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KNOWLEDGE AND AWARENESS LEVEL OF DIABETIC PATIENTS REGARDING DIABETIC RETINOPATHY IN SAUDI ARABIA

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Abstract

Introduction: Diabetes mellitus (DM) A silent epidemic has ascended in both developed and underdeveloped regions of the world. It causes damage to different organs and body tissue, such as the heart, nerves, kidneys, eyes, and blood vessels. One of the most common consequences of diabetes mellitus (DM) is diabetic retinopathy (DR), which is caused by damage to the retina's small blood vessels and neurons. The prevalence of diabetic retinopathy has significantly increased worldwide. Several studies conducted in different countries, including Saudi Arabia, highlight diabetic patients' knowledge and awareness toward diabetic retinopathy.

Objective: The study set out to assess knowledge and awareness level of diabetic Retinopathy among Diabetic patients in KSA.

Methodology: A cross-sectional study was conducted in Saudi Arabia targeting Saudis adult with diabetes between July 2024 - December 2024. The inclusion all diabetic Saudi patient, both males and females, aged 18 and more. Excluded are non-diabetic Saudi patient aged less than 18. A pre-designed, valid questionnaire from a previously published study done in Tabuk was employed for data collection.

Results: The study assessed the knowledge and awareness of diabetic patients regarding diabetic retinopathy in Saudi Arabia, involving 685 participants with a mean age of 32.2 years, predominantly female (65.4%). Alarmingly, 70.7% did not engage in regular exercise, despite 81.5% believing they managed their blood sugar well. A significant finding was that 64.1% lacked awareness of the importance of routine eye exams, although 88% recognized the link between diabetes and retinopathy. Notably, only 12.8% demonstrated strong knowledge about diabetic retinopathy, highlighting the urgent need for enhanced educational initiatives to improve understanding and promote early detection among

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patients.

Conclusion: The present study highlights the critical need for enhanced educational initiatives and targeted interventions to improve the knowledge and awareness of diabetic retinopathy among diabetic patients in Saudi Arabia.

Keywords: Knowledge, Awareness, Diabetic Mellitus (DM), Diabetic retinopathy (DR), Kingdom of Saudi Arabia (KSA).

Introduction:

Diabetes mellitus (DM) A silent epidemic has ascended in both developed and underdeveloped regions of the world [1]. It is a chronic metabolic disorder characterized by high levels of blood glucose. It causes damage to different organs and body tissue, such as the heart, nerves, kidneys, eyes, and blood vessels [2]. One of the most common consequences of diabetes mellitus (DM) is diabetic retinopathy (DR), which is caused by damage to the retina's small blood vessels and neurons [3].

Based to the International Diabetes Federation (IDF), diabetes affects around 17.7% of the Saudi population [4]. And the most frequent microvascular complication of diabetes is diabetic retinopathy (DR), which continues to be the primary cause of vision loss and blindness in people of working age in the developed world [5]. Anemia, age, pregnancy, hypertension, hyperlipidemia, long-term disease, inadequate glycemic management, and renal failure are some of the factors that raise the chance of developing diabetic retinopathy [6].

The prevalence of diabetic retinopathy has significantly increased worldwide. In the central region, the incidence varied between 19.7% and 26.1%, whereas research conducted in other parts of Saudi Arabia indicated a range between 27.8% and 36.4% [7]. A cross-sectional survey research that was conducted in Riyadh, Saudi Arabia in 2012 found that, only 44%, 43%, 42%, and 31% of respondents recognized blindness, stroke, diabetic neuropathy, and gangrene, respectively, as a complication of diabetes [8]. In Al-Taif and Al-Hassa regions, the prevalence of DR was also investigated and found to be 33% in both areas. Based on a different study, Al-Madinah has the greatest prevalence of DR, with 36.1% of all diabetic patients having some kind of DR [9]. As reported by a study from Jeddah, Saudi Arabia, people with diabetes mellitus were well-informed about the disease and how it affected their eyes, but they were less informed about diabetic retinopathy [10].

Diabetic patients in Saudi Arabia possess inadequate knowledge and awareness of diabetic retinopathy. Due to the insufficient number of studies, particularly in Saudi Arabia, that are pertinent to our topic. Patients with diabetes need to be aware of diabetic retinopathy to receive early diagnosis and treatment to avoid subsequent consequences like vision loss.

Objectives:

The study set out to assess knowledge and awareness level of diabetics Retinopathy among Diabetic patients in KSA.

