Original Research Article

Utilization of diabetic retinopathy screening among diabetic patients at a tertiary care hospital in Kerala, India

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ABSTRACT

Background: Diabetes is a major public health concern that affects nearly 463 million (9.3%) of global adult population. Diabetic retinopathy, which affects around 35% of all diabetic patients, is the fifth leading cause of preventable global blindness. This study was done to determine the status of diabetic retinopathy screening and the factors that influence its uptake among diabetic patients attending a tertiary care setting in Kerala, India.

Methods: 200 patients with diabetes mellitus on physician care were enrolled for a questionnaire-based survey which collected information on patient demographics, education, occupation, patient's awareness of retinopathy, screening, diabetic blindness and their source of such knowledge.

Results: 83% were aware that diabetes can result in vision loss. 61% were aware that diabetic blindness is preventable. 42% patients were aware of screening options for retinopathy. The awareness of retinopathy screening was significantly associated ($p=0.0001$) only with duration of diabetes.

Conclusions: Awareness of diabetic retinopathy among diabetic patients in Kerala was sub optimal. Better patient education and use of mass media can increase awareness on diabetes retinopathy screening programs.

Keywords: Awareness, Diabetic retinopathy screening, Tertiary care centre, Uptake

INTRODUCTION

Diabetes is a major public health concern that affects nearly 463 million (9.3%) of global adult population.¹ Diabetic retinopathy, which affects around 35% of all diabetic patients, is the fifth leading cause of preventable global blindness.² Diabetic retinopathy is also the sixth most common cause of blindness in India, with a reported prevalence of 7.3% to 26.2%.³ In the south Indian state of Kerala, an estimated 20% adults have diabetes mellitus and 26.8% of diabetic patients have diabetic retinopathy.⁴ Diabetic retinopathy is asymptomatic, in the early stages and slowly progresses to vision threatening complications like diabetic macular edema and proliferative diabetic retinopathy.⁵ Early detection and treatment can prevent 98% of diabetic blindness.⁶ The International Council of Ophthalmology, and the IIPH

DR project implementation core team, have developed India specific operational guidelines for screening and management of diabetic retinopathy.^{6,7} The implementation of these recommendations is affected by factors like the lack of awareness of diabetic blindness in Indian population and absence of a dedicated national diabetic retinopathy screening program.⁸⁻¹⁰ A population-based study from Kerala has previously reported suboptimal utilization (9.6%) of diabetic retinopathy screening.¹¹ Studies have reported significant prevalence of retinopathy among diabetic patients already under physician care in government hospitals of Kerala indicating inadequate detection of retinopathy even while diabetes is being treated.^{12,13}

We designed a cross sectional study to determine the status of diabetic retinopathy screening and understand

the factors that influence the uptake of screening among diabetic patients attending a tertiary health care setting in state of Kerala, India.

METHODS

The Institutional Ethics Committee approved the study protocol that utilized a cross sectional design. The study was conducted at a tertiary care teaching hospital in Thrissur district, Kerala from August 2019 to December 2019.

Inclusion criteria

Patients with established diagnosis of diabetes mellitus (type 1 and type 2) on treatment from the department of internal medicine at the study institute were enrolled in the study.

Exclusion criteria

Persons with impaired higher functions and those who had undergone treatment for vision threatening retinopathy were excluded.

Participants provided informed consent before enrollment into the study. The sample size was calculated as 200 persons with diabetes based on a reported prevalence of diabetic retinopathy of 34.1% among diabetic patients attending a diabetic centre in South India.¹⁴ Consecutive sampling was used to recruit subjects for the study from the outpatient department and medical wards.

Patients identified with diabetes at the study institute are routinely referred to the department of ophthalmology for diabetic retinopathy screening. The screening service is provided on the same day on payment of basic consultation charges. Patients can book another appointment slot on another day if they prefer. The screening included assessment of visual acuity, anterior segment examination with slit lamp bio microscopy, intraocular pressure assessment and posterior segment examination with a specific focus on possible complications of diabetes including retinopathy. Patients who need advanced testing were offered the same as appropriate.

A pre-designed questionnaire was used to collect information from the study participants on patient demographics, education, occupation, and patient's awareness of retinopathy, diabetic blindness, need for screening and their source of such knowledge. Their compliance to regular diabetic retinopathy screening and reasons for suboptimal uptake of the service were

explored. Apart from demographic data, the questionnaire had thirteen questions in an objective, multiple choice format. The questionnaires were administered by the evaluator to diabetic patients in the waiting area of medicine outpatient department and to the inpatients at their bedside. The questions were explained to the patient in a language they could understand, and the responses recorded using Google forms.

Data was transcribed into an MS Excel sheet and exported to the statistical software SPSS version 23.0 for analysis. The distribution of continuous variables is expressed as mean $\pm$ SD and categorical variables as proportions. The association of awareness and other variables was analyzed by Chi-square test and Fisher's exact test. Significance was assessed at 5% level.

