

Prevalence and Risk Factors for Eye Problems among 20-65 Years Old Iraqi Diabetics Patients

Baqir Kareem abed MBChB, FICMS/CM *
Yousif Abdul Rahim MBChB, FICMS/CM **
May Abdul hameed Ali MBChB, FICMS/FM ***
Muna F. Abbas , MBChB, FICMS/FM ****

Summary:

Background: Diabetes is a chronic illness that requires continuing medical care to prevent acute complications and to reduce the risk of long-term complication. Eye diseases are the most feared complication of diabetes. The main disorders include diabetic retinopathy, cataracts and glaucoma. Early detection of these conditions is important to avoid risk of vision affection or even blindness.

Objectives: This study aimed to assess the prevalence and risk factors for eye problems among 20-65 years old diabetics' patients.

Methods: We studied 2540 diabetic patients selected from the Specialized Center for Endocrinology & Diabetes and the National Center for Treatment & Research of Diabetes in Al-Mustanserria Collage of Medicine from the 1st of January, 2004 to the 31st of December, 2005. Structured questionnaires, full ophthalmological examination were used to determine the prevalence of eye problems with their risk factors.

Results: It was found that the prevalence of eye complications in the study sample was 45.4%, 30.2%, 14.6 and 3%, for reduction in visual acuity, retinopathy, cataract and glaucoma respectively. These ocular manifestations are common and cause a significant deterioration in the vision. Age, family history, duration of diabetic disease, smoking, and presence of chronic diseases (hypertension&\or ischemic heart disease), were found to be the main risk factors for the above complications which in turn lead to reduction in the visual acuity in diabetic patients.

Conclusions: These ocular manifestations are common in diabetic patients and cause a significant deterioration in the vision. Regular ophthalmology, including slit-lamp examination, fundus examination and regular measurement of the intraocular pressure, are necessary for the early detection and management of potential complications.

Key words: Diabetes mellitus, retinopathy, cataract, glaucoma.

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Introduction:

Diabetes mellitus (DM) is by far the most common metabolic disorder, its prevalence varying widely worldwide and ranging from as low as <1% to >30% ⁽¹⁾. It is due to insulin deficiency or inefficiency, which results in a state of hyperglycemia⁽²⁾.

Insulin-dependent diabetes mellitus (TI DM) and non-insulin-dependent diabetes mellitus (Til DM) are the two primary types and are the most widely distributed ^(1,3). In developing countries, the prevalence of diabetes is increasing, where there are, as 70 million people suffering from diabetes mellitus ^(4,5).

DM affects human body from head to toes. This includes the eyes which is the one inch spherical marvel that gives us vision. Damage to the eye is the most feared complication of diabetes and the most common and most serious eye complication of diabetes is diabetic retinopathy, which may result in poor vision or even blindness ⁽⁶⁻⁷⁾. DM is the most common

* *College of Medical and Health Technology*
** *Community Medicine Department , Al- Kindy College of Medicine*
*** *Community Medicine Department , Al- Kindy College of Medicine*
**** *Optometry Department ,College of Medical and Health Technology*

cause of blindness of working-age (20-65 years). Although total blindness in diabetes is uncommon since just fewer than 2% of people with IDDM actually suffer total vision loss, however, the fear of losing one's sight is strong, as anyone with diabetes who's had a change in vision can testify and unless an eye exam is done⁽⁷⁾. Patients with diabetes are more likely to develop eye problems such as cataracts (clouding of the natural eye lens) and glaucoma [increased intraocular pressure (IOP)], but the disease's affect on the retina (diabetic retinopathy) is the main threat to vision⁽⁸⁾. Most patients develop diabetic changes in the retina after approximately 20 years. Most people are unaware that they have eye damage; the great majority of this blindness can be prevented with proper examination and treatment by ophthalmologists^(7,9,10). Thus, it is essential that every country attempts to assess the magnitude of the problem and takes steps to control and prevent eye complications in diabetic patients and provide appropriate care^(11,12,13).

The **aim** of this study was to assess the prevalence and risk factors of eye complications associated with DM in working age group (20-65 years) Iraqi diabetic patients to ensure early diagnosis and proper treatment of these complications.

Patients and methods

1- Study design: Cross-sectional study was carried out during the period from the 1st of January, 2004 to the 31st of December, 2005.

2- Study population: Diabetics' patients whom age 20-65 years old, attending one of these diabetic centers; a- The Specialized Center for Endocrinology & Diabetes (in Al-Rusafa sector). b- The National Center for Treatment & Research of Diabetes in Al-Mustanseria Collage of Medicine (in Al-Karkh sector). The two centers were selected to reflect the different geographical distribution of patients in Al-Rusafa and Al-Karkh sectors, the main sectors in Baghdad. These centers are also attended by patients from rural areas around Baghdad and even from other Iraqi governorates.

