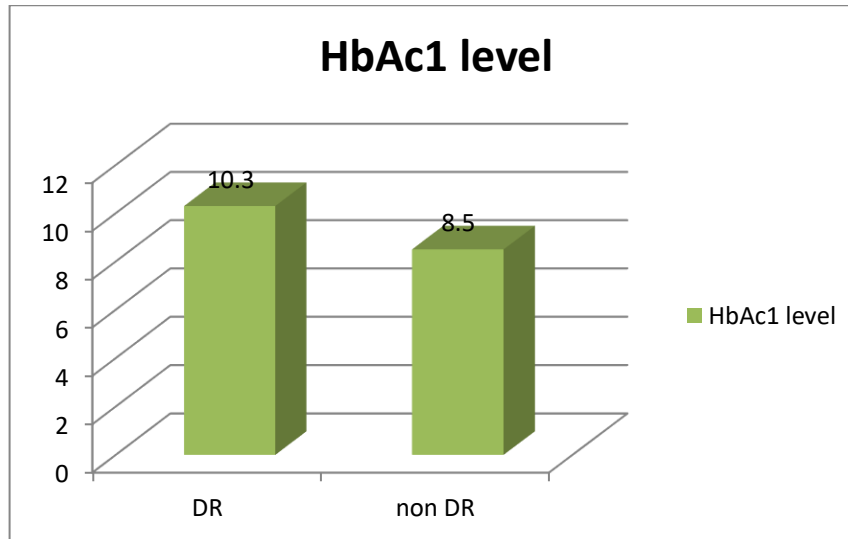
In our study, DR increases significantly with age as we show in the table (2), below 30 years age group we didn't record DR and gradually increase the percentage of the DR with age most of the patient was in the age group 50 and more.

**Table (2): age group relation to Diabetic Retinopathy.**

Variable Age group	Frequency of Diabetic	Frequency of DR at age group	%
< 20	5	0	0 %
21- 30	12	0	0 %
31- 40	48	2	4.1%
41- 50	168	16	9.5%
50-60	304	44	14.5%
> 60	213	53	24.9%
<b>Total</b>	750		

There was a significantly high level of mean HbAc1 (10.3 ) among the DR group in comparison to (8.5) in the non-DR group (figure 1).

**Figure (1): level of HbA1c in Diabetic Retinopathy and non-Diabetic Retinopathy patients.**



Also, hypertension in our study group play a role in developing DR,( 42.5% ) 270 patient was hypertensive in non-DR Group while significantly higher percent in DR group (60.9% )70 patients, and regarding smoking also there was a strong relationship to the DR as we found 30.4% of DR group were smoking in comparing to 22% in the non-DR group as shown in (table 3).

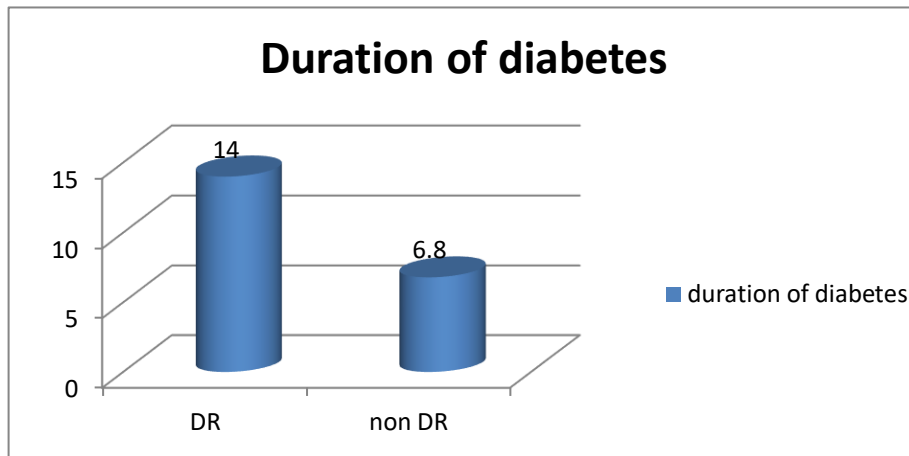
**Table (3): Risk factors among diabetic patients with Diabetic Retinopathy**

Risk factor	Group A DR (115)		Group B non-DR (635)		Total	P-value
		%		%		
Hypertensive	70	60.9%	270	42.5%	340	0.005
Smoker	35	30.4%	140	22%	338	0.050

We found a significantly clear relation between the duration of diabetes and DR.

