








A study of knowledge attitude practices and identification of perceived barriers towards screening for diabetic retinopathy amongst diabetics in an industrial area in western Maharashtra

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ABSTRACT

Introduction and aim. Diabetic retinopathy (DR) screening is first step in prevention of diabetic retinopathy related ocular morbidity. The aim of the study was to assess the gaps in the knowledge and awareness and evaluate its effects on the attitude and practice in known diabetic patients and to assess any anticipated barriers and its association with knowledge, attitude and practices.

Material and methods. A closed-ended questionnaire was given to 112 diabetics who met the inclusion criteria and visited a tertiary eye hospital in western Maharashtra. The purpose of the questionnaire was to assess knowledge, attitude and practices and perceived barriers to the study of DR. The statistical analysis was done on SPSS software.

Results. In our study, 73.4% did not know about DR, suggesting poor awareness about the disease, 59.5% did not feel the need for regular eye checkup. 67 (61.1%) had no knowledge about blood sugar control level and lipid control for effective control of DR, 89 (79.5%) of participants did not know about effective treatment options. Moreover, 74 (66.1%) participants were advised for DR screening by physician, while 60 (53.5%) were willing to get screened, negative attitude was not getting screened when vision is good seen in 87 (79.1%) participants. Furthermore, 84 (75%) patient think eye checkup are expensive, 66% people believe availability of doctor is an issue. 60 (54.5%) think that eye checkups are time consuming.

Conclusion. Our study demonstrated, that Spearman's correlation coefficient between knowledge and awareness and based on attitude and practice, is 0.54, and that this is statistically significant ($p < 0.01$). Our study has shown poor awareness and knowledge about the disease thus affecting attitude and practices, eye screening is considered expensive has been pointed out a major barrier in this study.

Keywords. awareness, barriers to diabetic retinopathy screening, diabetic retinopathy screening, knowledge

Introduction

Diabetes (diabetes mellitus) is a metabolic disorder characterized by high blood glucose levels, which may eventually result in multi-systemic complications. In India, 77 million individuals were affected with in 2019, and that number

will increase to 134 million by 2045.¹ An alarmingly high prevalence of diabetic retinopathy, i.e 3.5% was found in Sindhudurg district of the Maharashtra.²

In India, diabetes has become a common cause of blindness and ocular morbidity. The prevalence of di-

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abetic retinopathy (DR) in individuals with diabetes is expected to be around one-fifth.³ The WHO-NPCB surveys reveals that during the past 20 years, it has emerged as at number 6 from number 17 among the list of causes for blindness in India making it more crucial than ever to look into this issue.⁴

The diabetic retinopathy cannot be prevented from progression, but its impairing effects can be postponed. In accordance to two large randomised clinical trials early treatment Diabetic Retinopathy Study (ETDRS) and Diabetic Retinopathy Study, it was stated that with the help of LASER photocoagulation, about 50% of patients prevented their visual loss with proliferative diabetic retinopathy and macular oedema.^{5,6}

However, the benefits of those treatments can only be enjoyed with early detection and timely referral.

Epidemiological data states that prior to the development of visual deterioration, retinopathy may be well advanced. Patients are generally symptom-free when they should receive preventive treatment which gives a strong argument for establishment of more effective screening programmes. Screening programmes would be successful if diabetic population has knowledge and awareness about the disease. However, there have been reports of suboptimal attendance and significant demographic disparities. It is estimated that one-third of diabetic population never have an ocular examination.⁷ Pointing out to the need for the development of quality improvement strategies and to increase the screening attendance, which is crucial for the understanding of theoretical determinants, such as obstacles, which is expected to be achieved after this study.⁸ Industrial areas are economic development Hubs in our country with easy access to health care services, However getting screened becomes the first step of prevention in DR even after easy availability of health care services.

Aim

The aim of the study was to assess the gaps in the knowledge and awareness and evaluate its effects on the attitude and practice in known diabetic patients and to assess barriers to diabetic retinopathy screening in an Industrial area.

Material and methods

It is a cross sectional study conducted at urban health center of a tertiary medical college in an industrial area. This study was carried out in walk in patients in medicine outpatient department aged above 40 years, and diagnosed with insulin dependent diabetes mellitus and non-insulin dependent diabetes mellitus. Patients unwilling to participate in the study were excluded. The study was carried out from June 2019 to December 2019 after institutional ethical clearance (Dr DY Patil Med-

ical College and Research Center Institutional Ethics Sub-committee, Ref No.I.E.S.C/C-42/18). Total of 112 patients were enrolled during this period after taking a written consent, all the patients included in the study were enrolled. The purpose of this research study was informed and explained to them.

