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A Profile of Awareness and Knowledge of Diabetic Retinopathy Among Diabetics In Rural Based Hospital of Central India

Giradkar Shubhangi Deshmukh, M.S, F.S.E.I, Choudhrie Daisy Reuben, M.S, Bharti Chaya, M.S, Gaidhane Abhay, M.D,
Corresponding Author: Giradkar Shubhangi Deshmukh

Aim: *To study the awareness and knowledge of Diabetic retinopathy among Patients with Diabetes Mellitus in a rural based hospital of Central India*
Materials and Methods*: A prospective time bound study was done among the 89 consecutive diagnosed patients with Diabetes Mellitus visiting Ophthalmology department of a rural based hospital in M.P. All patients went through the questionnaire translated in the language they understand and patients were judged on the basis of their answers. A comprehensive ocular examination was carried out. Documentation of both anterior segment and posterior segment was done by digital imaging system. Statistical analysis was carried out using Univariate Analysis (chi square test).*
Observations*: The mean duration of Diabetes Mellitus (DM) was found to be 6.47 .The mean best corrected visual acuity (BCVA RE) was 0.21 (Log Mar) with median of 0.00(SD ±0.40). the mean BCVA of LE was 0.38(Log Mar) with median of 0.00(SD ± 0.84). As the duration of DM increased, the BCVA for both eyes was found to be significantly low (p value0.01). There was a positive correlation of duration of DM with severity of Diabetic retinopathy.(p value 0.01). Of the 89 patients who participated in the study, 47 males and 31 females had knowledge about DM but only 14(25.4%) males and 8(23.5%) females knew about Diabetic Retinopathy (DR) and its further implications on vision. There was no significant correlation between literacy of patient and awareness of Diabetic retinopathy.*
Conclusions: *Diabetes mellitus is still a less known entity in the general population. Diabetic retinopathy is even lesser known and understood in our rural setup. More awareness and knowledge needs to be imparted to every Diabetic patient by Physicians as soon as they are diagnosed. The suggestion to consult an Ophthalmologist on annual basis should be initiated by the physicians.*
Keywords: *Awareness, Knowledge, Diabetic Retinopathy, Early Treatment*

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I. Background

According to WHO factsheet published in October 2013, 347 million people worldwide have Diabetes Mellitus. (1)The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 according to WHO survey (2). The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The prevalence of diabetes is higher in men than women, but there are more women with diabetes than men. The urban population in developing countries is projected to double between 2000 and 2030. The most important demographic change to diabetes prevalence across the world appears to be the increase in the proportion of people 65 years of age(2) Diabetic retinopathy (DR) is the most common microvascular complication of diabetes, and it remains a leading cause of legal blindness and visual impairment in the working-age population in the developed world(3). Some regions in Europe, however, report low rates of any DR-notably, the Netherlands (4.8%), Finland (4%), Denmark (5%), and rural France (5%). These may either be the true prevalences or suggest that DR is still under diagnosed in these areas.(3)

It is estimated that nearly 80 million people in India will have diabetes by the year 2030(2). The prevalence of DR among Indians is reported to be 18%(3). Several reports have suggested that Indians with type 2 DM may differ from their European counterparts in many aspects, including younger age of onset, obesity, insulin resistance, and genetic predisposition. Moreover, the demographic right shift of the population, urbanization, and disparities in access to healthcare all may have implications on the prevalence of diabetes and its complications in this region. Although cataract and uncorrected refractive errors remain the major causes of blindness in this region, the impending diabetic epidemic in the subcontinent pose a significant public health. (3)

