

## ORIGINAL ARTICLE

# Magnitude and Determinants of Noncompliance for Screening and Management of Diabetic Retinopathy

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## ABSTRACT

**Introduction:** Strategies to reduce visual disabilities due to diabetic retinopathy (DR) include early detection and prompt management. Patient compliance is a crucial a factor to achieve this goal. The aim of the study is to assess the level of noncompliance among diabetic patients towards diabetic retinopathy screening and towards undergoing suggested ophthalmic interventions.

**Methodology:** Diabetic patients presenting to the tertiary eye hospital of Western India were divided into 2 groups: diabetic retinopathy (DR) screening group (SGR) and diabetic patients with sight threatening (STDR) who were advised intervention (DR treatment group) (TR GR). All patients were interviewed to determine the level of noncompliance and barriers perceived towards noncompliance.  $P < 0.05$  was statistically significant.

**Results:** There were 75 diabetics in SGR and 72 in TR GR. The rate of noncompliance for DR screening was 64% [95% confidence interval (CI):53.1 – 74.9]. The rate of non-compliance for treatment for DR was 56.9% (95%CI 45.5 – 68.3). Rural residents ( $P=0.03$ ) were statistically significantly more noncompliant towards DR screening. The best-corrected visual acuity in the better eye was associated to noncompliance to STDR treatment ( $P=0.001$ )while severity of DR was associated to the noncompliance for DR screening ( $P=0.05$ ).

**Conclusions:** Noncompliance towards periodic DR screening as well as recommended ophthalmic treatment among diabetic eye patients is high. Lack of knowledge, cost of intervention and distance to eyecare services were main perceived barriers. Public health strategies to address these barriers could improve compliance for periodic DR screening and STDR management.

**Key words:** Diabetic Retinopathy; Laser treatment; Noncompliance; Barriers.

## INTRODUCTION

Strategies to reduce visual disabilities due to diabetic retinopathy (DR) include early detection and prompt management.<sup>1</sup> However, patient compliance is a crucial a factor to achieve this goal. Best practice guidelines indicated that diabetics should undergo (at least) yearly screening after the diagnosis of diabetes.<sup>2</sup> These screening visits are key to early detection and timely treatments and are effective at reducing severe vision loss in 90% of patients.<sup>3</sup>

In India, patient compliance for periodic DR screening is reported to be as low as 43.5%.<sup>4</sup> The uptake of laser treatment even after recommendations by experts was even lower.<sup>5</sup> A lack of knowledge among diabetics regarding detection and the high cost of undergoing complete treatment were two main reasons for noncompliance.<sup>5</sup>

A study from south India reported that the compliance for DR assessment among known diabetic pa-

tients was 55%.<sup>6</sup> However, the rate and determinants of non-compliance towards DR screening and management separately has not been studied in the western India.

We evaluated the level of knowledge, attitude, perceived patient barriers for periodic DR screening and undergoing recommended interventions among diabetics from a DR clinic at a tertiary eye hospital.

