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Indian Journal of Clinical and Experimental Ophthalmology

Journal homepage: www.ijceo.org

Original Research Article

Diabetic retinopathy screening in diabetic patients attending non communicable disease clinic at tertiary health care hospital

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ARTICLE INFO

Article history:

Received 15-01-2022

Accepted 03-02-2022

Available online 29-06-2022

Keywords:

Diabetic retinopathy

Non communicable diseases

Visual impairment

Blindness

ABSTRACT

Aim : To streamline regular visits of NCD clinic diabetic patients for retina screening in relation to duration of disease, severity of diabetic retinopathy, magnitude of visual impairment and blindness.**Settings and Design:** Hospital based observational analytical cross-sectional study.**Materials and Methods:** 200 diabetic patients attending Non Communicable Disease clinic from January 2020- May 2021 above 18years of age were included and dilated retinal examination using Indirect ophthalmoscope were classified according to ETDRS classification after doing visual assessment.**Statistical Analysis used:** Analysis was done using Chi-square test, ANOVA, t-test. A p value of < 0.05 was considered statistically significant.**Results:** 93.5% were screened for first time, the point prevalence being 27.5%. 24% males and 33% females had diabetic retinopathy. The mean age was 52.4±9.168 years of diabetic retinopathy patients (P=0.01). 7.2% had unilateral diabetic retinopathy. 26.41% had DR in <5yrs, 45.28% in 6-10yrs, 18.85% in 11-15yrs, 9.43% in >15yrs. Mean duration diabetes of patients having DR was 8.88±4.99 years. 35 patients (63.63%) were insulin dependent. DME was found to be 22.7% and STDR was 13%.**Conclusions:** The study made NCD diabetic patients aware of importance of retinal check up. Duration of diabetes, severity of diabetic retinopathy and visual impairment are interrelated.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: reprint@ipinnovative.com

1. Introduction

Diabetes is one of the most common non-communicable disease in the world. The prevalence of Diabetes globally has been estimated to increase from 382 million in 2013 to 592 million by 2035.^{1,2} Most of the diabetic patients are unaware of the disease as it lacks warning symptoms and are majorly diagnosed at advanced stages. Various studies have shown that timely diagnosis and early intervention of diabetic retinopathy can prevent blindness. Non communicable disease clinic have been set up at various levels of health care system in India to serve this purpose. Diabetes is routinely treated at these NCD

clinics but due to lack of awareness regarding the health hazards caused by diabetes, these patients do not attend Ophthalmology clinic for regular retinal examination. These clinics are the major pool of diabetic patients, screening will help in early detection of diabetic retinopathy and early intervention.

2. Materials and Methods

The present study was a hospital based observational analytical cross-sectional study in patients visiting the non communicable Disease Clinic at Tertiary Hospital in South Gujarat and referred to Ophthalmology OPD for retinal examination. All the patients enrolled in the study were evaluated during a period from January 2020- May 2021.

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The sample size was taken as 200. Patients above 18 years of age diagnosed with diabetes attending non-communicable disease clinic and giving consent for retinal examination were included in the study. The exclusion criteria were all the diseases which affected retinal microvasculature other than diabetic retinopathy and cases where visualization of fundus is difficult due to dense media opacities.

2.1. Methodology

A protocol of the study was submitted to ethical committee for approval before the study was carried out. All patients attending NCD clinic were explained and counselled regarding the importance of retinal examination in diabetic patients for early diagnosis of diabetic retinopathy and those patients giving consent for examination of their retina were referred to ophthalmology OPD for detailed ophthalmic examination. Informed written consent was taken from the patient and purpose of study was explained to the patient first. Demographic data regarding patient characteristics such as age, sex, duration of diabetes, age of onset of diabetes, systemic treatment received for diabetes in form of oral hypoglycaemic drugs and injection insulin, recent fasting blood sugar (FBS), post prandial blood sugar (PP2BS), HbA1c if available, previous screening and record of the same were noted. All patients were evaluated for best corrected visual acuity by illuminated Snellen's chart for 6 meter distance and near vision with Roman's near vision chart. Detailed fundus examination after adequate mydriasis with tropicamide 0.8% and phenylephrine 5% was done using Indirect Ophthalmoscope to make the diagnosis of diabetic retinopathy. Staging of diabetic retinopathy was done using according to the early treatment of diabetic retinopathy Study (ETDRS) classification. Data were entered and analyzed using Microsoft Excel 365 & open Epi. Result was reported in mean, standard deviations, and frequency. Further analysis was done using Chi-square test, ANOVA, t-test. A p value of < 0.05 was considered statistically significant.