Studies on awareness of Diabetic Retinopathy

Andhra Pradesh Eye Disease Study conducted a study over a large population(2522 subjects) in Hyderabad and found that awareness of eye diseases related to Diabetes was 27.0%(13). Awareness of Diabetic Retinopathy was done in another study where the vast majority of the patients (118, 86.1%) were aware that diabetes could affect the eye compared to 13.9% who were not. There was equal number of male (59, 50%) and female patients (59, 50%) who were aware of the diabetic eye complications. The highest level of awareness was among the Indians (45, 38.1%), followed by the Malays (36,30.5%), the Chinese (36,30.5%), and other ethnic (1,0.8%). However, awareness of eye diseases was not significantly correlated with gender and race. In this study, 29.2% of type 2 diabetic patients had retinopathy in their first time eye testing. Although the awareness of diabetic eye complications was high among first time eye screening patients, the appropriate eye care-seeking behavior was comparatively less (14). In another study, A total of 653 patients were studied at Mangalore and the awareness of diabetic retinopathy was found in 182(27.9%)(15). In a study conducted among urban Nigerians, 84.3% of the patients were generally aware of diabetic retinopathy with their main source of information being hospital staff and fellow patients. 80.5% knew diabetic retinopathy could lead to blindness but only 15.7% have ever had retinopathy screening. There was little or no knowledge of retinopathy risk factors or the need for early detection through screening.(16). According to WHO, Diabetic retinopathy is projected as the 7th leading cause of blindness by2030 (1). Hence understanding the disease and its systemic manifestations especially the eye is important. Diabetic retinopathy is a chronic progressive, potentially sight-threatening disease of the retinal microvasculature associated with the prolonged hyperglycaemia and other conditions linked to diabetes mellitus such as hypertension. (6).

II. Materials and Methods

This is a prospective study conducted by the department of Ophthalmology, Padhar Hospital, Padhar, where 89 consecutive patients with fasting blood sugar > 110mg/dl, visiting eye outpatient department were enrolled after informed consent . Total number of 89 patients from all age groups was included in this study conducted from 1st August 2013 to 31st October2013. These patients belonged to tribal area near Padhar hospital, around Betul district of Madhya Pradesh in Central India. The patients went through the questionnaire after translation in their local language and multiple options were given for answers. Responses by patient for each question were noted and numerical codes were allotted to each answer.

The patient underwent a thorough ophthalmic evaluation as per standard norms for the study. All patients were subjected to visual evaluation on Snellens Chart at 6m distance. Refraction was done. These patients were subjected for anterior segment evaluation. Further evaluation was done by stereoscopic posterior segment examination by indirect ophthalmoscope using 90D and 20d indirect lenses, after complete mydriasis. All patients were subjected to anterior segment and posterior segment imaging by Fundus Camera (Canon, version 2012.).All patients with diabetic Retinopathy were classified according to Modified ETDRS classification for Diabetic Retinopathy (AAO, 2012). Similarly diabetic maculopathy was coded as per definition of ETDRS (AAO, 2012)

Inclusion criteria

1. All consecutive patients with h/o Diabetes mellitus (Fasting blood sugar >110mg/dl) visiting Eye Out Patient Department were enrolled in this study after informed consent and as per guidelines of declaration of Helsinki .
2. Patients cooperative for questionnaire, anterior segment examination and posterior segment evaluation were included.
3. Patients willing for fundus imaging were included in the study.

Statistical Analysis

Statistical analysis was performed with SPSS v 12 (SPSS Inc; Chicago, IL, USA). Determinants of knowledge on diabetes and diabetic retinopathy such as gender, age, and education level were analyzed between the groups using Univariate analysis (Chi-square test). $P<0.05$ was considered statistically significant.

OBSERVATIONS

The mean duration of Diabetes Mellitus (DM) was found to be 6.47 yrs with median of 5.0(SD ±6.29). The mean best corrected visual acuity (BCVA RE) was 0.21 (Log Mar) with median of 0.00(SD ±0.40). The mean BCVA of LE was 0.38(Log Mar) with median of 0.00(SD ± 0.84 (table1)). As the duration of DM increased, the BCVA for both eyes was found to be significantly low (p value0.01) (table 2). There was a positive correlation of duration of DM with severity of Diabetic retinopathy. (p value 0.01) (table3).

Table No. 1: Descriptive Statistics

Variable	Mean	Median	Standard Deviation
Duration of DM	6.47	5.00	6.29
BCVA RE	0.21	0.00	0.40
BCVA LE	0.38	0.00	0.84

Table No. 2: Correlation for duration of DM with BCVA LE and BCVA RE

	Duration of DM	BCVA LE	BCVA RE
Duration of DM	1		
BCVA LE	0.127	1	
BCVA RE	0.047	0.348**	1

**. Correlation is significant at the 0.01 level

Table No. 3: Correlation for duration of DM with grade of DR

	Duration of DM	BCVA LE	BCVA RE
Duration of DM	1		
Grade DR LE	0.425**	1	
Grade DR RE	0.385**	0.884**	1