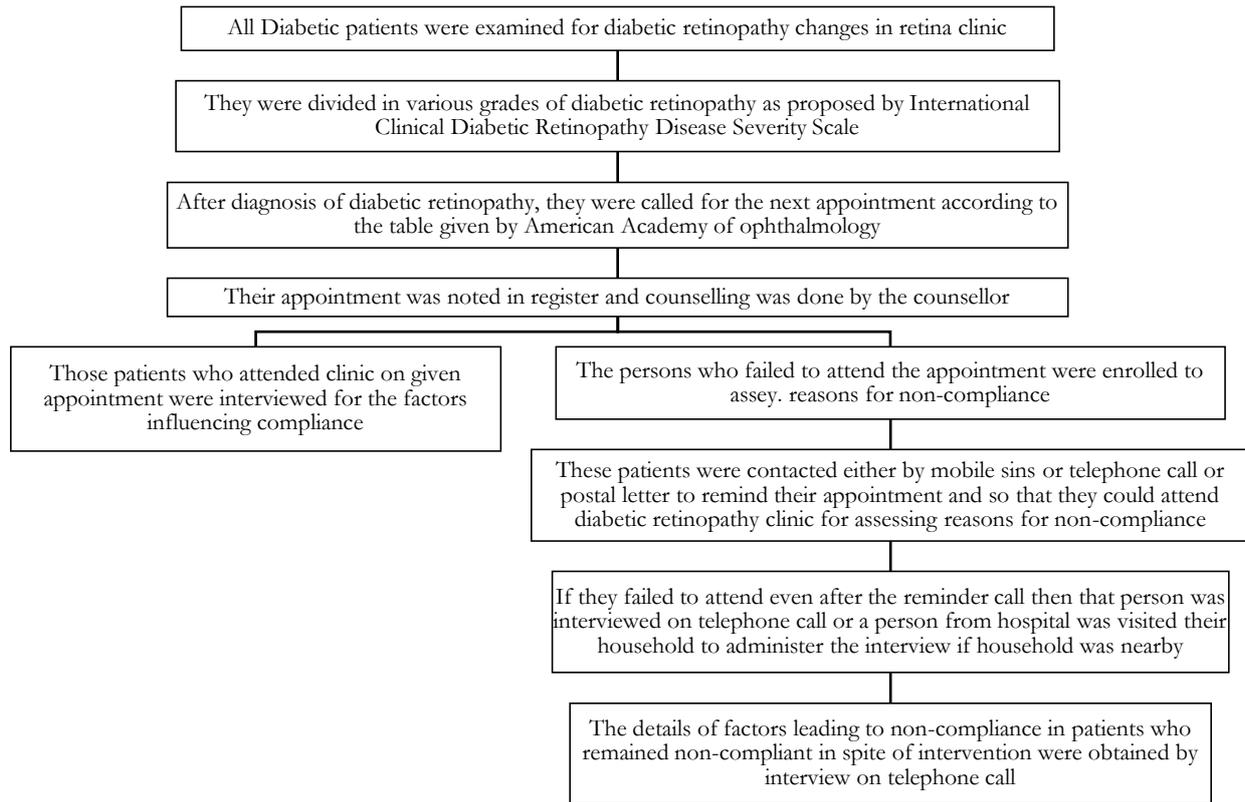
## MATERIAL & METHODS

This study was approved by the research and ethics committee of our institute. This survey was conducted at Tertiary eye care institute between January and October 2014. All 6,000 diabetic patients presenting to the hospital during the study period were our study population. Sample size calculations (Raosoft, Inc.) were performed with 5% level of significance, 95% confidence interval (CI) and 10% response distribution. A sample of at least 136 diabetic patients

were required. We enrolled 75 diabetic patients screened for DR and another 72 DR patients seeking treatment. Diabetics who presented to the DR clinics for screening but did not have DR were excluded from the study. Screening patients were classified as patients who had only been advised for follow-up. Treatment patients were classified as patients who had undergone treatment for DR and follow-up.

All diabetic patients were initially examined for the changes suggestive of DR in the retina clinic and then grouped in various grades of DR. After diagnosis and grading of DR, patients were counselled by a

trained and qualified counsellor and given follow up appointments. Their compliance at attending the scheduled follow up appointment was reviewed. The patients who attended the appointments were considered as compliant and they were interviewed for the factors influencing compliance. The patients who didn't attend the retina clinic were labelled as non-compliant, contacted and interviewed for the factors influencing non-compliance. Telephone call or a personal visit by a hospital employee. The details of data collection are presented in Figure 1.



**Figure 1: Flow chart showing selection of participants for diabetic retinopathy screening and treatment compliance study**

The questionnaire was administered in English or Marathi by trained investigators. The questions were related to patient knowledge, attitude and barriers to the compliance such as distance, service and cost. One point was given for every affirmative response and zero points for every negative response.

