

Knowledge, Awareness and Prevalence of Diabetic Retinopathy among Patients of Type 2 Diabetes Mellitus on Their First Visit to Eye Department in a Tertiary Health Care Centre - A Hospital Based Cross Sectional Study

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ABSTRACT

BACKGROUND

Diabetic retinopathy can be asymptomatic until there is significant vision loss. Generating awareness about diabetic retinopathy (DR) among individuals with type 2 diabetes mellitus (T2 DM) is of key importance. This can help in early diagnosis and management of DR, avoiding the sight threatening complications. The aim of this study was to assess the knowledge, awareness and prevalence of DR among patients of T2 DM on their first visit to ophthalmology outpatient department (OPD).

METHODS

This is a single centre, hospital-based, observational cross-sectional study. It was conducted from March 2019 to February 2020, among diagnosed cases of T2 DM attending the eye OPD for the first-time following diagnosis. A structured questionnaire was prepared that includes questions regarding the knowledge and awareness of DR. It was used to collect the data, following which a complete ophthalmic checkup was done. To evaluate for prevalence of retinopathy, a dilated funduscopy was done in every case. The data thus collected was then analyzed.

RESULTS

A total of 306 participants was enrolled which included 170 males and 136 females. Majority (69.28%) were aware that diabetes can affect eye (retina) which can lead to blindness. In spite of that, in 58.50% cases, the reason for 1st eye screening was "diminution of vision". About 74.51% patients said that there is no risk of DR if the blood sugar is well controlled. According to 50.98% respondents, retinal assessment is important only when vision is affected. Mass media (30.71%) was found to be the main source of information for the patients in this study. Duration of diabetes and the educational status were found to be significant ($p < 0.05$) for the awareness of diabetic retinopathy. However, we found the prevalence of diabetic retinopathy to be 17.65% among the patients undergoing eye screening for the 1st time following diagnosis of T2 DM.

CONCLUSIONS

In order to prevent vision threatening complications of DM, the level of awareness has to be increased. Complete ophthalmological evaluation including retinal examination is of utmost importance for early diagnosis and management.

KEYWORDS

Awareness, DR, Retinal Examination, Vision Threatening Complications, DM, Educational Status, Duration of DM

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DOI: 10.18410/jebmh/2020/368

How to Cite This Article:

*Satapathy J, Minj A, Chakrabarti K, et al.
Knowledge, awareness and prevalence
of diabetic retinopathy among patients of
type 2 diabetes mellitus on their first visit
to eye department in a tertiary health
care centre - a hospital based cross
sectional study. J Evid Based Med
Healthc 2020; 7(34), 1770-1775. DOI:
10.18410/jebmh/2020/368*

Submission 17-06-2020,

Peer Review 21-06-2020,

Acceptance 22-07-2020,

Published 24-08-2020.

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BACKGROUND

DM has become an economic burden for India as well as for the whole world. In the year 2000, India topped the world with the highest number of people (31.7 million) with DM. It is estimated by WHO that this figure might rise to 79.4 million by 2030.¹ Several complications can be encountered in patients with type 1 or type 2 DM. These complications are responsible for significant morbidity and mortality. The chronic complications of DM are broadly classified as microvascular and macrovascular. The microvascular complications have much higher prevalence than the macrovascular complications. These include neuropathy, nephropathy, and retinopathy. Cardiovascular disease, stroke, and peripheral artery disease comes under macrovascular Complications.

DR is a common vision threatening complication of diabetes mellitus. The long duration of diabetes leads to micro angiopathy changes which include protein synthesis in extracellular matrix and thickening of the capillary basement membrane.² This was found to play a major role in the pathogenesis of diabetic retinopathy. DR is classified into non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR), characterised by retinal neovascularization. NPDR is further classified as mild, moderate, severe and very severe varieties with or without the development of a macular oedema. The major causes of severe and permanent visual impairment are PDR and macular oedema. Nearly all patients with Type 1 diabetes and >60% of patients with Type 2 diabetes are expected to have some form of retinopathy by the first decade of diagnosis of diabetes.

