



(RESEARCH ARTICLE)



Knowledge and Awareness of Diabetic Retinopathy in People Living with Diabetes Mellitus (PLWD): A Hospital-based Cross-sectional study

Joyce Jiji Mepurathu * and Sumit Grover

Department of Optometry, Sushant University, Erstwhile Ansal University, Gurugram, India.

International Journal of Science and Research Archive, 2023, 10(01), 715–724

Publication history: Received on 28 August 2023; revised on 07 October 2023; accepted on 10 October 2023

Article DOI: <https://doi.org/10.30574/ijjsra.2023.10.1.0808>

Abstract

Title: Knowledge and awareness of Diabetic Retinopathy in People Living with Diabetes Mellitus (PLWD): A Hospital-based Cross-sectional study.

Purpose: To assess knowledge and awareness of Diabetic Retinopathy (DR) among adults with Diabetes Mellitus (DM) visiting the hospital.

Results: Out of 218 participants about 77.5% were aware that DM could affect the eye. However, only 34.4% were aware that it could cause blindness. About 54 (24.8%) had their HbA1c levels tested regularly while 107 (49.1%) tested only when asked. About 33.5% of the patients were not aware of any of the treatment modalities for DR such as laser photocoagulation, surgery, intravitreal injection. While the rest (66.5%) had heard about at least one of these treatment modalities. 32.6% of patients thought that the control of blood glucose is enough to control DR without any further intervention.

Conclusion: The study concluded that diabetes, as a global epidemic, requires attention from patients and health care professionals. Furthermore, the survey found that the majority of people with diabetes are fully aware of the need of eye screening and the fact that diabetes can affect the eye, but had little knowledge of diabetic retinopathy and its effects. To reduce visual impairment caused by diabetes, it is vital to increase community awareness about diabetic retinopathy and the necessity of retinal screening. It is necessary to conduct awareness programs aimed primarily at rural populations. Screening services should be improved at the community health centre level as well.

Keywords: People Living with Diabetes Mellitus; Diabetic Retinopathy; Knowledge; Awareness

1. Introduction

Diabetes mellitus (DM) is a systemic disease marked by an elevated blood glucose level over time. It has recently become a global burden as a result of its systemic consequences that affect various parts of the body [1]. DM is a worldwide problem. By 2030, it is anticipated that 439 million people worldwide will have diabetes, with the rise occurring disproportionately in developing nations (69% in developing countries vs. 20% in developed countries, using 2010 as a baseline) [2]. DM is becoming more common in India and around the world due to increased life expectancy, change in lifestyles and eating habits [3]. Because of the disease's insidious nature, many people go undiagnosed until they have consequences. Poor health literacy has been identified as a crucial socioeconomic variable in the course of disease by a number of authors [4].

Diabetic Retinopathy (DR) is a major possible consequence of DM that happens when the retina's nerves and tiny blood vessels are damaged [5]. DR is a primary cause of blindness and visual impairment in people with diabetes. Because DR

* Corresponding author: Joyce Jiji Mepurathu

is a silent illness, early detection and treatment are critical to its management [6]. The duration of diabetes and the intensity of hyperglycaemia are the two most important risk factors for diabetic retinopathy [7]. DR cannot be prevented, however the complications that cause severe vision loss can be minimized with early detection and treatment. According to the Early Treatment Diabetic Retinopathy Study (ETDRS) and Diabetic Retinopathy Study (DRS) LASER photocoagulation can reduce vision loss by 90% [8].

Knowledge refers to a patient's understanding of diabetic retinopathy, attitude refers to the patient's perception of the disease as well as any preconceived notions they may have, and practice refers to the methods by which patients express their attitudes and practices, i.e. the use of eye care services. The degree to which diabetic patients are aware of DM consequences, particularly DR, has a significant impact on their behavior. The patient's understanding of diabetes and associated complications is critical for prompt and optimal treatment compliance. It will also aid in the development of a diabetes and related complications preventive programme. With diabetes on the rise, the importance of raising awareness about diabetes and its complications are necessary.

