

Factors Affecting Retinal Screening Among Patients With Diabetes In India

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Aim- to identify various factors affecting diabetic retinopathy (DR) screening rate and measures to overcome the barriers.

Methods - Patients visiting the eye OPD were enrolled in this study from January 2017 to December 2018. A total of 2242 patients participated in this study. A questionnaire was prepared to conduct the survey. Excluding patients (82) with missing responses for more than three questions, a final sample of 2160 participants yielded.

Results - Although 71.16% of participants reported that their physician suggested DR exam, only 54.16% were screened during the past 2 years. Majority of them gave reason that they didn't know about the necessity of screening. Knowledge about DR, treatment of DR, risk factors of DR, and knowing the appropriate frequency to have an eye checkup for early detection of DR were significantly associated with receipt of a DR in the past 2 years (all $P < 0.05$).

Conclusion – Lack of awareness came out as major factor to be addressed. Information about the relationship between diabetes and retinopathy and concerns about damage to vision should be considered to promote DR screening

Abstract

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Introduction

Global burden of diabetes is continuously increasing worldwide, with India contributing a major part. Globally, over 400 million people are affected with diabetes with overall prevalence of Diabetic retinopathy (DR) of 34.6%, while 10.2% of them having sight-threatening diabetic retinopathy (STDR).^{1,2} India is considered as the diabetes capital of the world with 72 million people having diabetes with an estimated DR prevalence of around 18%.^{3,4}

There is a long asymptomatic stage in DR and hence the screening plays a very important role in early detection and so the timely intervention can reduce visual impairment due to STDR. The International Council of Ophthalmology has established the guidelines for DR screening program.⁵ Annually, dilated eye examination is recommended among individuals with diabetes with no signs of diabetic retinopathy.

There are various barriers which are responsible for declination in screening rate. A better understanding of these factors is very crucial for the success of the screening programs. Various studies have identified several factors that are associated with reduced adherence to retinopathy screening including lack of recognition of the need for periodic eye examinations, lack of public interest, economic barriers, geographic barriers, cultural beliefs, and duration of diabetes.^{6,7,8}

This study sought to identify personal characteristics, barriers, beliefs and other factors influencing diabetic eye care among patients in India. Our objectives were to: (1) determine the regular DR screening rate among patients in

a tertiary eye care centre in North- west India; (2) identify various factors affecting DR screening rate; and (3) identify the ways to overcome the barriers & improve DR screening rates.

Material & Methods

All the patients with Type 1 and Type 2 diabetes who visited the outpatient eye clinic of the eye centre from January 2017 to December 2018 were included in the study. Ethical committee of institute approved the study. 2242 patients were recruited and asked to complete the questionnaires. Written informed consent was taken from all participants. The survey was designed by the authors. Questions were designed to interpret maximum possible demographic factors. Before the main study, a pilot test of 30 patients was conducted to assess the relevance of questions, degree to which the questions were interpreted and understood and the effectiveness in providing useful information. We revised the questionnaire accordingly to improve the reliability and validity of our survey.

For illiterates or the patients with low literacy, a trained assistant was appointed to read the questions and the response was recorded. Questions were framed to cover various aspects of disease. Questions about the disease spectrum: duration of diabetes in years; presence of diabetic complications; presence of past eye problems; presence of diabetes-related eye problems and recent eye symptoms. Knowledge about DR was assessed with several questions including hearing about DR; understanding how often a DR examination is needed; having information about the treatments for DR and awareness of the risk factors for DR. Demographic variables included age, gender, education, employment, income and living arrangements.

Statistical analyses were conducted using SPSS (version 15.0; SPSS Inc., Chicago, IL). Descriptive analysis examined the associations between demographic and socioeconomic characteristics of participants, and the reasons why patients did not have a DRE in the past 2 years. In bivariate analysis, the Chi-square statistic was used to examine the categorical variables. P < 0.05 was considered statistically significant.

