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## INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/10483

DOI URL: <http://dx.doi.org/10.21474/IJAR01/10483>



### RESEARCH ARTICLE

#### AWARENESS OF DIABETIC EYE DISEASES AMONG DIABETIC IN-PATIENTS AT KING ABDULAZIZ UNIVERSITY HOSPITAL, JEDDAH, SAUDI ARABIA

Mona Saddig Khojah<sup>1</sup>, Lujain Faisal Bashamakh<sup>1</sup>, Anan Abdulghaffar Aljawi<sup>1</sup>, Ibtihal Oudah Al-Ghamdi<sup>1</sup>,  
Mariya Saeed Bahashwan<sup>1</sup>, Samaher Jabril Ismail<sup>1</sup>, Athal Kamal Filemban<sup>1</sup> and Ahmed Abdulrahman  
Basheikh<sup>2</sup>

1. Medical Student, King Abdulaziz University, Jeddah, Saudi Arabia.
2. Assistant Professor, Department of Ophthalmology, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia.

#### Manuscript Info

##### Manuscript History

Received: 10 December 2019

Final Accepted: 12 January 2020

Published: February 2020

##### Key words:-

Diabetes Mellitus, Diabetic Eye Disease,  
Awareness

#### Abstract

**Background:** Saudi Arabia is the second most common country affected by diabetes mellitus in the Middle East, and it is the seventh in the world. Approximately 10% of diabetic patients develop visual impairment and blindness due to ocular complications. These could be prevented by increasing awareness.

**Aim:** To assess the awareness of diabetic eye disease among diabetic in-patients.

**Methods:** This cross-sectional study was conducted among 241 diabetic in-patients treated between 2014 and 2017 at King Abdulaziz University Hospital, Jeddah, Saudi Arabia. The data were collected through a telephone-based interview and analysis was performed using SPSS. The chi-square test was used to investigate the relationship between demographic data and awareness to diabetic eye disease.

**Results:** A total of 241 patients were included in the analyses. Of these, 140 (58.1%) were males. Approximately 80.9% of the patients knew about diabetic eye disease. Patients with a higher educational level and economic status were more aware about diabetic eye disease. A considerable proportion of the patients (79.7%) were aware that retinopathy could be caused by diabetes. Conversely, only 41.9% and 32.8% were aware that cataract and glaucoma could be caused by diabetes mellitus, respectively.

**Conclusion:** Most patients were aware of the ophthalmologic complications of diabetes. Despite being aware of diabetic retinopathy, more than half of the patients did not know that it was curable; hence, more public health education is needed.

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#### Introduction:-

Diabetes mellitus (DM) is a metabolic disorder characterized by elevated blood sugar levels, and it is considered one of the major health issues that affect all ages worldwide.[1,2] DM is classified into two main types: DM type 1 and DM type 2. It affects about 280 million people globally, and it is estimated that this number will double by the year 2025. The prevalence of diabetes in Saudi Arabia in 2000 was about 890,000 cases, and researchers predict that by

**Corresponding Author:- Mona Saddig Khojah**

Address:- Medical Student, King Abdulaziz University, Jeddah, Saudi Arabia.

the year 2030, the number of diabetic cases will reach 2,523,000.[3,4] The World Health Organization has revealed that Saudi Arabia is the second most common country in the Middle East, and the seventh in the world, affected by DM.[5]

Diabetes is associated with several complications. The duration of the disease plays a major role in the occurrence of these complications, one of which is diabetic eye disease.[6,7] After 15 years of diabetes, almost 10% of patients may develop extreme visual impairment and around 2% may become blind.[8] Diabetic eye disease includes diabetic retinopathy (DR), diabetic macular edema (DME), cataract, and glaucoma.[9] DR causes progressive damage to the retina, and it is one of the most frequent microvascular complications known to be a leading cause of blindness, especially among the most productive age group (between 20 and 60 years). It affects approximately 77% of patients with type 2 diabetes after 10 years of diabetes onset and nearly all type 1 diabetes cases.[10,11] DME is one of the consequences of DR. Cataract is an eye condition in which the lens becomes cloudy, whereas in glaucoma, the optic nerve is damaged.[9]

Several investigators have discussed diabetic patients' awareness of diabetes-associated eye diseases.[2,12–14] In one study conducted in rural Tamil Nadu, India, it was shown that 78 of the 104 diabetes patients were aware that DM could affect their eyes; three of the patients (4.3%) knew that cataract could occur as an eye complication, and seven (9.0%) were aware of diabetic retinopathy. These results showed that most patients 68 (87.2%) were not aware of the specific effects of diabetes on the eye.[12] Moreover, a study conducted in Al-Jouf and Hail provinces in Saudi Arabia showed that 75.62% of 439 diabetic patients were aware that eye disorders could be caused by diabetes.[2] In contrast, a study conducted in Jeddah, Saudi Arabia, showed that 61% of diabetic outpatients were aware of diabetic retinopathy, whereas 70% did not know that the condition could be treated.[13] Another study conducted at the University of Port Harcourt Teaching Hospital, Nigeria, showed that most of the patients were aware of diabetic eye disease, but 58.8% did not know of the part of the eye that could be affected by diabetes.[14]

Although it has been proven that eye diseases are due to poor control of DM and lack of knowledge about its risk factors and ways of prevention,[15,16] there is a paucity of studies on the awareness of eye diseases among diabetic individuals in Saudi Arabia.