3- Study sampling: On average 50 diabetic patients visit each diabetic center per day. On a systematic random sample basis, we select 6-8 patients\ day, 4 days per week. A total

sample of 2540 patients was selected throughout the study period.

4- Data collection: A specially constructed questionnaire were used to collect the information, these include: a- Demographic information; age, gender, residence, educational level, marital status, family history (first degree), b- Clinical history; type of diabetes (I or II), age of the diagnosis, smoking history, history of previous eye trauma, history of previous eye disease, past medical history (meningitis, encephalitis, vitamin A deficiency) and other chronic diseases (hypertension, ischemic heart diseases).

c- Clinical eye examination; this is done in Al-Kindy Teaching Hospital and Al-Yarmouk Teaching Hospital by specialist ophthalmologist. We examine the:

- Visual acuity using snellen E chart for use at 6 m. visual acuity less than 9/6 consider to be affected.

- Intra ocular pressure by tentometry to detect glaucoma (IOP>14 considered to be elevated).

- Slit lamp, mydriatics and funduscopy examination (device). For the presence of cataract (mature or immature) or artificial lens (previous surgical replacement), or retinopathy. Diabetic retinopathy classified into four stages^(7,14):

- **Stage I:** Mild Nonproliferative Retinopathy. At this earliest stage, micro aneurysms occur.

- **Stage II:** Moderate Nonproliferative Retinopathy. Some blood vessels that nourish the retina are blocked.

- **Stage III:** Severe Non-proliferative Retinopathy. Many more blood vessels are blocked, depriving several areas of the retina with their blood supply.

- **Stage IV:** Proliferative Retinopathy. At this advanced stage, there is growth of new blood vessels.

4- Data analysis:

Data was entered and analyzed by Statistical Package for Social Sciences (SPSS) version 11. The following statistics were used: a- Descriptive statistics; tables, frequencies, and percentages, b- Inferential statistics; Chi-square test was used to find the significant of associations. P-values less than **0.01** considered being significant and the factor considered to be a risk factor^(15,16).

Results

The total number of diabetic patient enrolled in this study was 2540, and included 1560 (61.4%) males and 980 (38.6%) females. The male: Female ratio was 1.6:1. The numbers by age and sex, are presented in table one.

Table 1: Age and sex distribution of the study sample regarding the type of DM

Age groups (years)	Male		Female		Total	
	No	%	No	%	No	%
20-29	572	18.7	96	1.4	668	26.3
30-39	464	15.4	120	2.8	584	23.0
40-49	296	9.0	296	9.6	592	23.3
50-59	168	4.2	236	6.5	404	15.9
60-65	60	0.6	232	7.3	292	11.5
Total	1560	47.9	980	27.6	2540	100

The prevalence of eye complications in the study sample was 45.4%, 30.2%, 14.6 and 3%, for decrease visual acuity, retinopathy, cataract and glaucoma respectively as shown in table two.

Table 2: The prevalence of eye complications of the study sample regarding their numbers and percentages.

Eye complications							Total	
Decrease visual acuity		Retinopathy		Cataract		Glaucoma		
No.	%	No.	%	No.	%	No.	%	
1152	45.4	768	30.2	372	14.6	76	3	2540

Regarding visual acuity examination, 1152 (45.4%) patients of the diabetic sample had reduction more than 9/6. The association of reduction in the visual acuity and possible risk factors for this reduction is shown in table 3. Age, sex, residence, education, marital status, family history, type and duration of DM, smoking, history of previous head or eye trauma, past medical history of meningitis, encephalitis or vitamin A deficiency, presence of chronic diseases (HT or IHD), and presence of eye diseases (glaucoma, cataract, retinopathy) were considered as a risk factors for reduction of visual acuity in diabetic patients.

Table 3: Distribution of the study sample regarding reduction in the visual acuity and possible risk factors.