3. Results

200 Type 2 diabetic patients registered at NCD clinic at our tertiary hospital were screened. Out of them 55 patients had diabetic retinopathy in one or both the eyes. Out of 400 eyes screened, 106 eyes had diabetic retinopathy changes. HbA1c was not recorded in all patients and hence not included in discussion. Out of 200 patients, the point prevalence was 27.5%. 93.5% were screened for first time. 24% males and 33% had diabetic retinopathy. The mean age was 52.4±9.168 years of diabetic retinopathy patients (P=0.01). 7.2% had unilateral diabetic retinopathy. Mean duration diabetes of patients having DR was 8.88±4.99 years.

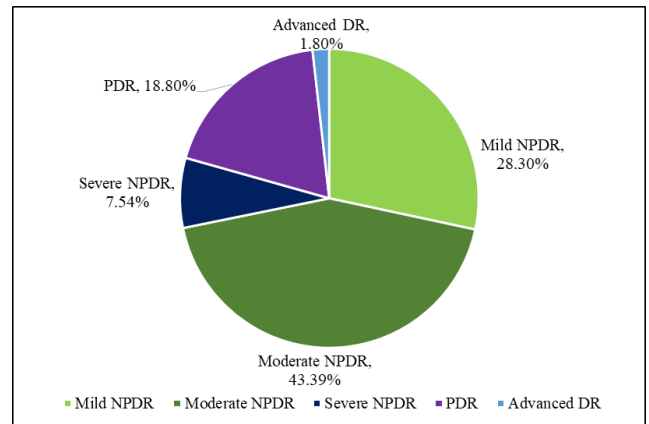


Fig. 1: Distribution of diabetic retinopathy according to ETDRS classification

Out of 200 diabetic patients in our study, 55 patients (27.5%) had diabetic retinopathy. Out of 110 eyes of these diabetic retinopathy patients 106 eyes had findings of diabetic retinopathy. Out of 106 eyes, 30 eyes had Mild NPDR (28.30%), 46 eyes had Moderate NPDR (43.39%), 8 eyes had Severe NPDR (7.54%), 20 eyes had PDR (18.8%), 2 eyes had Advanced DR (1.8%).

In our study, out of 400 eyes, 106 eyes had DR. 26.41% eyes had DR in <5yrs, 45.28% eyes in 6-10yrs, 18.85% eyes in 11-15yrs, 9.43% eyes in >15yrs. PDR was found to be maximum in duration of 11-15yrs. Mean duration of diabetes was 6.41 yrs and DR was 8.88±4.99 years and for patients with No DR the mean duration was 5.47±4.66 years. Thus, patients with DR had longer duration of diabetes.

Applying Chi square test the p value of severity of DR and uncontrolled FBS (P=0.22) was not found statistically significant. (χ^2 - 5.63, Df-4). Thus, there was no association of uncontrolled FBS and severity of DR in our study. Applying Chi square test, the p value of severity of DR with uncontrolled PP2BS (P=0.02) was found to be statistically significant.

In our study, out of 55 patients with diabetic retinopathy, 35 patients (63.63%) were insulin dependent and 21 patients (36.37%) were Non-insulin dependent.

In our present study DME was found in 24 eyes (22.7%) out of 106 eyes with DR. The higher prevalence of DME found in our study can be attributed due to small sample size.

Out of 106 diabetic retinopathy eyes 56 eyes (51.88%) had vision 6/12 or better, 25 eyes (23.58%) had vision 6/12 to 6/18 and 16 eyes (15.09%) had vision 6/18 to 6/60, 7 eyes (6.6%) had vision 6/60 to <3/60, 2 eyes were blind (1.8%) having vision <3/60. Sight threatening diabetic retinopathy was found to be 13%.