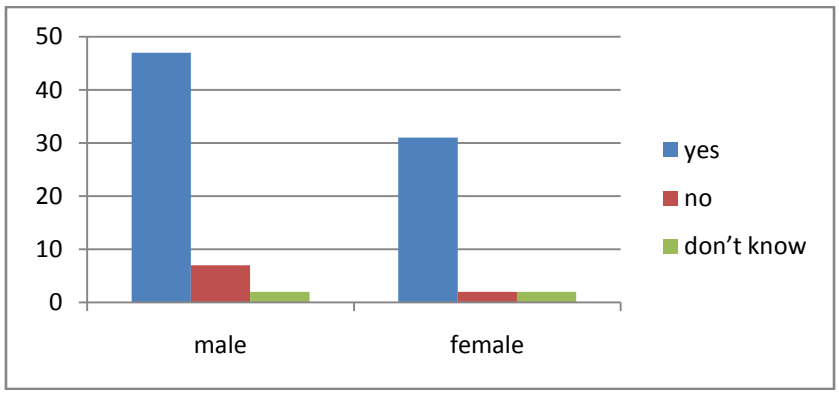
**. Correlation is significant at the 0.01 level

Correlation of Gender with knowledge of Diabetes Mellitus

There was no statistically significant difference among both genders regarding knowledge of Diabetes mellitus (p>0.01)(table 4).Of the 89 patients who participated in the study, 47(85.45%) males and 31 (91.17%) females had knowledge about DM (table 4)but only 14(25.4%) males and 8(23.5%) females knew about Diabetic Retinopathy(DR) and its further implications on vision(table5). There was no statistical significance among the genders about effect of DM on eyes (p>0.01) (table 5).

Table No. 4

Sex	Know about Diabetes Mellitus			Total
	Yes	No	Don't Know	
Male	47	7	1	55
Female	31	2	1	34
Total	78	9	2	89



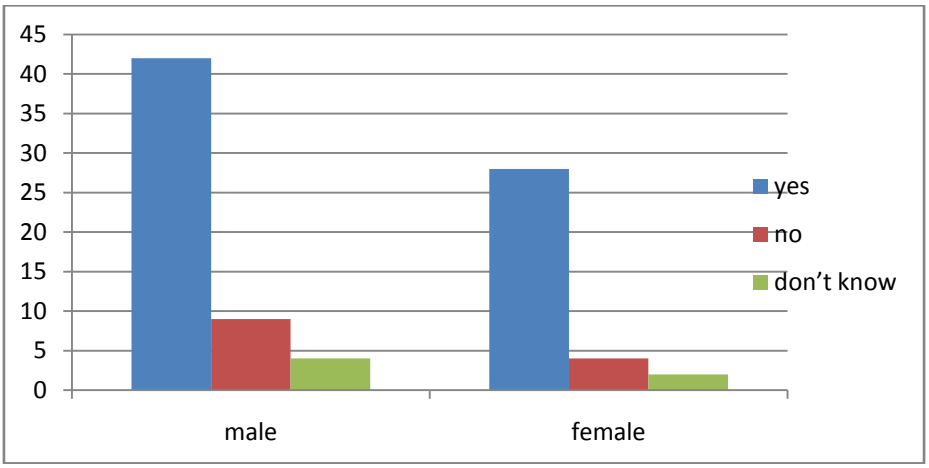
Knowledge of diabetes mellitus

Chi Square = 1.170 P Value =0.557

Table No. 5

Sex	Diabetes can affect eyes			Total
	Yes	No	Don't Know	
Male	42	9	4	55
Female	28	4	2	34
Total	70	13	6	89

