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RISK FACTORS FOR DIABETIC RETINOPATHY AND MACULOPATHY

Ophthalmology

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ABSTRACT

Aim: To investigate the risk factors for diabetic retinopathy and maculopathy.

Materials and methods: This was an observational cohort study of 100 cases of type 2 Diabetes with diabetic retinopathy in atleast one eye conducted at Tirunelveli medical college and hospital. Data was collected using a questionnaire and detailed ophthalmic examination was done. Stage of diabetic retinopathy according to Early Treatment Diabetic Retinopathy (ETDRS) grading system was done. Type of maculopathy was documented using fundus fluorescein angiography. The risk factors were studied and analysed statistically.

Results: The study demonstrated significant increase in diabetic maculopathy in the sixth decade and suggested a potential role of risk factors like duration of diabetes, treatment non-adherence for diabetes, glaucoma, microalbuminuria and total cholesterol/ HDL ratio for Diabetic retinopathy. Risk factors like family history of diabetic retinopathy, smoking, alcohol, total cholesterol, triglyceride levels, low HDL level and an abnormal A: V ratio favour maculopathy.

Conclusion: The study highlights the need for more social awareness and early screening of diabetic patients and needs frequent follow- up with the risk factors.

KEYWORDS

Risk Factors, Diabetic Retinopathy, Diabetic Maculopathy, Macular Edema.

INTRODUCTION:

Diabetic retinopathy (DR) is the leading cause of blindness among working age adults worldwide[1]. Estimated prevalence remains around 34.6 % (approximately 93 million individuals) and 10.2 % have an advanced stage of the disease[2]. Recent studies reported that early signs of neuro-retinal damage may even precede vascular signs of DR[3-7].

Chronic hyperglycemia is responsible for a chain of events that leads to DR. Although major risk factors like hyperglycemia and hypertension show a strong association with DR[8,9], there are variations in consistency and pattern of these factors[2]. Prolonged DM duration is a well-established risk factor for DR[10,11,12]. Microalbuminuria has been reported as a marker of microvascular dysfunction and DR[13,14]. Other risk factors such as body mass index (BMI) show controversies in relation to its association with this disease[15]. The aim of this study was to investigate the risk factors for DR and maculopathy.

MATERIALS AND METHODS:

Institutional Ethical committee approval was obtained first. This was an observational cohort study of 100 cases of type 2 Diabetes with diabetic retinopathy in atleast one eye conducted at Tirunelveli medical college and hospital during 2013-2015. Data was collected using a questionnaire which included presence or absence of DR, demographic data, glycemic control, DM profile (diabetes duration, type of DM and treatment) and comorbidities like systemic hypertension, dyslipidemia, and diabetic nephropathy.

Detailed ophthalmic examination was done by slit lamp biomicroscopy and indirect ophthalmoscopy. Visual acuity was recorded in each visit. Stage of diabetic retinopathy according to Early Treatment Diabetic Retinopathy (ETDRS) grading system was done. Type of maculopathy was documented using fundus fluorescein angiography.

The target for glycemic control was set as HbA1c≤7.0 %; hypertension was set as blood pressure ≥140/90 mmHg or use of antihypertensive therapy; dyslipidemia set as triglycerides ≥150 mg/dL and total cholesterol ≥200 mg/dL or use of statins for dyslipidemia; diabetic nephropathy set as microalbuminuria 30–300 mg/L, macroalbuminuria >300 mg/L or previous diagnosis of disease. The risk factors were studied and analysed statistically by Kendall's tau test, Pearson's chi square test and Fisher exact test. Patients were followed up for 2 years and our patients were very co-operative during the entire study.

RESULTS AND DISCUSSION:

In this study maximum number of diabetics belong to 6th decade i.e; 51-60 years age group which was comparable to Joslin et al[10] study. 68 males and 32 females participated in the study. Male to female ratio was 2.1: 1 whereas Golubovic Arsovska[11] reported male to female ratio of 1.26 :1.