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Methodology:

Study Design and Setting:

A cross-sectional study was conducted between July 2024 - December 2024 in Saudi Arabia. The study population consisted of Saudis adult with diabetes. This study included all diabetic Saudi patients aged 18 and more. However, non-diabetic Saudi patients aged less than 18 were excluded from this study.

Sample size:

Data collection started in July 2024 and ended in December 2024. A target sample of 384 patients (confidence level: 95%; margin of error: 5%) was used in the data collection process. Using the following formula, the sample size was estimated:

n = P(1-P) * Zα 2 / d 2 with a 95% confidence level.

n: Calculated sample size.

Z: The z-value for the selected level of confidence (1- a) = 1.96.

P: An estimated prevalence of knowledge.

Q: (1 – 0.50) = 50%, i.e., 0.50.

D: The maximum acceptable error = 0.05.

Therefore, the calculated minimum sample size was n = (1.96)2 X 0.50 X 0.50/ (0.05) 2 = 384.

Method for data collection, instrument and score system:

A pre-designed, valid questionnaire from a previously published study done in Tabuk was employed for data collection [11]. Through personal contact with the corresponding author, permission to utilize the questionnaire was received. Information on socio-demographic factors, such as gender, age, level of education, monthly income, diabetes duration, medication type, history of smoking, and awareness and knowledge about DR screening, prevention, and treatment, was included in the questionnaire.

Scoring system:

In all, a total of 22 statements were utilized to assess participants' knowledge and awareness. 9 statements for socio-demographic characteristics, 3 statements for general questions, and 10 statements for awareness and knowledge. The patient’s responses to knowledge and awareness 10 questions were assessed and received a score of one point for the correct answers, while incorrect or “I don’t know “responses received a score of zero points. The maximum score was 12 points and divided by using the original Bloom's cut-off point to 59%, 60%–79%, and 80%–100%.

Three groups were created based on the participants' scores. The knowledge score ranged from 0 to 12 points, which determined that patients with a score of 59% or lower (7 points or less) had poor knowledge, those with a score of 60–79% (8–9 points) had moderate knowledge, and those with a score of 80–100% (10–12 points) had strong knowledge.

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Pilot test:

20 people received the survey and were asked to fill it out. This was done to evaluate the study's viability and the ease of use of the questionnaire. Data from the pilot research were not included in the final analysis's conclusions.

Analyzes and entry method:

The Microsoft Excel (2016) Windows program was used to enter the collected data on the computer. The statistical package for social science software (SPSS), version 20, was then used to receive the data. to undergo statistical analysis

Results:

Table (1) displays various demographic parameters of the participants with a total number of (685). Participants' mean age is 32.2 years and there are substantial numbers of Participants (28.0%) aged 21 years old or less, indicating the preponderance of participants in this diabetic population who are younger. The problem of gender disparity is evident from the fact that the sample consists of 65.4% females and therefore requires a gender sensitive approach in the analysis and interpretation of health outcomes. It also finds that a relatively educated population — a considerable majority (63.2%) has obtained a bachelor's degree —. By half of this group earns less than 5,000, which is of course an indicator of an economy. What's alarming, however, is that the latter group—those who do not practice regular exercise—is a shocking 70.7%, while overwhelmingly (81.5%) of them think they are controlling their blood sugar levels properly.

Table (1): Sociodemographic characteristics of participants (n=685)

Parameter		***No.***	***Percent (%)***
Age (Mean:32.2, STD:13.7)	21 or less	192	28.0
	22 to 24	113	16.5
	25 to 35	145	21.2
	36 to 49	141	20.6
	50 or more	94	13.7
Gender	Female	448	65.4
	Male	237	34.6
Educational level	Primary school	13	1.9
	Middle school	15	2.2
	High school	181	26.4
	Bachelor's degree	433	63.2
	Postgraduate degree	31	4.5
	Uneducated	12	1.8
Monthly income	Less than 5000	374	54.6
	From (5000-10000)	158	23.1
	From (10,000 to 15,000)	90	13.1

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	More than 15,000	63	9.2
Smoking	No	601	87.7
	Yes	58	8.5
	Ex-smoker	26	3.8
Do you exercise regularly?	No	484	70.7
	Yes	201	29.3
Duration of diabetes mellitus	Less than 5 years.	388	56.6
	5 To 10 years	134	19.6
	More than 15 years	163	23.8
Type of drug used in the treatment of diabetes mellitus	Regulated or diabetic tablets.	309	45.1
	Insulin.	232	33.9
	Tablet and insulin	144	21.0
Do you believe /think that your blood sugar readings are under control and regular?	No	127	18.5
	Yes	558	81.5