Data collection

Patients were presented with a detailed questionnaire based on knowledge, attitude and practice (KAP) survey model to assess the awareness of diabetic retinopathy and its sight threatening complication and barriers were assessed which prevented them from screening for diabetic retinopathy.

Questionnaire was prepared by the author on basis of literature available.⁹ The content of questionnaire was validated by experts in the field of ophthalmology. Questions were framed in English and then translated in patient's regional language before presenting it to them. In presence of one of the investigator, patients were advised to fill in the questionnaire, Investigator recorded the response for illiterate patients without any interference or any prompting of relatives.

The questionnaire was divided in 3 Parts. The contents included were:

Part A: demographic data including age, gender, literacy, socioeconomic status based modified Kupuswamy classification, residential address were collected.¹⁰ Primary education was considered till class IV, secondary till class 12, graduation was completion of degree, and duration of diabetes was noted;

Part B: included questions based to assess knowledge and awareness, attitude and practices related to the disease and complications, anticipated barriers to screening for diabetic retinopathy. While understanding the disease is knowledge, simply knowing about it is awareness.¹¹ Attitude was defined as what is thought and practices was defined as what is done.¹²

Desirable answers were marked beforehand and were compared to response received knowledge was considered excellent if more than 60% of questionnaire were answered correctly, moderate between less than 60 to 30% and less than 30% were considered poor,

The answers will be later classified into good or poor awareness, positive and negative attitude, healthy and unhealthy practices. The barriers to screening were recorded. Barriers would be graded extreme if more than 50% of participants accepted it as an obstacle for DR screening. Patients with poor awareness and unhealthy practices will be briefed about the importance of good control of diabetes and regular health check-ups.

Data analysis

Descriptive statistics were summarized using frequencies, percentages, medians, and ranges. Continuous

data are presented as mean (SD) and medians with Inter quartile range.

Comparison between two groups were done using non-parametric Mann-Whitney U test. Whereas, comparison between more two groups were done using non-parametric Kruskal-Wallis test. All tests were 2 tailed and significance set at $p < 0.05$.

Scoring procedure

Summary score were calculated using sum of all right answers. Level domain categories (knowledge and awareness, attitude and practices, anticipation of barriers) were defined as total score divided by 3. All analyses were performed using SPSS version 25 (IBM, Armonk, NY, USA)

Results

Total 112 patients were included in the study, 59 (52.68%) were females, 67 (59.82%) belonged to low income group while 67(59.82%) had primary education, while 49 (43.75%) had diabetes mellitus less than 1 year (Table 1).

Table 1. Demographic data of participants

	n (%)
Gender	
Female	59 (52.68%)
Male	53 (47.32%)
Total	112 (100%)
Economic status	
Low	67 (59.82%)
Moderate	42 (37.5%)
High	3 (3.23%)
Education Levels	
Primary	67 (59.82%)
Secondary	29 (25.89%)
Graduation and higher	12 (10.71%)
Illiterate	4 (3.57%)
Duration of diabetes	
Less than 1 year	49 (43.75%)
1–5 years	24 (21.43%)
6–9 years	18 (16.07%)
10–14 years	13 (11.61%)
More than 15 years	8 (7.14%)
How long on medication	
Less than 1 year	40 (35.71%)
1–5 years	30 (26.92%)
6–9 years	8 (7.14%)
10–14 years	8 (7.14%)
More than 15 years	7 (6.25%)
No med/No response	19 (16.96%)

Based on knowledge 47 (42%) had poor knowledge and awareness, Unhealthy practices were noted amongst 74 (66.1%), while 54 (48.2%) considered diabetic retinopathy screening had some barriers (Table 2).

Table 2. Domain scores descriptive statistics table

	n (%)
Based on knowledge and awareness	
Excellent	18 (16.1%)
Moderate	47 (42%)
Poor	47 (42%)
Based on attitude and practice	
Strongly agree (healthy, positive practice)	11 (9.8%)
Slightly agree	27 (24.1%)
Disagree (unhealthy, negative practice)	74 (66.1%)
Based on anticipation of barriers	
Extreme barrier	48 (42.9%)
Somewhat of a barrier	54 (48.2%)
Not a barrier	10 (8.9%)

Table 3 showed that association of demographic factors and with based on knowledge and awareness. We found education is associated with levels of knowledge and awareness ($p=0.014$). Healthy attitude and practices ($p=0.001$). Other demographic variables included age, gender, economic status, duration of diabetic were and duration of medication were not significantly associated with levels of knowledge and awareness, attitude and practices and anticipation of barriers.

