

A Cross Sectional Study to Evaluate Association Between the Duration of Diabetes and Diabetic Retinopathy in Type 2 Diabetes Mellitus Patients in A Tertiary Care Centre

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Abstract:

Introduction: The numbers of people affected with lifestyle related diseases are increasing every day, diabetes being one of the major contributors to the increasing morbidity and mortality in the world. Diabetic retinopathy is one of the complications of diabetes which is thought to be associated with the duration of diabetes, we conducted this study to evaluate the same. **Methodology:** This study was conducted at Department of Ophthalmology. Total 100 cases were selected for the study and patient data was collected and analysed. Duration of diabetes and its association with diabetic retinopathy was studied. **Results:** There were 62 males (62%), most of the participants were more than 60 years of age (54%). Majority of the patients had diabetes for 5 to 10 years (44%) followed by 1 to 5 years (34%) and 0 – 1 year (22%). On FFA examination, majority of the patients had no any diabetic retinopathy (52%) while rest 48 patients had retinopathy (48%). Significant association was seen between the duration of diabetes and presence of diabetic retinopathy. ($p=0.002$). **Conclusion:** We found a significant association between the duration of diabetes and diabetic retinopathy. It is important that in patients with diabetes who are not diagnosed as retinopathy by ophthalmoscopy, FFA should be done.

Keywords: Diabetes Mellitus, Diabetic Retinopathy, FFA, Duration of diabetes

Introduction:

The International Federation of Diabetes, reported that 415 million adults around the world are suffering from diabetes, the numbers will reach around 642 million by 2040.¹

The international diabetes federation (IDF) reported that more than 400 million people have got diabetes mellitus in world and among these around 80-90 million are present in SEAR. India is one of the countries of SEA region and it contributes to around 73,000 cases of diabetes mellitus. The prevalence of

type 2 diabetes is 10-12% of the total population. The cause of this epidemic of diabetes is rapid epidemiological transition associated with the dietary patterns which have changed and decreased physical activity as evident from the increased diabetes cases in the urban population.² The increased duration of diabetes and poor glycemic control can lead to various complications in patients.³

There are various studies which suggest 60-70% of all Type 2 DM and almost all Type 1 diabetics are expected to develop the diabetic retinopathy (DR) over a period of time.⁴

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ISSN No. (p) : 2348-523X, (o) 2454-1982

DOI: 10.46858/vimshj.8203

Date of Published : 17th June 2021

Up to 21% of the patients with type 2 DM have retinopathy at the first diagnosis of the diabetes and most develop significant degree of retinopathy over time.³ Diabetes mellitus (DM) is one of the major causes of preventable blindness in both the developing and the developed countries.⁵

JW Yau et al⁶ in their meta-analysis found the overall prevalence of DR was 34.6% (95% CI of 34.5%–34.8%) for any type of DR, 6.96% (95% CI of 6.87%–7.04%) for PDR, 6.81% (95% CI of 6.74%–6.89%) for diabetic macular oedema (DME), and 10.2% (95% CI of 10.1%–10.3%) for VTDR. All DR prevalence end points increased with the duration of diabetes, HbA1c, and blood pressure levels.

The likelihood of patients with diabetic retinopathy (DR) to become blind is 25 times more than nondiabetics. Good glycemic control is one of the factor which play a role in arresting the development and progression of DR and decreasing visual loss.⁷ The prevalence of diabetic retinopathy increases with increased duration of disease.^{8,10}

We conducted this study to evaluate the association of duration of diabetes and diabetic retinopathy in type 2 diabetes mellitus patients.

Methodology:

This study was conducted in the Department of Ophthalmology. A total of 100 cases were selected for our study. Patient's data was categorized as age, gender, history of drug allergies and systemic illnesses.

Study Design: Cross sectional observational study

Study Duration: Two years – (January 2019 to December 2020).

Study Population & Site: Patients with type 2 DM visiting department of ophthalmology, DVVPF's Medical College & Hospital, Ahmednagar-414111, Maharashtra, India.

