www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 79.54
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i10.101

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Prevalence of Retinopathy and its Risk Factors among Persons with Diabetes Mellitus in the age Group of 20-60 Years Attending A Tertiary Eye Care Centre in Kerala

Authors
Sithara TV[1], Jasmin LB[2*]
[1]Junior Resident, Department of Ophthalmology, RIO, Government Medical College, Trivandrum, Kerala
[2]Assistant Professor, Department of Ophthalmology, RIO, Government Medical College Trivandrum, Kerala
*Corresponding Author
Dr Jasmin LB
Assistant Professor, Department of Ophthalmology, RIO, Government Medical College Trivandrum, Kerala
Email: *jasminbennet.bennet@gmail.com*

Abstract
Aim: *To estimate hospital based prevalence of diabetic retinopathy among persons with Diabetes Mellitus in the age group of 20-60 years and to find out the association of selected study variables with retinopathy.*
Methods: *Cross-sectional study conducted in 420 patients attended in OPD. Risk factors assessed using structured interviewer administered questionnaire, physical examination and laboratory reports. Dilated fundus evaluation was done, and retinopathy classified. Analysis done with SPSS software.*
Results: *Prevalence of diabetic retinopathy among studied population is 48.1% (95% CI 43.4 - 52.9%). Significant positive association with diabetic retinopathy was obtained for Age >50 years (OR-2.11; P<0.005), Male gender (OR-1.50; P<0.05), Duration of diabetes >10 years (OR-7.94; p<0.001), HbA1c >7% (OR 4.685; P<0.001), Insulin treatment (OR-4.685; P-<0.001), Hypertension (OR 1.68;P-0.008), CKD (P <0.0001), high urine microalbumin (P- 0.000), Anemia (OR- 2.77; P- 0.02), Smoking((OR-2.85; P-0.001) and Sedentary habits(OR 1.78;P-0.013). Duration of DM >10 years, Poor glycemic control, high urine microalbumin and treatment with insulin shows significant association on multivariate analysis and binary logistic regression.*
Conclusion: *Hospital based Prevalence of diabetes is 48.1%. Duration of diabetes, poor glycemic control, insulin treatment and high urine microalbumin are independent risk factors for retinopathy.*
Keywords: *Prevalence, Diabetic retinopathy, Duration, Insulin treatment.*

Introduction

Diabetic retinopathy is a major cause of defective vision among persons of working age. Long standing metabolic derangements caused by diabetes results in structural and functional changes in cells of human body mainly blood vessels and this leads to various complications of diabetes affecting the eye, nervous system and kidneys. It is found that within 15 to 20 years of diagnosis of diabetes, retinopathy develops in more than 75% of diabetics. Rising prevalence of diabetes demands more epidemiologic studies on diabetes-related complications in our population.

One study in India showed prevalence of 17.6 for diabetic retinopathy and estimated global prevalence from various studies is 34.6. Various studies for major risk factors of diabetic retinopathy, like hypertension, hyperglycemia and dyslipidemia showed strong association. But there are variations in consistency pattern and strength of these risk factors[1.]

The purpose of this study is to find out the prevalence of diabetic retinopathy among diabetic patients attending a Tertiary eye care Centre in Kerala for various complaints belonging to age group of 20-60 years and to assess various risk factors including other life style diseases and co-morbidities, social and demographic factors and life style.

Materials and Methods

This was a cross sectional study performed between January 2016 and January 2017 and enrolled patients attended in our OPD with diabetes mellitus and age between 20–60 years after obtaining informed consent.420 patients are included. Exclusion criteria were history of glaucoma, dense cataract, corneal opacities, pregnancy and recent ocular surgeries.

Structured interviewer administered questionnaire was used to collect data. Height measured using stadiometer and weight measured using analogue weighing machine and BMI calculated. Waist circumference and hip circumference were measured and Waist to Hip Ratio (WHR) calculated. Presence of hypertension was noted from history and blood pressure recordedat our OPD. History of other systemic comorbidities like coronary artery disease, diabetic nephropathy, dyslipidaemia and Diet and life style assessed using Questionnaire. From Lab investigations done within one year of study Haemoglobin, HbA1C urine microalbumin and renal status assessed. Dilated Fundus examination was done with Indirect ophthalmo-scopy and Slit lamp biomicroscopy and retinopathy classified based on International Clinical Diabetic Retinopathy Disease Severity scale as Normal, mild, moderate, and severe NPDR, PDR, and CSME.