As shown in figure 1, A compelling overview of the motivations for individuals to seek eye examination is presented by this data based on 685 random respondents. Of note, 183 people represent approximately 26.8% of the sample, and indicated that they were prompted by referral from a medical doctor. On the other hand, 303 participants, a substantial majority of 44.2% or about it, disclosed that their decision to have eye examination was due to personal awareness and knowledge of the impact of eye health. Additionally, at least 199 of 691 people, or almost 29.0 percent, reported that they had not had an eye examination at all.

Figure (1): Illustrates the reasons for eye examination among participants.

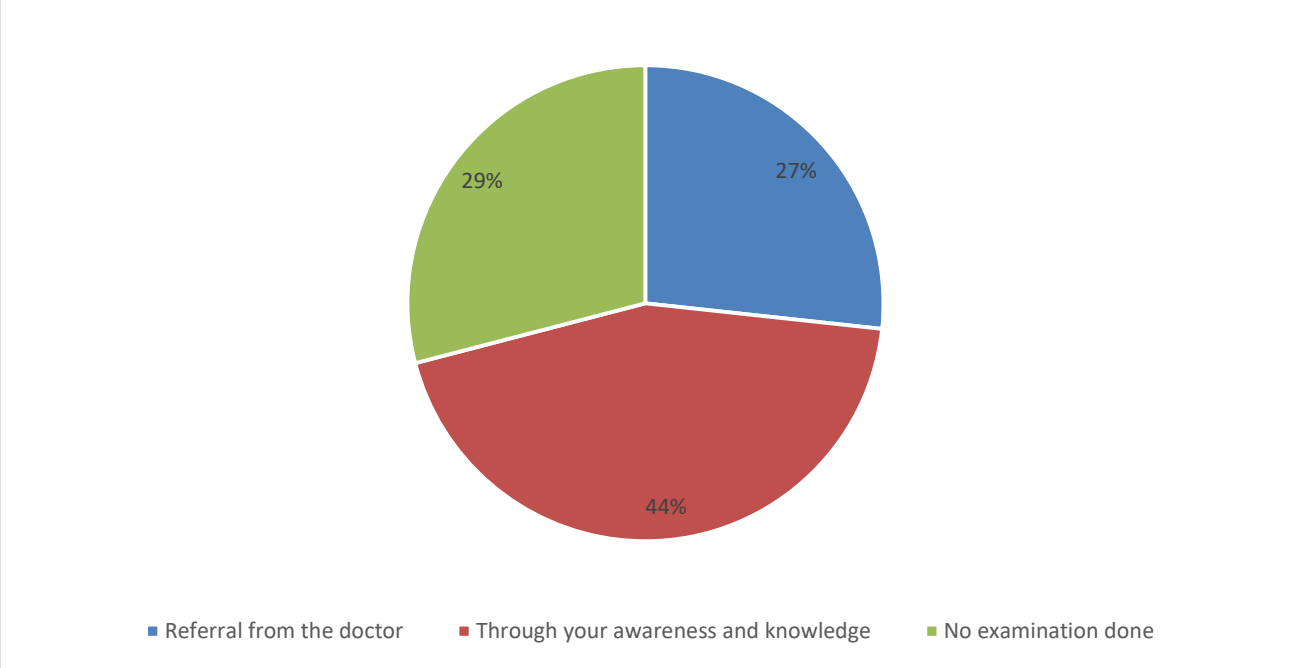

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Table 2 presents the data regarding knowledge, awareness, and behaviour with respect to diabetic retinopathy of a sample of 685 individuals. Compared to the previous question, a notable proportion (25.0%) reported never having undergone eye exam; of the 67.0% who had done so in the past year, awareness and knowledge were the main motivators (44.2%). But what was concerning was that a near whopping 64.1 per cent admitted to having no idea the value of going for routine checks on the eyes, a serious lack of education which could impede early detection and treatment. The importance of more detailed educational initiatives is underscored by the overwhelming consensus (88.0%) on the relationship between diabetes and retinopathy. Also, 92.6% of respondents believed that well controlled blood sugar levels would reduce the risk of retinopathy, confirming that the respondents were well informed in diabetes management. However, a large ratio of people (57.1) still thought that periodic examinations were unnecessary even when the blood sugar levels are stable, indicative of a possible misconception.