RESULTS

The study group had a mean age $\pm$ SD of 64.83 $\pm$ 10.52 years. One hundred and twenty-two (61%) patients were females. All patients were literate (Table 1) and 2.5% were unskilled laborers. All patients had type 2 diabetes mellitus. 47.5% of the patients had diabetes mellitus for more than 10 years, 33.5% had DM for 5-10 years and 19% for less than 5 years.

Table 1: Demographic characteristics of the study population (n=200).

Demographic characteristics	
Age (mean $\pm$ SD)	54.83 $\pm$ 10.520
Gender	
Male	78 (39%)
Female	122 (61%)
Education	
Primary	31.5%
Secondary	52.5%
Higher secondary	3.5%
College	9.5%
Professional	3%
Occupation	
Clerk	7 (3.5%)
Housewife	13 (6.5%)
Professional	6 (3%)
Retired	143 (71.5%)
Skilled worker	26 (13%)
Unskilled worker	5 (2.5%)
Duration of diabetes mellitus	
<5 years	19%
5-10 years	33.5%
>10 years	47.5%

Table 2: Association between demographic characteristics with awareness of diabetic retinopathy screening.

Parameter	Classification	Awareness regarding DR screening		Total (200)	Statistical significance
		No (n=116)	Yes (n=84)		
Age (in years)	<60	31	27	58	Chi square test P value- 0.72
	61-70	44	30	74	
	>70	41	27	68	
Gender	Female	49	29	78	Chi-square test P value- 0.26
	Male	67	55	122	
Educational status	Primary	40	23	63	Fishers exact test P value- 0.11
	Secondary	63	42	105	
	Higher secondary	4	3	7	
	College/professional	9	16	25	
Duration of diabetes (in years)	<5	30	9	39	Chi-square test P value- 0.0001
	5-10	45	21	66	
	>10	41	54	95	
Regular Physician care	No	3	4	7	Chi-square test P value- 0.32
	Yes	113	80	193	

Most patients (n=166, 83%) were aware that diabetes can affect the eye and result in vision loss. One hundred and twenty-two (61%) patients were aware that blindness due to diabetic eye disease is preventable. Eighty-four (42%) patients were aware of diabetic retinopathy and screening options for the same. The source of information was ophthalmologists, physicians, media and relatives in that order (Figure 1).

Figure 1: Source of awareness regarding diabetic retinopathy screening.

The awareness of diabetic retinopathy screening was not significantly affected by patient age, gender, educational status or regular physician care but was significantly associated ($p=0.0001$) with duration of diabetes. Uptake of diabetic retinopathy screening: Eighty-two (41%) diabetic patients underwent screening for diabetic retinopathy. 58.5% of these patients had complaints of defective vision. Almost all (99%) patients who were aware of retinopathy screening utilized the service. Only two patients did not. One of them had difficulty in transportation and the other neglected the screening referral. Out of the total 82 patients who underwent preliminary screening for diabetic retinopathy, only

62.1% (51) patients continued regular follow up as advised by the ophthalmologist (Table 2).

DISCUSSION

Previous studies have shown a higher awareness of DM among females.^{11,15} This may explain the larger proportion of females (61%) in the study; however, we did not find any gender specific difference in awareness among the study patients. All patients in the study group were literate reflecting the high literacy levels in Kerala. The low proportion (2.5%) of unskilled labourers may reflect the low prevalence of DM in this demographic group, and the lower utilization of healthcare services in this demographic as they must balance loss of daily wages with seeking healthcare.¹⁶ Most participants (81%) had diabetes for at least five years. Most (83%) were aware of the blinding potential of diabetic eye disease, but only 42% was aware of diabetic retinopathy or the need for regular retinopathy screening. The main source of information was ophthalmologists (59.5%) followed by physicians, media and relatives.

Previous studies from India have reported wide variation (17.01% to 93.2%) in the awareness about diabetic retinopathy among patients with diabetes.⁹ The awareness of diabetic retinopathy in this study (42%) was higher than those reported from tertiary care settings in Vellore, (17.02%) and Goa, (29.4%) but was lower than from a tertiary care centre in Andhra Pradesh (65.3%).^{9,17,18} A previous study from Kerala, reported an awareness of 84% regarding diabetic eye disease but only 19% regarding diabetic retinopathy.¹⁹ The main source of information in that study done in 2007 was the media, ophthalmologists and general practitioners in that order.¹⁹ The higher level of awareness in the present study possibly reflects an improvement in public awareness over a period of thirteen years.