58.76% of diabetic retinopathy cases had diabetes for less than 10 years which was slightly higher than Mahfouth et al study[12] (52%). Among patients with maculopathy, 49.61% had diabetes for less than 10 years but Klein R[13] reported 20.1%.

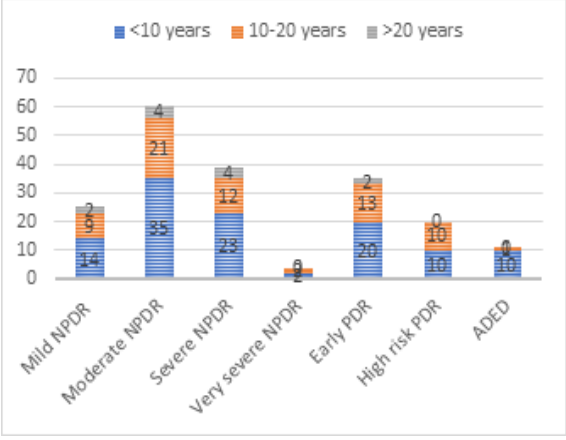


FIG.1 Stage of DR and duration of diabetes

TABLE1 Duration of Diabetes and type of maculopathy

DM duration in years	Maculopathy				Total	P value
	Focal	Diffuse	Ischaemic	Mixed		
0-5	6	21	2	0	29	0.119
5.1-10	16	14	2	3	35	
10.1-15	10	19	0	2	31	
15.1-20	3	20	2	0	25	
20.1-25	0	4	0	0	4	
>25	1	4	0	0	5	
Total	36	82	6	5	129	

Among the 194 eyes with DR, 129 had maculopathy. 76 (39.17%) had concurrent hypertension at presentation which was comparable with Klein et al study[14]. Hypertension had no correlation with progression of DR and p value was significant (0.001). This was comparable to DCCT study[15]. 43.41% of maculopathy cases had hypertension at presentation and there was no significant association (P value 0.21).

Out of 194 eyes with DR, 26 had obesity which accounted for 13.40%. Obesity had no significant correlation with DR (P value 0.4) and no association with maculopathy (P value 0.166).

Family history of diabetes, hypertension, DR and obesity had no correlation with DR and no association with maculopathy and P value was not significant. Family history of DR (1.03%) had significant correlation with progression of DR (P value 0.009). Family history of Hypertension had significant association with development of macular edema (P value 0.039).

Out of 194 eyes with DR, 31 were smokers which was 15.98%. Smoking had no significant correlation with DR (P value 0.287). It was comparable to Muhlhauser et al study[17]. 28 patients with maculopathy had history of smoking which was 21.71%. Smoking and maculopathy had significant association (P value 0.003).

21 out of 129 eyes with maculopathy had history of alcoholism which accounted for 16.27%. Alcohol and DR had no significant correlation (P value 0.236) but Alcohol and maculopathy had significant association (P value <0.0001)

TABLE 2 Type of treatment and type of maculopathy

Treatment	Maculopathy				Total	%	P value
	Focal	Diffuse	Ischaemic	Mixed			
Insulin	7	28	2	0	37	28.68%	<0.0001
OHA	29	50	4	5	88	68.22%	
Both	0	4	0	0	4	3.10%	
Total	36	82	6	5	129	100%	

Regarding treatment taken for diabetes, majority of the population (73.87%) were on oral hypoglycaemic agents, 21.11% of study population were on treatment with insulin, 5.02% were on treatment with both insulin and oral hypoglycaemic drugs. The magnitude of DR was surprisingly high in patients who were on oral hypoglycaemic drugs alone with significant association (P value 0.032). The proportion of patients with maculopathy was significantly higher with oral hypoglycaemic drugs(68.32%) (P value <0.0001). This is because the study group per se had more patients on OHA group. 40% of diabetics under insulin developed macular edema, 5.08% who was under treatment with oral hypoglycaemic agents developed macular edema and 16% of diabetics on both insulin and oral hypoglycaemic agents developed macular edema. Patients on insulin were found to have developed macular edema higher than patients on OHA and both insulin and OHA group (P value 0.021) which was comparable to WESDR study[18]. Type of treatment taken for Diabetes had no association with development of macular edema (P value 0.507) or with worsening of vision (P value 0.351).