Data analysis was performed with Statistical Package for Social Studies (SPSS 17) (IBM Corp., New York, NY, USA). Univariate analysis with a parametric method was used for analysis. For qualitative variables, frequencies and percentage proportions were calculated. A quantitative variable was first tested for a normal distribution. If the data were normally distributed, we calculated the mean and standard deviation.

If the data were not normally distributed, we calculated the median and 25% quartile. To compare the outcome among different subgroups, we used chi-square test, Fisher's exact test and 2-independent sample t-test as statistical tests. P<0.05 was considered statistically significant.

**RESULTS**

There were 75 diabetic patients in the DR screening group and 72 in treatment group. The profile of both groups is presented in Table 1. The rate of non-compliance for DR screening was 64% (95% CI:

53.1 – 74.9). The rate of non-compliance for treatment for DR was 56.9% (95% CI: 45.5 – 68.3).

We associated different independent variables to the non-compliance for DR screening. The age-gr (P = 0.5) and occupation (P = 0.7) were not associated to non-compliance. Female gender (P = 0.02), education (P=0.002) and rural residents (P = 0.03) were statistically significantly associated to non-compliance for DR screening.

We associated different independent variables to non-compliance towards DR treatment. The age-gr (P = 0.85), occupation (P = 0.73), Female gender (P = 0.09) and education (P = 0.3) were not associated to non-compliance. Rural residents (P = 0.01) were significantly associated to noncompliance for DR treatment.

The best-corrected visual acuity in the better eye of the participants was statistically significantly associated to the noncompliance for STDR treatment (P = 0.001) and early stages of DR were associated to noncompliance for DR screening (P = 0.050). (Table: 2).

The participant response regarding barriers to non-compliance was analysed. (Table 3). Lack of awareness, negative attitude, distance to an eye centre and expense were perceived barriers towards DR screening and undergoing treatment for STDR.

**Table 1: Patients profile of the diabetic retinopathy (DR) screening group and diabetic retinopathy treatment group**

Variable	DR screening (n = 75) (%)	DR treatment (n = 72) (%)
<b>Age-group</b>		
Less than 40	0 (0)	1 (1.4)
41 to 50	5 (6.7)	7 (9.7)
51 to 60	23 (30.7)	23 (31.9)
61 to 70	38 (50.7)	26 (36.1)
More than 70	9 (12)	15 (20.8)
<b>Gender</b>		
Male	52 (69.3)	43 (59.7)
Female	23 (30.7)	29 (40.3)
<b>Residence</b>		
Urban	51 (68)	47 (65.3)
Rural	24 (32)	25 (34.7)
<b>Education</b>		
None	3 (4)	6 (8.3)
Primary	18 (24)	13 (18.1)
High school	14 (18.7)	15 (20.8)
Intermediate	14 (18.7)	7 (9.7)
College	26 (34.7)	31 (43.1)
<b>Occupation</b>		
None	3 (4)	4 (5.6)
Homemaker	13 (17.3)	10 (13.9)
Labour	14 (18.7)	14 (19.4)
Skilled labour	21 (28)	12 (16.7)
Private business	20 (26.7)	13 (18.1)
Professional	4 (5.3)	19 (26.4)

**Table 2: Best corrected visual acuity and severity of diabetic retinopathy in the better eye and non-compliance towards diabetic retinopathy screening and treatment.**

Visual acuity	DR screening (n = 75)			DR treatment (n = 72)		
	Compliant	Noncompliant	Validity	Compliant	Noncompliant	Validity
6/6 to 6/18	25	47	P = 0.33	3	22	P = 0.001
<6/18 to 6/60	2	1		21	15	
<6/60	0	0		7	4	
Vision threatening DR	1	10	P = 0.05	31	41	-
Non Vision threatening DR	26	38		0	0	

