

Knowledge, Perceptions and Awareness of Diabetic Retinopathy among Patients with Type 2 Diabetes in Makkah Al-Mukarramah at Saudi Arabia

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Abstract:

1. Background

Knowledge, perceptions and awareness of diabetic retinopathy among individuals with type 2 diabetes mellitus is considered an important factor for early diagnosis and management of diabetic retinopathy. Diabetes mellitus (DM) is common metabolic disorder that is characterized by increased circulating blood glucose levels. Long term, continuous hyperglycemia leads to vasculature-related disorders, including those affecting the eyes, such as retinopathy, diabetes mellitus is an endocrine disease with chronic elevation in blood glucose levels. If not managed, it can lead to multi-organ damage also diabetes mellitus (DM) is a metabolic disease that is characterized by distortion in the metabolism of carbohydrates, lipids, and proteins and involves hyperglycemia. Diabetes mellitus has different types. Several complications are associated with diabetes including diabetic retinopathy (DR).

This study aimed: The aim of this study to evaluate knowledge, perceptions and awareness of diabetic retinopathy among patients of type 2 diabetes mellitus patients in Makkah Al-Mukarramah at Saudi Arabia.

Methods: cross-sectional study was conducted among the diabetic population from July to November 2021, Saudi Arabia. The patients were selected randomly from the general population visiting the diabetic center and primary healthcare clinics in Makkah. A self-administered questionnaire was distributed to evaluate their knowledge, perceptions and awareness of diabetic retinopathy and its complication diabetic retinopathy. Our total participants were (600)**Results:** A total of 600 participants known case of type 2 DM were interviewed to participate in the

questionnaire. that most of the participants (34.0%) were in the age group (40-50) years and the data ranged from (13-18) by mean \pm SD(15.68 \pm 1.703), the majority of them were males (65.0%) while female(35.0%),also regarding level of education the majority of participant are high school level were(28.0%) , awareness diabetic retinopathy(DR) among patients with type 2 diabetes study results show the majority of participant had average awareness were(49.0%) while weak awareness were(30.0%) the data ranged from(1-7) by mean \pm SD(4.54 \pm 1.88).

Conclusion: The knowledge and awareness the nature and consequences of diabetic retinopathy among patients with diabetes in Makkah patients' the participants' motivation to ophthalmology clinic for an eye assessment was poor in the , thus delay early diagnosis and management.

Keywords: Knowledge, perceptions, awareness, diabetic, retinopathy, among, patients, type 2 diabetes, Saudi Arabi.

Introduction

Diabetes mellitus (DM) is a metabolic disease characterized by alteration in carbohydrate, lipid and protein metabolism, where the body cannot regulate the amount of glucose in the blood.[1] Based on various studies from different countries, the global prevalence of DM was reported to be 8% in 2011 and is expected to rise to 10% by 2030.[2] The prevalence of DM is reported to be higher in Jordan than in other countries, with the reported prevalence being 17.1% in 2008 and this rate is expected to double in the next 10 years.[3]

Diabetes mellitus (DM) is common metabolic disorder that is characterized by increased circulating blood glucose levels. Long-term, continuous hyperglycemia leads to vasculature-related disorders, including those affecting the eyes, such as retinopathy. If not managed, it can lead to multi-organ damage. Examples of organs that can get damaged include, but are not limited to, the heart, the kidneys, blood vessels, nerves, and the eyes (causing diabetic retinopathy and possible vision loss). [4] Of the various types of diabetes, type 2 is the most common one. In this type, insulin levels are usually normal or increased. The problem lies in the body's inability to respond to insulin (insulin resistance). However, in the long run, insulin levels may decrease in this type as well.[1] DM affects more than 170 million people globally, and the numbers are on the rise.[2,3,5] In fact, 8% of the global population was diagnosed with DM in 2011. That percentage predicted to rise to 10% by the year 2030. [5,6]