Risk factors	Visual acuity				Total (N=2540) No	P-value
	Reduction (n=1152)		No reduction(n=1388)			
	No	%	No	%		
Age: 20-39	300	24	952	76	1252	<0.001
	852	66.1	436	33.9	1288	
Sex: Male	588	37.7	972	62.3	1560	0.001
	564	57.5	416	42.5	980	
Residence: urban	820	42.7	1100	57.3	1920	0.001
	332	53.5	288	46.5	620	
Education: <Secondary school	384	37.2	648	62.8	1032	0.001
	432	46.3	500	53.6	932	
	336	58.3	240	41.7	576	
Marital status: Single.	568	49.4	580	50.6	1148	0.001
	584	41.9	808	58.1	1392	
Family history: Yes.	456	73.1	168	26.9	624	0.001
	696	36.3	1220	63.7	1916	
Type of DM I	492	78.8	132	21.2	624	0.001
	660	34.4	1256	65.6	1916	
Duration of the disease (years): <5	76	9.6	716	90.4	792	0.001
	152	21.8	544	78.2	696	
	496	87.3	72	12.7	568	
	428	88.4	56	11.6	484	
Smoking history: Never smoker	344	39.4	528	60.6	872	0.001
	392	42.1	540	57.9	932	
	416	56.5	320	43.5	736	
History of previous head or eye trauma: Yes	260	63.1	152	36.9	412	0.001
	892	41.9	1236	58.1	2128	
Past medical history (meningitis, encephalitis&\or vit A deficiency) Yes.	216	36.7	372	63.3	588	0.001
	936	47.9	1016	52.1	1952	
Presence of chronic diseases (HT&\or IHD) Yes.	668	90.8	68	9.2	736	0.001
	484	26.8	1320	73.2	1804	
Presence of eye disease: Glaucoma Yes.	68	89.5	8	10.5	76	0.001
	1084	44	1380	56	2464	
Cataract: Yes.	360	96.8	12	3.2	372	0.001
	792	36.5	1376	63.5	2168	
Retinopathy: Absent	540	30.5	1232	69.5	1772	0.001
	404	73.2	148	26.8	552	
	208	96.3	8	3.7	216	

Retinopathy was found in 30.2% (768 patients) of the study sample, 71.9% of them were classified as grade I and II while 28.1% as grade III and IV. Their distribution regarding its severity and possible risk factors was shown in table 4. Age, sex, residence, marital status, family history, type and duration of DM, smoking, history of previous head or eye trauma,

past medical history of meningitis, encephalitis&\ or vitamin A deficiency, presence of chronic diseases (HT&\ or IHD), and presence of eye diseases (glaucoma, cataract, retinopathy) were considered as a risk factors for retinopathic changes in diabetic patients.

Table 4; The distribution of the study sample regarding the association of retinopathy and possible associated risk factors.

Risk factors	Retinopathy						Total (N=2540)	P-value
	Absent (n=1772) No. %		Grades 1&II (n=552) No. %		Grades III&IV (n=216) No. %			
Age: 20-39	1080	86.3	128	10.2	44	3.5	1252	0.001
40-65	692	53.7	424	32.9	172	13.4	1288	
Sex: Male	1148	73.6	288	18.5	124	7.9	1560	0.001
Female	624	63.7	264	26.9	92	9.4	980	
Residence : Urban	1376	71.7	388	20.2	156	8.1	1920	0.001
Rural	396	63.9	164	26.4	60	9.7	620	
Education: <Secondary	720	69.8	224	21.7	88	8.5	1032	0.05
Secondary	676	72.5	180	19.3	76	8.2	932	
>Secondary	376	65.3	148	25.7	52	9	576	
Marital status; Single	728	63.4	344	30	76	6.6	1148	0.001
Married	1044	75	208	14.9	140	10.1	1392	
Family history of DM: Yes	212	34	312	50	100	16	624	0.001
No	1560	81.4	240	12.5	116	6.1	1916	
Type of DM I	224	35.9	244	39.1	156	25	624	0.001
II	1548	80.8	308	16.1	60	3.1	1916	
Duration of the disease (years): <5	776	98	8	1	8	1 3.	792	0.001
5-10	552	79.	120	17.3	24	4 7	696	
11-15	352	3 62	176	31	40	29.8	568	
>15.	92	19	248	51.2	144		484	
Smoking history: Never smoker	760	87.2	96	11	16	1.8	872	0.001
Ex-smoker	688	73.8	152	16.3	92	9.9	932	
Current smoker	324	44	304	41.3	108	14.7	736	
Previous history of head or eye trauma: Yes	216	52.4	152	36.9	44	10.7	412	0.001
No	1556	73.1	400	18.8	172	8.1	2128	
Past medical history (meningitis encephalitis&\ or vit A deficiency) Yes	460	78.2	24	4.1	104	17.7	588	0.001
No	1312	67.2	528	27.1	112	5.7	1952	
Presence of chronic diseases (HT&\ or IHD) Yes	348	47.3	352	47.8	36	4.9	736	0.001
No	1424	78,9	200	11.1	180	10	1804	

Cataract was found in 14.6% of the study sample, their distribution according to the presence of suspected risk factors is shown in table 5. Age, residence, education, marital status, family history, type and duration of DM, smoking, past medical history of meningitis, encephalitis & \or vitamin A deficiency, presence of chronic diseases (HT & \or IHD), and presence of eye diseases (glaucoma, cataract, retinopathy) were considered as a risk factors for cataract development in diabetic patients.