The mean duration of diabetes in the DR group was 14 years while in the non-DR group was 6.8 years as shown in (figure 2).

**Figure (2): Relation between the duration of diabetes with Diabetic Retinopathy**



Regarding the type of diabetes, we noticed significant relation with type I diabetic as shown in( table 4). 22.6% (26 ) patients in group A have Type I diabetic in comparing to 16.2% (103 ) patients in Group B.

**Table (4): The percentage of Diabetic Retinopathy according to the type of Diabetes.**

Diabetes type	Group A DR (115)		Group B non-DR (635)		Total	P value
		%		%		
Type I	26	22.6%	103	16.2%	129	0.050
Type II	89	77.4%	532	83.8%	621	0.095
Total	115		635		750	

In our study, we didn't found any relation of DR with the education level of diabetic patients as we mention in ( table 5).

**Table (5): Correlation of educational level to Diabetic Retinopathy**

Educational level	Group A DR (115)		Group B non-DR (635)		Total	P-value
		%		%		
Primary	58	50.4%	310	48.9%	368	0.750
Secondary	38	33.1%	224	35.2%	262	0.644
Tertiary	19	16.5%	101	15.9%	120	0.868
Total	115		635		750	



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## Discussion:

Our research provides unmatched information on the prevalence of diabetic retinopathy and its risk factors in the Kirkuk region of Iraq, for which only trace data on DR has previously been published. Diabetic retinopathy was found to be prevalent in 15.3% of diabetic patients at Baba Gurgur Diabetic Center, according to the study.

In our study, the prevalence of DR was 14.3 percent in type II diabetes and 20.1 percent in type I diabetes, in both groups, the prevalence of DR was comparable to or lower than rates documented in other countries in the area and global research, such as Saudi Arabia (19.7% type II diabetes)<sup>(7)</sup>, Iran (37.0%)<sup>(8)</sup>, and India (21.7%)<sup>(9)</sup>.

Various rates of DR have been recorded around the world, with estimates mostly based on methodology, environment, diagnostic procedure, and population sample.

Joanne et al. found that the global prevalence of DR was (34.6 percent) in a major meta-analysis based on data from 35 studies in different countries (from 1980 to 2008) involving 22,896 people with diabetes<sup>(10)</sup>. A study in the United Kingdom found that overall diabetes prevalence was (32.4%), type I diabetes was (56%), and type II diabetes was (30.3%)<sup>(11)</sup>. In a study by Ruta et al., the median prevalence of diabetic retinopathy was found to be 27.9% (22-37%) in 33 developing countries<sup>(12)</sup>.

The lower prevalence of DR in our study group could be due to the following factors:

1- A lack of routine screening and patient education regarding diabetic retinopathy, its prevention, and management. These issues may be common in Middle Eastern countries, since there are few systematic screens for diabetic eye complications, especially in rural regions.

2- In our study, we lack OCT and fundus camera which explain retinopathy that is not captured in the study.

3- Our study sample was small and taken randomly.

In our study there was no relationship between the retinopathy and gender in comparison to other studies, some studies found males more prone to DR<sup>(13)</sup>, while other studies showed no relation<sup>(14)</sup>.