Results

A total of 2242 patients were recruited to participate in this study. Patients who were unable to respond to more than three questions, were excluded from the study. So after eliminating these 82 patients, our effective sample size was of 2160 patients. Out of these, 1170 patients had history of diabetic retinopathy screening in past 2 years while rest had no ophthalmic examination in past 2 years. About 54% of the patients were males and 46 % were

2 diabetes (table 1). Among the personal characteristics, education level, monthly income, duration of diabetes and knowledge of type of diabetes had significant relationship with knowledge or awareness about the DR. (Table 1)

Out of the total patients, 1537 (71.16%) patients reported that medical staff/ doctor had told them that diabetes might threaten their vision and suggested an eye examination. 1498 (69.35%) of patients believed that diabetes could threaten vision. Nearly half (56.11%) of the patients reported recent eye symptoms, including impaired vision (mostly due to cataract), allergic eye problems, dry eye, conjunctivitis or glaucoma. About 69.35% of the participants had heard the term, "Diabetic retinopathy." But, only about one-third of the patients knew about the frequency of follow up visits for screening and the treatment of retinopathy. Nearly half (45.41%) of the patients had no idea about the risk

Table 1: Demographic and socioeconomic characteristics

VARIABLES	NUMBER(%) n=2160	Knowledge about DR n=1498	No Knowledge about DR n= 662	p-value
Age				
<40 years	108 (5)	76	32	0.971
40-60 years	865 (40.04)	600	265	
>60 years	1187 (54.95)	822	365	
Gender				
Male	1165 (53.94)	785	380	0.913
Female	995 (46.06)	713	350	
Education				
Illiterate	546 (25.28)	222	324	0.0001
Up to senior secondary	732 (33.89)	496	236	
College or graduate	882 (40.83)	780	102	
Household Income per month in rupees				
< 10,000	532 (24.63)	206	326	0.0001
Upto 50,000	989 (45.79)	754	235	
>50,000	639 (29.58)	538	101	
Job status				
Private/ government job	671 (31.06)	471	199	0.811
Homemaker	544 (25.19)	379	172	
Retired	945 (43.75)	648	291	
Duration of diabetes				
<5 years	384 (17.78)	198	186	0.0001
5-10 years	1134 (52.5)	780	354	
>10 years	642 (29.72)	520	122	
Knowledge of type of diabetes- type 1 or type 2?				
Yes	973 (45.05)	788	185	0.0001
No	1187 (54.95)	710	477	
# DR- Diabetic Retinopathy				

females. The mean age was 63.4 ± 12.2 years. About 55% of participants were over age 60. One-fourth of the patients were illiterate and had monthly income < Rs.10,000/-. So, a considerable part of our society lacks the awareness and also the income to bear the treatment and travel expenses. Among the associated comorbidities, hypertension was the most common followed by heart disease, thyroid disease, neuropathy and others. About half of the participants did not know whether they were diagnosed with Type 1 or Type

factors for development of DR. Only 30.37% and 42.08% participants knew that diabetes > 5 years and high blood sugar respectively could harm the retina. As shown in (Table 2), recommendation from medical staff or doctors was significantly associated with DR examination. Also we noted that around 76% participants had belief in doctor’s treatment and instructions for control of diabetes and DR. This belief in doctors also had significant association with DR screening. Knowledge about DR, treatment of DR,

risk factors of DR, and knowing the appropriate frequency to have an eye checkup for early detection of DR were significantly associated with receipt of a DR in the past 2 years (all $P < 0.05$).

information provided by the health workers is not sufficient to rely upon. Apart from providing education about the disease and its consequences, health professionals should inquire about the status of a recent DR examination and make it a compulsory part of treatment of primary disease.

