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Original Research

The extent of awareness and knowledge of people in the Northern Border Region of Saudi Arabia about the effect of diabetes mellitus on the retina

Awareness of diabetic retinal complications

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Abstract

Aim: Diabetic ocular complications, especially diabetic retinopathy (DR), are a major cause that leads to irreversible blindness. Awareness of diabetes and its ocular complications may help in preventing vision loss.

This study evaluates the awareness of people (diabetics and non-diabetics) about the complications of diabetes in the eye, especially the retina.

Methods: This study is a questionnaire-based cross-sectional study. Data was collected through an online self-administered questionnaire. The target people from 16 years to 75years in both males and females The duration of the study from May 2024 to September 2024

The comparisons between the awareness about diabetic retinopathy and the association of awareness about diabetic retinopathy and educational level were analyzed using SPSS 24.0 version software.

Results: The study included 153 individuals. The age range of participants was 16–75, and the most dominant age group was those with an age range of 46–55 (35.7%).

The ratio of male to female was 58.8:41.2, regarding education, the most dominant group was those who had a university education, 80 (52.3%), then higher education level 46 (30.1). Most of the participants, 127 (83%) non-diabetic and 26 (17%) diagnosed with Diabetes mellitus. Of most of the participants, 141(80 males and 61 females), 92.2% of participants reported that diabetes affects the retina, and 87(45 males and 42 females) 56.9% agreed with the relation between diabetic retinopathy and blindness. 121(67 males and 54 females) 79.1% of participants reported that the control of blood glucose level can prevent diabetic retinopathy

There was high awareness among the participants, diabetic and non-diabetic, regarding diabetic retinopathy (DR), but annual check-ups were done in less than half of the patients. Improvement is required for scheduling annual eye examinations for the early detection of diabetic retinopathy (DR).

Conclusion: The results of this study showed a high level of self-report awareness regarding the association between DM and retinopathy. These results are in harmony with other local and international studies. All these studies found that the awareness regarding the association between DM and retinopathy is high among the people of higher education. This is due to the spread of social media, which has led to increased awareness among many people.

The strength of this study included patients of all ages from 16 to 75, and Most of the participants have a university education or higher.

Keywords

awareness, diabetes mellitus, diabetic retinopathy, eye examination, northern border region ksa

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Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by high glucose levels and the body's inability to produce or use insulin, which leads to multiple microvasculopathic abnormalities of the eye, leading to diabetic retinopathy (DR).[1]

Diabetic retinopathy (DR) is one of the major causes of visual disability, leading to irreversible blindness among adults. The pathogenesis of the disease emerges as neuroretinopathy and vascular changes in the retinal blood vessels because of a breakdown of the blood-retinal barrier and obliteration of the retinal capillaries.[2] Many systematic reviews of 59 population-based studies estimated the worldwide prevalence of diabetic retinopathy (DR) to be 35%.[3]

Diabetic retinopathy (DR) is one of the common complications of Diabetes mellitus (DM). The duration of DM is a significant factor in developing DR. The longer the duration of DM, the higher the risk for DR. It affects about 1/5th of diabetic patients with a duration of disease from 10 to 15 years.[4] According to studies from different areas in Saudi Arabia, the prevalence of diabetic retinopathy was found to be 28%-36% among diabetic patients.[5,6]

Studies in The Kingdom of Saudi Arabia (KSA) indicate a significant increase in the prevalence and incidence rates of type 1 diabetes mellitus, mainly among children and adolescents.[7]

According to many studies estimated that diabetes mellitus is a common disease in Saudi Arabia about 23%-32% of its adult population suffers from the disease. Understanding the level of public awareness of diabetes and its affection on the retina helps the decision maker to plan a future program that increases the level of knowledge in diagnosis, complications, and management among patients. The level of awareness and knowledge about diabetes is a crucial part of the early diagnosis, management, and prevention of potential visual impairment.[8]

Materials and Methods

This study is a questionnaire-based, cross-sectional study of diabetic and non-diabetic individuals. Data was collected through an online self-administered questionnaire (Table 1). The target people were from 16-75 years old, both sexes (male and female). The duration of the study is from May 2024 to September 2024.