Table 5: The distribution of the study sample regarding the association of cataract and possible associated risk factors.

Risk factors	Cataract				Total (N=2540)	P-value	
	Present (n=372)		Absent(n=2168)				
	No.	%	No.	%			
Age:	20-39	44	3.5	1208	96.5	1252	<0.001
	40-65	328	25.5	960	74.5		
Sex:	Male	216	13.8	1344	86.4	1560	<.150
	Female	156	15.9	824	84.1	980	
Residence:	Urban	248	12.9	1672	87.1	1920	<.001
	Rural	124	20	496	80	620	
Education:	<Secondary	136	13.2	896	86.8	1032	0.006
	Secondary	164	17.6	768	82.4	932	
	>Secondary	72	12.5	504	87.5	576	
Marital status:	Single	132	11.5	1016	88.5	1148	<0.001
	Married	240	17.2	1152	82.8	1392	
Family history Of DM:	Yes	232	37.2	392	62.8	624	<0.001
	No	140	7.3	1776	92.7	1916	
Type of DM	I	248	39.6	378	60.4	626	<0.001
	II	124	6.5	1790	93.5	1914	
Duration of the disease (years):	<5	8	1	784	99	792	<0.001
	5-10	84	12.1	612	87.9	696	
	11-15	112	19.7	456	80.3	568	
	>15	168	34.7	316	65.3	484	
Smoking history:	Never smoker	80	9.2	792	90.8	872	<0.001
	Ex-smoker	112	12	820	88	932	
	Current smoker	180	24,5	556	75.5	736	
Previous history of head or eye trauma:	Yes	44	10.7	368	89.3	412	0.013
	No	328	15.4	1800	84.6	2128	
Past medical history (meningitis, encephalitis & \or vit A deficiency)	Yes	24	4.1	564	95.9	588	<0.001
	No	348	93.5	1604	74.0	1952	
Presence of chronic diseases (HT & \or IHD)	Yes	272	36.9	464	63.1	736	<0.001
	No	100	5.5	1704	94.5	1804	

Increase in the IOP (glaucoma) was found in 3% of the study sample, their distribution according to the presence of suspected risk factors is shown in table 4. Age, residence, education, marital status, family history, duration of DM, presence of chronic diseases (HT&Aor IHD), and presence of eye diseases (glaucoma, cataract, retinopathy) were considered as a risk factors for increase in the IOP in diabetic patients.

Table 6: The distribution of the study sample regarding the increase in IOP (glaucoma) and possible associated risk factors.

Risk factors	Glaucoma				Total (N=2540)	P-value
	Present (n=76)		Absent (n=2464)			
	No.	%	No.	%		
Age:						
20-39	8	0.6	1244	99.4	1252	<0.001
40-65	68	5.3	1220	94.7	1288	
Sex:						
Male	44	2.8	1516	97.2	1560	0.522
Female	32	3.3	948	96.7	980	
Residence:						
Urban	40	2.1	1880	97.9	1920	<0.001
Rural	36	5.8	584	94.2	620	
Education :						
<Secondary	24	2.3	1008	97.7	1032	<0.001
Secondary	20	2.1	912	97.9	932	
>Secondary	32	5.6	544	94.4	576	
Marital status:						
Single.	16	1.4	1132	98.6	1148	<0.001
Married.	60	4.3	1332	95.7	1392	
Family history of DM:						
Yes.	32	5.1	592	94.9	624	<0.001
No.	44	2.3	1872	97.7	1916	
Type of DM						
I	12	1.9	612	98.1	624	0.071
II	64	3.3	1852	96.7	1916	
Duration of the disease (years):						
<5	4	0.5	788	99.5	792	<0.001
5-10	20	2.9	676	97.1	696	
11-15	36	6.3	532	97.7	568	
>15.	16	3.3	468	96.7	484	
Smoking history:						
Never smoker	20	2.3	852	97.7	872	0.321
Ex-smoker	32	3.4	900	96.6	932	
Current smoker	24	3.3	712	96.7	736	
previous History of head or eye trauma:						
Yes.	8	1.9	404	98.1	412	0.172
No.	68	3.2	2060	96.8	2128	
Past medical history (meningitis, encephalitis &\ or vitamin A deficiency):						
Yes	12	2	584	98	596	0.109
No.	64	3.3	1880	96.7	1944	
Presence of chronic diseases (HT&\or IHD):						
Yes.	52	7.1	684	92.9	736	<0.001
No.	24	1.3	1780	98.7	1804	