2. Material and methods

2.1. Study design

Hospital-based cross-sectional study.

2.2. Study participants

People with diabetes mellitus, aged >30 years, regardless of type.

2.3. Study site and duration

Patients visiting the hospital's ophthalmology outpatient department from February 2022 to April 2022.

2.4. Tools

A validated questionnaire was filled separately by each participant after getting approval from the Institution of Sushant University before administering on patients. The questionnaire contained questions about socio demographic information, understanding of the effects of diabetes on the eyes, and other areas.

2.5. Methodology

A hospital-based cross-sectional study was done on adult patients diagnosed with diabetes mellitus who visited the ophthalmology outpatient department. Information was gathered using a validated questionnaire. Informed consent (oral) was obtained from each participant. The questionnaire was developed after a thorough literature of existing studies on diabetic retinopathy awareness and understanding. The questionnaire was initially designed in English and all the questions were translated into two common languages, Marathi and Hindi, for those who could not follow English. The questionnaire and the study's purpose were explained to illiterate patients verbally.

The questions were developed to assess participant's knowledge and understanding of diabetes systemic and ocular problems, diabetic retinopathy, treatment options, disease implications, and preventive actions. Some of the questions were in the form of yes/no/not aware, while others contained options for the patients to choose from.

Each patient underwent a detailed ocular examination including visual acuity, anterior segment and fundus evaluation by an attending Ophthalmologist. Diabetic retinopathy changes, if any, were noted according to the ETDRS guidelines.

3. Results

A total of 218 patients were included in the study of which 107 (49.1%) were males and 111 (50.9%) were females. Of the enrolled patients, the mean age of participants was 56.99 ± 9.828 years. The demographic characteristics of the study population are listed below in [Table-1].

Table 1 Distribution of study participants depending on demographic characteristics (n=218)

Characteristics	Frequency (Percentage)
Age(Years)	
31-40	11 (5.0%)
41-50	45 (20.6%)
51-60	90 (41.3%)
61-70	60 (27.5%)
71-80	9 (4.1%)
81-90	3 (1.4%)
Gender	
Male	107 (49.1%)
Female	111 (50.9%)
Educational Level	
Post Graduate or honours	9 (4.1%)
Graduates	67 (30.7%)
Diploma	7 (3.2%)
Higher Secondary	34 (15.6%)
Secondary	25 (11.5%)
Upper Primary	20 (9.2%)
Primary	22 (10.1%)
Illiterate	34 (15.6%)
Socioeconomic status (Modified Kuppuswamy Classification)	
Upper Class	23 (10.6%)
Upper Middle	89 (40.8%)
Lower Middle	86 (39.4%)
Upper Lower	10 (4.6%)
Lower	10 (4.6%)
Occupation	
Working	99 (45.4%)
Not working	81 (37.2%)
Retired	38 (17.4%)
Locality	
Urban	52 (23.9%)
Semi urban	119 (54.6%)
Rural	45 (20.6%)

Affected individuals had DM for an average of $7.64 \pm (6.50)$ year. In terms of initial diagnosis, more than half (59.6%) were diagnosed during a routine health check-up, 21.1% after psychological stress, 11.5% were diagnosed by chance, and 7.8% were classified as others.

Table 2 Patients' diabetes status (n=218)

