

Awareness of diabetic retinopathy among patients with type 2 diabetes mellitus in Qassim, Saudi Arabia

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ABSTRACT

Introduction: Diabetic retinopathy (DR) is a well-known complication of diabetes mellitus (DM) and a major cause of vision loss. Increased awareness of DR is crucial for the prevention and early diagnosis of the disease and preservation of vision. The objective of this study is to assess the level of DR awareness in the Qassim region among type 2 diabetic patients. **Materials and Methods:** A cross-sectional study was conducted among patients who visited diabetic clinics between January and March 2019 in the Qassim region, Saudi Arabia. This study used structured questionnaires to assess awareness and knowledge of DR. The patients were considered to have a good level of DR awareness if they answered more than 60% of the questions correctly. **Results:** A total of 307 patients with type 2 DM, 201 males (65.5%) and 106 females (34.5%), participated in the current study. The results revealed that 63.5% of the participating patients involved in this study had good knowledge about DR; 86% of the patients had knowledge about the correlation between retinopathy and DM, and 89.9% believed that DR can be prevented by good control of diabetes. **Conclusion:** The study showed that about two-thirds of the participants were aware of DR, and most of them had knowledge about the relationship between retinopathy and DM. Younger patients and the group with a higher level of education were found to be more aware of DR. Awareness of DR should be correlated with behavioral practices to improve a patient's compliance in attending annual eye examinations.

Keywords: Awareness, diabetes mellitus, diabetic retinopathy, Qassim, Saudi Arabia

Introduction

In Saudi Arabia, 23.7% of the population are diabetic; this is considered to be one of the highest rates in the world.^[1] Diabetes mellitus (DM) causes many complications, and one of the common complications is diabetic retinopathy (DR). It is one of the major causes of blindness among working-aged individuals. More than 60% of type 2 diabetic patients will have some retinopathy after 20 years of disease duration.^[2] Other risk factors for DR are high glycemic levels, hypertension, hyperlipidemia, and renal diseases.

Early DR is asymptomatic and routine annual fundus screening is crucial for early detection and prevention of the complication. Increasing knowledge and awareness about DR and its complications among diabetic patients will help with the prevention and management of such a condition. This study was conducted in the Qassim region to evaluate the level of awareness of DR in type 2 diabetic patients.

Materials and Methods

A cross-sectional study was conducted between January and March 2019 in the Qassim region. This study used structured questionnaires that consisted of 10 questions to assess DR knowledge, screening, prevention, and treatment. To overcome the language barrier, it was translated to Arabic. The questionnaire was self-administered when the patients visited diabetic clinics

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at primary health centers and university clinics. Patients with type 1 or gestational diabetes were excluded. Demographic data, duration of DM, type of medication, risk factors for DR, education level, and self or family history of eye diseases were reported [Table 1].

The questionnaire was applied in other published studies and its reliability has been checked.^[3,4] The patients were considered to have a good level of awareness and knowledge about DR if they answered more than 60% of the questions correctly. The study was performed after ethical approval and was conducted by the research and ethics committees of Qassim Health Affairs and Qassim University. An informed consent was obtained, and confidentiality was maintained for all the participants.

Data were analyzed using IBM SPSS Statistics 25. Frequencies and percentages were produced to summarize the results. An independent samples *t*-test was used to test the significant differences in awareness of DR for numerical outcomes, and the Chi-square test was used for categorical variables. The level of significance was set at *P* < 0.05.

Results

A total of 307 patients with type 2 diabetes mellitus (DM), 201 males (65.5%) and 106 females (34.5%), participated in the current study. The average age of the patients was 52.06 (SD 11.43) years. The educational level of the patients was, to some extent, high: 112 (36.5%) were university graduates, 90 (29.3%) were secondary school graduates, 72 (23.5%) were primary school graduates, and 33 (10.7%) had no education.

