Research Article

THE PREVALANCE OF DIABETIC RETINOPATHY AND CORRELATION WITH RISK FACTORS: PROSPECTIVE STUDY

Rahul Agrawal[1]* and MM. Joshi[2]

[1]Department of Ophthalmology, L. N. Medical College, Kolar Road, Bhopal, Madhya Pradesh, India.
[2]Department of Medicine, L. N. Medical College, Kolar Road, Bhopal, Madhya Pradesh, India.

ABSTRACT

Diabetes Mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycemia; and is major cause of avoidable blindness in both the developing and the developed countries. Patients with diabetic retinopathy (DR) are 25 times more likely to become blind than non-diabetics. DR is a vascular disorder affecting the microvasculature of the retina. This prospective study was carried out on 610 diabetic patients. Detailed history and examination was carried out on all patients. Investigations and fundus examination was done. Proliferative diabetic retinopathy was noted in 145 (85.8%) patients, 7 (4.12%) patients had maculopathy and remaining 17 (10.06%) had proliferative diabetic retinopathy. The prevalence of retinopathy was 51.75% in patients with diabetes of more than 15 of yrs duration. Systolic and diastolic blood pressure has positive correlation with development of Diabetes retinopathy. Prevention is the most effective measure to reduce the burden of complications from diabetic retinopathy. Most diabetic eye diseases can be successfully treated if detected at early stage. Early detection and effective treatment in due time like laser photocoagulation is very effective in preserving the eyesight.

Keywords: Retinopathy, maculopathy, poliferative, haemorrhages.

INTRODUCTION

Diabetes mellitus (DM) is a major cause of avoidable blindness in both the developing and the developed countries[1]. Diabetes Mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycemia[2]. DM is classified on the basis of the pathologic process that leads to hyperglycemia. The two broad categories are type 1 and type 2. Type 2 DM is characterized by variable degree of insulin resistance, impaired insulin secretion and increased glucose production[2]. According to the latest World Health Organization (WHO) report, India has 31.7 million diabetic subjects, and the number is expected to increase to a staggering 79.4 million by 2030[3]. Indian patients demonstrate certain distinct features in relation to DM i.e. onset at a younger age, less common

obesity and a strong genetic predisposition[4]. So it becomes very interesting to study DM in Indian setting.

Diabetic retinopathy (DR) remains the leading cause of visual impairment in the western countries[5]. Patients with diabetic retinopathy (DR) are 25 times more likely to become blind than non-diabetics[1]. It is estimated that DR develops in more than 75% of diabetic patients within 15 to 20 years of diagnosis of diabetes[6, 7]. DR is a vascular disorder affecting the microvasculature of the retina. It is estimated that diabetes mellitus affects 4 per cent of the world's population[8]. Progression of DR and subsequent visual loss can be reduced by achieving good glycemic control. The important risk factors[1] responsible for the development of DR are duration of diabetes, poor glycemic control,

advanced age, associated hypertension, nephropathy, raised cholesterol, presence of anaemia, pregnancy.

Evidence of retinopathy is present in almost 50-80% of those with type 2 diabetes mellitus after 20 years of disease[9]. DR is broadly classified in two groups- non proliferative and proliferative. Prevalence of both background and proliferative retinopathy increases in direct proportion to the duration of diabetes[10].

The present study was carried out with the aim of find out the prevalence of DR in Indian set up and to identify the risk factors responsible for the development of DR.

MATERIAL AND METHODS

This prospective study was carried out on 610 patients presented to the diabetic OPD of our medical college hospital during a period of 2 years from January 2010 to December 2012. The patients represent the general population from urban as well as rural areas.

The diagnosis of diabetes was made in all patients by performing standard blood glucose tests-fasting as well as post-prandial. Glycosylated haemoglobin (HbA_{1C}) was also performed in all patients to confirm the diagnosis. The detail history was taken like the type, onset, duration, treatment, nature of diabetes control, associated systemic diseases and ocular complications. The selected patients were subjected for thorough clinical examinations and other routine investigations. A written informed consent was obtained from all the participating patients.

Hypertension was defined as the presence of systolic blood pressure (SBP) >150 mm Hg and diastolic blood pressure >90 mm Hg or more and if any person was being treated with antihypertensive drugs. In addition to blood glucose and Glycosylated haemoglobin (HbA_{1C}), lipid profile was also performed. Urine protein estimation was done in a 24-hr sample of urine. Presence of urinary infection was excluded before testing for proteinuria.