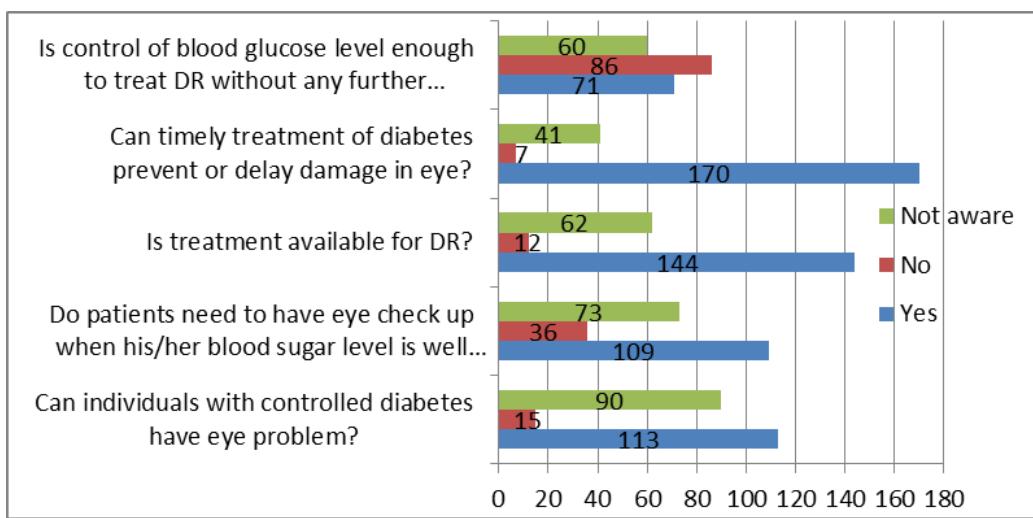
Patients' diabetes status	Frequency (Percentage)
How did you know that you have DM?	
After psychological stress	46 (21.1%)
Regular health check up	130 (59.6%)
Incidentally	25 (11.5%)
Others	17 (7.8%)
What type of diabetic medication you take?	
Tablets	178 (81.7%)
Insulin injections	25 (11.5%)
Untreated	15 (6.9%)
How do you assess your diabetic control?	
Constantly under control	137 (62.8%)
Fluctuating	48 (22.0%)
Poor control	33 (15.1%)
Have you ever tested your HbA1c	
	Yes: 145 (66.5%)
	No: 73 (33.5%)
Last HbA1c tested	
<15 days	23 (10.6%)
1-3 months	63 (28.9%)
3-6 months	25 (11.5%)
>6 months	34 (15.6%)
Last HbA1c value reported	
<6.5	13 (6.0%)
6.5-8	74 (33.9%)
>8	24 (11.0%)
Unknown	37 (17.0%)
How often has HbA1c been tested	
Regular (every 3 months)	54 (24.8%)
Infrequent >3 months	57 (26.1%)
Only when asked	107 (49.1%)

Regarding diabetic medications usage, 81.7% were using tablets, while 11.5% were taking insulin injections with or without any other medications. Untreated patients were 6.9%. The last HbA1c value reported among 33.9% patients was 6.5–8; on the other hand 11.9 % patients had HbA1c levels >8 [Table 2].

Table 3 Patients' response to awareness of diabetic eye disease

Awareness to diabetic eye disease	Yes n (%)	No n (%)	Not sure/not aware n (%)
Do you think that Diabetes can affect your eye?	169 (77.5%)	32 (14.7%)	17 (7.8%)
Do you think that Diabetes could cause blindness?	75 (34.4%)	53 (24.3%)	90 (41.3%)
Should a person with diabetes need eye screening?	191 (87.6%)	27 (12.4%)	
How often should a person with diabetes get eye check-up done?			
Every 6 months	68 (31.2%)		
Yearly	118 (54.1%)		
Only when vision is affected	32 (14.7%)		
Have you heard about Diabetic retinopathy?	109 (50.0%)	109 (50.0%)	
Do you think that control of blood glucose is enough to treat diabetic retinopathy without any further intervention?	71 (32.6%)	86 (39.9%)	60 (27.5%)
Do you know what are the treatment options for diabetic retinopathy?			
Laser, surgery or injection in the eye	145 (66.5%)		
Not aware	73 (33.5%)		