Regarding the medical history of DM, i.e., duration of diabetes, 123 (40.1%) of the patients were diagnosed with the disease less than 5 years ago, 99 (32.2%) more than 10 years ago, and 85 (27.7%) of the patients within 5 to 10 years ago. Treatment of diabetes for 174 (56.7%) patients was conducted with ingestion of tablets, 62 (20.2%) patients were treated with

insulin, 53 (17.3%) patients were treated with both tablets and insulin, and only 5.9% of the patients were treated by diet. The mean Hba1c (SD) was 8.4 (2.2), and the average BMI was 28.6. Regarding eye issues, 120 patients (39.1%) had a history of eye problems related to diabetes, and 112 (36.5%) had a family history of eye problems related to diabetes. Regarding the history of comorbidity, 99 patients (32.2%) had a history of dyslipidemia, 93 patients (30.3%) had hypertension, 41 patients (13.4%) had cardiac diseases, and 11 (3.6%) had renal impairment. Regarding other health concerns, 37 patients (12.0%) were active smokers and 227 (73.9%) of the patients did not exercise regularly [Table 2].

The results revealed that 195 (63.5%) of the participating patients involved in this study were aware of diabetic retinopathy (N = 307). The mean of the corrected answers was 6.74 out of 10. Furthermore, 86% of the patients were aware that there is a relationship between retinopathy and DM, and 89.9% believed that good control of diabetes might prevent DR. The results showed that 79.2% of the patients stated that DM may possibly lead to blindness and 81.8% were aware that retinopathy can be treated. Moreover, the results showed that most of the participants in this study were aware that visiting an optometrist, i.e., a regular eyeglass store, was not enough for people with DM (81.4%). Although 63.2% of the patients checked their eyes with a doctor last year, the results showed only 32.9% of the patients knew that an annual eye examination is recommended for diabetic patients. A total of 58.6% of the patients were aware that a diabetic patient can have eye problems at the time of diabetes diagnosis; however, only 43.0% of the patients were aware that eyes must be checked at the time of diabetes diagnosis. [Tables 3 and 4].

The study showed no statistically significant association between demographic variables and awareness of DR (*P* > 0.05), except for the age of the patient, in which that the younger patients were statistically significantly more knowledgeable about DR than the older ones (*P* = 0.05). The study showed that the

Table 1: Knowledge and Awareness Questionnaire of Diabetic Retinopathy (DR)

Knowledge and awareness questionnaire		
Is there any relation between retinopathy and DM?	Yes	No
Is blindness caused by diabetes mellitus?	Yes	No
Have your eyes been examined by a doctor in the last year?	Yes	No
If both eyes are good, screening for DR is not needed.	Yes	No
Is DR prevented by controlling diabetes mellitus?	Yes	No
Is it possible that newly diagnosed patients with diabetes have eye problems at the same time?	Yes	No
How often should a diabetic patient checkup his eyes?	-Every 6 months. -Every 1 or 2 years. -Once the vision is affected.	
When must you screen your eyes after the first diagnosis of diabetes?	-At diagnosis time -After 5 years. -Only if there are eye symptoms.	
Do you think diabetic retinopathy is a condition that can be treated?	Yes	No
Do you think visiting an optometrist or eyeglass store is adequate for a diabetic person?	Yes	No

education level of the patients is highly statistically significantly correlated with awareness of DR ($P = 0.002$), and the patients with a higher educational level (university graduates) were more aware of DR [Table 5].

Discussion

DR is one of the major complications of DM, and it is a well-known cause of vision loss. Increased awareness of such

Table 2: Demographic characteristics and medical history of the patients (n=307)