Table 1: Distribution of diabetic retinopathy according to duration of diabetes and stage of diabetic retinopathy(n-106 eyes)

Duration of DM	Present study					Percentage
	Mild NPDR	Moderate NPDR	Severe NPDR	PDR	Advanced DR	
<5yrs	8	19	0	1	0	28 (26.41%)
6-10yrs	20	19	4	5	0	48 (45.28%)
11-15yrs	2	4	2	10	2	20 (18.86%)
>15yrs	0	4	2	4	0	10 (9.43%)

Table 2: Distribution of diabetic retinopathy patients according to FBS and PP2BS control (n-55 DR patients). The normal range of FBS <126 mg/dl and PP2BS <200mg/dl was considered in this study

	FBS	PP2BS
Controlled	7 (13%)	17 (31%)
Uncontrolled	48 (87%)	138 (69%)
Total	55	145

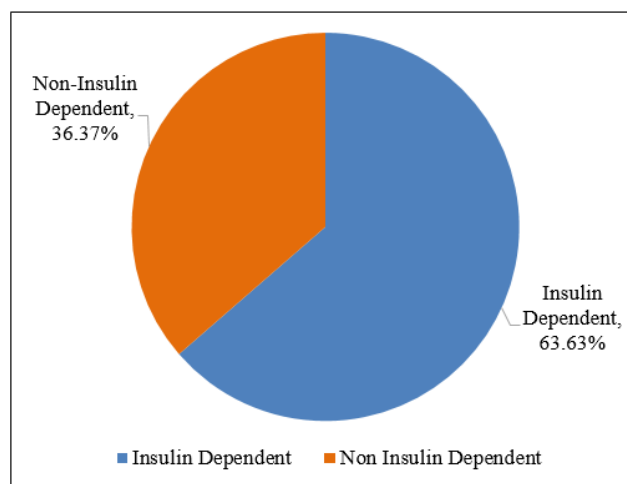


Fig. 2: Distribution of insulin and non-insulin dependent diabetic retinopathy patients

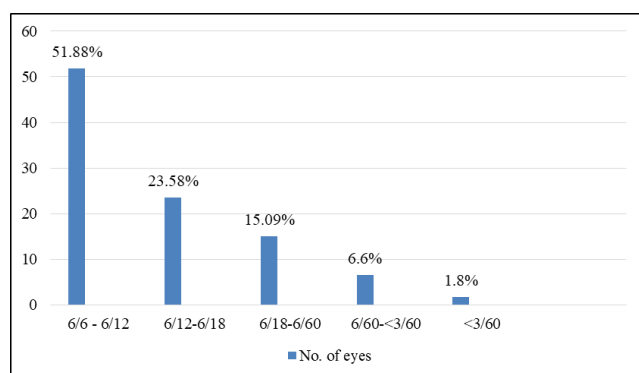


Fig. 3: Distribution of eyes of diabetic retinopathy patients according to Snellen's chart

4. Discussion

Out of 200 patients 55 patients had any diabetic retinopathy. The point prevalence of diabetic retinopathy in our study was 27.5%. The prevalence in our study is higher which can be explained due to small sample size. The patients screened from the NCD clinic were chronic diabetes having longer duration of diabetes.

In our present study, out of 200 known diabetic patients screened, only 13 patients (6.5%) were previously screened, 93.5% i.e 187 patients were screened for the first time. This shows importance of streamlining retinal examination for early diagnosis and prevention of visual impairment and blindness.

111 (55.5%) patients were Males out of which 26 (24%) patients had diabetic retinopathy in either or both eyes. 89 patients (44.5%) were Females out of which 29 (33%) females had diabetic retinopathy in either or both eyes (p=0.14, χ^2 - 2.079, Df-1). Applying Chi Square test, this association of gender with DR was not found to be statistically significant in our study. Maximum number of diabetics and DR patients were found to be in the age group of 41-60 years of age. The mean age of diabetic patients was 49.52±11.57 years and diabetic retinopathy patients was 52.4±9.168 years (p=0.01, f-1.77). t test was applied and p value was found to be significant.