Ethical Approval

This study was approved by the Ethics Committee of Northern Border University (Date: 19.05.2024, Decision No: 24/54/H). (Local Committee of Bioethics HAP-09-A-043)

Statistical Analysis

The comparisons between the awareness about diabetic retinopathy and the association of awareness about diabetic retinopathy and educational level were analyzed using SPSS 24.0 version software.

Reporting Guidelines

This study was reported in accordance with the STROBE guideline.

Results

The present study included 153 individuals. The age range of participants was 16–75, and the most dominant age group was those with an age range of 46–55 (35.7%).

The ratio of males to females was 58.8:41.2, regarding education, the most dominant group was those who had a university education, 80 (52,3%), then higher education level above university education, 46 (30.1). Most of the participants 127 (83%) non-diabetic and 26 (17%) diagnosed with DM. Of most of the participants, 141(80 male and 61female), 92.2% of participant reported that diabetes affects the retina (Table 2, Figure 1)

Regarding the relation between diabetic retinopathy and blindness, 87 (45male and 42 female) 56.9% were aware of the relation

Table 1. *The questionnaire*

Variable	Response option
Age, y	16-25
	26- 35
	36-45
	46-55
	56-65
	66 -75
Diabetic or non-diabetic	Does not have diabetes
	Diabetics: Type 1 Type 2
Education level	No education
	Primary school
	Middle school
	Secondary school
	University
	higher
Gender	Male
	Female
Family history of diabetes	Yes
	No
Type of treatment for diabetes	Tablets
	Injections
	Both tablets and injections
Do you know that diabetes can affect the retina?	Yes
	No
	To some extent
Does diabetes cause blindness?	Yes
	No
	To some extent
Can diabetic retinopathy be treated?	Yes
	No
The time of the first retinal examination after diagnosis of diabetes	
Does good blood sugar control prevent diabetic retinopathy?	Yes
	No
	To some extent
How often should you have an eye exam to check for diabetic retinopathy?	6 months
	Annually
	Only when visibility is low
	Lack of awareness of repetition
Why not perform an eye/retinal examination?	From a remote area
	Lack of money
	Lack of time
	No visual problem
	Lack of a caregiver
	Other reasons
What is the source of your knowledge about diabetic retinopathy?	Doctor
	Friends
	Relatives
	Media
	Not aware

Table 2. *Diabetes participant's awareness about diabetic retinopathy (n=153)*

Percentage	(n = 153) (%)
Do you know that diabetes can affect the retina?	141 (92.2)
Does good blood sugar control prevent diabetic retinopathy?	121 (79.1)
Does diabetes cause blindness?	87 (56.9)
Main source of information about diabetes mellitus and diabetic retinopathy	
Doctors	66 (43.1)
Family and friends	25 (16.4)
Social media	43 (22.2)
I did not get any information	28 (18.3)
How often should you have an eye exam to check for diabetic retinopathy?	
6 months	79 (51.6)
Annual	36 (23.5)
Only when vision is low	27 (17.6)
Lack of awareness	11 (7.2)

Table 3. *Association between sex of the participants and awareness of diabetic retinopathy (DR) ⟳Association between the educational level of the participants and awareness of diabetic retinopathy (DR) ⟳ The family history of the participant and awareness of diabetic retinopathy*

	Yes	No	To some extent	*P* value
Do you know that diabetes can affect the retina?				
Male	80	4	6	.195
Female	61	1	1	
Does good blood sugar control prevent diabetic retinopathy?				
Male	67	1	22	.195
Female	54	1	8	
Does diabetes cause blindness?				
Male	45	3	42	.131
Female	42	3	18	
Do you know that diabetes can affect the retina?				
Secondary school	23	1	3	.481
University education	74	3	2	
Higher education	45	2	2	
Does diabetes cause blindness?				
Secondary school	13	1	13	.1539
University education	51	5	23	
Higher education	23	1	23	
Does good blood sugar control prevent diabetic retinopathy?				
Secondary school	20	1	6	.243
University education	59	1	19	
Higher education	42	1	4	
Do you know that diabetes can affect the retina?				
Positive family history	78	1	2	.207
No family history	64	3	5	
Does diabetes cause blindness?				
Positive family history	102	2	11	.00001
No family history	13	2	23	
Does good blood sugar control prevent diabetic retinopathy?				
Positive family history	71	0	13	.162
No family history	52	2	15	

Do you that diabetes can affect the retina?