Sampling Technique: Convenience sampling

Sample Size Calculation:

According to a study conducted by Gadkari SS et al.⁴ the prevalence of diabetic retinopathy was 18%,

So, $p = 26\%$

Using formula for sample size (n) calculation,

$$n = \frac{4 \times p \times q}{e^2}$$

Where, $p = 18\% = 0.18$

$q = 1 - p = 0.82$

Taking e, absolute error of 10%, $e = 0.1$

$$\text{So, } n = \frac{4 \times 0.18 \times 0.82}{0.1 \times 0.1}$$

$$n = 59.04 \approx 60$$

A minimum of 60 cases should be included in the study, but during our study period we got 100 patients satisfying the study inclusion and exclusion criteria and they all were included.

Inclusion criteria:

- 1) Patients less than 10 years of diabetic age
- 2) Patients aged > 18 years

Exclusion criterion:

- 1) Patients with Type 1 Diabetes Mellitus
- 2) Patients who are known cases of Hypertension
- 3) Patients suffering from Nephropathy

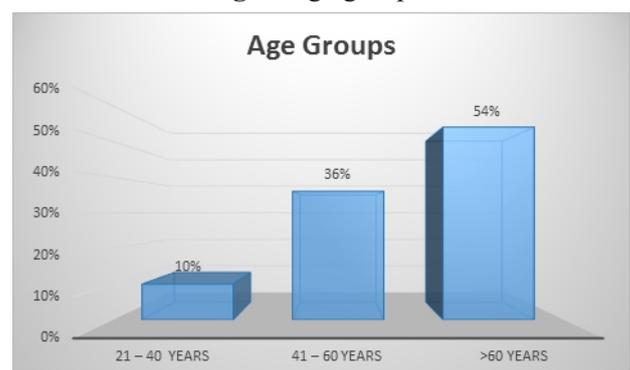
Written informed consent was taken from the patients before enrolling them in the study. All the patients were examined in detail by taking a detailed history. Complete ophthalmic and also medical history including diabetic history was obtained. Fluorescent Fundus Angiography (FFA) was used to classify patients for diabetic retinopathy.

Results:

We studied 100 patients visiting our institute to be evaluated for diabetic retinopathy. There were 62 males (62%) and 38 females (38%) in our study.

Most of the participants were more than 60 years of age (54%) followed by those in age group of 41 to 60 years (36%) and 21 to 40 years (10%).

Fig 1: Age groups



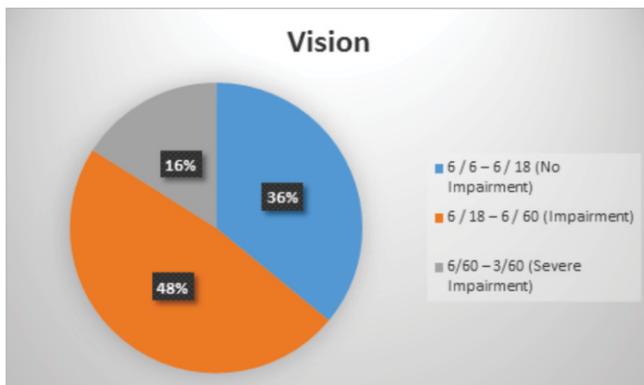
Majority of the patients had diabetes for 5 to 10 years (44%) followed by 1 to 5 years (34%) and 0 – 1 year (22%).

Table 1: Duration of diabetes

Duration of Diabetes	Number	Percentage (%)
0 – 1 Year	22	22
1 – 5 Years	34	34
5 – 10 Years	44	44
Total	100	100

Majority if the patients had vision impairment (48%), 36 patients had no impairment (36%) while rest 16 patients had severe impairment (16%).

Fig 2: Distribution of patients according to Vision



On FFA examination, majority of the patients had no any diabetic retinopathy (52%) while rest 48 patients had retinopathy (48%). Out of these 48 patients, 42 patients had NPDR (42%) and 6 had PDR (6%). In NPDR, 9 had mild NPDR (9%), 19 had moderate NPDR (19%) and 14 had severe NPDR (14%).