Presence of retinopathy in one eye was considered as diabetic retinopathy and asymmetrical retinopathy if present, the stage of retinopathy is based on the affected eye with the more severe grade of retinopathy.

Data entered in excel sheet. Analysis of data was done using statistical software SPSS. Proportion with confidence interval was done to evaluate the prevalence. Chi- square test was done for categorical variables and Student-T test for quantitative variables.

Results

Among 420 patients 59% were females and 41% males.

a. Prevalence of Diabetic Retinopathy

Prevalence of diabetic retinopathy among studied population of diabetic patients is 48.1 (95% CI 43.4 - 52.9%).

Table 1: Showing prevalence of retinopathy

Retinopathy	Frequency	Percent	95% CI for prevalence
No	218	51.9	
Yes	202	48.1	43.4-52.9%
Total	420	100.0	

Risk factors

b. Association of age with retinopathy

74.3% of subjects with Diabetic retinopathy belongs to age >50 years whereas 57.8% of subjects without retinopathy belongs to age group of >50 years. The observed difference was statistically significant (p value <0.005).

c. Association with gender

Significant positive association with male gender (Odds ratio 1.50,p<0.05).

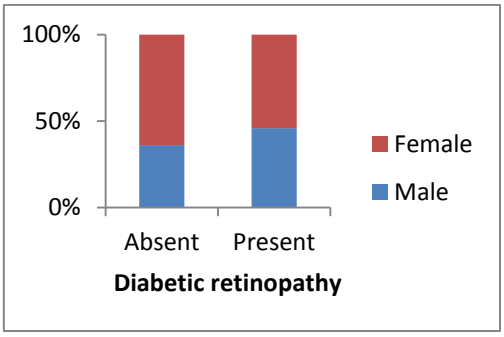

Fig 1: Association of Gender with DR

d) Socio economic status

70.8% of subjects with retinopathy and 62.4% of subjects without retinopathy belongs to upper lower or lower socioeconomic status. The observed difference is statistically not significant (P value 0.068).

e) Duration of Diabetes

Table 2: Duration of Diabetes and DR

duration	DR		Total(N=420)	P	OR
	Present	Absent			
	%	%	%		
>10 year	70.8	23.4	46.2	<0.001	7.94
<10 year	29.2	76.6	53.8		

There is a significant positive association with duration more than 10 years (p value <0.001).

f) Association with insulin use

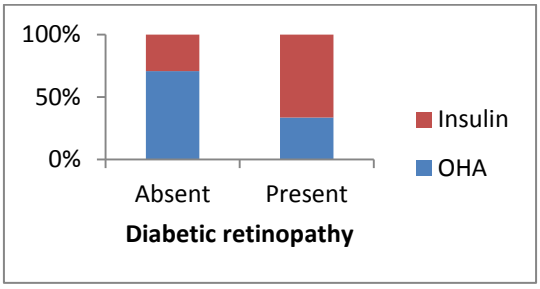

Fig 2: Insulin use and DR

Significant positive association was obtained for insulin use and DR (odds ratio 4.74 and P value <0.001).

g) Hypertension

57.4% of subjects with diabetic retinopathy was having hypertension whereas 44.5% of subjects without retinopathy was having hypertension. The observed difference is statistically significant (Odds ratio 1.68 and P value 0.008).

h) Dyslipidemia

36.4% of subjects with retinopathy have dyslipidemia, whereas 28.4% of subjects without retinopathy has dyslipidemia. The observed difference is statistically not significant (P value >0.05).

i) Diabetic Nephropathy

Table 3: Diabetic nephropathy and DR

CKD	Diabetic Retinopathy		Total	p
	Absent	Present		
	%	%	%	
No	98.6	91.1	95	<0.001
Yes	1.4	8.9	5	
Total	100	100	100	