Chi Square = 0.460 P Value = 0.794



Diabetes can affect eyes

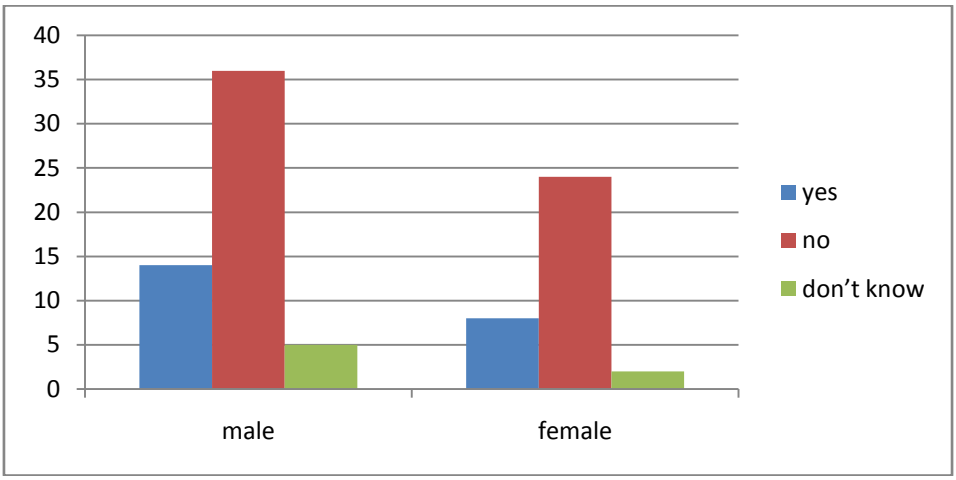
Correlation of gender with knowledge about Diabetic Retinopathy

Out of 55 males only 14 (25.45%) knew about effects of Diabetes mellitus on retina, whereas only 8(23.52%) out of 34 females had knowledge of diabetic retinopathy. There was no statistical significance among male and female gender regarding knowledge of Diabetic Retinopathy (p>0.01) (table6).

Table No. 6

Sex	Know about diabetic retinopathy			Total
	Yes	No	Don't Know	
Male	14	36	5	55
Female	8	24	2	34
Total	22	60	7	89

Chi Square = 0.389 P Value = 0.823



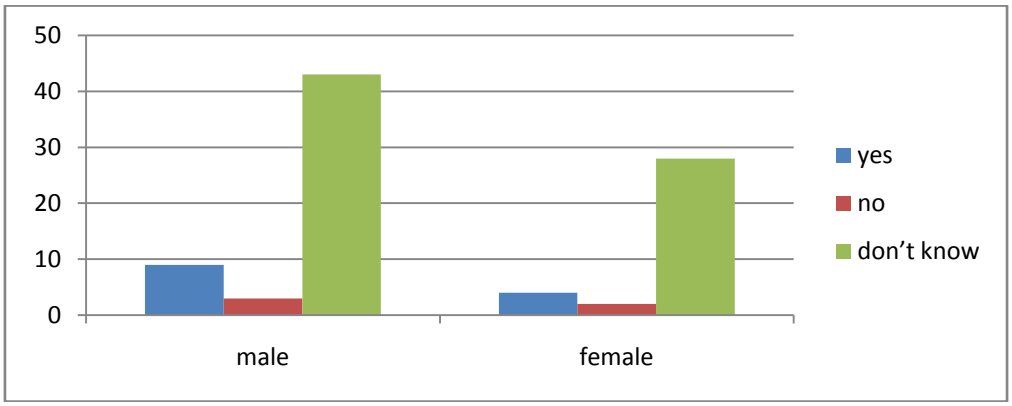
Know about diabetic retinopathy

When asked whether vision was 100% reversible after treatment, 78.18% males and 82.35% females did not have awareness regarding treatment once diabetic retinopathy develops (table 7). There was no statistically significant difference among either of gender regarding prognosis of vision after treatment of Diabetic Retinopathy

Table No. 7

Sex	Vision is 100% reversible after treatment			Total
	Yes	No	Don't Know	
Male	9	3	43	55
Female	4	2	28	34
Total	13	5	71	89

Chi Square = 0.357 P Value = 0.837



Vision 100 % reversible

If left untreated , only 23.63% males and 23.52% females were aware that diabetic retinopathy can lead to blindness(table 8).There was no statistically significant correlation among genders regarding knowledge of Diabetic Retinopathy(p>0.01)

Table No. 8

Sex	Diabetic retinopathy cause blindness in future			Total
	Yes	No	Don't Know	
Male	13	0	42	55
Female	8	0	26	34
Total	21	0	68	89

