

# Incidence and Risk Factors for Developing Diabetic Retinopathy in Type 1 and Type 2 Diabetes

Rohit Saxena<sup>1</sup>, Jata Shanker Verma<sup>2</sup>

## ABSTRACT

**Introduction:** Diabetes Mellitus (DM) is a complex metabolic disorder in which a relative or supreme insulin insufficiency influences the digestion of lipids, starches and proteins. One of the most important microvascular complications of DM is diabetic retinopathy (DR), which is the leading cause of blindness. The objectives of the present study were to estimate the incidence of and risk factors for the development of diabetic retinopathy in Diabetic patients.

**Material and methods:** We reviewed health care claims database records to identify all patients who were recently determined to have DM and experienced no less than one eye exam by an ophthalmologist or optometrist. A formerly approved calculation was connected to portray every young with Type 1 or Type 2 DM. Next, we recognized the patients who created diabetic retinopathy. Amid the follow-up time of 5.1 years, 149 diabetic patients, 88 male and 61 female were analyzed. The mean age of the participants was 27.05 years with a mean duration of diabetes of 5.7 years at initial registration. Epidemiological risk factors were as follows: age at DM diagnosis, hypertension, duration of DM and smoking etc.

**Result:** Among the 149 subjects, 67 with newly-diagnosed Type 1 DM and 82 with Type 2 DM, 39 (26.17%) developed retinopathy. The number of patients with Type 1 DM and Type 2 DM who developed retinopathy was 15(10.06%) and 24 (16.1%) and respectively.

**Conclusion:** Patients with type 2 DM attending an out-patient clinic had a high incidence of DR associated with traditional risk-factors. Physicians should be encouraged to pay greater attention to treatment protocols for T2 DM in patients.

**Keywords:** Diabetes mellitus(DM), Diabetic retinopathy(DR), Risk factors.

## INTRODUCTION

The incidence of type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM) is rising among children and adolescents worldwide.<sup>1</sup> Diabetic retinopathy (DR) is a genuine inconvenience that is regularly asymptomatic in early stages however may advance to sight threatening sickness.<sup>3</sup> Risk elements for DR in young people with T1DM incorporate malady term and the planning of pubescence.<sup>4</sup>

Diabetic retinopathy (DR) is the most continuous microvascular intricacy of diabetes mellitus (DM), bringing about visual impairment for more than 10,000 individuals with DM each year<sup>1</sup> and is the driving reason for lawful blindness.<sup>5</sup> Further, serious structures of the sickness prompting visual disability happen in half of sort 1 DM patients.<sup>6,7</sup> The main risk factors for the development and progress of DR are persistent hyperglycemia, DM duration, high blood pressure levels, current age, age at diagnosis, elevated HbA1c, LDL cholesterol, GFR, and the urine albumin-to-creatinine ratio.

Diabetes mellitus can lead to diabetic retinopathy and diabetic

macular edema, both of which can be detected with regular vision screenings. The incidence of any diabetic retinopathy and sight-threatening diabetic retinopathy was higher in patients with type 2 diabetes mellitus than in those with type 1 diabetes mellitus.<sup>8</sup> High incidence rates of diabetic eye disease are concerning, particularly with the increased incidence of type 2 diabetes mellitus. Various methods have been used to screen for diabetic retinopathy, including ophthalmoscopy (direct and indirect);<sup>9</sup> obtaining retinal images (for example, Polaroid images),<sup>10</sup> 35 mm transparencies, and more recently digital images with or without mydriasis; as well as combining ophthalmoscopy with retinal photography.<sup>11,12</sup> Duration of DM is strongly associated to the frequency and severity of DR.<sup>13</sup> As per Kohlberg and Arnqvist, with the presentation of glycosylated hemoglobin, it has been demonstrated that blood glucose control is the most essential free hazard calculate for DR.<sup>14</sup> In turn, Systemic Arterial Hypertension (SAH) is twice as continuous in the populace with DM, and appears to assume an essential part in DR<sup>15</sup>

## MATERIAL AND METHODS

Every person known to have newly diagnosed diabetes mellitus over the age of 12 years were included in the study. Definition of type 1 DM was based on the presence of DM, diagnosed before 30 years of age, at least one episode of diabetic ketoacidosis and/or ketonemia and need for insulin therapy within 1 year of DM diagnosis. Total 243 patients were diagnosed to be having DM, among them 94 were excluded due to various reasons. Out of 149 selected patients, 67 were diagnosed with Type 1 DM and 82 with Type 2 DM. Informed consent was obtained from all patients and study was approved. In the present study only a single observer, not aware of the patients' clinical data, classified all the subjects.