The International Diabetes Federation maintains that DM is prevalent in 8.6% of adults worldwide.[7] The Middle Eastern and North African (MENA) region exhibits an even higher prevalence rate of 9.6%, which is expected to increase to 12% by 2045.[8] This difference in prevalence rates is attributed to the urbanization process, increased rates of obesity and the

expanding aging populations in the MENA region.[2] Parallel with the global trends, the prevalence of DM in Saudi Arabia is increasing at an alarming rate, reaching an astonishing 13.1%.[3] The burden of DM and its systemic complications is enormous, inflicting an overwhelming strain on the national and international economies.[4] Diabetic Retinopathy is a progressive blood vessel disorder of the retina and is the most common ocular disease in diabetic eyes.[5] Recently, Diabetic Retinopathy is considered the leading cause of vision loss worldwide.[6] Saudi Arabia study reported a Diabetic Retinopathy prevalence rate of 64% among diabetic patients, which is expected considering the high rates of diabetic retinopathy, one of the many complications of DM, can eventually lead to vision loss.[7,8] World-wide statistics of Diabetic Retinopathy prevalence among those diagnosed with DM are as follows: US (28.5%)[9], Australia (32.2%)[10], Indonesia (43.1%)[11], India (21.7%)[12], Jordan (34.1%)[13] and Egypt (20.5%) [14] In Saudi, DR is found in 28-36% of those diagnosed with DM. [14,15]

DR in the entire region.7 Complications resulting from DM can be mitigated with appropriate education and management, which could significantly prevent end organ damage and halt the progression of the disease.[16]

2. Literature review:

A study from Saudi Arabia reported that 36.4% of T2DM patients suffered DR.[17] also other studies have shown different rates in countries like Saudi Arabia, India, and Oman (50–75%), while higher numbers were reported in Japan and Australia (98%, 96%, respectively).[18] Such variation is attributed to the differences in educational levels of each population, economic resources, the content and quality of information provided by treating physicians and awareness raised by health care systems[19]. another previous studies in Jordanian show that a high percentage of Jordanian patients with diabetes recruited in the study were aware that DM could affect their eyes (93.8%). This result is similar to other studies conducted in Jordan in awareness to the ocular effects of DM type 2 ranges from 88.2% to 98.3%, and that around 50.4% of Jordanian patients with diabetes are familiar with DR.[20,10]

The level of awareness about DR varies among different countries and different regions; a study from Australia[31] reported there were 37% only of DM patients who knew about ocular complications of DM. A lower level of awareness was reported from India (27%),[32] and the highest level of awareness was reported from the USA, where 65% of DM patients were aware of DR.[20]

Since it is based on the overall population in in Makkah, Saudi Arabia, it is the first study in Makah to provide data concerning the prevalence of DR on such a scale. The most of systematic review has

shown that there is generally low awareness, perceptions, and knowledge of diabetic retinopathy among patients with type 2 diabetes and about the risk factors and its complications among the Saudi population in particular. Most diabetes mellitus patients had low to moderate knowledge scores in Riyadh, Jeddah, Al Hasa, Al-Khobar, and Makkah. Also unexpectedly, health professionals in Saudi Arabia also had low knowledge scores about diabetes mellitus especially type 2.[21]

Study in Poland (2017) evaluates the characteristics and trends of the prevalence of diabetic retinopathy in the population with both type 1 and type 2 diabetes mellitus, in the years 2013–2017. Since it is based on the overall population of Poland, it is the first study in Europe and in the world to provide data concerning the prevalence of DR on such a scale. This study reported the rate of registered patients with DM and DR in the entire population of Poland on the level about 6.80% and 0.81%, respectively, in 2017.

During the study period, the total number of individuals with DM in Poland increased by 26.3%. Our finding is in agreement with the estimation of World Health Organization which projected that the total number of people with DM will double from 2000 to 2030.