Chi Square = 0.06 P Value = 0.806

Diabetic retinopathy causes blindness in future

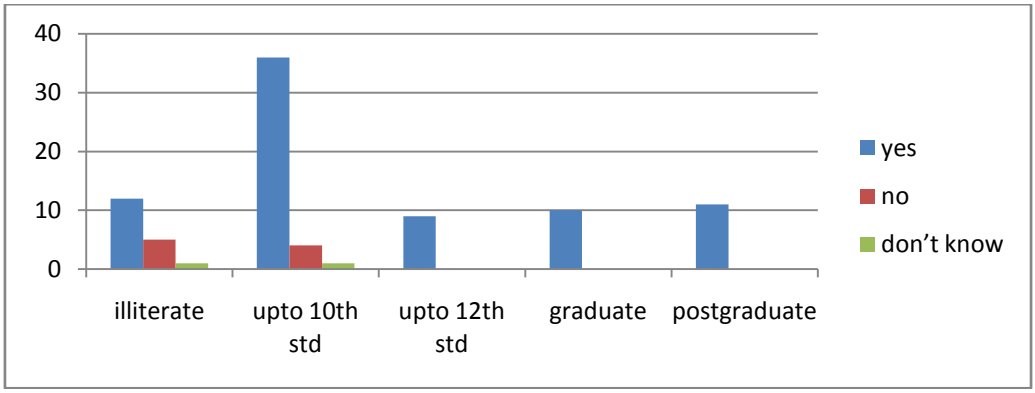
Correlation of literacy and knowledge about Diabetes mellitus

There was no statistically significant correlation of level of literacy and knowledge of DM (p>0.01) (table 9). All the patients were diagnosed cases of DM and perhaps because of repeated visits paid for blood tests and general health checkup , they were well aware of DM. Here it should be taken into consideration that patients were imparted knowledge by the physicians after they were diagnosed to have DM.

Table No. 9

Education	Know about Diabetes Mellitus			Total
	Yes	No	Don't Know	
Illiterate	12	5	1	18
Upto 10^{th} std	36	4	1	41
Upto 12^{th} std	9	0	0	9
Graduate	10	0	0	10
Postgraduate	11	0	0	11
Total	78	9	2	89

Chi Square = 11.578 P Value = 0.171



Know about diabetes mellitus

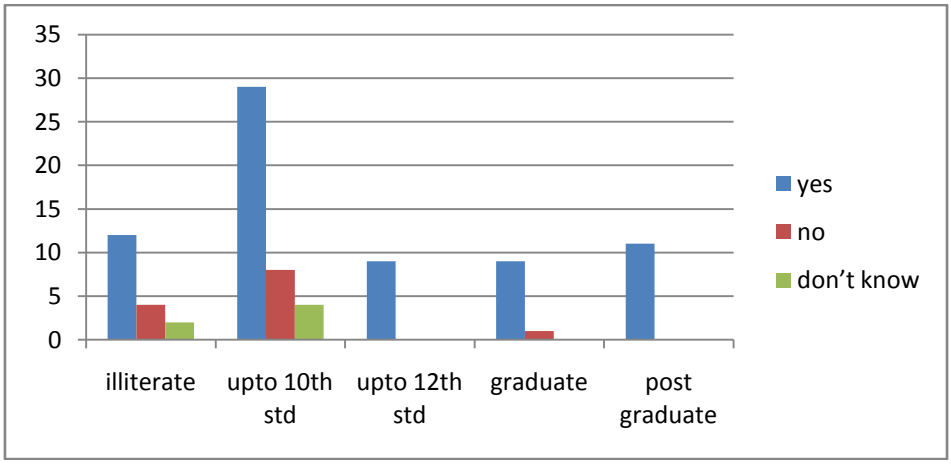
Correlation of level of literacy with ocular manifestations of DM

When patients were asked whether DM can cause ocular diseases they were aware that DM may cause cataract or low vision on long term. However they were not aware of retinal conditions.70 (78.65%) out of 89 patients agreed that DM may reduce vision. There was no statistical significance about correlation of level of literacy and awareness of low vision among diabetics (p>0.01)(table 10).