All patients with retinal sore were analyzed in the retina division under the supervision of a specialist in the field. The patients in the present review were beforehand surveyed by eye examination, including estimation of the amended visual sharpness (Snellen diagram), foremost and back section biomicroscopy, aplanation tonometry also, circuitous binocular ophthalmoscopy under mydriasis.

<sup>1</sup>Department of Ophthalmology, Assistant Professor, Hind Institute of Medical Sciences, Safedabad, Barabanki, <sup>2</sup>Assistant Professor, Department of Ophthalmology, Government Medical College, Kannauj (U.P.)

**Corresponding author:** Dr Rohit Saxena, Department of Ophthalmology, Assistant Professor, Hind Institute of Medical Sciences, Safedabad, Barabanki, (U.P.), India

**How to cite this article:** Rohit Saxena, Jata Shanker Verma. Incidence and risk factors for developing diabetic retinopathy in Type 1 and Type 2 Diabetes. International Journal of Contemporary Medical Research 2017;4(5):1172-1174.

All patients who appeared at fundoscopy any suspected retinal injuries were analyzed by fluorescent retinography to have the right analysis. We utilized the accompanying evaluating classifications of retinopathy: mild, moderate, severe and pre-proliferative or proliferative.

Risk factors for DR were recorded at the time of ophthalmologic examination and included age, age at onset of DM, DM duration, smoking habit, body mass index (BMI), systolic blood pressure (SBP) and diastolic blood pressure (DBP). All patients addressed a brief standard poll and experienced physical examination and research center tests. They were weighed wearing light open air garments without shoes and stature was recorded. BMI was computed as weight (kilograms)/height<sup>2</sup> (meters). Sitting blood pressure was measured on the correct arm to the closest 2mm Hg following a 10 minute rest utilizing a standard mercury sphygmomanometer. Subjects who smoked at least one cigarettes every day were named current smokers. Those

who had smoked in the past and halted for more than one year were named previous smokers.

## STATISTICAL ANALYSIS

Descriptive statistics like Mean and SD were used to interpret the results obtained. Microsoft office 2007 was used for the statistical analysis.

## RESULT

Among the 149 subjects, 67 with newly-diagnosed Type 1 DM and 82 with Type 2 DM, 39 (26.17%) developed retinopathy. The proportion of patients with Type 1 DM and Type 2 DM who developed retinopathy was 15 (10.06%) and 24 (16.1%) respectively. The mean age of patients with type 1 diabetes was 25.4 and with type 2 was 28.7 years. Age of onset of diabetes, BMI, BP, smoking history and rest demographic details are given in Table no1.

39 out of 149 subjects were diagnosed with Diabetic retinopathy. It was classified as Mild, moderate, severe and Proliferative. Risk factors for DR were recorded at the time of ophthalmologic examination which included age at onset of DM, DM duration, smoking habit, body mass index (BMI), hypertension, Pregnancy, poor diabetes control, nephropathy, hyperlipidemia, obesity, anemia and cataract surgery.

Duration of diabetes is one of main risk factor with greater risk with duration of 10-20 years in type 1 and 21-25 years in type 2 DM. Though other factors like poor diabetes control, smoking, hypertension also have important role in developing retinopathy.

## DISCUSSION

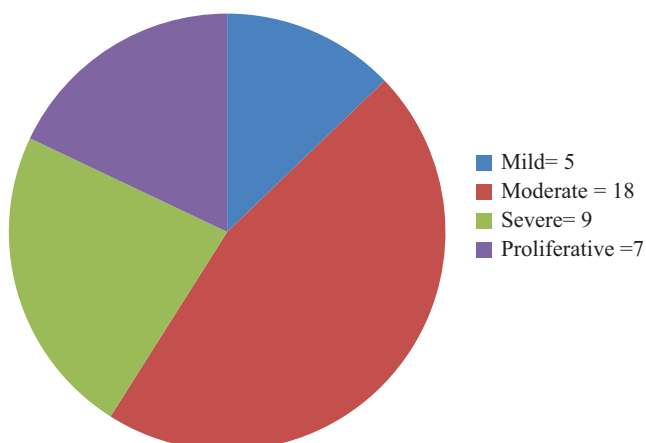
In this review, DR was available in a high rate of sort 2 DM patients and it was related with the primary customary hazard elements, in particular, DM duration, blood weight and smoking history. The occurrence of referable retinopathy was decidedly and autonomously related with type 2 diabetes and the need for insulin treatment, and contrarily identified with age at determination. It is trusted that high glucose compounds the clinical condition. Considers have demonstrated that the pervasiveness of DR increments with the term of the malady and the age of the patient. Following 20 years of malady, right around 99% of insulin-ward patients and 60% of non-insulin-subordinate patients have some degree of DR.<sup>16</sup>