Table (2): Parameters related to general questions, knowledge and awareness regarding diabetic retinopathy (n=685).

Parameter		***No.***	***Percent (%)***
Have your eyes been examined/ checked by a doctor in the previous year?	No	226	33.0
	Yes	459	67.0
What are the reasons that prompted you to have an eye examination?	Referral from the doctor	183	26.7
	Through your awareness and knowledge	303	44.2
	No examination done	199	29.1
What do you think about not going for regular eye examination? *	Lack of awareness of the knowledge of eye diseases of diabetes.	439	64.1
	Difficulty getting appointments or not having an ophthalmologist	223	32.6
	Material costs	156	22.8
	Not enough time	219	31.9
	Fear of discovering something dangerous	167	24.4
Do you think there is a relationship between diabetes and retinopathy?	No	82	12.0
	Yes	603	88.0
If blood sugar levels are controlled, do you think that diabetic retinopathy will be reduced or prevented?	No	51	7.4
	Yes	634	92.6
Do you think that you do not require periodic eye examination If the level of sugar in your blood is regular?	No	391	57.1
	Yes	294	42.9
How many times should you visit an ophthalmology doctor to screen the retina and eye, in your opinion?	Every six months.	383	55.9
	Annually or every two years	218	31.8
	Only if there are eye symptoms.	84	12.3
	No	136	19.9

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Do you think diabetes may cause/ lead to blindness?	Yes	549	80.1
Can a patient who is diagnosed with diabetes also have eye problems at the same time?	No	136	19.9
	Yes	549	80.1
When must an eye checked be performed in patient with diabetes?	At the same time of diagnosis	412	60.1
	After one year of diagnosis	119	17.4
	Only when vision affected	154	22.5
Do you think retinopathy can be treated?	No	58	8.5
	Yes	365	53.3
	I don't know	262	38.2
What treatment methods are currently available when there is retinopathy in patients with diabetes? *	Good control of diabetes alone is sufficient	310	45.3
	Laser treatment	202	29.5
	Surgical treatment	124	18.1
	I do not know	311	45.4
Do you think that a diabetic patient going to see an optometrist (a regular eyeglass store) isn't enough?	No	57	8.3
	Yes	513	74.9
	I don't know	115	16.8

Results may overlap

As shown in figure (2), The data that we present here represents the responses of a total sample of 685 individuals to the timing of eye examinations for patients with diabetes. Surprisingly, 412 respondents (approximately 60.1%) indicated that it should be performed at the time of diagnosing which shows that awareness about the need for early detection to avoid complications is quite strong. However, 119, or 17.4%, said an eye examination should occur after one year of diagnosis, and 154, or 22.5%, said these tests should be done only when vision is compromised.

Figure (2): Illustrates when eye examination is performed for diabetic patients.