**Table 3: Barriers of non-compliance for diabetic retinopathy screening and diabetic retinopathy treatment**

Barriers	Non compliance for DR* Screening (n = 48)			Non compliance for DR Treatment (n = 41)		
	Number	Percentage	95% CI	Number	Percentage	95% CI
Knowledge	19	39.6	24.1-55.1	18	43.9	28.7 - 59.1
Attitude	17	35.4	20.2 - 50.6	6	14.6	3.8-25.4
Distance	6	12.5	2.0 - 23.0	7	17.1	5.6-28.6
Cost & service	6	12.5	2.0 - 23.0	10	24.2	11.1-37.3

\*DR =Diabetic Retinopathy

**DISCUSSION**

Two-thirds of diabetic patients did not comply with the annual DR screening visit and more than half of the patients with vision threatening DR did not comply with the suggested treatment. Females and those residing in rural area were associated with non-compliance for DR screening and management. Lack

of knowledge, distance to eye care services and high cost were perceived barriers for diabetic patients with ocular symptoms.

This is perhaps first study in the western India highlighting an important issue that needs urgent attention to address visual disabilities due to DR.

DR is a leading cause of irreversible blindness in the working age group. Various studies have documented effective screening programs can decrease blindness related to DR. Unfortunately this program suffers from poor compliance from patients and often we receive patients with advanced, untreatable condition especially in developing countries like India. Health seeking behaviour of a community depends on multiple factors and to improve these behaviours, studies need to identify the barriers and address them proactively.

The rate of noncompliance for DR screening in the present study (64%) and treatment for DR (56%) matched rates reported in other regions of India and other developing countries.<sup>9,10</sup> Similar barrier seem to exist in developing countries resulting in noncompliance.

Females were more noncompliant for DR screening and management compared to male diabetics in our study. However element of error cannot be ruled out in this observation. These results correlate with studies from many countries.<sup>11,12</sup> Our observation of greater female non-compliance is in contrast to findings of Kalyango et al.<sup>13</sup> Our observation other studies reporting similar results on female non-compliance suggests that gender sensitive approaches should be developed to address the barriers to compliance. The indicators to monitor the progress of interventions should also be gender specific similar to the elimination of avoidable blindness due to cataract<sup>14,15</sup>.

Patients from rural areas were more non-compliant compared that patients from urban areas. Byun et al<sup>16</sup> found higher rates of non-compliance among the rural population. More eye hospitals in an urban area could have made access to eye care easy for diabetic in catchment area of cities compared to the diabetic of rural area.

Less educated patients were more noncompliant toward screening and management. A study highlighting the association of low educational levels to the noncompliance for more morbid ailments, supports the associated reported our study.<sup>17</sup>

We found noncompliance was higher among individuals with good vision in the better eye. Moore et al<sup>18</sup> reported that patients with poor visual acuity in the worse eye had higher compliance in instilling topical glaucoma medication. Early stages of glaucoma and DR spare vision for daily living. Hence, the association of noncompliance to visual status noted in our study is logical.

Those with early stage DR had higher rates of non-compliance. Human tendency is to ignore a condition in the early stages that is not affecting vision could explain our observation<sup>19</sup>.

Lack of knowledge was a leading perceived barrier for both DR screening and STDR treatment. Many patients with DR remain asymptomatic, unaware that their vision is under threat. Insufficient guidance by the attending primary caregiver and the asymptomatic nature of the condition were the main barriers to regular eye examinations among diabetics in UK.<sup>20</sup>

There were some limitations to our study. We evaluated diabetic patients who had already approached eye care professionals. Their health related behaviour is likely to be different than diabetic patients who have not consulted eye doctors. Therefore the rate and factors associated to noncompliance in the present study should be extrapolated to all diabetic patients.

Noncompliance for undergoing periodic DR screening as well as recommended eye treatment in diabetic eye patients is high. Lack of knowledge, cost of intervention and distance of eye care services from the patient residence were the main perceived barriers. Public health strategies to address these barriers could improve compliance for periodic DR screening and STDR management.

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