With the increasing number of people with diabetes, the number of DR and vision-threatening DR, has been estimated to rise to 191.0 million and 56.3 million, respectively, by 2030[22]. The mean prevalence of DR in Poland was 9.70% in the population with type 2 DM, and it increased significantly—from 7.8% in the year 2013 to 11.0% in the year 2017, respectively.[23]

A study from AlJouf and Hail province, KSA reported that 75.62% of diabetic patients were aware that diabetes can result in eye diseases.[24] A study from Taif, KSA showed that two-thirds of screened T2DM patients had good knowledge about DR.[25] A study from Jeddah, KSA demonstrated that DM patients had a good awareness about DM and its effects on eye; however, they showed the lack of awareness regarding DR.[26] Another study from Jeddah, King Abdul Aziz University found that 61% of diabetic patients had awareness about DR.[27]

In other recently published studies, the prevalence of DR among type 2 DM patients ranged from 20.1% per over 64 thousand patients from German/Austrian Diabetes Prospective Documentation Initiative, through 21.0% in over 11 thousand patients from the greater Wellington region in New Zealand [24], to 28.3% per over 7.7 million subjects in the Clinical Practice Research Datalink (CPRD) database in Great Britain [25]. The prevalence of DR among type 1 DM patients was higher and ranged from 13.4% in India [28], through 29.0% in the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) from the USA and 42.3% in the greater Wellington region in New Zealand[24], to 48.4% in the CPRD database in Great Britain[25]

Addoor and Bhandary reported that among the diabetics attending peripheral diabetic clinics in Melaka, Malaysia, there was no statistically significant effect of previous follow-up visits for DM on

the level of awareness. In this study, follow-up with healthcare professionals (based on recommended guidelines) and level of awareness were significantly associated. [36]

2.1 Rationale:

There may be a gap between knowledge of diabetes and perceptions of diabetes among patients in Saudi Arabia. Diabetes mellitus is a life-long disorder which can be treated by a complex regimen of insulin injections, diet and exercise, and which greatly affects the life of patients and their families. The researcher expects low the awareness, perceptions, and knowledge of diabetic retinopathy among patients with type 2 diabetes generally high in our study in Makkah Al-Mukarramah. This study will add significantly to the knowledge, awareness, and perceptions, and knowledge of diabetic retinopathy among patients with type 2 diabetes. In addition, for early diagnosis and treatment of DR, it is crucial to have a strong awareness of DR and its risk factors.

2.2.Aim of the Study

The aim of this study to evaluate knowledge, perceptions and awareness of diabetic retinopathy among patients of type 2 diabetes mellitus patients in Makkah Al-Mukarramah at Saudi Arabia.

2.3.Objectives:

The objective of this study was to evaluate the knowledge, perceptions and awareness of diabetic retinopathy among patients of type 2 diabetes mellitus patients and compliance among patients with type 2 diabetes in Makkah Al-Mukarramah at Saudi Arabia.

3. Subjects and Methodology:

3.1Study design:

This study is descriptive type of cross-sectional study was conducted among 600 diabetic type II enrolled in our research study. The patients were selected randomly from the general population visiting the Makkah Al-Mukarramah diabetic center and primary healthcare clinics in Makkah Al-Mukarramah

3.2 Study setting / study area:

The study has been carried out in the city of Makkah Al-Mokarramah Makah is the holiest spot on Earth. It is the birthplace of the Prophet Mohammad and the principal place of the pilgrims to perform Umrah and Hajj. It is located in the western area in Kingdom of Saudi Arabia and called the Holy Capital. Contains a population around 1.578 million .This study has been conducted in Makkah secondary school governorate, in the western region of Saudi Arabia. and it reflects a diversified demographic profile with a considerable portion of the population comes from rural descent, while others come from an urban one. This difference translates into biological, socioeconomic and lifestyle differences in the Makkah population.

3.3 Study population:

The study has been conducted among general population visiting the Makkah diabetic center and primary healthcare clinics in Makkah During the July to November 2021

3.4 Study design:

A cross-sectional study has been conducted to evaluate knowledge, perceptions and awareness of diabetic retinopathy among patients of type 2 diabetes mellitus patients and diabetic retinopathy management at Saudi Arabia, to the population visiting the Makkah diabetic center and primary healthcare clinics in Makkah in 2021.