Table 3. Comparison of demographic factors with domains on knowledge and awareness

Factors	Based on knowledge and awareness			p	
	Excellent	Moderate	Poor		
Age, median (IQR)	61.5 (44.75–70.5)	60 (50–66)	52 (44.5–61.5)	>0.05	
Sex	Female	6 (33.3%)	24 (53.3%)	26 (57.8%)	0.208
	Male	12 (66.7%)	21 (46.7%)	19 (42.2%)	
Economic status	Low	5 (38.5%)	20 (54.1%)	30 (69.8%)	0.271
	Medium	7 (53.8%)	16 (43.2%)	12 (27.9%)	
	High	1 (7.7%)	1 (2.7%)	1 (2.3%)	
Education level	Primary	7 (43.8%)	19 (47.5%)	24 (55.8%)	0.014
	Secondary	7 (43.8%)	15 (37.5%)	7 (16.3%)	
	Graduation and higher	2 (12.5%)	6 (15%)	4 (9.3%)	
	Illiterate	0 (0%)	0 (0%)	8 (18.6%)	
Duration of diabetes	Less than 1 years	6 (33.3%)	20 (43.5%)	25 (56.8%)	0.337
	1–5 years	5 (27.8%)	10 (21.7%)	8 (18.2%)	
	6–9 years	4 (22.2%)	9 (19.6%)	4 (9.1%)	
	10–14 years	3 (16.7%)	3 (6.5%)	6 (13.6%)	
	More than 15 years	0 (0%)	4 (8.7%)	1 (2.3%)	
Years of medication	Less than 5 years	9 (64.3%)	14 (51.9%)	15 (65.2%)	0.278
	6 to 9 years	3 (21.4%)	10 (37%)	6 (26.1%)	
	More than 9 years	2 (14.3%)	3 (11.1%)	2 (8.7%)	

The results are presented in a matrix such that, as can be seen the correlations are replicated. Our study resulted, that spearman’s correlation coefficient between knowledge

Table 4. Knowledge, awareness, attitude and practices regarding diabetic retinopathy

Knowledge and awareness	Frequency	Percentage
Do you think diabetes can affect multiple organ systems?		
Yes	39	34.8
No	72	64.3
No Idea	1	0.9
Which organs do you think would be affected?		
Stomach	1	0.8
Eyes	1	0.8
Kidneys	9	8
Lungs	4	3.6
Eyes and kidneys	6	5.4
No idea	91	81.3
Do you think diabetes patients require regular eye checkups?		
Yes	45	40.5
No	67	59.5
Do you feel timely treatment can help prevent damage to the eyes in diabetic patients?		
Yes	67	59.8
No	45	40.2
Whom do you think need to be consulted in case of eye problems?		
Ophthalmologist	54	48.2
Any specialist	5	4.5
Optometrist	2	1.8
General practitioner	51	45.5
When do you think a diabetic patient should visit the ophthalmologist?		
When blood sugar is well controlled	1	0.9
When blood sugar is poorly controlled	23	20.2
Don't know	88	78.9
Do you know about diabetic retinopathy?		
Yes	29	25.89
No	83	74.1
How did you come to know about diabetic retinopathy?		
Doctor/Nurse/ophthalmologist	16	14.3
TV/Newspaper/Radio	1	0.9
Family members/friends/relatives with diabetes	3	2.7
Other sources		
Not answered	92	82.1
What do you feel can help treat diabetic retinopathy effectively?		
Control of diabetes	9	8
Only medication	1	0.9
LASER	13	11.6
Don't know	89	79.5
Is retina the main part that gets damaged?		
Yes	26	23.2
No	83	74.1
Don't know	3	2.7
Do you think that the eye doctor will have special equipments to check for the effects of diabetes on eyes?		
Yes	57	50.9
No	55	49.1
Does eye treatment become more effective with controlled blood sugar and lipids?		
Yes	67	59.82
No	45	40.18

Do you think one eye can be affected before the other eye in diabetes?

