PROSPECTIVE NON-RANDOMISED OBSERVATIONAL CASE STUDY DIABETIC MACULOPATHY

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ABSTRACT

BACKGROUND

The epidemiological study of diabetic maculopathy in Indian population for the period of three years duration and study the treatment outcome following laser photocoagulation for various type of diabetic maculopathy.

MATERIALS AND METHODS

The study was conducted from July 2000 to November 2002 in 96 eyes of 50 patients. Diabetic patients either referred or detected at GOH are taken into study. History regarding onset, duration, family history, drug schedule and dietary habits. Associated systemic factors HT, IHD, renal diseases are recorded. Patients are tested for BCVA using Snellen's chart, IOP using Goldmann applanation tonometer, slit lamp examination, fundus examination using direct and indirect ophthalmoscope and 90D biomicroscopy. Fundus photography taken using fundus camera. FFA done in all cases.

RESULTS

32 patients were above 50 years of age and 18 patients are below 50 years of age. The ratio of male-to-female is 2.85:1 and 92% of patients have bilateral involvement. 28% of patients with maculopathy had diabetes mellitus of 6-10 years duration and 24% of patients had 11-15 years duration. 18.7% cases had clinically significant macular oedema. In FFA study showed 44.8% had focal lesions, 34.4% had diffuse lesions and 28.8% had ischaemic lesions. 76.9% of focal lesions improved with focal photocoagulation and 50% of diffuse lesions improved with grid photocoagulation.

CONCLUSION

Diabetic maculopathy is the commonest cause of visual loss in patient with diabetic retinopathy. Periodic follow up and examination are necessary to detect the involvement of macula at an earlier stage. Early treatment with photocoagulation can stabilise the visual acuity and prevent visual loss.

KEYWORDS

Diabetic Maculopathy, Visual Acuity, Duration, Fundus Fluorescein Angiogram, Laser Photocoagulation.

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BACKGROUND

Diabetes mellitus is a disorder of carbohydrate metabolism characterised by hyperglycaemia and glycosuria. Diabetic retinopathy is a microangiopathy affecting precapillary arterioles, capillaries and venules. The most common cause of early visual impairment in diabetic retinopathy is macular oedema. The disease affects the young and old, chronic and progressive in its course leading to blindness, which is preventable and treatable condition. The complications of diabetes mellitus are a direct sequelae of long-term hyperglycaemia modified by genetic and acquired factors. The prevalence and severity of diabetic retinopathy is related to duration[1] of diabetes mellitus. Retinopathy in IDDM does not occur within 5 years after the onset of the disease. In NIDDM, retinopathy is found within 5 years. Diabetic children are less prone to retinopathy. Risk increases during puberty due to hormonal and metabolic changes.[2] Positive correlation occurs with poor metabolic control and severity of retinopathy.[3] Worsening of retinopathy can occur following rapid control of blood glucose with appearance of cotton wool spots and Intraretinal Microvascular Abnormalities (IRMA). Hypertension can cause progression of diabetic retinopathy and patients are prone to develop microvascular complications.[4] Proteinuria and renal disease are strongly associated with severity of retinopathy.

ETDRS classification[5] is used to classify diabetic retinopathy, which gives better understanding of progression of disease and deciding about management. In these, retinopathy is classified into nonproliferative diabetic retinopathy, proliferative diabetic retinopathy and maculopathy.[6] Macular oedema is an important component of NPDR and associated with any stage of NPDR and with PDR. Macular oedema is defined as an area of thickening

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within one disc area of the foveal centre or as retinal thickening or definite hard exudates associated with retinal thickening at or within one disc area of the centre of macula. Fundus fluorescein angiogram is the important diagnostic tool in classifying the type of maculopathy. It is very useful in deciding about the management of non-CSME by differentiating ischaemic from other type.

AIM

To study the incidence, relationship between diabetic age and type of maculopathy, role of FFA and laser photocoagulation in diabetic maculopathy.

MATERIALS AND METHODS

The study was conducted from July 2000 to November 2002 in 96 eyes of 50 patients. Diabetic patients either referred or detected at GOH are taken into study. History regarding onset, duration, family history, drug schedule and dietary habits, associated systemic factors, HT, IHD and renal diseases are recorded.

Inclusion Criteria

1. All diabetic patients with macular oedema are included.
2. Both type I and type II diabetic patients included.
3. All age groups included.

Exclusion Criteria

1. Patients with diabetic retinopathy without maculopathy are excluded.
2. Macular oedema due to other causes are excluded.
3. Diabetic patients with associated ocular conditions - glaucoma and uveitis are excluded.
4. Grade III and IV hypertensive retinopathy excluded.