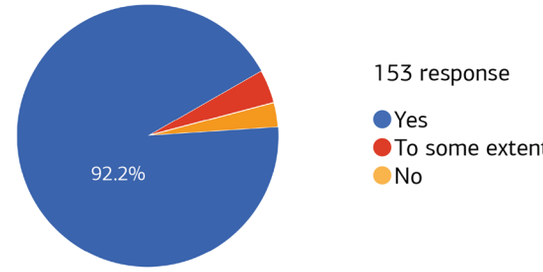

Figure 1. *The responses to the question: Do you know that diabetes can affect the retina?*

Does diabetes cause blindess?

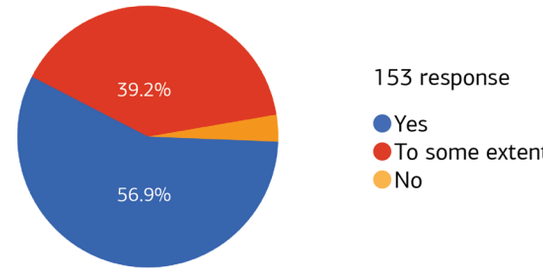

Figure 2. *The responses to the question: Does diabetes causes blindness?*

Does good blood sugar control prevent diabetle retinopathy?

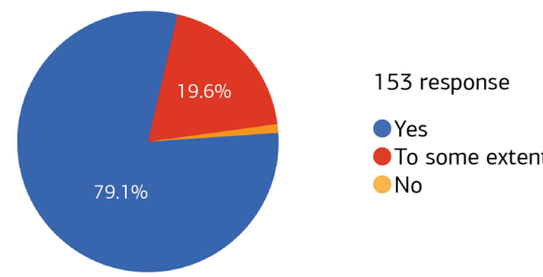

Figure 3. *The responses to the question: Does good blood sugar control prevent diabetic retinopathy?*

between diabetic retinopathy and blindness (Figure 2) Of the participant, 121(67 male and 54 female), 79.1%of participants reported that the control of blood glucose levels can prevent diabetic retinopathy Figure 3.

The main source of information about diabetes mellitus and diabetic retinopathy was reported to be doctors (43.1%), followed by social media (22.2%).

The participants' responses to awareness are as follows There were 141 (92.2%) who were aware that diabetes mellitus could affect the retina, whereas 121 (79.1%) were aware that control of blood sugar reduces the risk of DR, and 79 (51,6) believed that the diabetic retinopathy can treatable disease and 87(56.9%) patients were aware that DR could lead to blindness. 79 (51.6%) reported that the examination of the eye in diabetic patients every 6 months, and the reason for not having an eye examination is a lack of knowledge about the disease in 66 (43.1%). The main source of information about diabetes mellitus and DR was reported to be by doctors (43.1%), followed by social media (22.2%).

The awareness that (diabetes mellitus can cause diabetic retinopathy, that control of diabetes mellitus reduces the risk of diabetic retinopathy, and that diabetic retinopathy can lead to blindness) was compared with different demographic variables as male and female participants and with the different levels of

education by using the Chi-square test (Table 3).

No significant association between the sex and the awareness that diabetes mellitus can cause diabetic retinopathy, that control of diabetes mellitus reduces the risk of diabetic retinopathy, and that diabetic retinopathy can lead to blindness (P-value 0.195,0.195 and 0.131, respectively) also No significant difference There between the university educational level and the higher education.

By the comparison between the association between the family history and the awareness that DM can cause retinopathy, that control of DM reduces the risk of DR, and that DR can lead to blindness, there was no significant association between the family history and the awareness that the DM can cause the retinopathy (p-value 0.207) and that that control of DM reduces the risk of diabetic retinopathy (P-value 0.162) while there was a significant association between the family history and the awareness that diabetes can cause the blindness (p-value is <0.00001).

By the comparison between the association between the family history and the awareness that DM can cause retinopathy, that control of DM reduces the risk of DR, and that DR can lead to blindness, there was no significant association between the family history and the awareness that the DM can cause the retinopathy (p-value 0.207) and that that control of DM reduces the risk of diabetic retinopathy (P-value 0.162) while there was a significant association between the family history and the awareness that diabetes can cause the blindness (p-value is <0.00001).

