



Prevalence of Diabetic Retinopathy (DR) In Rural Areas of Western India

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Financial Support: None declared

Conflict of Interest: None declared

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How to cite this article:

Shroff PH, Patel KJ, Kapadia PR, Patel SD. Prevalence of Diabetic Retinopathy (DR) In Rural Areas of Western India. Natl J Community Med 2018;9(9):647-650

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Date of Submission: 14-08-17

Date of Acceptance: 26-09-18

Date of Publication: 30-09-18

ABSTRACT

Background The prevalence of DR urban and rural parts of India has been evaluated in many studies. But prevalence of DR and its awareness in the rural areas of South Gujarat still remains to be assessed.

Objectives The study was conducted to assess the prevalence and awareness of DR amongst Diabetics in rural South Gujarat.

Materials & Methods: 180 Diabetic patients in rural areas of South Gujarat were screened for DR between September 2014 and October 2015. Ophthalmological Examination including dilated fundus examination was done using Indirect Ophthalmoscope. Patients also answered a set of questionnaire prepared to assess the awareness of Diabetes and Diabetic Retinopathy as its complication.

Results: The prevalence of DR was found to be 27.78%. Non-Proliferative Diabetic Retinopathy (NPDR) comprised 82% while Proliferative Diabetic Retinopathy (PDR) comprised 18% cases. Duration of Diabetes was found to be significantly associated with DR with prevalence in the age-groups 41-50, 51-60, 61-70 and >70 years being 16.67%, 18.42%, 26.47% and 50% respectively. Awareness about Diabetes and DR was extremely low.

Conclusion: Present study found high prevalence of DR as compared to other studies which were conducted in urban areas of India. Awareness regarding diabetes and its complication was extremely low.

Keywords: Prevalence of Diabetic Retinopathy, Prevalence of DR in Gujarat, Prevalence of DR in rural areas of South Gujarat

INTRODUCTION

In 2014, the total number of diabetics were estimated to be around 422 million, 8.5% of the world population¹ of which 62 million are believed to be in India (7.1% of its total adult population). The world prevalence of Diabetic Retinopathy (DR) is estimated around 34.6%², whereas in India regional prevalence of DR varies from 15% to 40% depending on the rural or urban areas and their lifestyle.

Diabetic retinopathy is a microvascular complication of Diabetes. DR is the leading cause of visual impairment, particularly among persons of work-

ing age.³ Rising number of Diabetic population and hence DR, is a cause of worry and mandates availability of well trained eye-care professionals at all health centres including the rural areas. Awareness of the disease amongst the general population affects the patient compliance and rate of eye examinations, and hence the prevalence of DR in that population.

DR progresses from mild NPDR to PDR and leads to complications like Vitreous Hemorrhage (VH) over a period of time. 15% of Severe Non-Proliferative Diabetic Retinopathy (NPDR) and 45% of Very Severe NPDR progress to High-risk PDR in a period of one year.⁴ Laser photocoagulation

treatment, if provided in time reduces loss of vision in patients with PDR and Macular edema by half.^{5,6} However DR can progress to PDR without causing symptoms leading to patient presentation at late stages. This establishes the importance of screening for DR among Diabetics, especially in the regions with high prevalence.

Earlier, DM was considered an urban disease. It is estimated that the prevalence of DM in rural areas is roughly one-fourth of that seen in urban areas.⁷ However, a study, Ramachandran et al.: showed nearly a threefold increase in prevalence in rural areas which rose from 2.2% in 1989 to 6.3% in 2003.⁸ In a cross-sectional study of self-reported population attending Diabetic Retinopathy screening camps in 2006, in rural areas, the prevalence of DM was found to be 20% and that of DR was found to be 18%.⁹ This indicates a certain rise in prevalence of DM and DR. Many factors may be responsible for increase in the prevalence of DM and DR. The changing lifestyle and urbanization of rural culture are gradually influencing the rural population. This calls for more epidemiological studies in the rural areas and actions needed to curb the growing problem.

MATERIAL AND METHODS

Before starting Data collection, whole list of PHC of South Gujarat was obtained from District office. Conveniently 5 PHCs were selected with farthest 100 km from New Civil Hospital, Surat and nearest of 25 km. Target of study was to enrol 10 participants per day and visit for 20 days on convenience basis for the participants.

