

**Original Research Article** 

# TO STUDY THE CORRELATION OF SMOKING WITH DIABETIC RETINOPATHY IN TYPE 2 DIABETES MELLITUS

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#### ABSTRACT

**Background:** Diabetes Mellitus is a global pandemic with several serious longterm complications: diabetic retinopathy, nephropathy, and neuropathy. [2] Diabetic Retinopathy (DR) is a significant cause of vision loss. The prevalence of DR is higher in Western countries. Several risk factors contribute to the onset and progression of DR, including the presence, duration, and control of diabetes. Lifestyle factors like smoking and alcohol are also implicated. The relationship between smoking and DR is unclear, with various studies giving conflicting results. The aim is to study the association between cigarette smoking and diabetic retinopathy in Type 2 Diabetes Mellitus (T2DM) patients.

**Materials and Methods:** The study was conducted at the Northern Railway Central Hospital, New Delhi, from August 2022 to December 2024. It was an observational, analytical, cross-sectional study. A consecutive sampling method was used, and a total of 200 cases were evaluated. All patients underwent a detailed workup to establish the diagnosis, duration, and level of control of DM. Subsequently, they all underwent retinal examination, and Diabetic Retinopathy grading was done as per the ETDRS classification. All patients were questioned regarding their smoking habits.

**Results:** Only 26% of patients were smokers. The prevalence of DR was lower among smokers (34.6%) than non-smokers (59.4%), though not statistically significant (p=0.092).

**Conclusion:** The role of smoking in T2 DM is as yet unclear and needs further studies with better standardization to reach to a final conclusion.

Keywords: Type 2 Diabetes Mellitus, Diabetic Retinopathy, cigarette smoking

# **INTRODUCTION**

Diabetes mellitus is a global public health crisis, with 537 million adults affected in 2021 and an expected increase of 46% more, by 2045.<sup>[1]</sup> Diabetes causes both microvascular and macrovascular complications. The macrovascular complications are ischemic heart disease, peripheral vascular disease, and cerebrovascular disease. The microvascular complications include retinopathy, nephropathy, and neuropathy.<sup>[2]</sup>

Diabetic retinopathy (DR) is a significant cause of vision loss, affecting 80% of individuals with diabetes. It poses both a personal and societal burden due to its impact on quality of life and the financial

strain it creates. In South Asia, DR prevalence (19.9%) is relatively lower compared to developed European countries (45.7%).<sup>[3]</sup>

DR is classified into two main stages: Non-Proliferative Diabetic Retinopathy (NPDR) and Proliferative Diabetic Retinopathy (PDR). NPDR is characterized by lesions in retinal capillaries, including Microaneurysm, hemorrhages, and edema, while PDR involves the abnormal growth of new blood vessels, leading to complications such as vitreous hemorrhage and retinal detachment. Both stages contribute to Diabetic Macular Edema (DME), where fluid accumulation in the macula causes visual impairment.<sup>[4]</sup> Several risk factors contribute to the onset and progression of DR, including the duration of diabetes, diabetic nephropathy, neuropathy, foot ulcers, hypertension, and serum cholesterol levels. Other factors, such as fasting blood glucose levels, HbA1c, and the patient's age, are also crucial in determining the risk of DR development.<sup>[5]</sup> Other demographic confounders have also been studied, such as age, gender, family history of diabetes, diabetes duration, and lifestyle factors (smoking and alcohol drinking).<sup>[6]</sup>

Smoking may exacerbate the development of DR. It impairs endothelial function mediated by nitric oxide through increased superoxide anion generation. This increases the risk of DR. It also causes alterations in retinal microcirculation. The combination of nicotine and diabetes can affect retinal structure, reducing total retinal thickness. Vasoconstriction caused by nicotine can impair retinal blood flow and the retinal vessels' autoregulatory response to hypoxia.<sup>[1]</sup>

Some studies have found that cigarette smoking is associated with diabetic retinopathy.<sup>[7,8]</sup> However, there are others that do not give the same result.<sup>[2,9-11]</sup> Therefore, the relationship between smoking and DR is unclear, and further studies are indicated to clarify the issue.

**Aim:** To study the association between smoking and diabetic retinopathy in Type 2 Diabetes Mellitus (T2DM) patients.

**Objective:** To define whether cessation of smoking can reuce the risk of DR in patients of T2DM.

# **MATERIALS AND METHODS**

The study was conducted in the Departments of Ophthalmology, General Medicine, and General Surgery, at the Northern Railway Central Hospital, New Delhi, over 30 months, from August 2022 to December 2024. It was an observational, analytical, cross-sectional study.