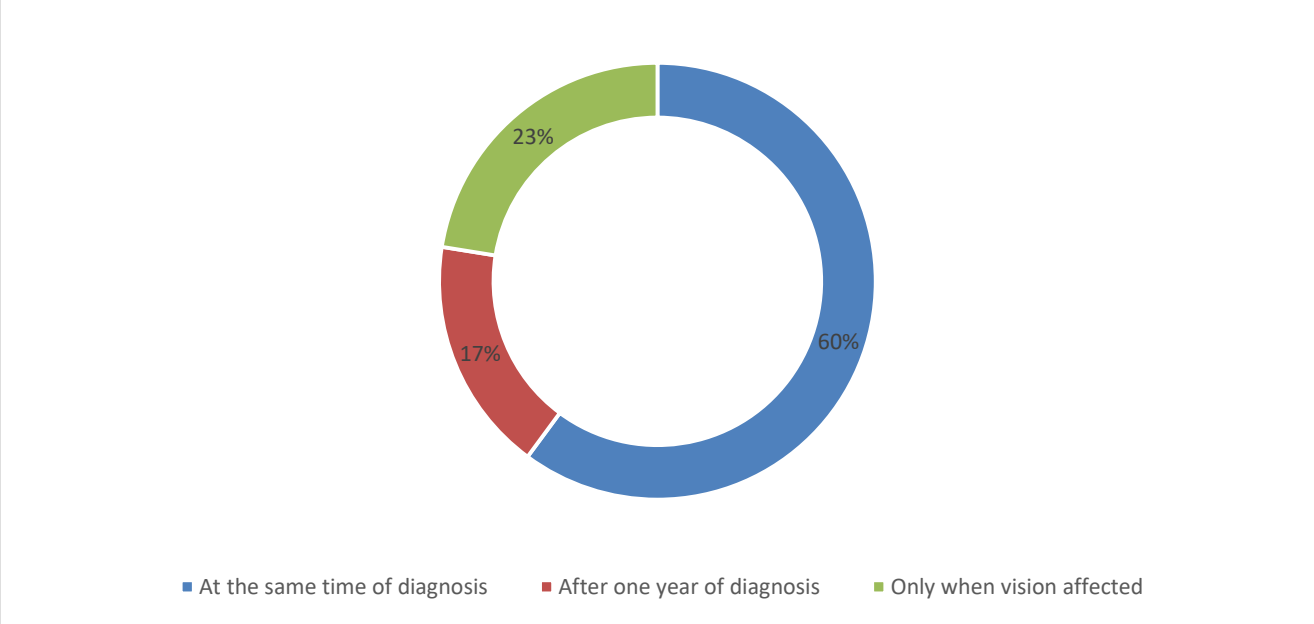

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Table 3 shows the provided data of the knowledge and awareness of diabetic patients with diabetic retinopathy, a serious complicate of diabetes. What is notable is that only 12.8% of patients are at a strong level of knowledge regarding a critical part of their diabetes management. On the contrary, 52.3 percent of respondents possess a moderate level of knowledge, whilst this begs the argument if not more does need to be done to educate. In fact, about 34.9% of patients had a low level of knowledge, equally alarms, opposing their impact on early detection and later treatment.

Table (3): Shows knowledge and awareness level of diabetic patients regarding diabetic Retinopathy score results.

	Frequency	**Percent**
Strong level of knowledge	88	12.8
Moderate level of knowledge	358	52.3
Low level of knowledge	239	34.9
Total	685	100.0

Table (4) shows that knowledge regarding diabetic retinopathy has statistically significant relation to age (P value=0.003), educational level (P value=0.001), monthly income (P value=0.0001), believing that blood sugar is under control (P value=0.016), undergoing eyes examination past year (P value=0.0001), reasons that prompted to having eye examination (P value=0.0001). It also shows statistically insignificant relation to gender, smoking, regular exercise, duration of diabetes, type of drug used for diabetes.

Table (4): Relation between knowledge regarding diabetic retinopathy and sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=685)***	***P value****
		Low level of knowledge	**Strong or moderate level of knowledge**		
Gender	Female	152	296	448	0.468
		63.6%	66.4%	65.4%	
	Male	87	150	237	
		36.4%	33.6%	34.6%	
Age	21 or less	79	113	192	0.003
		33.1%	25.3%	28.0%	
	22 to 24	38	75	113	
		15.9%	16.8%	16.5%	
	25 to 35	56	89	145	
		23.4%	20.0%	21.2%	
	36 to 49	30	111	141	
		12.6%	24.9%	20.6%	
	50 or more	36	58	94	
		15.1%	13.0%	13.7%	
Educational level	Primary school	7	6	13	0.001
		2.9%	1.3%	1.9%	

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	Middle school	9	6	15	
		3.8%	1.3%	2.2%	
	High school	58	123	181	
		24.3%	27.6%	26.4%	
	Bachelor's degree	145	288	433	
		60.7%	64.6%	63.2%	
	Postgraduate degree	10	21	31	
		4.2%	4.7%	4.5%	
	Uneducated	10	2	12	
		4.2%	0.4%	1.8%	
Monthly income	Less than 5000	160	214	374	0.0001
		66.9%	48.0%	54.6%	
	From (5000-10000)	48	110	158	
		20.1%	24.7%	23.1%	
	From (10,000 to 15,000)	12	78	90	
		5.0%	17.5%	13.1%	
	More than 15,000	19	44	63	
		7.9%	9.9%	9.2%	
Smoking	No	206	395	601	0.365
		86.2%	88.6%	87.7%	
	Yes	25	33	58	
		10.5%	7.4%	8.5%	
	Ex-smoker	8	18	26	
		3.3%	4.0%	3.8%	
Do you exercise regularly?	No	176	308	484	0.209
		73.6%	69.1%	70.7%	
	Yes	63	138	201	
		26.4%	30.9%	29.3%	
Duration of diabetes mellitus	Less than 5 years.	144	244	388	0.052
		60.3%	54.7%	56.6%	
	5 To 10 years	51	83	134	
		21.3%	18.6%	19.6%	
	More than 15 years	44	119	163	
		18.4%	26.7%	23.8%	
Type of drug used in the treatment of diabetes mellitus	Regulated or diabetic tablets.	109	200	309	0.688
		45.6%	44.8%	45.1%	
	Insulin.	84	148	232	
		35.1%	33.2%	33.9%	
	Tablet and insulin	46	98	144	
		19.2%	22.0%	21.0%	
Do you believe /think that your blood sugar readings are under control and regular?	No	56	71	127	0.016
		23.4%	15.9%	18.5%	
	Yes	183	375	558	
		76.6%	84.1%	81.5%	