Compared to hospital-based studies, community studies from Kerala report a higher level of awareness of diabetic retinopathy among diabetic patients (77.07 in rural Kerala, 71.3% in semi-urban central Kerala).^{11,20} The study by Prabhakaran et al identified mass media (48%) and hospital/camps (41%) as major sources of information in rural Kerala.²⁰

Duration of diabetes was the only variable that was significantly associated with awareness of diabetic retinopathy screening in this study. This is consistent with the reports from a tertiary care teaching hospital in Ludhiana, and a population-based study from rural central Kerala.^{20,21} The lack of significant association for diabetic retinopathy screening with age and gender in this study is consistent with previous studies from Goa and central Kerala.^{9,11}

Awareness of diabetic retinopathy screening was not associated with regular physician care for diabetes. The lack of association may indicate lack of sustained patient education initiatives regarding diabetic retinopathy screening by health care providers involved in treatment of diabetes. This observation is consistent with results from previous hospital- and -population- based studies from India and globally.^{11,19,22-26} The present study underlines the need for uniform preferred practice patterns pertaining to patient education and prompt referral for diabetic retinopathy screening by physicians across diabetic care facilities in our country. The National Program for Control of Blindness (NPCB) has recommended opportunistic screening for diabetic retinopathy in India, which emphasizes the role of physicians in ensuring diabetic retinopathy screening.²⁷

We did not find any statistically significant association between educational status of patients and awareness of diabetic retinopathy screening, however, all patients in this study were literate and had basic formal schooling. The lack of association with educational status in this study is between the categories of education and not a comparison of education with no education.

The uptake of diabetic retinopathy screening service was suboptimal (41%) in the study. Previous hospital-based studies, from different parts of the world have reported uptake rates ranging from 8%-85.7%.²⁷⁻³⁰ Our rate is significantly lower than a healthcare setting in England (85.7%).²⁸ The UK has a well-established NHS Diabetic Eye Screening Programme (NDESP) that ensures routine screening for diabetic patients attending the health care system. Our result is comparable to that from diabetic clinics of Malaysia (50%), a south east Asian developing country with similar socioeconomic economic realities as India.²⁹ The screening uptake rate in our study was higher than that from community health centres in rural Maharashtra, (9.5%) and an Ayush hospital in Hyderabad (8%).^{30,31}

A third of diabetics in the Indian population never undergo eye examination.²⁷ Uptake of diabetic retinopathy screening reported in population-based studies from Kerala range from 9.6% to 59.02%.^{11,20} In this study, 99% of patient who were aware of retinopathy screening utilized the service suggesting that good awareness leads to good practice. This is in concurrence with a study from a similar tertiary care teaching hospital in Vellore.¹⁷ A systematic review of DR screening uptake patterns by Piyasena et al also reports higher uptake of retinopathy screening services when patients were educated about diabetic retinopathy.³² Only one patient in the present study had neglected the referral for screening. Transportation difficulty had prevented screening in a patient who was given referral and wanted to undergo screening. This is in concurrence with a study from Maharashtra which reports better uptake of screening when the service is offered closer to home or transportation arranged.¹⁰

We observed that compliance to regular follow up as advised by the ophthalmologist at the time of screening was not satisfactory (62.1%). Further in-depth exploration is needed to find out the deterrents for the same.

The present study identifies patient education by medical practitioners and utilization of mass media as focus areas that need improvement to increase awareness and uptake of diabetic retinopathy screening services. A previous hospital-based study from Kerala had reported that diabetic patients wished to get more information regarding retinopathy from media and treating physicians.¹⁹ The need for multipronged efforts necessitates a dedicated national programme to fight diabetic eye disease. Evidence from international studies suggest a better uptake of diabetic screening services in countries with a dedicated national programme for prevention of diabetic blindness.²⁸

To the best of our knowledge, the present study is the first to report on the rate of awareness and uptake of diabetic retinopathy screening among diabetic patients under physician care from a tertiary teaching hospital in Kerala. We also looked at factors that impact the practice of screening in such a setting. Such data is imperative to drive policy that is appropriate and customized to end point health care delivery. We chose a tertiary care health care delivery system since it allows preferred guidelines to be more easily translated into practice. However, this study sample from a tertiary care centre may not be representative of all levels of diabetic care facilities in our country. Further studies from diverse health care settings and general practitioners in the community may give us a more composite picture. Identifying hurdles that prevent ideal retinopathy screening practices by physicians also need further exploration.

Though we have identified use of mass media as an area that needs improvement, the specific potential of social

media in raising awareness about diabetic retinopathy deserves to be investigated further.

CONCLUSION

This study found the uptake of diabetic retinopathy screening among diabetic patients under medical care in a tertiary care centre in the south Indian state of Kerala to be 41%. Raising awareness level of diabetic retinopathy can improve uptake of screening. To achieve this, patient education by physicians and use of mass media need to be strengthened. Transportation difficulty was identified as a major deterrent for practice of diabetic retinopathy screening among patients with adequate knowledge and right attitude.

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