7.73% of patients who were not adherent to treatment for diabetes had DR. Treatment non-adherence had significant correlation with progression of DR (P value 0.001). 6.98% of treatment non-adherence patients had maculopathy. There was no significant association of treatment non-adherence with type of maculopathy (P value 0.136). 9.09% of diabetics on regular treatment developed macular edema and 9.09% diabetics who were non-adherent to treatment developed macular edema.

Glaucoma was found in 5.67% of total DR patients in contrast to Malfouth A Bamashmus study[18] who reported 8.6% of patients with diabetes. 1.51% had neovascular glaucoma among study population. Glaucoma and DR stage had significant correlation (P value 0.015%) but Glaucoma and maculopathy had no significant association (P value 0.199). 6 patients with glaucoma developed macular edema and there was significant association.

In our study, none of the patients with DR who underwent cataract surgery developed macular edema and P value was not significant (1.000).

Microalbuminuria was seen in 9.28% of study population which was low as compared to Feldman et al. study who reported 35%. Microalbuminuria had significant correlation with progression of DR (P value 0.014). 9.30% of study population had maculopathy at presentation and it had no significant association (P value 0.864).

Total cholesterol, high triglyceride levels, low HDL level, high total cholesterol/HDL ratio, LDL had significant association with maculopathy (P values 0.037, 0.001, 0.038, 0.015 and 0.049 respectively) were significant. This was comparable to Ferris et al study[16].

Normal A: V ratio (2:3) was found in 59.69% of patients, arteriolar narrowing with normal venous calibre was found in 5.43%, both arteriolar narrowing and venous dilatation was found in 6.97% and only venous dilatation found in 27.91%. Venous dilatation was found to be more common with maculopathy and the P value was significant (0.010).

SUMMARY:

Diabetic retinopathy and maculopathy were commonest in the sixth decade of life of which moderate NPDR and diffuse maculopathy were the commonest.

Patients directly attending department of Ophthalmology were much more than referral. Diffuse maculopathy was the commonest irrespective of DR stage. Moderate NPDR and severe NPDR showed maximum proportion of patients with macular edema. Patients in stage of moderate NPDR and severe NPDR progressed to macular edema within 6 months at 66% and 33% respectively. So observation has to be more stringent in these conditions. In our population, sub-cohort of increased duration of Diabetes are low which may be explained by disability and mortality with increase in age.

Duration of diabetes, treatment non-adherence for diabetes, glaucoma, microalbuminuria and total cholesterol/ HDL ratio are the positive risk factors for the progression of DR. Smoking, alcohol, total cholesterol, triglyceride levels, low HDL level and an abnormal A : V ratio are risk factors for maculopathy. The incidence of macular edema was observed in moderate and severe NPDR. High PPBS, glaucoma and uncontrolled diastolic BP are the definite risk factors for incidence of macular edema in patients with Diabetic retinopathy during the follow-up period. Treatment adherence is an important factor in controlling progression of DR. Intraocular pressure had no correlation with progression of DR or maculopathy. Glaucoma is a risk factor for maculopathy. Patients with glaucoma had incidence of macular edema in short period which was never reported in literature and needs further study. Nephropathy positively correlated with DR. Retinal venous dilatation is an important indicator towards maculopathy.

CONCLUSION:

The study demonstrated significant increase in diabetic maculopathy in the sixth decade. The study suggested a potential role of risk factors like duration of diabetes, treatment non-adherence for diabetes, glaucoma, microalbuminuria and total cholesterol/ HDL ratio for Diabetic retinopathy. Risk factors like family history of diabetic retinopathy, smoking, alcohol, high post prandial blood sugar, uncontrolled diastolic BP, total cholesterol, triglyceride levels, low HDL level and an abnormal A : V ratio favour diabetic maculopathy . This highlights the need for more social awareness and early screening of diabetic patients and needs frequent follow- up with these risk factors.

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