The reported prevalence of retinopathy was 21.7% in T2 DM patients of age ≥ 40 years.¹ The CDC (Centres for Disease Control and prevention) estimates that the prevalence of DR will triple from 2005 to 2050. However, a better understanding of the risk factors responsible for the development of DR, the pathophysiology of the disease, and its manifestations have allowed for significant advances in the prevention and management of diabetic retinopathy.

The risk factors for DR that have been reported among patients with diabetes include uncontrolled blood sugar, longer duration of the disease and the presence of other systemic diseases such as hypertension³ and hyperlipidaemia. This was subsequently supported by several studies showing that effective blood pressure control significantly reduces the risk of progression of DR. With better systemic management of diabetes mellitus and hypertension, as well as the development of screening programs and timely intervention, the incidence of PDR and/or macular oedema has decreased significantly. Incidence of DR increases with increase of age. Thus, age is also an important risk factor for the development of diabetic retinopathy.

DR can be asymptomatic until there is significant vision loss. Therefore, early detection is important in preventing

blindness. Increasing awareness of retinopathy among patients with diabetes is considered an important factor for early diagnosis and management of DR, in addition to the prevention of possible visual impairment due to the disease.³ It is recommended that all the level of health care workers and the members of various medical associations, senior citizen forums etc must be involved in increasing awareness, improving screening coverage and establishing referral linkages between screening and treatment centres. For improving access to DR treatment, screening facilities in public sector has been linked to the treatment facilities in non-government charitable organisations. Local print and electronic media play a major role in generating awareness.

In developing countries like India, the economic burden of health care costs is a major reason to avoid seeking health care services, especially by the lower and the middle class citizens. To lessen this burden, most of the states in India have started government health policies free for poor people. Creating awareness among the health policy makers regarding the magnitude of the problem can help them to come up with better insurance coverage for the patients with DM. This may solve the problem of middle class people to a large extent.

In spite of all these, variable levels of awareness of DR among patients with diabetes have been reported from different countries around the world including India.^{4,5,6} Although majority of our general population feel that the patients with DM should undergo frequent eye check-ups, very few of the patients with DM check for diabetic retinopathy. General practitioners and physicians are usually the first access points of the patients with DM. As a part of Kerala comprehensive diabetic retinopathy training model, nearly 200 general practitioners in Kerala along with other paramedics and health workers were trained to create awareness for retinopathy screening among the patients of Type 2 diabetes.⁶ Such steps should be taken by the other state governments too to create awareness among the patients with DM. To the best of our knowledge no studies has been done in this part of eastern India to assess the awareness of DR.

This study is aimed to assess the knowledge, awareness and prevalence of diabetic retinopathy among patients of T2 DM on their first visit to eye OPD.

METHODS

The work was designed as single centre, hospital-based observational cross-sectional study. It was conducted in the department of ophthalmology over a period of 1 year from March 2019 to Feb 2020 after taking approval from the Institutional ethical committee. Sample size was calculated by using Raosoft online sample size calculator and 306 participants were considered to be adequate for our study. The respondents were enrolled after taking their written consent for the study.

Inclusion Criteria

Patients T2 DM, who were presented to the department of ophthalmology for the first time for eye screening.

Exclusion Criteria

Patients who had already undergone DR screening before, those who are unable to answer the questionnaire and the patients who are not willing to take part in the study were excluded.

A thorough search of literature relevant to awareness of DR was done and structured questionnaire for the study was prepared in English and also translated to the local language. The validity of the questionnaire contents were assessed by a team of expert. The questionnaire included three sets of questions –

Set 1. To assess the socio-demographic data: this includes age, gender, education, occupation and other associated chronic illness.