Variables	Type 1 diabetes (n=67)	Type 2 diabetes (n=82)
Mean age (years)	25.4± 4.2	28.7±5.7
Sex		
Males	37	51
Females	30	31
Age at onset of DM (years)	14.5±5.7	20.5± 4.2
BMI (kg/m <sup>2</sup> )	22.4±6.2	25.6±4.7
Systolic BP (mm/Hg)	117.5±8.1	119.2±3.9
Diastolic BP (mm/Hg)	77.3±12.1	76.1±6.9
Smoking		
Yes	23	39
No	44	43
Diabetic Retinopathy(DR)	15(10.06%)	24(16.10%)

Table-1: Demographic details of patients

Type 1		Type 2	
Duration of DM (years)	Incidence of DR	Duration of DM (years)	Incidence of DR
>5	0	11-15	1
5-10	3	16-20	4
10-20	7	21-25	11
>20	5	>25	8

Table-2: Duration of Diabetes as a risk factor for Retinopathy



Graph-1: Diabetic retinopathy in DM patients according to classification

In our review rate of DR was (26.17%) and is related with span of diabetes. A few reviews, counting the Liverpool Diabetic Eye Study, comparatively discovered that the rate of diabetic retinopathy was related with the term of diabetes and the utilization of insulin treatment.<sup>17</sup> A more youthful age at analysis of diabetes has likewise been connected with expanded occurrence of retinopathy.<sup>18</sup> In concurrence with past reviews, we discovered no connection between the rate of retinopathy and members' sex, however we found a solid affiliation amongst rate and the utilization of insulin treatment, apparently demonstrating the phase of the illness.<sup>19</sup> As indicated by Boelter, the length of DM is an element to be mulled over in all patients, paying little respect to glycemic control or the level of eye contribution.<sup>20</sup> In the review being referred to, the term of the infection was evaluated as a hazard consider determinant the ascent of retinopathy. Another viewpoint that must be highlighted is the affiliation of smoking with any level of DR found in this review. Smoking propensities and DR are

dubiously related and no affiliation has been portrayed by a few authors.<sup>21</sup> In patients with type 2 DM we, as others, had already portrayed a defensive relationship of smoking and DR.<sup>22</sup>

Constraint of this review is that we were not ready to acquire data for those individuals who did not take an interest in screening; some may have been prohibited for restorative reasons, since they were at that point accepting consideration from an ophthalmologist for diabetic retinopathy, or they didn't go to for other obscure reasons. Since this review included just patients going by eye-mind suppliers, the DR rates among those not looking for ophthalmic care remain obscure, and we might be under-or overestimating the genuine DR occurrence because of referral predisposition. To better foresee the improvement of retinopathy, further research ought to explore extra hazard elements (for case, the individual and aggregate impacts of glycaemic control (HbA1c), pulse, egg whites discharge, and lipid status, and in addition conceivable medications). These discoveries could enhance chance stratification by better characterizing safe screening interims on an individual premise. Another essential zone to research additionally incorporates the monetary impact of the distinctive screening interims.<sup>23-25</sup>

## CONCLUSION

We closed with the present review that there is noteworthy requirement for appraisal of diabetic patients with respect to the nearness of DR. We additionally reasoned that there is solid relationship amongst DR and the hazard variables surveyed in this review. Frequency of 26.17% of DR in DM patients demonstrates that this condition keeps on being a noteworthy open medical issue in spite of current information about cutting edge DR.