Yes	29	36.37
No	82	73.21
Don't know	1	0.9

Do you feel children who have diabetes also have a risk of developing eye complications?

Yes	46	41.07
No	64	57.14
Don't know	2	1.79

If vision is damaged due to diabetes, use of 'low vision aids' helps in daily work?

Yes	58	52.7
No	49	44.5
Don't know	3	4.46

On successfully being treated with LASER, that eye does not require LASER treatment again

Yes	54	50.5
No	48	44.9
Don't know	10	8.93

Attitude and Practice**Has the physician advised you to visit the eye doctor?**

Yes	74	66.1
No	38	33.9

If Yes, will you go?

Yes	60	53.6
No	16	14.3
Not decided	1	0.9
Not answered	35	31.2

If the patient has their diabetes under control, do you feel there is a need to visit the ophthalmologist

Yes	31	28.4
No	76	69.7
Don't Know	1	0.9
Not answered	4	3.57

How often do you get your eyes examined?

Monthly	2	1.8
Half yearly	14	12.5
Annually	13	11.6
Need Basis	48	42.9
This is the first time	35	31.3

How regularly do you check your blood sugar?

Daily	8	7.14
Weekly	9	8.04
Monthly	45	40.18
Yearly	50	44.64

Does having good vision mean that your eyes are not affected?

Yes	87	77.67
No	22	19.64
Don't know	3	2.68

Does taking eye treatment mean that there is no further need for you to control your blood sugar and lipid?

Yes	53	47.32
No	54	46.42
Don't know	7	6.25

and awareness and based on attitude and practice, is 0.54, and that this is statistically significant ($p < 0.01$).

A Spearman's rank-order correlation was run to determine the relationship between based on knowledge

and awareness based on attitude and practice. There was a moderate, positive correlation between both domains, which was statistically significant. Moreover, a Spearman's rank-order correlation was run to determine the relationship between based on anticipation of barriers and based on knowledge and awareness. There was an almost low negative correlation between based on anticipation of barriers and based on knowledge and awareness which was not statistically significant ($p>0.05$). Almost low negative correlation was found between Based on anticipation of barrier and attitude and practices.

In this table, only 40.5% agreed knew that regular eye checkup is needed, maximum participants 45. 66 (59.5%) did not know about regular eye checkup for DR screening, 80 (73.4%) had no idea about DR.

74 (66.1%) participants were advised for DR screening by physician, while 60 (53.6%) were willing to get screened, negative attitude was not getting screened when vision is good in 87 (77.67%) of participants (Table 4).

Table 5. Anticipated barriers towards DR screening

Barriers	Frequency	Percentage
Based on anticipation of barriers		
Do you feel undergoing LASER treatment may be painful?		
Yes	63	56.25
No	42	37.5
Don't know	7	6.25
Do you think eye check-ups are expensive?		
Yes	84	75
No	28	25
Do you think travelling the distance to go for eye checkups is worth the effort?		
Yes	66	58.9
No	46	41.1
Do you have anyone to accompany you during eye checkups?		
Yes	80	71.43
No	32	28.57
Do you feel information on eye problems due to diabetes should be given by eye doctor ONLY?		
Yes	55	50.5
No	54	49.5
Is the availability of doctor an issue in your neighborhood?		
Yes	66	58.93
No	46	41.07
Do you feel patients with diabetes waste their time in eye checkups?		
Yes	60	54.6
No	49	44.5
Don't know	3	2.68

The survey revealed that a significant percentage of respondents perceived LASER treatment as potentially painful (56.25%) and eye checkups as expensive (75%). A majority believed traveling for eye checkups was worthwhile (58.9%) and had someone accompany them (71.43%). Opinions were divided on the source of information (50.5% preferred eye doctors), availability of doctors (58.93% considered it an issue), and time wasted during checkups (54.6% felt it was wasted).