Table No. 10

Education	Think diabetes can affect eyes			Total
	Yes	No	Don't Know	
Illiterate	12	4	2	18
Upto 10th std	29	8	4	41
Upto 12th std	9	0	0	9
Graduate	9	1	0	10
Postgraduate	11	0	0	11
Total	70	13	6	89

Chi Square = 9.520 P Value = 0.300



Think diabetes can affect eyes

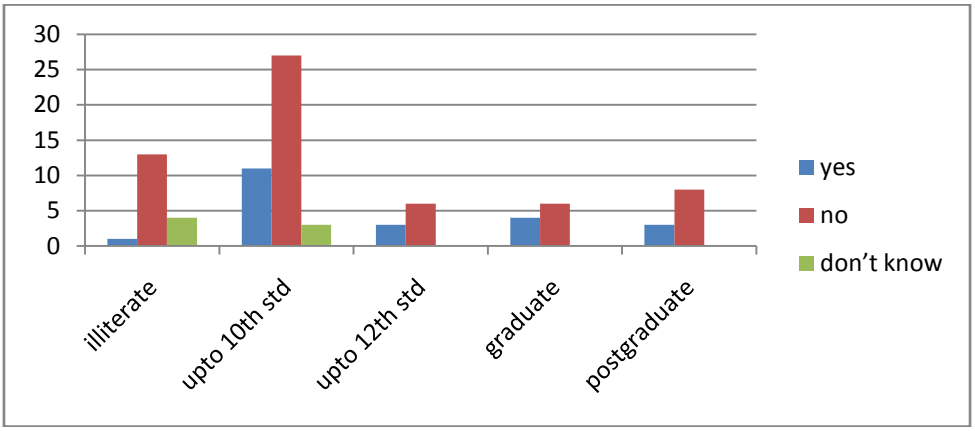
Correlation of level of literacy with knowledge of Diabetic Retinopathy

There was no statistical significance of level of literacy with the knowledge of Diabetic retinopathy (p>0.01).1(1.1% of total patients) illiterate, 11(12.3%) patients educated upto10th standard, 3(3.37%) educated till 12th standard, 4(4.49%) graduates and 3(3.37%) postgraduates had some knowledge about Diabetic Retinopathy (table 11).

Table No. 11

Education	Know about Diabetic Retinopathy			Total
	Yes	No	Don't Know	
Illiterate	1	13	4	18
Upto 10th std	11	27	3	41
Upto 12th std	3	6	0	9
Graduate	4	6	0	10
Postgraduate	3	8	0	11
Total	22	60	7	89

Chi Square = 11.289 P Value = 0.186



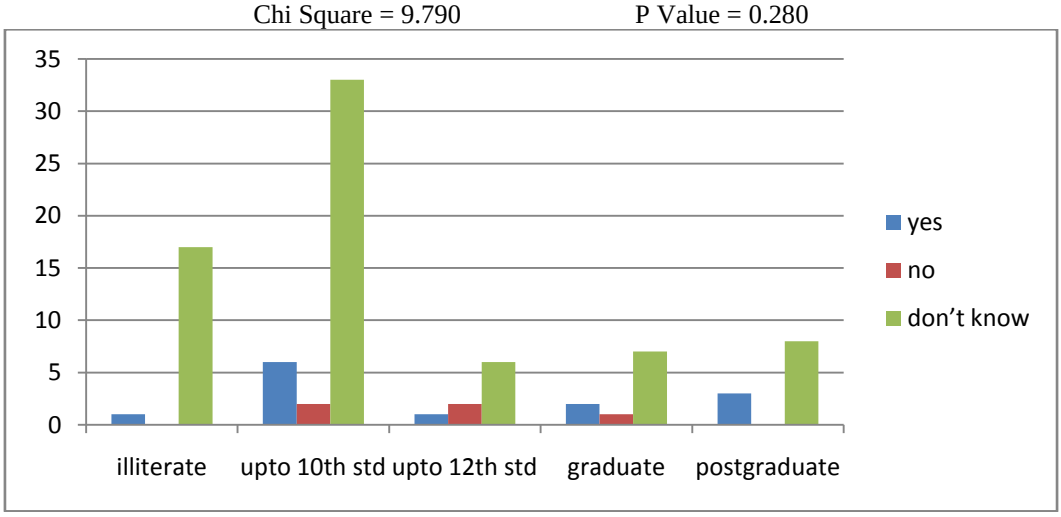
Correlation of level of literacy with awareness of recovery of vision after treatment