Among 218 participants about 77.5% were aware that DM could affect the eye. However, only 34.4% were aware that it could cause blindness, 41.3% did not know that DM could cause blindness, and 24.3% assured that it would not cause blindness [Table 3]. Several other questions were asked to assess their knowledge of the disease and how it's managed: 31.2% thought that they should visit an ophthalmologist every six months, 54.1% of them thought that they should do so every one year, 9.8% and 14.7% answered only when there is a problem with vision. Also, 113 (51.8%) patients believed that individuals may have eye problems even if their blood sugar levels were well controlled 109 (50%) felt that there is a need for eye check-up even if it was well controlled. Regarding patient awareness about DR, half (50%) of the patients said that they had heard of it, while the other half (50%) said they had never heard of it. At the same time 78% believed that with timely treatment it can delay damage to the eye to a certain extent [Figure-1]

**Figure 1** Frequency distribution of knowledge regarding diabetes and its eye complications (based on questionnaire)

About 33.5% of the patients were not aware of any of the treatment modalities for DR such as laser photocoagulation, surgery, intravitreal injection. While the rest (66.5%) had heard about at least one of these treatment modalities. 32.6% of patients thought that the control of blood glucose is enough to control DR without any further intervention.

Table 4 Association of gender, age, educational level and socio-economic status with knowledge of Diabetic Retinopathy (DR)

Characteristics	Knowledge of DR Knowledge Group	Non knowledge Group	p-value
Gender			
Male	51	56	0.499
Female	58	53	
Age(Years)			
31-40	8	3	0.545
41-50	22	23	
51-60	42	48	
61-70	30	30	
71-80	6	3	
81-90	1	2	
Educational level			
Post Graduate or honours	6	3	<0.0001*
Graduates	50	17	
Diploma	5	2	
Higher secondary	14	20	
Secondary	11	14	
Upper primary	8	12	
Primary	7	15	
Illiterate	8	26	
Socio economic status			
Upper class	17	6	0.002*
Upper Middle	51	38	
Lower Middle	35	51	
Upper Lower	1	9	
Lower	5	5	

There was no statistical association between gender of the participants, age and knowledge of DR. Only the level of education ($p<0.0001$) and socio-economic ($p=0.002$) retained statistical significance [Table 4].

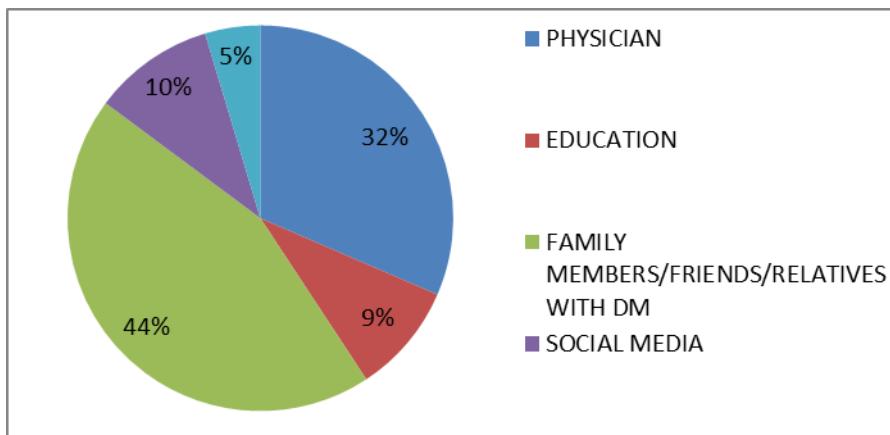


Figure 2 Source of Information about Diabetic Retinopathy

Regarding source of information, 44% of patients got information about diabetic retinopathy from family members/friends/relatives with diabetes, 32% from physician, 9% from reading books, 10% from various media and 5% from television, radios or newspapers [Figure 2]