3.5 Selection criteria:

3.5 1 Inclusion criteria

- Population visiting the Makkah diabetic center and primary healthcare clinics in Makkah.
- The T2DM patients who read and speak Arabic as a first language .
- All nationalities

3.5.2 Exclusion criteria :

- No specific exclusion criteria.

3.6. Sample size

- Population visiting the Makkah diabetic center and primary healthcare clinics in Makkah
- The sample size has been calculated by applying Raosoft sample size calculator based on (The margin of error: 5%, Confidence level: 95%, and the response distribution was considered to be 20%) accordingly the Sample size is (600) the diabetic participants (male and female) after official communication with the administrator, after that, The researcher has been Permission from the regional Research, in the Makkah and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been 600. Computer generated simple random sampling technique was used to select the study participants.

3.7 Sampling technique:

Systematic random sampling technique is adopted. After that, by using random number generator, then simple random sampling technique has been applied to select the participants population. Also, convenience sampling technique will be utilized to select the participants in the study. By using systematic sampling random as dividing the total participants by the required sample size; (600).

3.8 Data collection tool

An electronic survey adapted from previous literature research developed in the Arabic version used for data collection. and frameworks to assess the level of awareness of diabetic retinopathy and compliance with diabetes and diabetic retinopathy management. The questionnaire has been

developed in Arabic version. The questions were first pre-tested and were revised and finalized after it has been pilot tested. Before completing the survey, participants were required to indicate their consent using a forced response question followed by the survey questionnaires. Permission was obtained through personal communication with the principle author before using the questionnaire form. The survey is estimated to take 10 min to complete .

To collect the information, a set of questions were constructed and developed. All questions were closed-ended, with tick boxes provided for responses; participants answered the questionnaires from the from July to November 2021.

The questionnaire consisted of questions that

First part General and Socio demographic information. These variables included contact data (email or mobile phone number),(age, gender, Sources of information). Other variables were education level, economic level.

A questionnaire has been developed that had Socio demographic data and questions related to awareness respectively. The two senior faculty members checked the questionnaire's validity and comprehension, and it was revised according to their suggestions. A pilot study has been conducted on 20 participants to check the questionnaire's understanding and responses further, and its Cronbach's alpha was 0.75. The results of the pilot study were not included in the final analysis.

Data entry and analysis were carried out using the Statistical Package for the Social Sciences. Pearson's Chi-square tests were performed to explore if there is any significant association between the awareness of diabetic retinopathy and compliance with diabetes and diabetic retinopathy management and their (i) gender, (ii) age, and (iii) level of education.

3.9 Data collection technique:

Researcher has been visits the selected diabetic center and primary healthcare clinics in Makkah after getting the approval from the ministries of health. The researcher has been obtained permission from primary healthcare clinics director and participants in the Makkah

After the arrival of the participants has been explained the purpose of the study to all participants attending .

3.10Data entry and analysis:

Data were analyzed using (SPSS version 25). Percentages and numbers were calculated to summarize nominal and categorical information. The chi-square test (X^2), Anova test (F), and T-test (t) were used to study the significance of association and significant differences. 95% confidence intervals (CI) were calculated. P-value <0.05 was considered statistically significant.

4. Pilot study

A pilot study has been conducted in diabetic retinopathy participant using the same questionnaire to test the methodology of the study. As a feedback, the questionnaire has been clear and no defect has been detected in the methodology.

5. Ethical considerations

Informed Consent from all participants considered before participation. The survey includes questions about basic socio demographic data, knowledge about DM and DR, source of knowledge, Compliance to DM control, and management. The survey also includes questions about routine visits to ophthalmology clinics for retina screening and early eye check-up. Lastly, participants asked about possible barriers that prevented them from regular visits to ophthalmology clinics .

Our study and procedures performed according to ethical principles and standards of the Makkah ethical committee. Approval for conducting our research study granted by the Makkah ethical committee in Makkah region, Ministry of Health .