Significant positive association with nephropathy was obtained (P value <0.001).

j) Coronary artery disease

9.4% of subjects with retinopathy had history of coronary artery disease and 6.4 % of patients without retinopathy also had history of CAD. The observed difference is statistically not significant (P value 0.256).

k) Association with Body Mass Index

40.1% of subjects with retinopathy were overweight or obese and 45.4% of subjects without retinopathy were overweight or obese. The observed difference was statistically not significant (P value >0.05).

l) Association with Waist Hip Ratio

91.1%of subjects with retinopathy and 89% of subjects without retinopathy had high WHR. The observed difference was statistically not significant (P value >0.05).

m) Association with Hemoglobin level

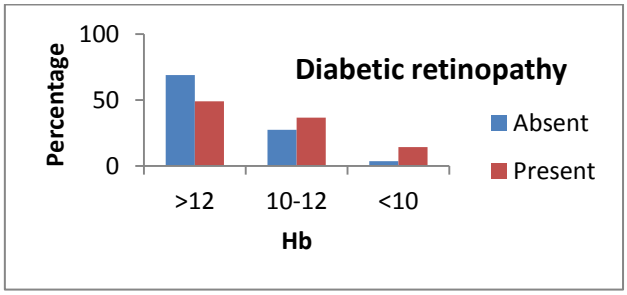

Fig 3: Haemoglobin level and DR

There is significant positive association with haemoglobin <10 mg/dl (Odds ratio 2.77 and (P value<0.001).

n) Smoking

Table 4: Association with Smoking

Smoking	Diabetic Retinopathy		Total	P
	Absent	Present		
	%	%	%	
No	93.6	83.7	88.8	0.001
Yes	6.4	16.3	11.2	
Total	100	100	100	

There is significant positive association with smoking and diabetic retinopathy(Odds ratio 2.85and P value0.001).

o) HbA1C

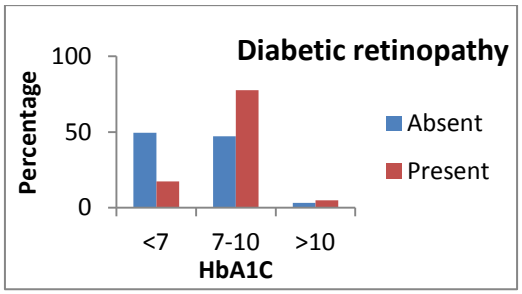

Fig 4: HbA1C and DR

Significant positive association was obtained with HbA1C (Odds ratio 4.685 and P value0.001).

p) Urine microalbumin

44.6% of subjects with retinopathy has high urine microalbumin levels whereas 11.9% of subjects without retinopathy has high urine microalbumin levels. The observed difference is statistically significant (Odds ratio 5.93 and P value0.000).

q) Sedentary habits

57.9 % of subjects with retinopathy have sedentary life style having only mild activity whereas 43.6 % of subjects without retinopathy was having mild activity. The observed difference is statistically significant (Odds ratio 1.78 and P value0.013)

r) Food habits

59.9% of subjects with retinopathy and 52.2% of subjects without retinopathy had moderate to high risk food habit like frequent intake of carbohydrate and refined flour containing foods and less intake of fruits and vegetables. The observed difference was statistically not significant (P value 0.243).

Multivariate analysis

By multivariate logistic regression (Binary logistic regression), after adjusting for all the variables, duration of Diabetes more than 10 years (odds ratio 4.150, p value 0.000), treatment with insulin (odds ratio 2.316, P value 0.002), uncontrolled DM - HbA1C more than 7 (odds ratio 3.684; p value 0.000) and high urine microalbumin level (odds ratio 2.377; p value 0.005) are found to be as independent risk factors for diabetic retinopathy

Discussion

Prevalence of diabetic retinopathy in our study is 48.1 (95% CI 43.4-52.9%). A study on self-reported diabetic subjects identified by questionnaire in Kerala detected a prevalence of 26.8%[2.] In the study conducted on prevalence of diabetic retinopathy in urban India[3] in Chennai prevalence of DR is 17.6% and showed prevalence of diabetic retinopathy is lower in urban south Indians compared to other populations. A higher prevalence of 34.1% was reported in a clinic based study[4]. Higher prevalence in our study may be due to referral bias for treatment to tertiary eye care center and due to late reporting for screening for retinopathy due to lack of awareness and other facilities.