4. Discussion

Prolonged disease duration is connected with a variety of disease-related problems. The present study showed that the mean duration of diabetes was $7.64 \pm (6.50)$ years. Despite most participants having diabetes for 7 years or more the awareness about ocular complications resulting in blindness was lower (34.4%). The previous study done analyzed various risk factors influencing diabetic retinopathy where longer the duration of diabetes higher the risk of diabetic retinopathy was one of the main factor [25] which was identical to our study where longer duration of diabetes possessed as a risk factor for the occurrence of diabetic retinopathy. This underlines the importance of implementing health education techniques on the disease and complications at the primary, secondary, and tertiary levels of health care. In this study, family members/friends/relatives with DM were the primary source of information (44%) followed by physicians (32%) which was in contrast with other studies that quoted physicians as their primary source of information [7][13][15]. When administered questions regarding awareness of DR, half (50%) participants responded that they have heard about the term from either family members or physicians while the other half (50%) said they have never heard about it. This emphasizes the need for raising awareness of diabetes mellitus control and complications should be placed not only among diabetic patients, but also among their family members, as they can motivate patients and assist them in seeking early treatment.

Knowledge and awareness of diabetic patients: In a previous study done by Al Zarea BK et.al, the knowledge of diabetic patients about related ocular problems was found to be 75.62% [17]. In this study more about 77.5% were aware that DM could affect the eye which was found to be slightly higher when compared to other study done in Bagalkot [8] which showed 45.7% were aware about ocular implications and 37.1% in a study done in Tamil Nadu [16]. One study done by Rani PK et.al, showed that only 3.8% patients were aware of ocular complications as a result of DM, which is a very small group in percentage when compared with other studies [16]. The main reason for this improvement in the number of awareness among the masses from the previous study conducted from 2008 to our study was mostly due to several awareness campaigns done by Ministry of Health and Family Welfare guidelines in the form of leaflets, pamphlets to generate awareness about the sight threatening condition [26]. The International Diabetes Federation also focused on advocating awareness and educating people living with diabetes through webinars and academic session [27]. This study was able to interview both urban and rural populations as the study was conducted in a tertiary care hospital where we found that patients residing in urban and semi urban area had more knowledge about DM and its ocular complications when compared to those living in rural areas.

Majority of patients (51.8%) interviewed in this study believed that those whose diabetes were under control will have no visual problems which was found to be low when compared with results from Bagalkot (68%) [8] and slightly higher when compared with the findings from Malaysia [22]. This study stated that diabetes, as a global epidemic, requires attention from patients, health care professionals. Furthermore, this survey found that the majority of people with diabetes are fully aware of the need of eye screening and the fact that diabetes can have ocular complications. However, based on self-reported HbA1c values, some of them also had poorly controlled diabetes while about 49.1% only tested it when they were asked.

Some literature strongly support the fact that education plays a crucial role in enhancing the knowledge and awareness [16][23][24]. This study also showed that individuals with higher educational level who attended college had more knowledge about DM and its complications (51.2%) when compared with those who had primary level education or no education at all (38%).

In this study there was no significant statistical association between the age, gender of participants and knowledge of DR which was found to similar in the previous study [13]. Statistical significance was seen in participants who belonged to the upper socio-economic group ($p=0.002$) who had more knowledge of DR and participants who had higher educational level had more knowledge of DR with statistical significance ($p<0.0001$)

Patients who have a strong understanding of diabetes and diabetic retinopathy can create good pattern that can help them avoid sight-threatening problems. It is necessary to develop strategies to educate diabetes patients about this potentially blinding condition.

Regular awareness campaigns, posters, leaflets, diabetic retinopathy screening camps, and community-based education techniques can all help at the primary level.

The most common barrier, according to this study, is a lack of knowledge about the importance of undergoing eye examination regularly. As this is a potentially serious complication, patients should be informed about the importance of having their eyes checked on a regular basis. Additionally, treating physicians should encourage patients to have their eyes checked for retinopathy. As a result, interaction with persons with diabetes could be used to emphasize the significance of eye screening.