There was no statistical significance of level of literacy and awareness about effect of treatment on vision($p>0.01$). Only 1 (1.12%) patient who was illiterate thought vision loss due to diabetic retinopathy was 100% reversible after treatment, whereas 6(6.72%) patients educated up to 10th standard were aware. 3(3.37%) postgraduates, 2(2.24%) graduates and 1(1.12%) educated up to 12th standard knew about the recovery of vision after treatment.(table 12)

Table No. 12

Education	vision is 100% reversible after treatment			Total
	Yes	No	Don't Know	
Illiterate	1	0	17	18
Upto 10th std	6	2	33	41
Upto 12th std	1	2	6	9
Graduate	2	1	7	10
Postgraduate	3	0	8	11
Total	13	5	71	89

Chi Square = 9.790 P Value = 0.280



Correlation of level of literacy with knowledge of blindness due to Diabetic Retinopathy

Whether DR can cause blindness was known to only 5.55% of illiterate, 24.39% of patients educated upto 10^{th} standard, 33.33% educated upto 12^{th} standard , 40% graduates and 27.27% of postgraduates (table 13). Only 21(23.59%) were aware of the fact that Diabetic Retinopathy may cause blindness in future if left untreated.

Table No. 13

Education	Diabetic retinopathy cause blindness in future			Total
	Yes	No	Don't Know	
Illiterate	1	0	17	18
Upto 10^{th} std	10	0	31	41
Upto 12^{th} std	3	0	6	9
Graduate	4	0	6	10
Postgraduate	3	0	8	11
Total	21	0	68	89

Chi Square = 5.312 P Value = 0.257

Limitations of our study

Our study was conducted on 89 patients, which was a small sample size. A more elaborate study with large sample size would have been better to judge awareness in the given population. The study was time bound which lasted for only three months. A long term study would probably generate more awareness and give useful and accurate data. We plan to research with a more advanced study which will include Angiography and treatment modalities like Laser and its effects on prognosis of vision to study the disease with details.

The strength of the study was a better knowledge about symptomatology of diabetes mellitus in patients with due credit to the physicians who are conducting an independent study on diabetic patients.

III. Conclusions And Discussion

The awareness of eye diseases related to Diabetes Mellitus was 27% in APEDS(Andhra Pradesh Eye Disease Study) (13), as compared to 23.59% in our region. In our study only 14.6% were aware that vision is reversible after treatment. Few studies conducted in past(14,15) showed awareness to be ranging between 27.9% to 86.1%.in Nigerians 84.3% of Diabetics were aware about DR and 80.5% knew that it may lead to blindness.

In our study 78(87%) patients were very well aware of symptoms of DM, out of which 70(78.65%) were aware that it may cause some effect on eyes. 22(24.71%) had heard about Diabetic Retinopathy. Only 21(23.59%) were aware of the fact that Diabetic Retinopathy may cause blindness in future if left untreated. We tried to study awareness regarding knowledge of treatment modalities and prognosis of vision after appropriate treatment, we observed that only 13(14.60%) patients agreed that vision is reversible if timely intervention is undertaken. The level of literacy seems to have no correlation with either awareness or knowledge of the disease. Similarly either of the gender were equally aware of treatment modalities.

Out of 178 eyes of 89 patients we examined, 117(65.73%) eyes had normal retina. 34(19.10%) eyes showed changes of Non Proliferative Diabetic Retinopathy, 14(7.86%) eyes had Proliferative Diabetic Retinopathy, and 16(8.98%) eyes had clinically significant macular edema. Laser treatment was done for patients where indicated. Patients were advised regular follow up as per guidelines by AAO.