Variables	Categories	
Mean age year (SD)	52.06 (11.43)	
	<50 yrs	150 (48.9%)
	>50 yrs	157 (51.1%)
Gender (%)	Male	201 (65.5%)
	Female	106 (34.5%)
Duration of Diabetes	<5 yrs	123 (40.1%)
	5-10 years	85 (27.7%)
	>10 yrs	99 (32.2%)
Treatment of diabetes	Insulin	62 (20.2%)
	Tablet	174 (56.7%)
	Both	53 (17.3%)
	Diet	18 (5.9%)
Mean BMI (SD)	28.6 (8.4)	
Mean Hba1c (SD)	8.4 (2.2)	
Hypertension (%)	Yes	93 (30.3%)
	No	214 (69.7%)
Dyslipidemia (%)	Yes	99 (32.2%)
	No	208 (67.8%)
Renal impairment (%)	Yes	11 (3.6%)
	No	296 (96.4%)
Cardiac disease (%)	Yes	41 (13.4%)
	No	266 (86.6%)
Regular exercise (%)	Yes	80 (26.1%)
	No	227 (73.9%)
Smoking (%)	Yes	37 (12.0%)
	No	251 (81.8%)
	Ex-smoker	19 (6.2%)
Education level (%)	University	112 (36.5%)
	Secondary	90 (29.3%)
	Primary	72 (23.5%)
	None	33 (10.7%)
Eye problems related to diabetes (%)	Yes	120 (39.1%)
	No	187 (60.9%)
Family history of eye problems related to diabetes (%)	Yes	112 (36.5%)
	No	195 (63.5%)
Mean of correct answers (SD)	6.74 (1.86)	

SD=standard deviation; BMI=Body Mass Index.

Table 3: Frequency distribution of the patients regarding awareness of diabetic retinopathy (n=307)

	n	Percentage
Aware (have good knowledge)	195	63.5
Unaware	112	36.5
Total	307	100.0

a complication among diabetic patients will help in prevention and early diagnosis. In our study, 63.5% of the participating patients were aware of diabetic retinopathy. The results are compatible with a study done in another region of Saudi Arabia (Taif).^[4] In our study, 86% of patients were aware of the relationship between retinopathy and DM, and this percentage is comparable to (83.9%) reported in studies carried out in Saudi Arabia (Riyadh and Jeddah) as well as in studies conducted locally and globally.^[4,13] Furthermore, compared to the level of awareness reported in studies in other countries such as China (36.6%) and India (37.1%), our study showed a much higher awareness level.^[14,15] However, using different measurements and standards to assess the knowledge about DR makes the comparison between the results of these various studies difficult.

In our study, the level of education was the cardinal factor with the highest significance for increased awareness of DR. The patients with higher education levels were more knowledgeable about DR compared to patients with low education levels. This result is consistent with many studies conducted in other regions and countries.^[4,5,8-10,13,16] Also, our study showed that younger patients were more aware of DR compared to older patients; this may be explained by the fact that younger patients are more educated and exposed to media than older patients. Nevertheless, gender, duration of DM, type of DM treatment, BMI, and HBA1c level showed no significant association with the awareness of DR.

Despite the high level of awareness (86% of patients) about the relationship between diabetes and DR, only 63% of the patients had their eyes checked by a doctor last year. Furthermore, just one-third of the patients had the knowledge that an annual eye examination is recommended for diabetes patients, and only 43.0% of the patients were aware that eyes must be checked at the time of diabetes diagnosis. This discrepancy between the levels of awareness and compliance in attending routine eye examinations indicate that knowledge alone is not sufficient and behavioral practice should be correlative. This finding is a common behavior among patients with diabetes worldwide.^[4,9,10,17] Primary care physicians have a major role in the modification of this behavior and improve the compliance of patients by educating and stressing the importance of regular screening as well as prompt them to see an ophthalmologist whenever the findings are suggestive of DR.

Conclusion

Diabetic retinopathy is a common complication of DM, and it is a leading cause of blindness. Increased awareness of this disease is crucial for prevention and early detection. In our study, about two-thirds of patients had good knowledge about DR, and most of the participating patients were aware of the relationship between retinopathy and DM. However, routine annual eye examinations and knowledge about the frequency and screening time for eye checkups were low. Younger patients and patients with high levels of education were found to be more aware of DR.