Set 2. To assess the diabetes status of patients: this includes duration of DM, type of treatment and blood sugar level (good control of blood sugar level was taken as FBS $\leq$ 126 mg/dL and/or 2 hours PPBS $\leq$ 200 mg/dL).⁷

Set 3. To assess awareness of DR and regular eye check-up: Whether diabetes can affect the eye (retina), what was the source of information about diabetic retinopathy, how frequently eye check-up is required, the effect of blood-sugar level on progression of DR, treatment modalities of DR, reasons for undergoing first eye check-up and the barriers for early eye screening following the diagnosis of DM.

In the questionnaire some of the questions were in the “yes”, “no” or “don’t know” format while others required to choose the appropriate answer among multiple choices given. The questionnaire was administered by the interviewers who were well versed in English and in local language, and then data were collected for compilation. Following which, all the patients underwent complete ophthalmic examination by using standard technique and equipment. Retinal evaluation for DR was done by indirect ophthalmoscopy and/or by 90D / 78D lens on slit- lamp biomicroscope after dilating the pupil. Fundus picture of diabetic retinopathy was graded according to the ETDRS classification.

Statistical Analysis

The data thus collected were entered in Microsoft excel and analysed by using Z proportion test. Wherever required ANOVA two factors without replication was used. P value less than 0.05 was considered to be significant.

RESULTS

A total of 306 patients (170 males and 136 females) were participated in the study. The average age ($\pm$ SD) of the study group was 51.49 ($\pm$ 10.01) years and it ranged from 30 to 82 years. All patients were diagnosed with type 2 DM. Of the study sample, 78 were diagnosed with the disease for <1 year, 118 between 1-5 years, 64 between 6 - 10 years and 46 for more than 10 years. The socio demographic characteristics of all participants are shown in Table 1.

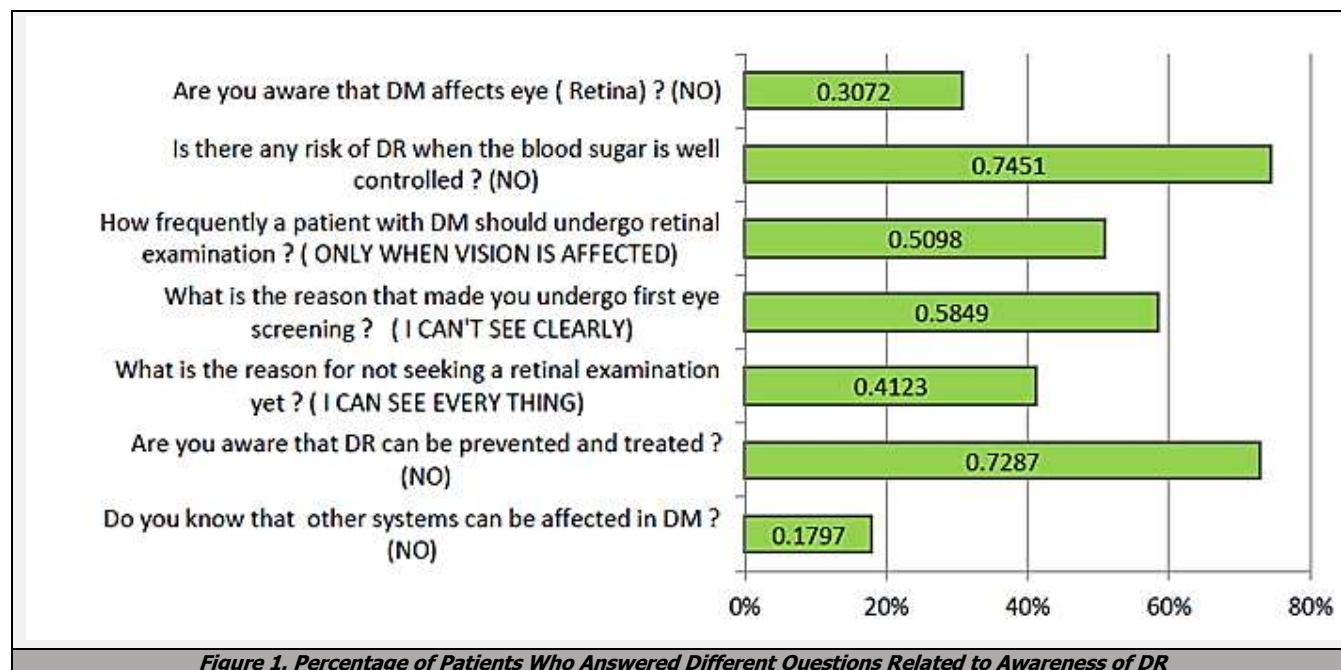
Variables	Number (n)	Percentage (%)
Mean age in years (mean $\pm$ SD)	51.49 ($\pm$ 10.01)	—
Gender		
Female	136	44.44
Male	170	55.56
Education		
None	21	06.86
Primary	148	48.37
Secondary	130	42.48
Higher secondary	07	02.29
Occupation		
Professional work	144	47.06
Non-professional work	162	52.94
Duration of DM		
<1 year.	78	25.49
1-5 years	118	38.56
6–10 years	64	20.92
>10 years	46	15.03
Blood glucose control		
Good	179	58.50
Bad	124	40.52
Not done in last 3 months	03	00.98
Type of treatment		
Oral hypoglycaemic agents	261	85.29
Insulin	37	12.10
None/alternate medicines	08	02.61
Source of information for DR		
Med/para med staffs	79	25.81
Relatives/friends	07	02.29
Social media	94	30.71
Multiple source	16	05.22
No information	40	13.07
Reasons for first eye screening		
Referred by doctor	69	22.55
Self-awareness	58	18.95
Diminution of vision	179	58.50
Other Associated diseases		
Yes	122	39.87
No	184	60.13
Diabetic retinopathy		
No DR	252	82.35
Yes	54	17.65