Discussion

The study aimed to assess the level of non-diabetic and diabetic patients' awareness in the Northern Border Governorate, KSA. Diabetes mellitus is a common cause of Diabetic retinopathy, which is one of the causes of visual impairment and blindness, and the awareness of the population of the complications of diabetes plays an important role in the prevention of diabetic retinopathy.[2]

This study found that the awareness among the diabetic and non-diabetic participants is high regarding Diabetic Retinopathy, with (91.7%) being aware that DM can affect the retina. 57% are aware that DR can lead to blindness. 88.3 of the patients were also aware that control of blood sugar may reduce the risk for DR.

The results of this study showed a high level of self-reported awareness regarding the association between DM and retinopathy, this result is in harmony with other international and local studies.[9-13] All these studies found that the awareness regarding the association between DM and retinopathy is high between the peoples of higher education whereas one study showed the lowest awareness from the rural area in India.[14] This is due to the spread of social media, which has led to increased awareness among many people.

Some studies concluded that WhatsApp was the social media most used in Saudi Arabia by the participants to communicate and obtain information about diabetes, and social media was useful in improving education, awareness, and communication among people with diabetes.[15]

By comparing the present study with the other studies in different regions of Saudi Arabia, we found that in this study, the awareness of participants by diabetic retinopathy was 91.5% among the participants in the Northern Border region, KSA and 42% of them got their information from the doctors. Whereas studies from different areas in Saudi Arabia reported different levels of knowledge about diabetic retinopathy in Hail, Taif, and Jeddah, and studies from King Abdul Aziz University Hospital, Jeddah, there were 75.62%, 64%, 82.6%, and 61%, respectively, who had awareness.[10,11,16,17] In a recent study in Madinah, Saudi Arabia, among 240 patients who participated, less than half of the patients had a fair level of knowledge (47.1%) and a good level of knowledge (42.1%) about diabetic retinopathy.[18]

The results of the studies all over the world showed the level of awareness of diabetic retinopathy high in India 50%, USA 52%, and Oman 75%.[12,19,20] The awareness was higher in Myanmar, 86%, and Nigeria, 84.3%.[21,22]

The variation in the level of awareness between different studies and this study was due to the variation in the level of education of each population in our study. All participants had a high level of education, and the percentage of education among the participants was high: 17% secondary, 30% university education, 53% higher than university education. Higher awareness was significantly associated with a higher level of education.[12] In a Saudi study, such a correlation between awareness and education was reported, in this study, a significant association between educational level (in this study, 43.5% of participants have higher education level) and awareness about DM and retinopathy. This was similar to the studies from Jordan[9] and Malaysia, both of which showed that higher educational people had better awareness than those with low educational levels.

In this study, there were 79% of participants awarded the control of blood sugar-preventing retinopathy. In a similar study, (70.8%) of patients reported good levels of blood glucose control the DR.[23] Other studies concluded poor diabetic control among diabetes mellitus type 2 patients, which resulted in a high rate of complications.[24]

The main source of information about DM and DR (59.4%) from their doctors, followed by social media (20.3%) and their family (11.3) and friends (9.7); this is similar to the findings from the two studies from Jordan and Malaysia.[9,25]

In our study, (54%) of patients reported a family history of diabetes; this percentage was less than that in other studies conducted in Madinah (92%).[19] And studies in Riyadh, Saudi Arabia, in which 70% and 79.8% of patients had a family history of diabetes.[24]

The strength of this study included patients of all ages from 16 to 75, and most of the participants have a university education or higher.

Limitations

The present study has some limitations. Because the study was shown only in one Saudi Arabian region, the generalization of the results is limited. Additionally, the non-probability sampling method may be subjected to selection bias. The information regarding diabetic retinopathy awareness was gathered via self-reported responses to questionnaire items rather than from medical records, so the participant may have over-reported.

Conclusion

The study found a high level of awareness of diabetic retinopathy among the participants, and there was an association between the level of education and awareness. Also, medical doctors are the main source of information.

Declarations

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent

Electronic informed consent was obtained from all participants before they completed the online questionnaire.

Data Availability

The datasets used and/or analyzed during the current study are not publicly available due to patient privacy reasons but are available from the corresponding author on reasonable request.

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding

None.

Abbreviations

DM: Diabetes mellitus
DR: Diabetic retinopathy
KSA: Kingdom of saudi arabia
SPSS: Statistical package for the social sciences

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