A community based cross sectional study was carried out in conveniently selected PHCs of South Gujarat. All the known patients of Diabetes Type II were contacted with the help of grass root worker in the particular village and also from the records of PHC. They were motivated to come at the PHC for eye examination at their convenient time and also had included the known case of Diabetes who visited the PHC for the treatment during data collection period. We had tried to cover all the patients of Diabetes irrespective of from where they avail the treatment for same. All patients were on anti-diabetic medications.

Before enrolling them into the study, information regarding the study was given and after that written informed consent was taken. The patient was thoroughly explained about the examinations to be conducted which included best corrected visual acuity (BCVA) and fundus examination after dilatation of pupils. BCVA was evaluated on Snellen's charts. Pupils were dilated with tropicamide (0.8% w/v) and phenylephrine (5.0% w/v) eyedrops.

Fundus examination was done with Indirect Ophthalmoscope using 20 D lens. After a detailed clinical examination of retina using Indirect Ophthalmoscopy examination for a peripheral retinal view, the grading of DR was done based on the Early Treatment Diabetic Retinopathy Study (ETDRS) classification.¹⁰

After full eye examination, a pre designed semi structured questionnaire on awareness and knowledge regarding Diabetes and its complication were completed. At the end of examination, patients requiring further care were referred to Ophthalmology Department, New Civil Hospital-Surat.

Total 180 participants were enrolled conveniently during study period. Permission was taken from all the conveniently selected PHCs for data collection prior to study. Study was approved from Human Research Ethics Committee, Government Medical College-Surat.

RESULTS

In the present study, Diabetic patients residing in the rural areas of South Gujarat were examined. A total of 180 patients were screened of which highest number (68) of patients belonged to the age-group of 61 to 70 years.

Total percentage of Diabetic Retinopathy is 27.78%. Amongst them, NPDR was seen in 82% of cases while PDR was seen in 18% of cases.

Although the highest number of patients screened belong to the age-group 61 to 70 years i.e. 37.78% but the age-group >70 years showed the highest percentage of Diabetic Retinopathy i.e. 50%, amongst the screened Diabetics. There was significant association between Age distribution and Diabetic retinopathy (Table 1).

Table 1: Age Distribution of Diabetic Retinopathy

Age (Years)	Diabetic Retinopathy		Total
	Absent (n=130) (%)	Present (n=50) (%)	
<40	2 (50)	2 (50)	4
41-50	30 (83.33)	6 (16.67)	36
51-60	31 (81.58)	7 (18.42)	38
61-70	50 (73.5)	18 (26.5)	68
>70	17 (50)	17 (50)	34

$\chi^2 = 13.29, df = 4, p = 0.0099^*$

Table 2: Sex Distribution of Diabetic Retinopathy

Sex	Diabetic Retinopathy		Total
	Absent (n=130) (%)	Present (n=50) (%)	
Female	62 (72.09)	24 (27.91)	86
Male	68 (72.34)	26 (27.66)	94

$\chi^2 = 0.00137, df = 1, p = 0.9705$

Table 3: Association of Duration of DM with DR

Duration of DM (Yrs)	Diabetic Retinopathy (%)		Total
	Absent (n=130)	Present (n=50)	
<1	18 (81.81)	4 (18.19)	22
1-5	46 (75.41)	15 (24.59)	61
6-10	45 (80.36)	11 (19.64)	56
11-15	16 (69.56)	7 (30.44)	23
>15	5 (27.78)	13 (72.22)	18
Mean	6.22 ± 5.44	9.6 ± 6.34	0.001*

Table 4: Association between Hypertension, patient compliance, awareness about DR and DR

Variable	Diabetic Retinopathy (%)		Total	P value
	Present (n=50)	Absent (n= 130)		
Hypertension				
Present	18 (36)	21 (16.2)	39	0.003*
Absent	32 (64)	109 (83.8)	141	
Patient Compliance				
Regular	8 (16)	47 (36.2)	55	0.005*
Irregular	42 (84)	83 (63.8)	125	
Awareness about DR				
Present	2 (4)	7 (5.4)	9	0.7026
Absent	48 (96)	123 (94.6)	171	

Diabetic Retinopathy was seen in 27.66% of Males and in 27.91% of Females with Diabetes. There was no significant association between Gender and diabetic retinopathy (Table 2).