5. Conclusion

The study results indicate although awareness levels are high knowledge levels are lower therefore health seeking behavior to have proactive diabetes control. More programmes for raising awareness towards diabetic retinopathy as a complication needs to be worked on and behavioral changes on the awareness to be seen and self health seeking patterns to be improved and implemented.

Compliance with ethical standards

Acknowledgments

I would first like to thank my mentor Dr. Sumit Grover, DO, DNB (Ophthal.), FICO (UK), MBA (Hospital Management), MSc. PHEC, LSHTM (Univ. of London), Assistant Professor of Ophthalmology AIIMS, New-Delhi for being a constant support. I am deeply indebted to them for their invaluable guidance and constant encouragement in completion of this work.

I would also like to thank Mr Mohammed Kazi, Head of Department of Optometry, Isha Netralaya, Kalyan (W) for being a great support and providing guidance whenever needed.

I also thank the entire team of Isha Netralaya, Kalyan (W) for their help and support throughout the course of this work for giving me permission for gathering. I express my sincere thanks to all my patients for their co-operation and participation in this study.

I would also like to express my gratitude to Dr. Prema K Chande for encouraging me and helping me in writing the manuscript and providing healthy feedback throughout.

Disclosure of conflict of interest

No conflict of interests to be disclosed.

Statement of ethical approval

Ethical approval from the Institution of Sushant University was taken prior to the study for administering the validated questionnaire on the study participants.

Statement of informed consent

Informed oral consent was obtained from all individual participants included in the study.

References

- [1] Hamzeh A, Almhanni G, Aljaber Y, Alhasan R, Alhasan R, Alsamman M et al. Awareness of diabetes and diabetic retinopathy among a group of diabetic patients in main public hospitals in Damascus, Syria during the Syrian crisis. *BMC Health Services Research*. 2019; 19(1).
- [2] Kulkarni S, Kondalkar S, Mactaggart I, Shamanna B, Lodhi A, Mendke R et al. Estimating the magnitude of diabetes mellitus and diabetic retinopathy in an older age urban population in Pune, western India. *BMJ Open Ophthalmology*. 2019; 4(1):e000201.
- [3] Raman R, Gella L, Srinivasan S, Sharma T. Diabetic retinopathy: An epidemic at home and around the world. *Indian Journal of Ophthalmology*. 2016; 64(1):69.
- [4] Gupta RK, Shora TN, Jan R, Raina SK, Mengi V, Khajuria V. Knowledge, attitude and practices in type 2 diabetes mellitus patients in rural Northern India. *Indian journal of community health*. 2015 Sep 30;27(3):327-33.
- [5] Al-latayfeh M, Shatnawi R, Al Shdaifat A. Attitudes and Awareness Towards Diabetic Retinopathy Among Patients with Diabetes in Amman, Jordan. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*. 2021;Volume 14:1425-1430.
- [6] Rajesh B, Hussain R, Giridhar A, Gopalakrishnan M, Sadasivan S, James J et al. Knowledge and awareness about diabetes mellitus and diabetic retinopathy in suburban population of a South Indian state and its practice among the patients with diabetes mellitus: A population-based study. *Indian Journal of Ophthalmology*. 2016;64(4):272.
- [7] S M, Davalgi S, Aithal S, Dilip B. Awareness of diabetic retinopathy and barriers for eye screening among adults with type 2 diabetes mellitus attending tertiary care teaching hospital, Davanagere, Karnataka. *International Journal of Medical Science and Public Health*. 2018; 7(11):686.
- [8] Shetgar A, Patil B, Salagar M, Nanditha A. Assessment of awareness of diabetic retinopathy among diabetics: A Clinical Survey. *Indian Journal of Clinical and Experimental Ophthalmology*. 2015;1(4):260.
- [9] Ramasamy K, Raman R, Tandon M. Current State of Care for Diabetic Retinopathy in India. *Current Diabetes Reports*. 2013;13(4):460-468.
- [10] Mirza UT, Riaz S, Qamar A, Baig MS, Mehmood T, Khan MT. An Assessment of Awareness Towards Diabetic Retinopathy among Diabetic Patients of DHQ Hospital Jhelum, Punjab. Hospital.; 13:12-70.
- [11] Ting D, Tay-Kearney M, Vignarajan J, Kanagasingam Y. Diabetic retinopathy screening: can the viewing monitor influence the reading and grading outcomes. *Eye*. 2012; 26(12):1511-1516.
- [12] Alyoubi W, Abulkhair M, Shalash W. Diabetic Retinopathy Fundus Image Classification and Lesions Localization System Using Deep Learning. *Sensors*. 2021;21(11):3704.
- [13] Geethadevi M, Thampi B, Antony J, Raghavan R, Sasidharan R, Mohan A. A study of knowledge, attitude and practice in diabetic retinopathy among patients attending a primary health care centre.
- [14] Murali N, Abinaya S, Saveetha V. Knowledge, attitude and practice of Diabetic Retinopathy among type II diabetic patients of South Indian population. *Research Journal of Pharmacy and Technology*. 2017;10(9):3017.
- [15] Venugopal D, Lal B, Fernandes S, Gavde D. Awareness and knowledge of diabetic retinopathy and associated factors in Goa: A hospital-based cross-sectional study. *Indian Journal of Ophthalmology*. 2020;68(2):383.
- [16] Rani P, Raman R, Subramani S, Perumal G, Kumaramanickavel G, Sharma T. Knowledge of diabetes and diabetic retinopathy among rural populations in India, and the influence of knowledge of diabetic retinopathy on attitude and practice. *Rural and Remote Health*. 2008 Jul 24:8:838
- [17] Al Zarea BK. Knowledge, Attitude and Practice of Diabetic Retinopathy amongst the Diabetic Patients of of AlJouf and Hail Province of Saudi Arabia. *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH* 2016;Vol-10(5): NC05-NC08.
- [18] Assem A, Tegegne M, Alemu D, Woredekal A, Tefera T. Knowledge about diabetic retinopathy, eye check-up practice and associated factors among adult patients with diabetes mellitus attending at debark hospital, Northwest Ethiopia. *BMC Ophthalmology*. 2020; 20(1).