Table 4: Patients' awareness of diabetic retinopathy (n=307)

Knowledge and awareness questionnaire	Correct answer	%
Is there any relation between retinopathy and DM?	Yes	86.0
Is blindness caused by diabetes mellitus?	Yes	79.2
Have your eyes been examined by a doctor in the last year?	Yes	63.2
If both eyes are good, screening for DR is not needed.	No	58.0
Is DR prevented by controlling diabetes mellitus?	Yes	89.9
Is it possible that newly diagnosed patients with diabetes have eye problems at the same time?	Yes	58.6
How often should a diabetic patient checkup his eyes?	Every 1 or 2 years	32.9
When you must screen your eyes after the first diagnosis of diabetes?	At the time of diagnosis	43.0
Do you think diabetic retinopathy is a condition that can be treated?	Yes	81.8
Do you think visiting an optometrist or eyeglass store is adequate for a diabetic person?	No	81.4

Table 5 Analysis of relationship between awareness of DR and demographic, medical history variables (n=307)

Variables	Category	Aware	Not aware	P
Mean age year (SD)		51.10 (10.60)	53.73 (12.63)	0.05*
	<50 yrs	99 (50.8%)	51 (45.5%)	0.38 ^{ns}
	>50 yrs	96 (49.2%)	61 (54.5%)	
Gender (%)	Male	123 (63.1%)	78 (69.6%)	0.24 ^{ns}
	Female	72 (36.9%)	34 (30.4%)	
Duration of Diabetes	<5 yrs	76 (39.0%)	47 (42.2%)	0.83 ^{ns}
	5-10 years	56 (28.7%)	29 (25.9%)	
	>10 yrs	63 (32.3%)	36 (32.1%)	
Treatment of diabetes	Insulin	36 (18.5%)	26 (23.2%)	0.60 ^{ns}
	Tablet	113 (57.9%)	61 (54.5%)	
	Both	36 (18.5%)	17 (15.2%)	
	Diet	10 (5.1%)	8 (7.1%)	
Mean BMI (SD)		28.80 (6.46)	28.15 (10.94)	0.51 ^{ns}
Mean Hba1c (SD)		8.19 (1.85)	8.58 (2.71)	0.32 ^{ns}
Hypertension (%)	Yes	60 (30.8%)	33 (29.5%)	0.81 ^{ns}
	No	135 (69.2%)	79 (70.5%)	
Dyslipidemia (%)	Yes	62 (31.8%)	37 (33.0%)	0.82 ^{ns}
	No	133 (68.2%)	75 (67.0%)	
Renal impairment (%)	Yes	6 (3.1%)	5 (4.5%)	0.53 ^{ns}
	No	189 (96.9%)	107 (95.5%)	
Cardiac disease (%)	Yes	24 (12.3%)	17 (15.2%)	0.48 ^{ns}
	No	171 (87.7%)	95 (84.8%)	
Regular exercise (%)	Yes	52 (26.7%)	28 (25.0%)	0.75 ^{ns}
	No	143 (73.3%)	84 (75.0%)	
Smoking (%)	Yes	18 (9.2%)	19 (17.0%)	0.06 ^{ns}
	No	162 (83.1%)	89 (79.5%)	
Education level (%)	University	85 (43.6%)	27 (24.1%)	0.002**
	Secondary	48 (24.6%)	42 (37.5%)	
	Primary	46 (23.6%)	26 (23.2%)	
	None	16 (8.2%)	17 (15.2%)	
Eye problems related to diabetes (%)	Yes	79 (40.5%)	41 (36.6%)	0.50 ^{ns}
	No	116 (59.5%)	71 (63.4%)	
Family history of eye problems related to diabetes (%)	Yes	66 (33.8%)	46 (41.1%)	0.21 ^{ns}
	No	129 (66.2%)	66 (58.9%)	
Mean of correct answers (SD)		7.90 (0.86)	4.72 (1.34)	0.000**

SD=standard deviation; BMI=Body Mass Index; ns=not significant; **Significant at 0.01; *Significant at 0.05

Our recommendation is to increase the awareness level of DR, the importance of clinical eye examinations, and correlated awareness with behavior practices to improve patient compliance in attending annual eye examinations. Thereby, early diagnosis and management of DR will reduce the incidence of this potentially blinding disease.

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Ethical approval

The study was performed after ethical approval was obtained by the research and ethics committees of Qassim Health Affairs and Qassim University.

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Conflicts of interest

There are no conflicts of interest.

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