After adequately dilating the pupil using 1% Mydriacyl, detailed fundus examination was carried out using indirect ophthalmoscopy to look for presence of diabetic retinopathy and its type. Background diabetic retinopathy (BDR) was diagnosed by the presence of micro aneurysms, blot hemorrhages or cotton wool spots. Proliferative diabetic retinopathy (PDR) was defined as the presence of abnormal new vessels on the disc or elsewhere. Retinopathy was classified according to diabetic retinopathy study

(DRS) and early treatment diabetic retinopathy study (ETDRS) [11, 12].

RESULTS

Out of total 610 diabetic patients included in the study, 329 (53.93%) were males, 281 (46.07%) were females.

Table I shows prevalence of diabetic in different age groups and percentage of diabetic retinopathy in each group. After the age of 60 years more than 50% patients had evidence of retinopathy. Table II shows percentage of DR according to duration of diabetes. This clearly shows that as the duration of diabetes increases, prevalence of retinopathy also increases. The prevalence of retinopathy was 51.75% in patients with diabetes of more than 15 of yrs duration.

Table III shows the relationship between systolic blood pressure and diabetic retinopathy. It clearly depicts that as the systolic blood pressure go on increasing, the chances of developing diabetic retinopathy also increases. 41.84% patients with blood pressure more than 160 mm Hg had evidence of DR in contrast to only 1.11% in patients with blood pressure below 120 mm Hg.

Diastolic blood pressure also has positive correlation with development of Diabetes retinopathy. (Refer table no. IV). Total 169 patients (27.70%) had evidence of retinopathy. Proliferative diabetic retinopathy was noted in 145 (85.8%) patients, 7 (4.12%) patients had maculopathy and remaining 17 (10.06%) had proliferative diabetic retinopathy (Table V).

DISCUSSION

Retinopathy is a major cause of morbidity in patients with diabetes. It remains the primary cause of blindness in most industrialized countries. The present study tried to correlate development of diabetic retinopathy with other risk factors. The Fundoscopic findings were also noted.

The mean age of the patients was 55.51 years. Minimum age was 24 years and maximum age was 77 years. The duration of diabetes ranged from 4 to 20 years. 51.72% patients of DR were in the age group 61-70. Agrawal RP et al[4] also noted that more that more than 50% patients after the age of 60 years had evidence of retinopathy. Khuwaja[13] and Adams DD[14] also concluded that DM is leading cause of blindness between the ages of 20 and 74. Singh R et al[1] stated that prevalence and severity of DR increases with increasing age in Type 1 DM but not in type 2 DM.

Duration of diabetes is also independent risk factor for development of DR. In the present study, Diabetic retinopathy was present in 51.75% patients with diabetes of more than 15 of yrs duration. Agrawal RP et al[4] also found same correlation in their study. Rema and Pradeepa[8] quoted that duration of diabetes is probably the strongest predictor for development and progression of retinopathy. Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) reported that higher prevalence of DR was associated with longer duration of diabetes.

Out of 610 patients, 169 patients (27.70%) had evidence of retinopathy. Agrawal RP et al[4] recorded retinopathy in 28.9% patients. Ramchandran et al[15] noted DR in 23.7% cases of type 2 DM. In Australian study by Knuiman MW[16] recorded prevalence of DR in 28% patients. The observed geographic/population variations in the prevalence of diabetic retinopathy could be due to real ethnic differences in the susceptibility to diabetic retinopathy (genetic) or due to poor control of diabetes, prevalence of hypertension and influence of socio-economical and cultural factors (environmental)[4].

Hypertension is significant risk factor for development of DR. The possible mechanisms by which hypertension may affect DR are haemodynamic (impaired auto regulation and hyperperfusion) and through VEGF (vascular endothelial growth factor) [8].

Other risk factors for DR are poor glycemic control, associated renal disease, elevated serum lipids, alcohol consumption, presence of anaemia, etc[8].

The major limitation of our study was the included sample size, which should be more as the prevalence of the diabetes is higher. So that it can give some promising results. A larger study evaluating other mentioned risk factors should be carried out.

Table 1: Distribution of patients of DR according to age groups

Age group in years	Total	Presence of retinopathy	
		No. of patients	Percentage
< 30	62	10	16.13%
31-40	105	15	14.29%
41-50	113	21	18.58%
51-60	154	29	18.83%
61-70	87	45	51.72%
> 70	89	49	55.06%
Total	610	169	27.70%

Table 2: Prevalence of DR according to duration of diabetes

Duration of Diabetes in years	Total	Presence of retinopathy	
		No. of patients	Percentage
< 5	110	21	19.09%
6-10	239	45	18.82%
11-15	147	44	29.93%
> 15	114	59	51.75%
Total	610	169	27.70%