Our study was conducted at a rural based hospital in central India where eye care facilities are still at a primary level. Besides most of the population we cater to is not well aware of the advances in eye care and pays little attention to visual problems. Imparting knowledge about Diabetes Mellitus and its sequelae to eye is essential. Combined efforts from both Physicians and Ophthalmologists are required to help patient live a better quality of life. Ophthalmologists have a significant role to play in the present scenario where India is projected as the world capital for Diabetes mellitus. As per figures postulated by World Health Population by 2030 India will have the highest number of Diabetics in the world. In this context we would like to suggest that National Programme for Control of Blindness have been focussing on Cataract Blindness, which is a reversible blindness since several decades, must also include Diabetic Retinopathy as leading cause of blindness and plan strategy to reduce ocular morbidity due to Diabetes. Educating community regarding treatment modalities of Diabetic Retinopathy is the need of an hour, because timely intervention by LASER and intravitreal injections can still provide useful vision till the life expectancy. As life expectancy increases due to the boon of technology, the numbers of geriatric population is also expected to rise and hence few years down the line, probably more geriatric population is likely to suffer from Diabetes and its related complications. Combined efforts from government officials, Physicians and Ophthalmologists can help to spread awareness regarding diabetic retinopathy in the less approached areas. Developed nations have come up with screening programmes and guidelines for prevention and treatment of diabetic retinopathy on a large scale. In India several institutions have

followed with well planned screening protocols and guidelines for management and prevention of diabetic retinopathy concentrated around urban as well as rural areas (CURES, SNDRP, APEDS and guidelines on managenent of Diabetic retinopathy by Aravind Eyecare System). We plan to formulate strategies focusing on educational programmes on Diabetic Retinopathy and other diabetic eye diseases in our district in collaboration with the ongoing projects on community health outreach team by our hospital.

Key points of the study

-Purpose of the study was to promote awareness and help the community overcome visual problems / blindness due to Diabetic Retinopathy.

- Patients were made aware that most early stages in the Diabetic Retinopathy are treatable and retinal changes are reversible with laser and intravitreal therapy. Hence useful vision can be restored for some duration.

-We educated the patients regarding life style modification: diet, exercise and medication to improve quality of life and productivity in all young diabetics, especially if the patient is a sole bread winner.

- -After assessing the level of awareness and knowledge, education was imparted to patients on the disease of DM and comorbid conditions. Patients were made aware regarding changes in eye and investigations patient must undergo to study and follow up the disease.

Significance of control of blood sugar and blood pressure level was also explained.

-Last but not the least, patient were educated regarding regular follow up and treatment by laser, and or vitreoretinal surgeries in advanced stages.

We feel that by spreading awareness in community, ocular morbidity and mortality secondary to Diabetes can be reduced to a greater extent.

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Address for correspondence
Dr. Shubhangi Giradkar
Padhar Hospital Campus
PADHAR, Dist – Betul
Madhya Pradesh
Ph.no.08349443100, 9326575303

ANNEXURE 1

PROFORMA FOR SCREENING OF DIABETIC RETINOPATHY
DEPARTMENT OF OPHTHALMOLOGY, PADHAR HOSPITAL

Name: Age/Gender Date:
Unit no _____ Address_____
Education: illiterate/Upto 10thstd/ Upto 12thstd/graduate/ post graduate
Urban/ rural occupation: _____
Duration of diabetes mellitus: _____
Family history of diabetes: yes/ no / don't know

AWARENESS ABOUT DIABETIC RETINOPATHY

1. Do you know what diabetes mellitus is? Yes/No/Don't know
2. Do you think diabetes can affect eyes? Yes/No/Don't know
3. What are the symptoms of diabetes? Polyuria/polydipsia/polyphagia/decreased vision/ non healing ulcers/cataract/all the above/ none of the above
4. Where did you get this information from? TV/ radio/visit to a hospital/ family, friends/camps
5. Do you know what diabetic retinopathy is? Yes/No/ Don't know

KNOWLEDGE ABOUT DIABETIC RETINOPATHY

6. According to you what is diabetic retinopathy? _____
7. (a). Is diabetic retinopathy treatable? Yes/ No/ Don't know

(b).What are the treatment options? Eye drops/ surgery/ laser/ no treatment available

8. Do you think vision is 100% reversible after treatment? Yes/ no/ don't know
9. Does diabetic retinopathy cause blindness in future? Yes/ no/ don't know
10. What is the sequelae for diabetic retinopathy? Cataract/glaucoma/optic atrophy/ vitreous haemorrhage/ retinal detachment

	Right eye	Left eye
BCVA		
Anterior segment		
Iop		
Gonioscopy		

Diagnosis		
Grade		

Grading ofDR: 0 no DR; 1= verymild DR;2= mild DR;3= moderate DR;4= severe DR;5 = very severe DR 6=PDR without HRC; 7= PDR withHRC; 8=maculopathy; 9=CSME ; 10= end stage disease

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