In this study, DR increases significantly with age, below 30 years age group we didn't record DR and gradually the percent of DR increases with the age, most of the patients were in the age group 50 and more. According to Aiello et al., more than 60% of type II

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diabetic individuals would develop retinopathy after 20 years of diabetes, regardless of diabetic treatment<sup>(15)</sup>, Other studies<sup>(16), (17), (18)</sup>. have backed this up.

In diabetic people, the chances of developing DR grow as they get older<sup>(19)</sup>.

In addition, increasing age has a substantial impact on the severity of DR<sup>(16)</sup>. We found a considerable effect of age on DR in this study, particularly in the age groups 51- 60 and > 60. According to some writers, age may be a predictor of the duration of DR in patients<sup>(20)</sup>.

The DR group had a substantially higher mean HbA1c (10.3%) than the non-DR group (8.5%), which is consistent with recent studies suggesting that the duration of diabetes may be reflecting a total glycemic control and exposure to other risk factors throughout time<sup>(21), (15)</sup>.

In our investigation, chronic hypertension was found to be strongly linked with DR, whereas most studies suggest that increased blood pressure is significantly associated with DR<sup>(16), (21)</sup>.

Regarding smoking also there was a strong relationship to the DR as we found 30.4% of the DR group were smoking in comparing to 22% in the non-DR group, in a meta-analysis the risk of diabetic retinopathy significantly increased in smokers with type 1 diabetes<sup>(22)</sup>.

In another study regarding the association of smoking with proliferative retinopathy,

There was no link between diabetes duration and proliferative retinopathy in nonsmokers, while among smokers, the number of people with proliferative retinopathy increased as diabetes duration increased<sup>(23)</sup>.

The duration of diabetes in our study was strongly associated with the DR. the mean duration of diabetes was 14 years in the DR group while 6.8 years in the non-DR group. In other studies, the duration of diabetes, fasting blood glucose, and glycosylated hemoglobin test were all found to be substantially linked with retinopathy (P-value 0.005)<sup>(24)</sup>. However, multivariate analysis revealed that the length of diabetes was an independent risk factor for both the type and advancement of retinopathy (Odds Ratio 5.7 for 5 to 10 years and 32.3 for more than 10 years in cases of non-proliferative retinopathy)<sup>(25)</sup>.

In the Nepal study, Diabetic Retinopathy was found in 24.8 percent of patients with diabetes for less than 5 years, while Diabetic Retinopathy was found in 90.3 percent of patients with diabetes for 20 years or more<sup>(26)</sup>.

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Type I diabetes was found to be a high risk factor for DR in this study's participants, with 20.2 percent of those with type I diabetes having DR compared to 14.3 percent of those with type II diabetes. This finding was similar to earlier research <sup>(27), (28), (29) (30)</sup>.

In our study, we didn't find any relation of DR with the education level of diabetic patients in some studies. The knowledge of DR was significantly higher in those who belonged to the higher socioeconomic strata <sup>(31)</sup>.

## **Conclusion**

The prevalence of DR was observed to be fair among Iraqi diabetic patients in this study. Diabetic retinopathy is significantly linked to high HbA1c levels, hypertension, and smoking. Our findings suggest that governments and healthcare professionals in Iraq should make greater efforts to ensure diagnoses of DR in diabetic individuals and that risk factors linked with DR are better controlled.

Diabetes and diabetic retinopathy education programs for the general public, as well as the Diabetes self-management and care can be improved with ongoing medical education, as well as prevent ophthalmic problems.

## **Recommendations**

We recommend education programs on Diabetes Retinopathy awareness and screening programs to early detection of any level of diabetic retinopathy.

## **Acknowledgments**

- We are thankful to the laboratory staff of Baba Gurgur Diabetic Center for their generous cooperation in completing the current study.

## **Abbreviations**

DR: Diabetic retinopathy

VTDR: vision-threatening diabetic retinopathy

PDR: proliferative Diabetic retinopathy

DME: diabetic macular edema

DCCT: Diabetes Control and Complication Trial

ETDRS: Early Treatment Diabetic Retinopathy Study

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