Thus, this study aims to assess the awareness of diabetes-associated eye diseases among in-patients at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia.

### **Methodology:-**

This hospital-based, analytical, cross-sectional study was conducted on 241 diabetic patients who were admitted to KAUH, Jeddah, Saudi Arabia, between 2014 and 2017. Patients were included irrespective of gender, nationality, or type of diabetes mellitus (type 1 or 2). However, included patients were required to be  $\geq 18$  years old. Patients were excluded if they could not be reached due to missing or changed phone numbers, refusal to participate in the study, or deceased. Ethical approval was obtained (reference number 117-17) from the institutional review board of King Abdulaziz University.

The data were collected through a telephone-based questionnaire after obtaining verbal consent from the patients. The questionnaire was prepared in English and translated verbally into Arabic by well-trained medical students. Its contents were validated through consultation with a panel of experts in ophthalmology. The questions included the patients' socio-demographic data, type of diabetes, diabetes onset, duration and complications, and questions that assessed their knowledge of diabetic eye disease.

The data were entered using Microsoft Excel, and analyses were performed using the Statistical Package for the Social Sciences (SPSS) software, version 21. The chi-square test was used to investigate the relationship between demographic data and awareness to diabetic eye disease. A  $p$ -value  $\leq 0.05$  was considered significant.

### **Results:-**

Data from 241 diabetic in-patients were analyzed. Fifty-nine patients (19.7%) were not approached due to limitations. Among the included patients, 140 (58.1%) were males. The age of participants was categorized into five groups; most of the respondents were in the 50–60-year age group (40.2%). A considerable proportion of the

patients (n = 197, 81.7%) had DMtype 2. The full demographic characteristics and clinical data of the patients are shown in Table 1.

**Table 1:-** Demographic and clinical data of the patients (n = 241).

Characteristics	Frequency (Percent)
<b>Gender</b>	
Male	58.1
Female	41.9
<b>Age (years)</b>	
< 20	3 (1.2)
20–29	13 (5.4)
30–39	20 (8.3)
40–49	24 (10)
50–59	97 (40.2)
≥ 60	84 (34.9)
<b>Nationality</b>	
Saudi	120 (49.8)
Non-Saudi	121 (50.2)
<b>Economic status (monthly income)</b>	
< 6000 SAR	151 (62.7)
6000–9999 SAR	37 (15.4)
1000–14999 SAR	16 (6.6)
1500–19999 SAR	11 (4.6)
> 200000 SAR	11 (4.6)
Refused to answer	15 (16.2)
<b>Educational level</b>	
Illiterate	46 (19.1)
Primary	47 (19.5)
Intermediate	39 (16.2)
Secondary (High school)	54 (22.4)
Bachelor or Diploma	47 (19.5)
Postgraduate (Master, PhD)	8 (3.3)
<b>Type diabetes</b>	
Type 1	44 (18.3)
Type 2	197 (81.7)
<b>Duration of diabetes (years)</b>	
< 5	56 (23.2)
6–10	40 (16.6)
11–15	44 (18.3)
16–20	48 (19.9)
> 20	53 (22.0)

Most of the patients 195 (80.9%) had heard about diabetic eye disease, and 197 (81.7%) thought timely treatment of diabetes could prevent/delay eye damage. Additionally, 191 patients (79.3%) thought the treatment of eye diseases (cataract, glaucoma, and diabetic retinopathy) could be effective by controlling blood sugar and lipids levels. Further analyses revealed that gender ( $p=0.023$ ), type of DM ( $p=0.034$ ), and level of education ( $p=0.002$ ) were significantly associated with patients' beliefs that eye treatment could be more effective by controlling blood sugar and lipids. Furthermore, 143 (59.3%) of the participants thought that children with DM also had an increased risk of diabetic eye disease and this was significantly associated with nationality ( $p=0.004$ ).

We found a significant association between educational level ( $p = 0.047$ ), nationality ( $p = 0.036$ ), and economic status ( $p = 0.041$ ) and awareness of diabetic eye disease (Table 2). No significant association was found between age and knowledge of diabetes

**Table 2:-** Details regarding the awareness of diabetic eye disease among patients with diabetes (n = 241).

Question	Frequency			Nationality (p-value)	Educational Level (p-value)	Economic Status (p-value)
	Yes	No	I Don't Know			
Have you ever heard of diabetic eye disease?	195	46	-	<b>0.036</b>	<b>0.047</b>	<b>0.041</b>
Do you think that timely treatment can prevent/ delay damage in eyes due to diabetes?	197	8	36	0.736	0.051	0.288
Do you think that controlling blood sugar and lipids makes eye treatment effective?	191	7	43	0.347	<b>0.002</b>	0.580
Do you think that children with diabetes also have risk of eye complications?	143	19	79	<b>0.004</b>	<b>0.016</b>	0.759

\* p-value for the difference in characteristics by awareness status, based on the chi-square test.

p-value ≤ 0.05 is significant.