6. Budget: Self-funded

Results

Distribution of demographic data(age, gender, Level of education, economic level, Sources of information) in our study(n=600)

Table1: Demographic characteristics of study population

Variables	N	%
Age		
<30	108	18
30-40.	114	19
40-50.	204	34
50-60	126	21
>60	48	8
Gender		
Female	210	35
Male	390	65
Level of education		
None	114	19
Elementary	138	23
High School	168	28
Intermediate education	72	12
Higher education	108	18

Table 1 shows that most of the participants (34.0%) were in the age group (40-50) years follow by the (21.0%) were in the age(50-60) years the majority of them were males (65.0%) while

female(35.0%),also regarding level of education the majority of participant are high school level were(28.0%) while elementary were(23.0%).

Table2:Distribution of variables(duration of DM, family history of DM, blood glucoses levels, main source of information (knowledge) about DM and DR, referral to eye doctor, is your vision is affected by DM)

Variables	N	%
Duration of DM		
<5	270	45
5-10.	168	28
>10	162	27
Family history of DM		
Yes	456	76
No	144	24
Blood glucoses levels		
Controlled	438	73
Uncontrolled	162	27
main source of information (knowledge) about DM and DR		
Doctor	348	58
Internet /social media	90	15
Friends and relatives	120	20
Not received any information	42	7
Referral to eye doctor		
General practitioner	246	41
Patient himself	132	22
Have no referral yet	222	37
Is your vision is affected by DM?		
Yes	366	61
No	234	39

Table 2 shows the duration of DM most of the participants (28.0%) were (5-10) year followed by >10 were (27%), the majority of them were have family history of DM were(76%) , regarding the blood glucoses level the most of the participants controlled were(73%)

Most of the patients not receiving information from recommended sources. (58%) of participants the main source of information (knowledge) about DM and DR were doctors, while friends and relatives were(20%) but not received any information or source of information was social media, internet, (7%, 15%) , regarding the referral to eye doctor the majority of them referral to general practitioner were(41%) while no referral were (37%) while is your vision is affected by DM the most of practitioner answer yes were (61%)

Table(3) and figure(1) Distribution of the awareness diabetic retinopathy(DR) among patients with type 2 diabetes

Awareness		
	N	%
Weak	180	30
Average	294	49
High	126	21
Total	600	100
Range	1-7.	
Mean±SD	4.54±1.88	

Table 3 and figure(1) Regarding awareness diabetic retinopathy(DR) among patients with type 2 diabetes study results show the majority of participant had average awareness were(49.0%) while weak awareness were(30.0%) the data ranged from(1-7) by mean ±SD(4.54±1.88)

Figure (1) Distribution of the awareness diabetic retinopathy(DR) among patients with type 2 diabetes