Table 3: Relationship of systolic blood pressure and development of DR

Systolic BP in mm of Hg.	Total	Presence of retinopathy	
		No. of patients	Percentage
< 120	90	1	1.11%
121-140	143	31	21.68%
141-160	236	78	33.05%
> 160	141	59	41.84%
Total	610	169	

Table 4: Relationship of diastolic blood pressure and development of DR

Diastolic BP in mm of Hg.	Total	Presence of retinopathy	
		No. of patients	Percentage
< 80	112	2	1.79%
81-90	140	27	19.29%
91-100	241	76	31.54%
> 100	117	64	54.70%
Total	610	169	

Table 5: Frequency of different types of Fundoscopic findings

Fundoscopy findings	Number of patients	Percentage
Proliferative	145	85.8%
Maculopathy	7	4.12%
Non proliferative	17	10.06%
Total	169	

CONCLUSION
The possible risk factors responsible for the development of DR are duration of diabetes, poor glycemic control, advanced age, associated hypertension, nephropathy, raised cholesterol, presence of anaemia, pregnancy etc. So avoidance of these high risk factors helps to reduce the complications. Prevention is the most effective measure to reduce the burden of complications from diabetic retinopathy. Periodic and comprehensive eye checkups by expert ophthalmologist are essential for all individuals with DM. Most diabetic eye diseases can be successfully treated if detected at early stage. Early detection and effective treatment in due

time like laser photocoagulation is very effective in preserving the eyesight.

REFERENCES

1. Singh R, Ramasamy K, Abraham C, Gupta V, Gupta A. Diabetic retinopathy: An update. Indian J Ophthalmol. 2008, 56 (3):179-88.
2. Abid Ullah Khan, Rehana Yasmeen, Munawar Habib. Frequency of different grades of retinopathy in type-2 diabetes mellitus patients at military hospital Rawalpindi. March 2012, 1.
3. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes, estimates for the year 2000 and projections for 2030. *Diabetes Care*. 2004; 27:1047–53.
4. Agrawal RP, Ranka M, Beniwal R, Gothwal SR, Jain GC, Kochar DK, Kothari RP. Prevalence of diabetic retinopathy in type 2 diabetes in relation to risk factors: hospital based study. Int. J. Diab. Dev. Countries. 2003 (23):16-9.
5. Mohan Rema, Sundaram Premkumar, Balaji Anitha, Raj Deepa, Rajendra Pradeepa, and Viswanathan Mohan. Prevalence of Diabetic Retinopathy in Urban India: The Chennai Urban Rural Epidemiology Study (CURES) Eye Study I. Investigative Ophthalmology & Visual Science. July 2005, 46 (7): 2328-33.
6. Dwyer MS, Melton J, Ballard DJ, et al. Incidence of diabetic retinopathy and blindness: a population based study in Rochester. Minnesota. Diabetes Care. 1985;8:316 –22.
7. Klein R, Klein BE, Moss SE, Davis MD, DeMets ML. The Wisconsin epidemiologic study of diabetic retinopathy. III Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. Arch Ophthalmol. 1984; 102:527–32.
8. Rema M and Pradeepa R. Diabetic retinopathy: An Indian perspective. Indian J Med Res. March 2007, 297-310.
9. Aguilar D, Hallman DM, Piller LB, Klein EK, et al. Adverse Association between Diabetic Retinopathy and Cardiac Structure and Function. Am Heart J. Mar 2009; 157: 563–8.
10. Bamashmus MA, Gunaid AA, Khandekar RB . Diabetic retinopathy, visual impairment and ocular status among patients with diabetes mellitus in Yemen: A hospital-based study. Indian J Ophthalmol. Jul–Aug 2009; 57: 293-8.
11. Klein R, Klein BEK, Moss SE, Davis MD, Demets DL. The Wisconsin epidemiologic study of diabetic retinopathy III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. Arch Ophthalmol 1984; 102: 527-32.
12. Klein R, Klein BEK, Moss SE, Davis MD, Demets DL. The Wisconsin epidemiologic study of diabetic retinopathy. Four year incidence and progression of diabetic retinopathy, when age at diagnosis is 30 years or more. Arch Ophthalmol 1989; 107: 244-9.
13. Khuwaja AK. Evidence-based care of type 2 diabetes mellitus: epidemiology, screening, diagnosis and initial evaluation. J Liaquat Uni Med Health Sci Sep - Dec 2003; 2: 63-7.
14. Adams DD. Autoimmune destruction of pericytes as the cause of diabetic retinopathy. Clin Ophthalmol. 2008 June; 2: 295–8.
15. Ramachandran A, Snehalata C, Satyavani K, Latha E, Sasikala R, Vijay V. Prevalence of vascular complications and their risk factors in type 2 diabetes. Jour Assoc Phy India 1999; 47: 1152-6.