Discussion

In 2004, according to the World Health Organization, more than 150 million people worldwide suffered from diabetes. Its incidence is increasing rapidly, and it is estimated that by the year 2025 this number will double⁽¹⁷⁾. People with diabetes are prone to eye diseases because of high blood sugar, narrowed blood vessels and other factors. These disorders include diabetic retinopathy, glaucoma and cataracts which in turn cause reduction in visual acuity. Early detection of these conditions is important to avoid risk of blindness^(18,19).

The data presented in this study demonstrate that eye manifestations are important health problems in the diabetic population. The prevalence of eye complications in the study sample was 30.2%, 14.6 and 3%, for retinopathy, cataract and glaucoma respectively, these complications with other possible factors (age, sex, duration of the disease, smoking, presence of chronic diseases) cause reduction in the visual acuity in 45.4% of the study sample which certainly affect their working abilities as well as their quality of life, it can be very difficult coping with everyday life^(13,20). The data showed that several factors relating to personal and clinical characteristics might play an important role in the development and/or progression of diabetic eye complications. But to increase the validity of the study, we considered the level of significance less than 0.01 as indicator for significant association. Regarding reduction of visual acuity in diabetic patients, all the studied factors found to be statistically associated with this problem. Among the interesting factors are sex, residence, level of education, marital status, family history were found to be indicators of the progression of diabetic eye complications. Regarding personal characteristics, age was the strongest predictors of the development of eye complications, while duration of the disease and smoking were the strongest regarding clinical factors. The same findings have been reported by others^(7, 20, 21, 22)

Initially, most people with diabetic retinopathy experience only mild vision problems. But the condition can worsen and threaten the vision. The threat of blindness is scary. But with early detection and treatment, the risk of severe vision loss from diabetic retinopathy is small⁽²³⁾. In this study, all the studied

characters except the level of education were considered as a risk factors for diabetic retinopathy. In fact, this complication might occur in old patients even if he/she is not diabetics, but they appear to occur earlier and more severe in diabetics patients. Smoking doubles the damage to the body caused by diabetes by causing hardening of the arteries even in non diabetic patients but researchers have discovered smoking triples the retinopathy progression rate and the harmful effect does not depend on whether you smoke cigarettes, a pipe, or cigars, but is more dependent on the amount you smoke^(20,21). Nearly half of people with known diabetes have some degree of diabetic retinopathy. The longer you have diabetes, the more likely it is you'll develop diabetic retinopathy. Also the association between retinopathy and elevated blood pressure has been found in many studies^(19, 22). Hypertension and diabetes are interrelated diseases and, generally, diabetic patients who have hypertension are more likely to develop eye complications^(14,19).

Cataract is known to be of unknown origin in most of cases, but diabetic patient has a significant risk to develop such complication⁽²¹⁾. In this study all the studied factors (except sex and previous history of head or eye trauma), were considered as a risk factors. After diabetic retinopathy and cataract, glaucoma had been found to be the third most common cause of blindness among our patients. Sex, type of DM, smoking, previous history of head or eye trauma, and past medical history were found not statistically associated with this problem and hence not considered as a risk factors. The same finding was found in the Ophthalmology Department of King Hussein Medical Centre Jordan by Tahat et al. who found that the leading three causes of blindness in Jordan, independent of age, were cataract (30%), advanced diabetic retinopathy (21%) and all forms of glaucoma (4%)⁽²⁴⁾.

Conclusions

- 1- Eye manifestations are important health problems in the diabetic population.
- 2- The prevalence of eye problems among the study sample ranging from 45.4% for reduction in visual acuity, 30.2% for retinopathy, 14.6% for cataract to 3% for glaucoma. These ocular manifestations are

common and cause a significant deterioration in the vision.

3- Age of the patient, family history of DM, type and duration of the disease, smoking, HT and IHD are the main risk factors for these complications.

Recommendations

1- Regular ophthalmologic examination for diabetic patients including slit-lamp examination, fundus examination and regular measurement of the intraocular pressure, which are necessary for the early detection and management of potential complications.

2- Ensure good glycemic control for diabetic patients.

3- Establishment of eye-care center in each diabetic center.

4- Multi-disiplinary approach for controllable risk factors including health edu programmes target the diabetic groups and include education on the hazards of smoking, and the promotion of a healthy diet and healthy lifestyle.

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