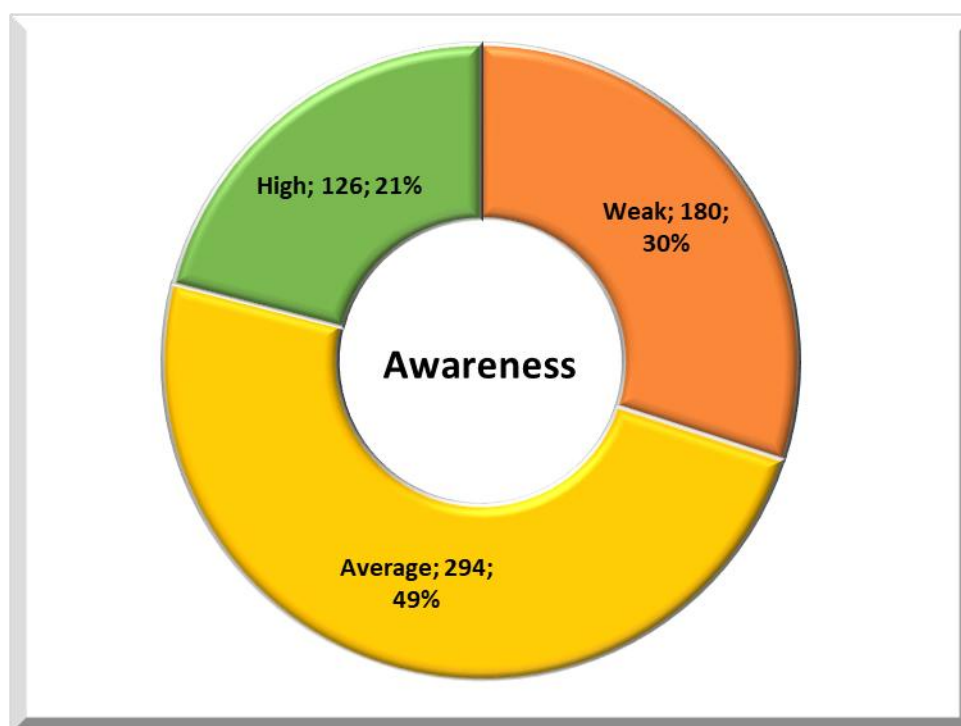


Table 4: Distribution of the information regarding DM and DR management

	N	%
Do you think the information you get about diabetes is sufficient?		
Yes	312	52
No	288	48

Are you fully adherent to your current DM treatment?		
Yes	474	79
No	126	21
Do you measure your blood sugar at home?		
Yes	486	81
No	114	19
How frequent do you measure your blood sugar at home?		
Every month	54	9
Every week	114	19
Every day	210	35
Once I feel unwell	132	22
Never	90	15
When you did last time had your vision exam?		
I did not review	306	51
During the past 6 months	132	22
During the past year	162	27
Barriers		
Living in remote area	114	19
Lack of information about DR	198	33
Lack of time	126	21
Cost of the test	96	16
Fearing of discovering something bad	66	11

Most Participants think that information you get about diabetes is sufficient were(52%) while there was a sufficient of information about DM were(48%), most of participants you fully adherent to your current DM treatment were(79%) while (81.0%) reported measuring blood sugar at home. The frequency of measuring the level of blood sugar was varying from participant to participant. The majority of patients measure their blood glucose level daily (35%), followed by those who were performing the test only when feeling unwell (22.0%), (19.0%) measure the sugar level weekly, and (15.0%) of participants not measuring, (27.0%) of participants had an eye exam in the last year, lastly, those who examined their eyes in the past six months (22.0%), regarding the barriers the most barriers found lack of information about DR were(33%) followed by lack of time were(21%) .

Table 5: Association between awareness of DR and selected variables

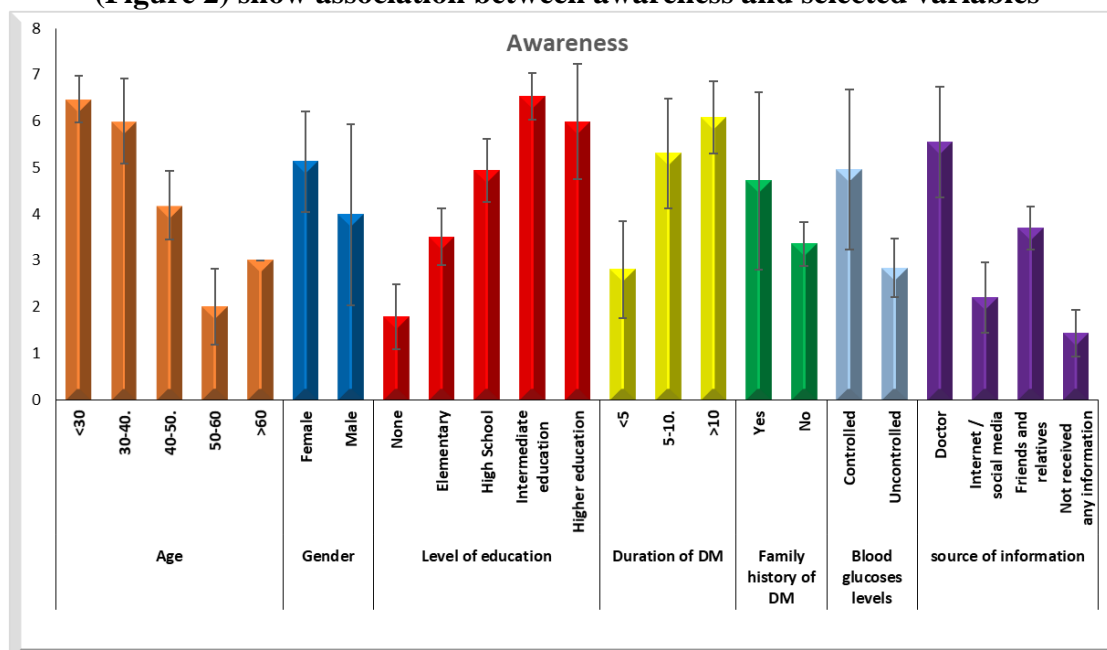
		N	Awareness		F or T	ANOVA or T-test	
			Mean	± SD		Test value	P-value
Age	<30	108	6.472	± 0.502	f	746.335	<0.001*
	30-40.	114	6.000	± 0.912			
	40-50.	204	4.186	± 0.739			
	50-60	126	2.000	± 0.820			