Among 48.1% of subjects with diabetic retinopathy 11.4% subjects were with mild NPDR, 15.2% were with moderate NPDR, 9% were with severe NPDR, 7.1% were with PDR, 0.7 were with HRPDR and 4.5% were with ADED

Risk factors

In this study 74.3% of subjects with Diabetic retinopathy belongs to age >50 years and age more than 50 years is a significant risk factor for diabetic retinopathy. Retinopathy was more common among males in our study and the association was statistically significant. Similar male predominance was reported in the Chennai Urban Rural Epidemiologic Study[3], UKPDS study[5].

Even though retinopathy was more common in subjects belonging to upper lower or lower socioeconomic status in our study, there was no significant association found on statistical analysis

Duration of diabetes for more than 10 years shows statistically significant association with retinopathy in our study. This was consistent with findings in previous studies[54,55,56].

Degree of glycaemic control indicated by HbA1c level shows significant association with retinopathy with high HbA1c level associated with more prevalence of retinopathy (p value <0.001). This is consistent with previous studies[6,7,8].

Retinopathy was more common in subjects using insulin for control of blood sugar than those on Oral Hypoglycemic Agents. The association was found statistically significant in our study. Similar findings have been reported in the Beaver Dam study[9].

Subjects with hypertension has more prevalence of retinopathy and are statistically significant risk factors for retinopathy in our study. Various clinical studies show association between hypertension and the presence and severity of retinopathy in persons with diabetes[10].

Dyslipidemia showed no statistically significant association with retinopathy in our study. The CURES study found that mean serum cholesterol, serum TG and HDL-C concentrations were significantly higher in subjects with DR compared with those without DR.

Statistically significant association was found with diabetic nephropathy and retinopathy in our study. Significant association was found in our study with high urine microalbumin levels and presence of retinopathy. In the study by Padmaja et al a significant association was found between severity of retinopathy and albuminuria[11] and subjects with microalbuminuria were around 2 times as likely to have retinopathy as those without microalbuminuria and the risk is 6 times in the presence of macroalbuminuria.

No significant association was found with coronary artery disease and retinopathy in our study.

No significant association was obtained with Body mass Index and Waist Hip Ratio of subjects and occurrence of diabetic retinopathy in our study. In a study conducted by Raman R et al, in urban south Indian population, isolated abdominal obesity and higher WHR in women were associated with diabetic retinopathy.[12]

Habit of smoking cigarettes is a statistically significant risk factor in our study (P value 0.001). The DCCT trial reported that there are positive correlations between tobacco use and the progression of retinopathy and of the retinopathy-associated risk factors[13].

Sedentary lifestyle is a significant risk factor for retinopathy in our study. Other studies have suggested a protective role for physical activity in diabetic retinopathy[14].

In our study moderate to high risk food habits with increased frequency of intake of rice, parotta, bakery items, red meat and carbonated drinks and decreased intake of fruits and vegetables did not show any significant association with diabetic retinopathy. DCCT trial reported that diet, particularly the consumption of fatty acids and dietary fiber, are significantly associated with the rate of progression of diabetic retinopathy and retinopathy-related risk factors

Multivariate logistic regression analysis showed association of diabetic retinopathy with duration of Diabetes more than 10 years remains most significant about 4.1 times higher chance of retinopathy after adjusting other variables. Uncontrolled diabetes with HbA1C more than 7 has 3.68 times higher chance of retinopathy as per our study Treatment with insulin (odds ratio 2.316) and high urine microalbumin level (odds ratio 2.377) are also show higher risk for retinopathy after adjusting for other confounding variables, and are independent risk factors for diabetic retinopathy.