Procedures

Patients are tested for BCVA using Snellen's chart, IOP using Goldmann applanation tonometer, slit lamp examination, fundus examination using direct and indirect ophthalmoscope and 90D biomicroscopy. Fundus photography taken using fundus camera. FFA done in all cases with all precautionary measurements after getting informed consent.

RESULTS

I. Age Incidence

Sl. No.	Age Groups	Number of Patients	Percentage
1.	21-30	3	6
2.	31-40	4	8
3.	41-50	11	22
4.	51-60	16	32
5.	61-70	13	26
6.	71-80	3	6

Table 1. Age Incidence

In this study, the predominant age group affected is the 51-60 years range 32%, followed by 61-70 years range 26% and 41-50 years range 22%.

II. Sex Incidence

Sl. No.	Age Group (Years)	Number of Males	Number of Females	Percentage	
				Males	Females
1.	21-30	3	-	6%	-
2.	31-40	4	-	8%	-
3.	41-50	9	2	18%	4%
4.	51-60	9	7	18%	14%
5.	61-70	11	2	22%	4%
6.	71-80	1	2	2%	4%

Table 2. Sex Incidence

The ratio of male-to-female in our study 3:1. The predominant age group in which males and females were affected was between 51-60 years.

III. Laterality

	Right Eye	Left Eye	Both Eye
Number	2	2	46
Percentage	4%	4%	92%

Table 3. Laterality

In this study, 92% of the patients had bilateral involvement, although asymmetrically.

IV. Duration of Diabetes

Duration of Diabetes (In Years)	Number of Patients	Percentages
<1	3	6%
2-5	10	20%
6-10	14	28%
11-15	12	24%
16-20	7	14%
21-25	4	8%

Table 4. Duration of Diabetes Mellitus

In this study, 28% of patients had diabetes of 6-10 years duration followed by 24% of patients of 11-15 years duration. 26% of patients had diabetes of 5 or less than 5 years of duration.

V. Duration of Defective Vision

Sl. No.	Duration of DV (in Years)	Number of Cases		Total	Percentage
		RE	LE		
1.	<1 year	10	12	22	25%
2.	1-3	16	16	32	36.7%
3.	4-6	12	12	24	27.3%
4.	7-9	6	2	8	9%
5.	10-12	1	1	2	2%

Table 5. Duration of Defective Vision

Most of the patients 36.7% had defective vision of 1-3 years duration. 28.5% of patients had visual loss of less than one year duration.

VI. Visual Acuity on Presentation

Sl. No.	Visual Acuity on Presentation	Number of Cases		Total	Percentage
		RE	LE		
1.	6/6-6/9	5	6	11	11.5%
2.	6/12-6/18	11	14	25	26%
3.	6/24-6/36	15	14	29	30.2%
4.	6/60	13	10	23	24%
5.	<4/60	4	4	8	8.3%

Table 6. Visual Acuity on Presentation

11.5% of cases had good visual acuity, 30.2% of cases had visual acuity of 6/24-6/36 on presentation.

VII. Visual Acuity on Presentation to the Type of Maculopathy

Visual Acuity	Focal				Diffuse				Ischaemic			
	RE	LE	Total	%	RE	LE	Total	%	RE	LE	Total	%
6/6-6/9	5	6	11	25.6	-	-	-	-	-	-	-	-
6/12-6/18	8	11	19	44	2	2	4	12	1	1	2	10
6/24-6/36	6	3	9	21	6	6	12	36.4	3	5	8	40
6/60-4/60	2	1	2	4.7	8	7	15	45.6	3	3	6	30
<4/60	1	1	2	4.7	1	1	2	6	2	2	4	20

Table 7. Visual Acuity on Presentation to the Type of Maculopathy

44% of the patients with focal type of lesion had visual acuity in the range of 6/12-6/18. Most of the patients with focal type of lesion had visual acuity between 6/6-6/36.

45.6% of patients with diffuse type had visual acuity between 6/60-6/40. Mostly, the visual acuity ranges of patients were between 6/24-4/60.

40% of patients with ischaemic type had visual acuity range between 6/24-6/36.

18 cases had features of proliferative diabetic retinopathy.

4 cases had features of hypertensive retinopathy grade I to II (Keith Wagner Grading).

VIII. Fundus Fluorescein Angiography

Types of Maculopathy	Number of Cases		Total	Percentage
	RE	LE		
Focal	22	21	43	44.79%
Diffuse	17	16	33	34.37%
Ischaemic	9	11	20	20.83%

Table 8. Type of Maculopathy on FFA

In our series, 44.8% patients had focal type of maculopathy. 34.4% had diffuse type and 20.8% had ischaemic lesion.