## REFERENCES

- Green A, Patterson CC, Group on behalf of the ETS. Trends in the incidence of childhood-onset diabetes in Europe 1989e1998. *Diabetologia*. 2001;44:B3-B8.
- Lin W-H, Wang M-C, Wang W-M, et al. Incidence of and mortality from type I diabetes in Taiwan from 1999 through 2010: a nationwide cohort study. *PLoS One*. 2014;9:e86172.
- Broe R. Early risk stratification in pediatric type 1 diabetes. *Acta Ophthalmol*. 2015;93 thesis 1:1-19.
- Day C. The rising tide of type 2 diabetes. *Br J Diabetes Vasc Dis*. 2001;1:37-43.
- Porta M, Allione A. Diabetic retinopathy and its relevance to paediatric age. An update. *Pediatr Endocrinol Rev*. 2004;1:404-411.
- Thomas RL, Dunstan FD, Luzio SD, et al. Prevalence of diabetic retinopathy within a national diabetic retinopathy screening service. *Br J Ophthalmol*. 2015;99:64-68.
- Lian JX, Gangwani RA, McGhee SM, et al. Systematic screening for diabetic retinopathy (DR) in Hong Kong: prevalence of DR and visual impairment among diabetic population. *Br J Ophthalmol*. 2016;100:151-155.
- Roy MS, Klein R, OColmain BJ, Klein BE, Moss SE, Kempen JH. The prevalence of diabetic retinopathy among adult type 1 diabetic persons. *Arch Ophthalmol*. 2004;122:546-51.
- Diabetic retinal photography versus ophthalmic consultation. *Singapore Med J*. 2004;45:276-9.
- Jones D, Dolben J, Owens DR, Vora JP, Young S, Creagh FM. Non-mydriatic Polaroid photography in screening for diabetic retinopathy: evaluation in a clinical setting. *BMJ*. 1988;296:1029-30.
- Owens DR, Gibbins RL, Lewis PA, Wall S, Allen JC, Morton R. Screening for diabetic retinopathy by general practitioners: ophthalmoscopy or retinal photography as 35 mm colour transparencies? *Diabet Med*. 1998;15:170-5.
- Scanlon PH, Malhotra R, Greenwood RH, Aldington SJ, Foy C, Flatman M, et al. Comparison of two reference standards in validating two field mydriatic digital photography as a method of screening for diabetic retinopathy. *Br J Ophthalmol*. 2003;87:1258-63.
- Sparrow JM, McLeod BK, Smith TDW, Birk MK, Rosenthal AR. The prevalence of diabetic retinopathy and maculopathy and their risk factors in the non-insulin-treatde diabetic patients of an English town. *Eye (Lond)*. 1993;7:158-63.
- Kullberg CE, Arnqvist HJ. Good blood glucose control characterizes patients without retinopathy after long diabetes duration. *Diabet Med*. 1994;12:314-20.
- Laakso M. Benefits of strict glucose and blood pressure control in type 2 diabetes: lessons from the UK Prospective Diabetes Study. *Circulation*. 1999;99:461-2.
- Moreira Jr CA, Ávila M. Retinopatia diabética. In: Moreira Jr CA, Ávila M. *Retina e vítreo*. Rio de Janeiro: Cultura Médica; 2000.
- Younis N, Broadbent DM, Vora JP, Harding SP. Incidence of sight-threatening retinopathy in patients with type 2 diabetes in the Liverpool Diabetic Eye study: a cohort study. *Lancet*. 2003;361:195-200.
- Klein R, Klein BE, Moss SE, Davis MD, DeMets DL. The Wisconsin Epidemiologic Study of Diabetic Retinopathy. X: four-year incidence and progression of diabetic retinopathy when age at diagnosis is 30 years or more. *Arch Ophthalmol*. 1989;107:244-9.
- Cikamatana L, Mitchell P, Rochtchina E, Foran S, Wang JJ. Five-year incidence and progression of diabetic retinopathy in a defined older population: the Blue Mountains Eye Study. 2007;21:465.
- Boelter MC, Azevedo MJ, Gross JL, Lavinsky J. Risk factors for diabetic retinopathy. *Arq Bras Oftalmol*. 2003;66:239-47.
- Cantoni A CM, Congeti I, Carrerasi G, Castell C, Tresserras R. Type 1 Diabetes Mellitus in Catalonia: Chronic complications and Metabolic control ten years after onset. *Med Sci Monit*. 2005;10:185-90.
- Stratton IM, Kohner EM, Aldington SJ, Turner RC, Holman RR, Manley SE, et al. UKPDS 50: risk factors for incidence and progression of retinopathy in Type II diabetes over 6 years from diagnosis. *Diabetologia*. 2001;44:156-63.
- Vaggu. Sree Kumar, Ramya. B, Soujanya. T. A clinical study of fundus changes in diabetic patients. *International Journal of Contemporary Medical Research*. 2016;3:2260-2263.
- Aliya Nusrath, Namitha D, N Asha Rani, Rajeshwari A, Prathibha K. Assessment of serum paraoxonase1 activity in diabetic retinopathy patients. *International Journal of Contemporary Medical Research*. 2016;3:332-335.
- Sandeep Kumar Jain, M.S. Johri. Study to know the prevalence of microvascular complications in type 2 diabetes mellitus patients. *International Journal of Contemporary Medical Research*. 2016;3:1992-1994.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 01-04-2017; **Accepted:** 15-05-2017; **Published:** 30-05-2017