Table 1. Sociodemographic Characteristics of Study Population (N=306)

Data obtained show that out of the 306 interviewed participants, 212 (69.28%) were aware that DM can affect eye which can lead to blindness. Figure 1 shows the percentage of patients who answered different questions related to awareness of DR.

When patients were asked about their knowledge on how often the eyes should be examined during diabetes, 88 (28.76%) patients answered “every 6 months”, 54 patients (17.65%) thought that eye examination should be done every year and 08 patients (2.61%) answered “every 2 years”. The response of 156 patients (50.98%) was that retinal assessment is important only when vision is affected.

Mass media such as internet, television (TV), magazines and newspapers were the main source of information regarding DM and DR for 94 (30.71%) participants, while 77 (25.16%) subjects obtained their information from relatives and friends affected by diabetes.



About 79 (25.81%) patients were informed by their treating physician, nurses and paramedical staffs. Only 40 participants (13.07%) reported that they had not received any information about DM and its complications including DR (Table 1). Univariate analysis showed that awareness of DR was not significantly associated with patients' gender ($P=0.109$) and age ($P=0.759$). Duration of DM was found to be significantly associated with awareness of DR ($P=0.045$). Of the study population, 191 patients (62.42%) reported upon questioning that they had good blood sugar control. However, this also did not have a statistically significant effect on the awareness level of DR ($P=0.624$). Remarkably, the level of awareness of DR was found to be significantly associated with patients' educational status ($P<0.0001$) as shown in Table 2. Patients with a relatively higher educational level (secondary and higher secondary) were more aware of DR.

DISCUSSION

DM and the related complications are major public health challenges in present century. Most of the people with DM develop a lot of complications due to lack of knowledge and awareness about the disease. Retinopathy is a well-established complication of DM which contributes to irreversible visual morbidity.