IX Maculopathy - Relative Incidence

Sl. No.	Fundus Change	Focal	Diffuse	Ischaemic
1.	Maculopathy alone	14	7	
2.	Maculopathy with retinopathy	29	26	20

Table 9. Maculopathy Relative Incidence

In this study, 14 of focal type had maculopathy alone. They are the patients who presented with early visual changes.

X. Type of Maculopathy

Sl. No.	Type	Number	Percentage
1.	CSME	18	18.7%
2.	Non-CSME	78	81.3%

Table 10. Type of Maculopathy

In our series, 18.7% cases having clinically significant macular oedema.

In CSME, 3.3% cases had focal type and 66.7% cases had diffuse type of maculopathy. In non-CSME, 25.6% cases had ischaemic type and 74.4% cases had non-ischaemic type of maculopathy.

XI. Duration of Diabetes to the Type of Maculopathy

Duration of Diabetes (in years)	Focal				Diffuse				Ischaemic			
	RE	LE	Total	Percentage	RE	LE	Total	Percentage	RE	LE	Total	Percentage
<1	2	2	4	9.3	2	2	4	12.1	-	-	-	-
2-5	8	7	15	34.9	1	2	3	9.1	1	1	2	10
6-10	7	8	15	34.9	3	3	6	18.2	1	4	5	25
11-15	2	1	3	7	6	5	11	33.3	2	4	6	30
10-20	2	2	4	9.3	4	3	7	21.2	2	1	3	15
>20	1	1	2	4.6	1	1	2	6.1	3	1	4	20

Table 11. Duration of Diabetes to Type of Maculopathy

In our series, 35% of focal type had diabetes of 6-10 years duration and 35% of patients had 2-5 years duration. This signifies that the fact type develop earlier. Since, microaneurysms are the earlier change, they leak and form hard exudate rings.

33.3% of ischaemic type had diabetes of 11-15 years duration and 25% had for 6-10 years. Ischaemia is due to the occlusion of precapillary arterioles and associated with proliferative diabetics of longer duration, this may explain the longer duration of the disease.

XII. Laser Treatment

a. Focal Diabetic Maculopathy

	Visual Acuity					
	Better		Same		Worse	
	Number	Percentage	Number	Percentage	Number	Percentage
Difference in line on Snellen chart 1 or more	10	76.9	3	23.1	-	-

Table 12. Results After Focal Photocoagulation in Focal Lesions

Of 13 patients with focal lesions, 10 showed improvement in one or more line in Snellen chart and vision of three patients remained static.

b. Diffuse Diabetic Maculopathy

	Visual Acuity					
	Better		Same		Worse	
	Number	Percentage	Number	Percentage	Number	Percentage
Difference in Line on Snellen chart 1 or more	8	50	6	37.5	2	12.5

Table 13. Results After Grid Photocoagulation in Diffuse Lesions

50% of treated patients with diffuse oedema (grid photocoagulation) showed visual improvement. If the visual acuity on initial presentation is less than 6/60, the vision remained either static or became worse.

DISCUSSION

96 eyes of 50 patients were taken for study. 32 patients were above 50 years of age, 18 patients were below 50 years of age and male-to-female ratio was 2.85:1. The predominant age group affected is 51-60 years range (26%) and 61-70 years range (26%) and 41-50 years range (22%). 28% of patients had diabetes mellitus of 6-10 years' duration followed by 24% patients of 11-15 years of duration and 26% of patients had five or less than five years of duration. This correlates with Wisconsin Epidemiological Study of Diabetic Retinopathy[1] revealed diabetic retinopathy more prevalent in people aged 45 to 64 years.

76.9% of focal type of maculopathy improved with focal laser photocoagulation. It correlates with ETDRS, which showed improvement of visual acuity in 57% cases following focal photocoagulation (ETDRS Report I photocoagulation for diabetic macular oedema)[7] and Patz, Blankerships Chang et al study[8] revealed 75% of treated patients had significant visual improvement. 50% of treated patients with diffuse oedema by grid photocoagulation showed visual improvement. It correlates with ETDRS report I photocoagulation for diabetic macular oedema 103:1985 ophthal,[7,9] which showed improvement of visual acuity

occurred in 43% of cases and worsening in 25% of cases following grid photocoagulation. Focal laser treatment to leaking microaneurysms and grid laser photocoagulation to areas of diffuse lesions prevented moderate visual loss. Laser treatment also results in closure of microaneurysms, resolution of oedema and absorption of hard exudates.

CONCLUSION

Diabetic maculopathy is the commonest cause of visual loss in patient with diabetic retinopathy. Periodic follow up and examination are necessary to detect the involvement of macula at an earlier stage. Early treatment with photocoagulation can stabilise the visual acuity and prevent visual loss.

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