Amongst diabetic patients who had heard about cataract (n = 215, 89.2%) or glaucoma (n = 176, 73%), only 101 (41.9%) and 79 (32.8%) participants were aware that DM could cause these diseases, respectively. Furthermore, 192 patients (79.7%) were aware that DM could cause DR. Close to half of the respondents (n = 122, 50.6%) had never heard of DR or did not know that it could be treated, and this result was significantly associated with the duration of diabetes (p= 0.018). Less than half of the patients (41.9%) were aware that DM could cause cataract. A much smaller proportion was aware that DM could lead to glaucoma. Conversely, close to four-fifths of the patients knew that diabetes could cause DR (Figure 1).

Lastly, 220 of the participants (91.3%) said regular eye checkups were important in diabetes, and this result was significantly associated with the duration of diabetes (p= 0.044); eight patients (3.3%) did not believe in the importance of regular eye checkups, whereas 13 (5.4%) did not know whether eye checkups were important.

### Discussion:-

Our analyses demonstrated that most of the participants (80.9%) had heard about diabetic eye disease, which falls within the range reported in other hospital-based studies conducted in Kenya (83%), (17) Malaysia (87.2%), (18) and Saudi Arabia (75.6%). (2) A higher proportion of patients in a survey of diabetic patients attending Tokyo's Women's Medical University were aware of diabetic eye disease. In their report, the investigators found that > 98% of the patients surveyed were aware of diabetic eye disease. (19) It is plausible that the higher percentage in Funatsu et al.'s study was because during consultations, physicians educated their patients about ocular complications and recommendations regarding periodic eye examinations. (19) Contrary to our findings, other investigators who surveyed adult diabetic patients (attending an endocrinology clinic at a university in Nigeria) reported that only 56.9% of the patients were aware of diabetic eye disease. (14) The difference between our findings and those of these investigators could be attributed to several reasons. First, most of the respondents in the study conducted in Nigeria depended on others to take care of them and their disease and were therefore less aware of diabetic eye disease. Second, the respondents in the Nigerian study reportedly had less access to information on diabetes available on the Internet, which could also play a role on their knowledge levels on diabetes and its complications.

These studies demonstrated that educational level was significantly associated with respondents' beliefs that timely treatment could delay or prevent eye complications, eye treatment could be more effective by controlling blood sugar and lipid levels, and children with diabetes had an increased risk of developing diabetic eye complications. Studies conducted in other countries such as Malaysia, (18) India, (1) and Oman (20) found that education played a major role in participants' knowledge. This could denote that educated patients tend to read and know more about their diseases than illiterate people who face difficulties in understanding written information.

Approximately 80% of the patients had heard about cataract, glaucoma and diabetic retinopathy in the present study. While the respondents in our sample could not determine specific diabetes-associated eye diseases, only 41.9% and 32.8% of patients were aware that cataract and glaucoma could be caused by DM, respectively. (12) Compared with

the findings of other researchers, the patients in our study were less knowledgeable of diabetes-associated eye disease. In a cross-sectional survey of diabetic patients attending the Endocrinology Clinic of Federal Medical Centre, Owerri, Imo state, Nigeria, investigators reported that 11.65% of the respondents were aware of cataract as a complication of diabetes.(21) We believe that the difference between our findings and those of Achigbu et al. may be due to the fact that in their setting, little focus was placed on promotion, prevention, and health education.

Although a satisfactory proportion (79.7%) of patients knew that DR was a complication caused by DM, more than half of them were unaware that this complication could be treated. We believe that if patients are not aware that DR is a treatable complication, they might not see the benefit of having regular eye examinations. A study conducted in Malaysia highlighted this result, showing that patients who had poor knowledge of DR and its treatment were more likely to miss treatment for DR and had poor control of its risk factors.(22) In another report,(23) it was found that patients who had an eye examination were significantly more likely to believe that there was a treatment for DR, compared to those who did not have an eye examination. These results underscore the importance of raising awareness about DM and DR, as early detection of complications can only be accessed by periodic examination.

This study has all the limitations inherent to cross-sectional studies. Issues encountered during data collection were due to communication difficulties such as language barriers or health problem, which limited the use of some data. Finally, the results of this study cannot be generalized to the population of Jeddah as it was a single-center study.

### **Conclusion:-**

Overall, most diabetic in-patients at KAUH were aware of diabetic eye disease. Even though most of the patients knew that DM could cause DR, more than half did not know that the condition was treatable. Despite the increase in the incidence of DM, there is still some lack of knowledge regarding specific ocular complications; therefore, more public health education to improve the awareness of diabetic eye disease is recommended. We also recommend future studies with a larger sample from the outpatient clinics of our hospital and other hospitals in Jeddah to enhance the generalizability of the results.

### **Acknowledgment:-**

The authors would like to thank the following medical students who collected data for this study: Kasim Alsabban, Majed Halawani, Aseel Bafrah, Khaled Alqarni, Ola Abudaowd, and Razan Khafaji.

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