Major limitation of our study was that it was a cross sectional study conducted for only one year. As it is conducted in a tertiary eye care centre prevalence calculated is only hospital based prevalence and could not be projected to population as such. Large multicentral prospective studies are required to validate our findings.

Conclusion

Duration of diabetes and glycemic control are the major risk factors for diabetic retinopathy.

High urine microalbumin level in diabetic patients indicating microvascular damage shows a higher chance of retinopathy. Established nephropathy also has significant association.

Thus, good glycemic control, regular exercises and avoidance of smoking may decrease the chance of developing retinopathy to some extent.

References

1. Vinícius Carriero Lima, [1,2] Gabriela Coutinho Cavalieri,[1] Maurício Carriero Lima,[1] Nazaré et al Otília Risk factors for diabetic retinopathy: a case–control study;nt J Retina Vitreous. 2016; 2: 21.
2. Narendran V, John RK, RaghuramA, Ravindran RD, Nirmalan PK, Thulasiraj RD. Diabetic retinopathy among self reported diabetics in southern India: a population based assessment. *Br J Ophthalmol*. 2002;86:1014–1018
3. Rema M[1], Premkumar S, Anitha B, Deepa R, Pradeepa R, Mohan V. Prevalence of diabetic retinopathy in urban India: the Chennai Urban Rural Epidemiology Study (CURES) eye study, I.Invest Ophthalmol Vis Sci. 2005 Jul;46(7):2328-33.
4. Rema M, Ponnaiya M, Mohan V. Prevalence of retinopathy in non insulin dependent diabetes mellitus at a diabetes centre in southern India. Diabetes Res Clin Pract. 1996 Sep;34(1):29–36.
5. Kohner EM, Aldington SJ, Stratton IM, et al. Diabetic retinopathy at diagnosis of non insulin dependent diabetes mellitus and associated risk factors. United Kingdom Prospective Diabetes Study, 30. *Arch Ophthalmology*. 1998;116:297–303
6. Agardh E, Agardh CD, Koul S, Torffvit O. A four year follow up study on the incidence of diabetic retinopathy in older onset diabetes mellitus. *Diabet Med*. 1994;11:273–278.
7. Cohen O, Norymberg K, Neumann E, Dekel H. Complication free duration and the risk of development of retinopathy in elderly diabetic patients. *Arch Intern Med*. 1998;158:641–644.
8. Yoshida Y, Hagura R, Hara Y, Sugasawa G, Akanuma Y. Risk factors for the development of diabetic retinopathy in Japanese type 2 diabetic patients. *Diabetes Res Clin Pract*. 2001;51:195–203
9. Klein R, Klein BE, Moss SE, Karthyn MA. The Beaver Dam Eye Study: Retinopathy in adults with newly discovered and previously diagnosed diabetes mellitus. *Ophthalmology*. 1992;99:58–62
10. R Klein and B E K Klein Blood pressure control and diabetic retinopathy; Br J Ophthalmol. 2002 Apr; 86(4): 365–367
11. Rani PK, Raman R, Gupta A,Pal SS, Kulothungan V, Sharma T. Albuminuria and Diabetic Retinopathy in Type 2 diabetes Mellitus Sankara Nethralaya Diabetic Retinopathy Epidemiologic and molecular Genitic Study (SN-DREAMS, report 12).DiabetolMetab Syndr.2011 May 25;(1):9.
12. Raman R[1], Rani PK, Gnanamoorthy P, Sudhir RR, Kumaramanikavel G, Sharma T.association of obesity with diabetic retinopathy: sankaranethralaya diabetic retinopathy epidemiology and molecular genetics study Acta Diabetol. 2010 Sep;47(3):209-15.
13. David K. Cundiff and Claudio R. Nigg, PhD Diet and Diabetic Retinopathy: Insights From the Diabetes Control and Complications Trial (DCCT) Med Gen Medv.7(1); 2005 PMC168138.
14. Dirani m[1], Crowstonjg, Van wijngaarden P. Physical inactivity as a risk factor for diabetic retinopathy? A review Clin Exp Ophthalmol. 2014 Aug;42(6):574-81.