	>60	48	3.000 ± 0.000			
Gender	Female	210	5.129 ± 1.088	t	7.837	<0.001*
	Male	390	3.990 ± 1.948			
Level of education	None	114	1.789 ± 0.697	f	620.469	<0.001*
	Elementary	138	3.507 ± 0.607			
	High School	168	4.929 ± 0.680			
	Intermediate education	72	6.528 ± 0.503			
	Higher education	108	5.991 ± 1.249			
Duration of DM	<5	270	2.807 ± 1.042	f	609.748	<0.001*
	5-10.	168	5.304 ± 1.188			
	>10	162	6.074 ± 0.777			
Family history of DM	Yes	456	4.715 ± 1.913	t	8.448	<0.001*
	No	144	3.354 ± 0.480			
Blood glucoses levels	Controlled	438	4.961 ± 1.728	t	15.254	<0.001*
	Uncontrolled	162	2.840 ± 0.630			
source of information	Doctor	348	5.549 ± 1.189	f	456.773	<0.001*
	Internet /social media	90	2.200 ± 0.753			
	Friends and relatives	120	3.700 ± 0.460			
	Not received any information	42	1.429 ± 0.501			

Awareness of DR the show that is a significant relation between awareness of DR and demographic data regarding age (increase in <30 follow by 30-40 age) where $F=746.335$ and $P\text{-value}=<0.001$ by mean+ SD (6.472 ± 0.502 , 6.000 ± 0.912). Regarding gender In our study the majority of our participants were noticed in female more than male with Mean± SD (5.129 ± 1.088) with a significant relation between awareness and gender were $T=7.837$ and $P\text{-value}=0.001$. Regarding Level of education show that a significant relation between awareness and Level of education (increase in intermediate education) were $F=620.469$ and $P\text{-value}=0.001$ by mean+ SD (6.528 ± 0.503).

Also regarding the duration of DM show that a significant relation between awareness and duration of DM (increase in the >10 years) were $F=609.748$ and $P\text{-value}=0.001$ by mean+ SD (6.074 ± 0.777). Regarding family history of DM, our study analysis statistically significant in the association between awareness of DR and family history of DM were $T=8.448$ and $P\text{-value}=0.001$ by mean+ SD (4.715 ± 1.913). Regarding blood glucose level, our study analysis statistically significant in the association between awareness of DR and controlling of the level of blood glucose were $T=15.254$ and $P\text{-value}=0.001$ by mean+ SD (4.961 ± 1.728). also source of information, our study analysis statistically significant in the association between awareness of DR and source of information were $F=456.773$ and $P\text{-value}=0.001$.