Table 2: Distribution of patients according to FFA findings:

FFA Findings	Number	Percentage (%)
No DR	52	52
NPDR	Mild NPDR	9
	Moderate NPDR	19
	Severe NPDR	14
PDR	6	6
Total	100	100

Significant association was seen between the duration of diabetes and presence of diabetic retinopathy. ($p=0.002$) Out of 22 patients with less than one year of diabetes, 18 had no any diabetic retinopathy

(81.82%) while 4 patients had non-proliferative diabetic retinopathy (NPDR - 18.18%). In 34 patients with 1 to 5 years of diabetes had 22 patients with no any diabetic retinopathy (64.71%), 10 patients had NPDR (29.41%), 2 patients had proliferative diabetic retinopathy (PDR - 5.88%). Out of 44 patients who had diabetes for 5 to 10 years, majority of the patients had diabetic retinopathy, with 28 patients having NPDR (63.64%) and 4 patients having PDR (9.09%).

Table 3: Association between Duration of Diabetes and FFA Finding

Duration of Diabetes	No DR	NPDR	PDR	Total
0 – 1 Year	18	4	0	22
1 – 5 Years	22	10	2	34
5 – 10 Years	12	28	4	44
Total	52	42	6	100
$\chi^2 = 21.17, p = 0.002, \text{Significant}$				

Discussion:

Diabetic retinopathy (DR) progresses from the mild nonproliferative DR, characterized by increased vascular permeability on retina, to the moderate and severe nonproliferative stage (NPDR), which is characterized by the vascular closure, to proliferative diabetic retinopathy (PDR), which is characterized by growth of new blood vessels on retina and the posterior surface of vitreous.¹¹

We studied 100 patients visiting our institute to be evaluated for diabetic retinopathy. There were 62 males (62%) and 38 females (38%) in our study. Gadekallu TR et al¹² also found majority of males (59%).

Most of the patients had more than 60 years of age (54%) followed by those in age group of 41 to 60 years (36%) and 21 to 40 years (10%). Mean age was 58.65 years. The study by SS Kahlaf et al¹³ had mean age of 54.91 similar to the current study. The study by K Shankar et al¹⁴ also had similar mean age of 55.65 years.

Majority of the patients had diabetes for 5 to 10 years (44%) followed by 1 to 5 years (34%) and 0 – 1 year (22%). Voigt M et al¹⁵ reported that in their study, majority of the patients were having diabetes for more than 5 years.

On FFA examination, majority of the patients had no any diabetic retinopathy (52%) while rest 48 patients had retinopathy (48%). Out of these 48 patients, 42 patients had NPDR (42%) and 6 had PDR (6%). In NPDR, 9 had mild NPDR (9%), 19 had moderate NPDR (19%) and 14 had severe NPDR (14%).

The study by Bertram *et al.*¹⁶ had 19% mild to moderate NPDR similar to the current study. The study by Sumi S *et al.*¹⁷ had higher percentage of people with NPDR (71%).

Significant association was seen between the duration of diabetes and presence of diabetic retinopathy. ($p=0.002$) Out of 22 patients with less than one year of diabetes, 18 had no any diabetic retinopathy (81.82%). In 34 patients with 1 to 5 years of diabetes had 22 patients with no any diabetic retinopathy (64.71%), 10 patients had NPDR (29.41%), 2 patients had proliferative diabetic retinopathy (PDR – 5.88%). Out of 44 patients who had diabetes for 5 to 10 years, majority of the patients had diabetic retinopathy, with 28 patients having NPDR (63.64%) and 4 patients having PDR (9.09%).

Yan ZP *et al.*¹⁸ also found that increased duration of diabetes poses a major risk of having diabetic retinopathy, with most severe risk in patients with diabetes of more than 5 years as found in our study.

FFA should be done in patients diagnosed with diabetes to rule out retinopathy and to avoid unnecessary complications.¹⁹ The availability of a full time VR surgeon at our institute made it possible for us to collect data of 100 patients. Patel RD *et al.*²⁰ had data of 148 FFA images in their study. M Tavakoli *et al.*²¹ also studied patients with a total of 192 fundus images. Both these studies recommended the evaluation of diabetic retinopathy in diabetic patients by FFA.

Conclusion:

We found a significant association between the duration of diabetes and diabetic retinopathy. It is important that in patients with diabetes who are not diagnosed as retinopathy by ophthalmoscopy, FFA should be done.

Funding: This was a self-funded project.

Conflict of interest: None

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