In our study out of 306 patients 212(69.28%) were aware that DM can affect eye (retina) leading to blindness. Which is quite high as compared to the study by Hussain R et al (40.7%)⁶ and Rani PK et al(37.1%).⁸ However the result is almost similar to the study by Khandekar et al (72%),⁹ Tajunisah I et al (86.1%)⁴ and Alzahrani SH et al (82.6%).¹⁰ Repeated prior visits to eye clinics affecting the level of awareness among the patients with DM, could be a reason for this disparity. On further analysis of factors which is contributing in the awareness of diabetic retinopathy, we

found that the awareness was significantly high among the educated patients than the illiterate patients ($P<0.0001$).

Variable	Aware about DR (n)	Not Aware About DR. (n)	P Value
Gender			
Male	110	60	0.109
Female	102	34	
Age Group in Years			
30-50	104	44	0.759
51-70	106	44	
Above 70	02	06	
Duration of DM in Years			
< 1	49	28	0.045 (Significant)
1-5	79	40	
6-10	42	22	
More than 10	42	04	
Their View on Blood Sugar Control			
Good	130	61	0.624
Bad	82	33	
Education			
None	04	17	<0.0001 (Significant)
Primary/Secondary/Higher secondary	208	77	

Table 2. Analysis of Association between Awareness of DR and Selected Variables (Gender, Age, Duration of DM, Blood Sugar Control, and Educational Level)

This correlation indicates that education is an important factor in creating awareness. Similar result was found in the study by Tajunisah I et al,⁴ Hussain R et al⁶, Bakkar MM et al¹¹ and Cetin EN et al.¹² We also found positive correlation of awareness with duration of diabetes ($P<0.045$), while no significant correlation was found with age, gender and control of blood sugar level.

The main source of information in our study about the diabetic retinopathy was Mass media (30.7%) followed by medical personnel like doctors, nurses and paramedical staffs (25.81%). This reflects the requirement of health education from medical professional and promotional health companion through mass media. Our result differs from other studies where the main source of information was family and friends.^{6,13} Some studies have found medical

personnel as the main source of information for diabetic patients.^{4,11,14}

The biggest barrier (41.23%) for early eye screening was lack of knowledge about the severity of the disease. When they are asked 'why they have not undergone retinal examination earlier', their answer was 'because until now I could see everything'. Similar response was found in the studies by Hussain et al⁶, Shah K et al,¹⁵ Dervan E et al¹⁶ and Ovenseri-OgbomoGO et al.¹⁷ This indicates the fact that there is lack of motivation and knowledge among diabetic patients regarding regular ophthalmological evaluation.

In present study despite of high awareness (69.28%), most of the patients (72.87%) had very limited or no knowledge about the preventive measures and the available treatment options for DR. Similar response was found in the study by Tajunisah I et al.⁴ While Al Zarea BK et al¹⁸ reported a majority of patients had adequate knowledge about the treatment. However, in our study very few patients had knowledge about various surgical and laser treatment available for diabetic retinopathy.

The high prevalence of DR in diabetic patients imposes a large economic burden. In the present study the prevalence of diabetic retinopathy was 17.65%, which is similar to that observed by Karma LB et al (17.4%),¹⁹ Rema M et al (17.6%)²⁰ and Raman R et al (18.1%)²¹ in studies done in different states of India. However, a study by Yau J et al²² reported a global prevalence of DR is 3.4.6%, which is quite high as compared to our study.

CONCLUSIONS

In spite of adequate awareness for DR, there is lack of motivation for regular eye screening. The knowledge about the preventive measures and treatment modalities is poor among patients. This necessitates more aggressive health promotional programs at different levels stressing on regular screening for retinopathy among diabetic patients.

Limitations

The present study is a hospital based study where interdepartmental referral can reflect high awareness. A community based study with large sample size is required to find out actual awareness among the patients with type 2 DM.

Financial or Other Competing Interests: None.

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