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Have your eyes been examined/ checked by a doctor in the previous year?	No	117	109	226	0.0001
		49.0%	24.4%	33.0%	
	Yes	122	337	459	
		51.0%	75.6%	67.0%	
What are the reasons that prompted you to have an eye examination?	Referral from the doctor	54	129	183	0.0001
		22.6%	28.9%	26.7%	
	Through your awareness and knowledge	87	216	303	
		36.4%	48.4%	44.2%	
	No examination done	98	101	199	
		41.0%	22.6%	29.1%	

P value was considered significant if ≤ 0.05.

Discussion:

In the present study the knowledge and awareness of diabetic patients regarding diabetic retinopathy in Saudi Arabia was assessed. Findings offer critical insight for understanding and behavior of this very disease-related complication in this population.

When it comes to demographic data, we noticed that the sample is quite imbalanced with 65.4 females. This implies the need of the gender sensitive approaches for health outcome analysis as it has been indicated by previous studies that gender affects the management of diabetes and diabetes complications [12, 13]. Encouraging is the fact that the participants have relatively a high educational attainment, with 63.2 % having obtained the bachelor's degree. Nevertheless, prospects of the financial conditions of this educated group remains a source of worry as half report that their monthly income does not exceed 5,000 SAR.

Especially worrying in light of the study's findings around the participants' motivation to have a look at their eyes. However, a large share (29.0%) had never had an eye examination, and 44.2% were motivated by personal awareness of eye health. This is consistent with previous studies in other countries which have systematically obtained low rates of eye examination in diabetic patients [14, 15]. A critical gaping hole that must be filled through targeted educational initiatives is a lack of awareness amongst 64.1% of respondents of the importance of regular eye checks.

However, while 88.0% of respondents agreed that diabetes was linked to retinopathy, and 92.6% said that well controlled blood sugar levels could help reduce risk for retinopathy, a concerning 57.1% still felt that periodic eye checks were unnecessary if blood sugar levels remained steady. This reflects a large knowledge gap in the understanding of fact that early detection and prompt management of diabetic retinopathy is the key to preventing vision loss [16,17].

Results of the knowledge levels assessment of diabetic retinopathy showed that only 12.8% have a strong knowledge level while overall 52.3% had moderate knowledge level and 34.9% were at low knowledge level. These findings are consistent with prior diabetic settings studies where suboptimal knowledge levels of diabetic patients have been reported consistently [18, 19]. Statistical analysis also reported significant associations of knowledge of diabetic retinopathy with age, level of education, monthly income, perceived blood sugar control and having had an eye exam in the previous year. These results stress the importance of implementing targeted educational programs based on these sociodemographic and clinical factors to increase diabetic patients' awareness of and knowledge about diabetic retinopathy in Saudi Arabia.

Limitations of the study include its cross-sectional design, not allowing us to infer causal relationships

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and the self-report data could be subject to recall bias. Furthermore, the study was done in a single area and may not be reproducible in the entire Saudi population. Future research should include longitudinal studies and expand upon study of diabetic retinopathy knowledge and awareness in Saudi diabetic patients to diverse regions within the country to thoroughly assess the level of knowledge and awareness of diabetic retinopathy among Saudi diabetic patients.

Conclusion:
The need for better educational efforts and targeted interventions to increase knowledge and awareness of diabetic retinopathy among diabetic patients in Saudi Arabia is found in the present study. The findings highlight the importance of closing these knowledge gaps and misperceptions, and sociodemographic and clinical factors affecting patients' understanding and behavior. Healthcare providers and policy makers can help improve early detection, timeliness of management and ultimately prevention of vision loss caused by diabetic retinopathy in this population if these strategies are applied.

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Ethical approval:

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

Funding:

This study was not supported by any outside sources.

Conflict of interests:

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability:

All data associated with this study are present in the paper.

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