In our study, out of 200 patients, 55 patients had diabetic retinopathy, 4 patients had unilateral diabetic retinopathy (7.2%), 2 patients (3.6%) had bilateral asymmetric with NPDR in one eye and PDR in other eye and 49 patients (89.09%) had bilateral symmetric i.e same stage in both eyes. Out of 400 eyes, 106 eyes had DR. Out of 106 eyes, 30 eyes had Mild NPDR (28.30%), 46 eyes had Moderate NPDR (43.39%), 8 eyes had Severe NPDR (7.54%), 20 eyes had PDR (18.8%), 2 eyes had Advanced DR (1.8%). 26.41% eyes had DR in <5yrs, 45.28% eyes in 6-10yrs, 18.85% eyes in 11-15yrs, 9.43% eyes in >15yrs. Margarete Voigt et al in 2018³ in their study found that <5yrs of duration of

diabetes had 14.4% of DR, 5-10yrs had 20.0% DR, 10-15yrs had 23.5% and >15yrs had 42.1%.

p value of severity of DR and uncontrolled FBS ($P=0.22$) was not found statistically significant. p value of severity of DR with uncontrolled PP2BS ($P=0.02$) was found to be statistically significant. This implies that there is association of uncontrolled PP2BS with severity of DR in our study. FBS (mean \pm SD) of DR patients was 175.81 ± 58.33 mg/dl and PP2BS (mean \pm SD) was 246.38 ± 66.83 mg/dl. This implies that uncontrolled PP2BS was associated with diabetic retinopathy. Ezra Belay Ketema et al in 2015⁴ in their study found that monitoring of Post Prandial Glucose will be more helpful to achieve optimal glycemic control and prevent long term diabetes complication than FPG alone in the absence of HbA1c, especially in developing countries.

Applying Chi square test the p value ($P=<0.01$) of insulin dependent with DR was found to be statistically significant. By applying Chi square test, the p value of insulin dependence and severity of DR ($P=0.009$) was found to be statistically significant. Thus, there is association of Insulin dependence and severity of DR.

Out of 106 diabetic retinopathy eyes 56 eyes (51.88%) had vision 6/12 or better, 25 eyes (23.58%) had vision 6/12 to 6/18 and 16 eyes (15.09%) had vision 6/18 to 6/60, 7 eyes (6.6%) had vision 6/60 to <3/60, 2 eyes were blind (1.8%) having vision <3/60. Kristinsson JK et al in 1997⁵ in their study found Visual acuity of 196 patients (96%) was equal or better than 6/12 in their better eye, 6 patients (3%) had 6/18-6/36 in their better eye, and 2 patients (1%) had equal or worse than 6/60 in their better eye, or legally blind. Higher visual impairment in our study may be attributed to older age at examination, longer duration of diabetes, presence of senile cataract, proliferative diabetic retinopathy, higher prevalence of DME and late presentation of patients. Sight threatening DR (STDR) comprises severe NPDR, PDR (including advanced diabetic disease), or CSME⁶ was found to be 13%. G V S Murthy et al in 2020⁷ in their study found STDR to be 7.5%. Applying Chi square test, the p value of visual impairment of DR ($P=<0.01$) was found to be significant. This difference was most probably due difference in sample size and, due to lack of proper screening procedure for diabetes in our country, patients generally report only when they are symptomatic.

5. Strengths of the Study

93.5% diabetics were screened for first time in this study. This emphasizes that although DM is routinely treated at NCD clinic, DR screening needs urgent attention.

6. Limitations of the Study

Patients were explained about importance of retinal examination in diabetics for early diagnosis of diabetic retinopathy at NCD clinic and were referred to

Ophthalmology OPD but many patients did not turn up for retinal examination and were dropped out of the study.

7. Conclusions

This study made NCD diabetic patients aware of importance of retinal check up. Duration of diabetes, severity of diabetic retinopathy and visual impairment are interrelated. It also emphasizes that if we streamline screening of all diabetic patients attending NCD clinic, there will be early diagnosis and early visual rehabilitation of diabetic population preventing blindness leading to advanced diabetic retinopathy changes.

8. Source of Funding

None.

9. Conflict of Interest

The authors declare no conflict of interest.

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Cite this article: Merchant VM, Kapadia PR. Diabetic retinopathy screening in diabetic patients attending non communicable disease clinic at tertiary health care hospital. *Indian J Clin Exp Ophthalmol* 2022;8(2):286-289.