**Study Population:** All patients presenting to Medicine, Surgery, or Ophthalmology OPD, who on biochemical investigations were found to have high blood sugar levels, were included in the study, subject to the following inclusion and exclusion criteria **Inclusion Criteria** 

# All patients presenting with

- 1. Laboratory confirmed cases of both sexes, having Type 2 DM.
- 2. Age more than > 35 years.
- 3. Patients who have had diabetes for 5 years or more.

#### **Exclusion Criteria**

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- 1. Patients with Type 1 DM
- 2. Congenital ocular disease: Myopic fundus

- 3. Traumatic posterior chamber abnormality, Retinopathy of prematurity
- 4. Metabolic disorder other than DM, Cataract eye.
- 5. Patients not having at least 2 reports of HbA1c/ year for at least the preceding 5 years.
- 6. Smokers who have been smoking for less than 5 packet-years.

**Sampling Method and Size:** A consecutive sampling method was used, and 200 patients were enrolled during the study period. A total of 200 cases were evaluated.

**Methodology:** All patients who attended the Departments of General Surgery, General Medicine and Ophthalmology at the Northern Railway Central Hospital, New Delhi, and were found to have a raised blood sugar or a history of DM were referred to the Medicine department for a detailed work up to establish the diagnosisof T2DM, and the duration and level of control of DM. They underwent HbA1c examination, and their previous reports were also reviewed. The average HbA1c was the average of all available HbA1c reports over at least the last five years, with at least 2 HbA1c reports per year.

Subsequently, they all underwent retinal examination by a professional hand-held direct ophthalmoscope. Consultants in the department of ophthalmology did all examinations personally. Diabetic Retinopathy grading was done as per the ETDRS classification.

Diabetic Retinopathy level	Retinal findings					
Mild NPDR	Microaneurysm					
Moderate NPDR	Haemorrhages (Dot or blot) or MAs in one to three retinal quadrants and/or cotton wool spots, hard exudates, or venous beading					
Severe NPDR	Intraretinal haemorrhages (> 20 in each quadrant), venous beading in two or more quadrants, or an IRMA in one or more quadrants					
PDR	NPDR that has progressed to PDR, and they exhibit either neovascularization of the disc/elsewhere or vitreous/preretinal haemorrhage					

All patients were questioned regarding their smoking habits and classified as non-smokers or smokers. Smokers were defined as those who had been smoking for 5 packet-years or more. The results were analyzed using the Chi-Square test to find the importance of smoking in DR.

#### **RESULTS**

Only 26 % of patients were smokers, while 74% were not smokers. This might be because occasional smokers, smoking less than 5 packet-years, were excluded from the study.

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Smoking	Number of patients	%							
Yes	52	26.0							
No	148	74.0							
Total patients	100	100.0							

Table 2											
Variables		Norma	Normal		NPDR			P value			
		Ν	%	Ν	%	Ν	%				
Smoking	Yes (n=52)	34	65.4	14	26.9	4	7.7	0.092			
_	No (n=148)	60	40.5	68	45.9	20	13.5				

The prevalence of DR was lower among smokers (34.6%) than non-smokers (59.4%), though not statistically significant (p=0.092).

### **DISCUSSION**

Persistent hyperglycemia in T2D can progressively damage the vascular network causing macrovascular and microvascular complications. Nearly half of the newly diagnosed T2DM cases have chronic complications.<sup>[12]</sup> Microvascular complications nephropathy,[13] include diabetic diabetic retinopathy,<sup>[14]</sup> and diabetic neuropathy.<sup>[15]</sup> The macrovascular complications include coronary heart disease, stroke, and peripheral artery disease. Lifestyle modifications, including stopping smoking, are highly relevant in preventing vascular complications.<sup>[16]</sup> One study with 1169 patients with T2D found that current smokers had a higher risk of proliferative DR compared to former smokers.<sup>[17]</sup>

Our study found that the prevalence of DR was lower among smokers (34.6%) than non-smokers (59.5%), though not statistically significant (p=0.092).

Some studies. including the Wisconsin Epidemiologic Study, found no significant link between smoking and DR development and progression.<sup>[2,18-20]</sup> The UK Prospective Diabetes Study (UKPDS) observed a reduced incidence and lower risk of DR progression among current smokers.<sup>[21]</sup> A meta-analysis of 73 studies found a decreased risk of DR in smokers with T2D compared to never-smokers, but an increased risk in T1D smokers.<sup>[22]</sup> This contrasts with Matuszewski et al. (2020), who reported smoking as a significant risk factor.<sup>[23]</sup>

# CONCLUSION

The role of smoking in T2 DM is as yet unclear and needs further studies with better standardization to reach a final conclusion.

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