Discussion

DR if diagnosed early can prevent irreversible visual loss. This depends on the overcoming anticipated barriers along with a good level of knowledge awareness and attitude of patients diagnosed with diabetes. Secondly, along with lowering the personal suffering caused due to blindness and visual impairment, providing ophthalmic care to patients with diabetes at the right time can result in significant cost savings for eye care programmes.¹³

There are fewer studies about KAP from industrial area of Maharashtra majority of awareness studies are done in South India. In our study, 73.4 % were unaware about DR, when leading question was asked timely screening for DR prevents damage to eye, 67 (59.5%) answered positively. Too many questions on the identical topic, participants could have answered correctly. In study done by Srinivasan et al. 49 patients (17.01%) were aware of DR as an ocular complication of diabetes.¹⁴ Study done in South India by Babu et al., only 28% of the population was 'aware' of diabetes, while 5.4% answered that eye or kidneys may be affected in diabetes.¹⁵ Namperumalsamy et al. showed that person from the community were aware that diabetes could affect all 5 major systems listed.¹⁶

61.1% of participants had no knowledge about blood sugar control and lipid control level for effective control of DR, while 79.5% of participants did not know about effective treatment options. We found poor awareness about DR resulting in low grade knowledge about treatment option. Probably a question asked about lasers 48 (44.9%) answered correctly could be due to no other modality of treatment mentioned. Though this is in comparison with other study done in Oman which have better literacy rates. We found higher level of education is associated with healthy attitude and positive practices ($p=0.001$). Screening for DR is of the utmost importance considering it a preventable visual loss if diagnosed early, All strategies developed for sight saving would be beneficial only if knowledge about the disease is well perceived amongst diabetics.

Discussing about attitude and practices, 66.1% participants were advised for DR screening by physician, while 53.5% were willing to get screened, negative attitude was not getting screened when vision is good seen in 79.1% participants, additionally, patients often become complacent if they have control over their blood sugar levels without realizing that their chance of having DR increases with the length of their diabetes. Majority get blood sugar level checked regularly again suggesting good awareness about diabetes but not about its complications. Shubha Kumar et al. determined that getting such eye care was unnecessary in the absence of any symptoms reported.¹⁷

We found barriers to DR screening, 75% of patients think eye check-ups are expensive, while 66% people be-

lieve availability of doctor is an issue. Moreover, more than half of participants think that eye checkups are time consuming. Graham et al. found that the early detection and treatment can prevent 50% to 70% of DR-related visual impairments.¹⁸

Strength of the study is a qualitative study based on responses from patients and their perspective, limitation were unavoidable leading questions. A larger sample size may have provided more insight.

Our study pointed out positive attitude and practices were noted amongst diabetics who were aware about the disease which was statistically significant (0.54), however a negative correlation was noted between anticipation of barriers and knowledge and awareness also with attitude and barriers. Similar results were seen in study done by Srinivasan et al. where positive attitude and good practice patterns had a significant association with the knowledge about the disease.¹⁴

There is wider gap between health policies, its perception about the disease complication and its utilization, till date majority attention has been directed towards cataract. Diabetes being more complex requires frequent follow up which is only possible if patients are aware about the disease process.

Compulsory referral for DR screening should be made mandatory at each time contact with health care workers to catch diabetic retinopathy early. Outreach camps and telemedicine can help in bridging the gap. The information gained from our study reveals significant association between of knowledge awareness, and its impact on attitude and practices however we did not find any correlation between knowledge awareness and anticipation of barriers.

In spite of rapid technological advances in screening and management of DR, primary prevention still remains to be the only feasible approach in many developing countries with competing demands.^{19,20}

Conclusion

Health education in form of booklets, advertisements about it benefits, creating community leaders, strong referral systems and health care policy implementation for improving of awareness amongst diabetics should be set earliest to prevent a pandemic of diabetic retinopathy. Knowledge and awareness about the disease will result in healthy attitude and practices. Overcoming barriers by incorporation of telemedicine, cost and time effective approach like organizing local camps for DR screening should be fruitful in early diagnosis and timely treatment.

Declarations

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Author contributions

Conceptualization, P.B., S.S., Ru.M. and Re.M.; Methodology, P.B. and I.M.; Software, N.K.M. and P.G.; Validation, Ru.M., Re.M. and P.B.; Formal Analysis, P.B.; S.S.; Resources, S.S.; Data Curation, P.B.; Writing – Original Draft Preparation, P.B.; Writing – Review & Editing, P.B. and P.G.; Visualization, P.B.; Supervision, P.B.; Project Administration, R.M.

Conflicts of interest

There are no conflict of interest.

Data availability

The author confirm that data supporting the finding are available within the article. Raw data supporting the findings of this study are available from the corresponding author, on reasonable request.

Ethics approval

Study design was approved by Dr DY Patil Medical College and Research Center Institutional Ethics Subcommittee, Ref No.I.E.S.C/C-42/18.

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