Increasing prevalence of Diabetic Retinopathy was seen with increase in duration of Diabetes. Highest prevalence was 72.22% with Diabetics with duration of >15 years. As mentioned in table 3, highest percentage of DR was found in those having duration of >15 years (72.22%). The percentage of DR in Duration of <1 year, 1 to 5 years, 6 to 10 years, 11 to 15 years were 18.18%, 24.59%, 19.64% and 30.43% respectively. Mean Duration of DM among those with DR was 9.6 ± 6.34 years and among those without DR was 6.22 ± 5.44 years. Subjects with DR had significantly higher duration than those without DR.

Out of all patients screened, 39 patients were Hypertensive and amongst them 18 (46.15%) patients have Diabetic Retinopathy. In this study, out of 50 patients having DR, 18 patients (36%) were also Hypertensive. While out of 130 patients with no signs of DR, 21 patients (16.15%) were Hypertensive. There was significant association between HTN and DR. Indicating that HTN is co-associated with DM.

A total of 153 (85%) patients were diagnosed during investigations for some other disease while only 4 (2.2%) patients were diagnosed during routine blood sugar check-ups. Out of 180 patients, 55 (30.56%) patients accepted that they were not taking their medicines regularly. Only 9(5%) patients

were aware that Diabetes can cause damage to the eyes.

In this study, the awareness levels about DR are found to be extremely low but due to small sample size, these results cannot be extrapolated to a larger population.

Also none of the patients knew the name of the medicines they were put on, that they may suffer from hypoglycemia or that DM can cause damage to organs other than eyes. Nobody had undergone an eye check-up for DR prior to the study. This shows a gross lack of awareness among this population. There was significant association between patient compliance and DR. Compliance was irregular in DR.

There was no significant association between awareness about DR and DR.

DISCUSSION

A community based cross sectional study was carried out among rural population of South Gujarat during September-2014 to February-2015. Total 180 patients, who were known cases of Diabetes Mellitus type II, were enrolled during study period.

The prevalence of Diabetic Retinopathy in a country like India has large regional variations. This makes it very difficult to standardize the prevalence rate and stresses importance of screening for every regional area. In this study, it was found that the prevalence of Diabetic Retinopathy in rural areas of South Gujarat was high when compared to other studies conducted in both rural and urban areas of India.^{11,12} This difference can be explained by the diversity in lifestyle in various parts of India. Also ethnicity is an independent risk factor for Diabetic Retinopathy¹³ and can explain the difference in prevalence of DR. Age and Duration of Diabetes were found to have a significant association with Diabetic Retinopathy. Prevalence of DR was also found to be significantly more in patients with Hypertension as compared to patients with no Hypertension. This corroborates to the hypothesis that lowering blood pressure levels is associated with lesser complications related to Diabetes¹⁴ and slower progression of DR.¹⁵ Of all the risk factors, Duration of Diabetes was found to be the strongest risk factor for DR.

Another important finding in this study was that the awareness about Diabetes and DR as its complication was found to be extremely low. Awareness about any disease in a population has a very important role in the progression of the epidemic.¹⁶ In this rural population studied, only 9 (5%) out of 180 were aware about DR as a complication of Diabetes. Currently India is facing the rise

of epidemic of Diabetes and such alarmingly low awareness of a disease is a cause of worry. Low levels of awareness in a population leads to non-compliance in medication and ignorance of routine check-up visits. In this situation it will be extremely difficult to keep morbidity due to DR under check. Moreover, it has been found that the incidence of Diabetes Mellitus type 2 is on the rise in young adults, especially in the developing countries like India.¹⁷ This only adds to the economic loss to the country.

This study recommends that more screening camps and campaigns on education and awareness be urgently carried out in this region. For this purpose, a multifactorial approach which could involve help from the ASHA workers, Anganwadi workers, Optometrists, Medical Officers and Non-Government Organizations is needed. Importance of regular follow-up should also be explained to these patients. Patients who need to be referred to higher centers should be helped with transportation. Numerous such measures need to be taken to curb the problem of Diabetic Retinopathy, else the growing prevalence of Diabetes in India poses a severe threat of raising blindness due to Diabetic Retinopathy.

CONCLUSION

The prevalence of Diabetic Retinopathy in rural areas of South Gujarat is higher and awareness about the disease is extremely low warranting immediate awareness campaigns. Besides, duration of Diabetes and Hypertension have a significant association with Prevalence of DR.

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