(Figure 2) show association between awareness and selected variables



Discussion

Diabetic retinopathy is one of the microvascular complications of DM. However, if DR is not diagnosed and managed early, it can lead to irreversible blindness. Lack of awareness about DR is a significant health problem that can delay early screening, management, and prevention. A study published in 2016 showed that the prevalence of pre-diabetes among the adult population of Jeddah was 9.0% (8.6% in women and 9.4% in men) [11]. The overall prevalence of diabetic retinopathy in the KSA ranges between 33 and 36% in different regions [12]. Our study aimed to evaluate knowledge, perceptions and awareness of diabetic retinopathy among patients of type 2 diabetes mellitus patients in Makkah Al-Mukarramah at Saudi Arabia. A study conducted in Jazan showed that 27.8% of people with diabetes suffered from diabetic retinopathy. [16] The prevalence of DR in Jazan is less than most of the results reported in regional and international studies.[9,10,13,12,11]

Our obtained data showed that out of 600 participants enrolled in the study, (27%) were aware that the uncontrolled DM leads to retina and eye problems. Among all participants reported that weak awareness were (30.0%) the data ranged from (1-7) by mean \pm SD (4.54 \pm 1.88) DR leads to blindness. Bakkar et al found 81.9% of participants reported that DR leads to blindness. [30] Furthermore, Katrina et al noted 75% of diabetic participants reported that DR is a risk factor for blindness [27]

In regards to awareness about DR and ocular complication we observed our result (21%) was a similar that study in USA (52%) , India (50%), Oman (72%), and North of Saudi Arabia (75.62%). [18] However, the level of awareness in our study noted to be also less than that of Japan (98%) [23], Australia (96%) and Jordan (88.2%) [16]. Our result of level of awareness is average 49.0%, also

other studies conducted in the Kingdom of Saudi Arabia as follow: Taif 64% [25] , Jeddah 82.6% [16] , also another study conducted in Jeddah at King Abdul-Aziz University hospital 61% of participants were aware [27]. In respect to awareness of DM control, Participants (73%) were aware that control of blood glucose level can decrease the risk of DR development. Though, only Participants (40.4%) were aware that prognosis of DR can vision is affect. Similarly, Bakkar et al found 82.7% of participants were aware that the risk of DR complication can be reduced by controlling blood glucose and 38.4% were aware that DR risk can be controlled by laser treatment. [30]

In accordance to fully adherent to your current DM treatment routine retinal examination, (79%) reported regular examination should be considered. In contrast, (51%) reported did not review any time vision examination . According to the Al Zarea et al noted in his study 73.8% aware about important of regular retinal assessment. [18] Lian et al conducted study to assess awareness level about retinal examination and systematic screening in Hong Kong and he found 75.7% were aware about importance of retinal screening and regular visits. [31]

Awareness of DR was associated significantly with Participants gender ($P < 0.001$), and family history ($p < 0.001$), (Table 5). These results not agree with the findings of Bakkar et al and Manu et al. [30] In contrast, Alrashedi et al found significant association between female gender and level of awareness (p -value = 0.001). [32] Furthermore, Alsaidan et al found significant correlation of awareness with male gender. [33]

Significant association found between level of awareness and age ($P < 0.001$). Level of awareness noted to be higher among the young adult age group in comparison to older ages. The awareness was significantly associated with the age 30-40 . old. Similarly, Alrashedi et al noted a correlation between age and level of awareness. [32] On the contrary Bakkar et al observed poor association between age and awareness level. [30]

Buari et al conducted study in Malaysia to study level of awareness and she noted the awareness was significantly associated with the age among urban and rural residential population. Moreover, she observed higher level of awareness among 35-50 age group. [34]

On other hand, Almalki et al found duration of DM was significantly associated with those who known as T2DM who diagnosed for at least 5 years. [35] Furthermore, Tegegne et al observed significant association between duration of DM and Knowledge of participants .

Control of blood glucose level reported by 73% of participants. High level of awareness found among those who controlled there sugar level ($P < 0.001$). Also, other studies noted the correlation between the maintaining blood glucose level and high Awareness. [15]

Remarkably, the educational level found to be significantly associated with the level of awareness of DR ($p < 0.001$). Relatively participants with Intermediate education observed to be more aware of DR as a consequence of diabetes (Figure 2). In addition, high education statistically associated with high level of awareness in previous conducted studies. [6, 4, 8, 19] On the contrary, Alsaidan et al observed no association between level of education and level of awareness about DR. [33]

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