Table 2: Response to questionnaire and analysis

QUESTIONS	WITHPAST SCREENING (n=1170), n (%)	WITHOUTPAST SCREENING (n=990), n (%)	p- value
Doctor/ medical staff recommended an eye check-up?	995 (85.04)	542 (54.75)	<0.0001
Aware of diabetic retinopathy/eye problems related to diabetes?	854 (72.99)	644 (65.05)	0.0001
Presence of diabetes-related eye problems?	412 (35.21)	334 (33.74)	0.4741
Presence of recent eye symptoms?	664 (56.75)	548 (55.35)	0.5137
Tick the factors you think are responsible for control of diabetes/diabetic retinopathy			
Dietary control	913 (78.03)	790 (79.80)	0.3157
Regular exercise	843 (72.05)	721 (73.43)	0.4734
Regular monitoring of blood sugar level	822 (70.26)	664 (67.07)	0.1109
Control body weight	712 (60.85)	598 (60.40)	0.8311
Follow doctor instruction	919 (78.54)	721 (73.43)	0.0055
Know that the Diabetic retinopathy can be treated?	420 (35.89)	312 (31.51)	0.0322
Know about the frequency of eye examination for diabetic retinopathy	438 (37.43)	324 (32.72)	0.0225
Tick the risk factors you think are associated with diabetic retinopathy			
Diabetes > 5 years	378 (32.30)	278 (28.08)	0.0336
Type 1 diabetes	204 (17.43)	138 (13.93)	0.0264
Type 2 diabetes	314 (26.84)	229 (23.13)	0.0477
High blood sugar	520 (44.44)	389 (39.29)	0.0156
High lipid levels	167 (14.27)	129 (13.03)	0.4038
No idea	525 (44.87)	456 (46.06)	0.5800
Reasons for no eye checkup in the past 2 years-			
No idea about the disease		352 (35.56)	
Feel it unnecessary		206 (20.81)	
Belief that eyes are healthy		176 (17.78)	
Too busy		101 (10.20)	
No family member to accompany		72 (7.27)	
Cannot afford medical/travel expense		68 (6.86)	
Lack of transportation		46 (4.65)	
Lack of ophthalmologist nearby		42 (4.24)	
Other health problems to take care of		40 (4.04)	

Discussion

54.16% of patients in our study reported that they received a dilated eye examination for DR in the past 2 years. Their knowledge about the disease was significantly associated with reported receipt of a DR screening. Major reason provided by the patient for not receiving a DR exam at recommended intervals was lack of knowledge and awareness about the nature and severity of illness. These results suggest that the awareness about the illness is an important determinant of taking a health-protective action.

Although nearly 72% of participants said that the doctor had informed them about the eye complications of diabetes and the belief in doctor was significantly associated with the desired results. But around 21% of patients without a recent DR screening thought that this examination was unnecessary. The latter finding indicates that the routine

Rather than advised, screening should be "ordered".

It has been found in our study that patients recently diagnosed with diabetes mellitus who did not experience eye problems, feels that the eye examination is unnecessary; this finding is consistent with the previous studies.^{9,10} Awareness and knowledge of the participant about DR was significant predictor of screening, but the level of knowledge about DR was low. As consistent to previous studies, our findings confirmed that insufficient knowledge create hinderences in the path of health seeking and health behaviors.^{12,13}

Based on our study we can conclude that to overcome the shortcomings, the national and regional screening initiatives should be launched as soon as possible.¹⁴ Considering the geographic and demographic variation of country like India, mass screening and awareness programs are not very much effective for such a large and low educated population.

Telemedicine using retinal photography and remote readers seems to be an effective measure. Rani et al. prepared a rural DR screening model using an indigenous camera, by which referable posterior segment abnormalities in a rural diabetes eye care program can be detected via undilated pupil.¹⁵ Also, Retinal photography allows permanent documentation of the retinopathy status and hence, helpful in serial evaluation. As reported by Namperumalsamy P.¹⁶ we also believe to give more focus on detecting sight-threatening retinopathy until India get specialized personnel and technology to cop up with the increasing load of diabetes. Mobile eye clinics and smartphone-based retinal photography are also practicable solutions.^{17,18}

There are few limitations of our study. There were variety of eye symptoms or diseases in our participants. Patients with greater knowledge about diabetes and DR may have better respond to the survey. Educational level of participant also created hindrance in our study. A better approach with community level survey could provide a better idea of prevalent situation.

Conclusion

Diabetic care management is a complex process. A multifaceted approach to promote the awareness about the diabetes and diabetic retinopathy is needed. Our findings highlight that the knowledge and perception of threat was an important determinant in promoting diabetic eye care. Despite being advised by the health professionals, majority of patients doubted the necessity of screening. A strong network is needed to promote the need and necessity of DR screening as early recognition and treatment can save the vision of patients.

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