- [19] Shah V, Kamdar P, Shah N. Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat. International Journal of Diabetes in Developing Countries. 2009; 29(3):118.
- [20] Raman R, Ramasamy K, Rajalakshmi R, Sivaprasad S, Natarajan S. Diabetic retinopathy screening guidelines in India: All India Ophthalmological Society diabetic retinopathy task force and Vitreoretinal Society of India Consensus Statement. Indian Journal of Ophthalmology. 2021; 69(3):678.
- [21] Avidor D, Loewenstein A, Waisbord M, Nutman A. Cost-effectiveness of diabetic retinopathy screening programs using telemedicine: a systematic review. Cost Effectiveness and Resource Allocation. 2020; 18(1).
- [22] Tajunisah I, Wong PS, Tan LT, Rokiah P, Reddy SC. Awareness of eye complications and prevalence of retinopathy in the first visit to eye clinic among Type 2 diabetic patients. Int J Ophthalmol 2011; 4: 519-24.
- [23] Williams MV, Baker DW, Parker RM, Nurss JR. Relationship of functional health literacy to patients' knowledge of their chronic disease. A study of patients with hypertension and diabetes. Archives Inter Med. 1998; 158:166-172.
- [24] Rothman RL, Malone R, Bryant B. The spoken knowledge in low literacy in diabetes scale. The Diabetes Educator. 2005;31 :215-224.
- [25] Abougalambou, S. S. I., & Abougalambou, A. S. Risk factors associated with diabetic retinopathy among type 2 diabetes patients at teaching hospital in Malaysia. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2015 9(2), 98-103.
- [26] Home | Ministry of Health and Family Welfare | GOI (mohfw.gov.in)
- [27] International Diabetes Federation (idf.org)