EVALUATION OF RETINOPATHY IN MALNUTRITION RELATED DIABETES MELLITUS USING NON-MYDRIATIC RETINAL COLOUR PHOTOGRAPHY

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Malnutrition related diabetes mellitus (MRDM), which is different from the classical insulin dependent diabetes mellitus and non insulin dependent diabetes mellitus (NIDDM) is seen in upto one third of young diabetics in India and other developing countries.

Retinopathy is an important preventable cause of blindness in all forms of diabetes[6]. Objective assessment of retinopathy using permanent photographic images is more accurate than simple ophthalmoscopic examinations.

The Canon CR 3 45 NM retinal camera uses an infrarred light to focus and does not require pharmacological mydriasis to photograph the retina. With a field of vision of 45 degrees, use of the camera substantially increases the rate of detection of diabetic retinopathy[7].

We report the evaluation of retinopathy using the non-mydriatic retinal camera and a high resolution fine grain colour film in patients with malnutrition related diabetes mellitus and non insulin dependent diabetes mellitus. To our knowledge this is the first study where all such MRDM patients were assessed by high resolution fine grain colour transparencies, and retinopathy scored according to the Wisconsin Diabetic Retinopathy study score[4].

Materials and Methods

Definition of terms

Malnutrition related diabetes meIlitus[2] :

(a) Body mass index (BMI=height in metres squared divided by weight in kilograms) less than 19

(b) Onset of diabetes before 30 years

(c) History of consumption of low protein diet.

(d) Moderate to severe hyperglycemia, absence of ketosis

(e) Insulin dependence for control of hyperglycemia

(f) No history of biliary disease or alcohol consumption as to cause pancreatic pathology

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Mean blood pressure

Mean blood pressure is the sum of the diastolic pressure and one third the pulse pressure[3].

All the photographs were taken by only one person (GRS) using the Canon CR 3 45 NM non-mydriatic retinal camera. The 45 degrees field of vision, was fixed, and the image included the macula and peri-macular areas. Photographs were taken of the right eye first and then of the left eye.

Fujichrome professional D(125 ASA) colour transparency film was used, and developed in the C-6 process. Retinopathy was scored (by KS) in a blind fashion after projecting each transparency on a matte off white projection screen 15 feet from the projector.

The Wisconsin Diabetic-Retinopathy Study scoring system was used, with modification[4].

Level	**Definition**
1	No retinopathy
1.5	Retinal hemorrhages only No microaneurysms
2	Microaneurysms (one or more) only
3	Microaneurysms and one or more of the following : questionable intraretinal microvascular abnormalities questionable venous beading, small venous loops
4	Microaneurysms and one or more of the following : intra retinal microvascular abnormalities venous beading larger venous loops
6.0	Fibrous proliferation only
6.1	No evidence of 6.0 or 6.5 but scars of photocoagulation either in ‘scatter’ or confluent patches, presumably directed at new vessels
6.5	New vessels on or within one disc diameter of disc

Grades 1.5 to 3 constitute background retinopathy, and 6 through to 7, proliferative retinopathy.

Routine blood chemistry and renal parameters including blood urea, serum creatinine, serum electrolytes and 24 hour urinary albumin excretion were estimated.

The data was analysed on Apple lle microcomputer using d Base II and Abstat software packages.

Table l

Diabetic Retinopathy

	MRDM (n : 8)	NIDDM (n : 13)
No retinopathy	6	6
Background	2	7
Maculopathy	0	1
Proliferative	0	0

Note : The diabetic with maculopathy had background changes also.

Table 2

Comparison of NIDDM patients with and without retinopathy

	With retinopathy (n : 6)	Without retinopathy (n : 7)	
Mean age in yrs (SD)	53.00 ± 7.5	54.00 ± 7.7	$p < 0.01$
Mean duration in yrs (SD)	10.57 ± 5.4	7.17 ± 4.0	$p < 0.05$
Mean age at onset in yrs	43.29 ± 9.1	46.83 ± 10.8	n.s.
Frequencies :			
Systolic BP> 159 mmHg	3	0	$p < 0.05$
Diastolic BP>89 mmHg	3	0	$p < 0.01$
Glucose > 150 mg/dl	3	3	n.s.
Creatinine > 1.5 mg/dl	4	1	$p < 0.1$
Urine albumin >0.5 gm/24 h	3	2	n.s.

Table 3

Comparison of MRDM patients with and without retinopathy

	With retinopathy (n : 2)	Without retinopathy (n : 6)	
Mean duration yrs (SD)	2.5 ± 2. 1	6.5 ± 7.9	p < 0.5
Frequencies :			
Systolic BP >159 mmHg	0	1	p < 0.5
Diastolic BP > 89 mmHg	0	3	p < 0.5
Glucose > 150 mg/dl	2	6	p < 0.5
Serum creatinine <1.5 mg/dl	1	5	p<0.001
Urine albumin > 0.5 mg/24 h	1	3	p< 0.001

Results

There were eight patients of MRDM (seven males, one female) and 13 NIDDM (seven males, six females). Retinopathy was seen in both groups-: background retinopathy in 25% of MRDM and 53.85% of NIDDM; macular edema was present in 12.5% of MRDM and 7.69% of NIDDM. Neither group showed proliferative retinopathy.

Among the MRDM patients with retinopathy (2/7), both were males, with the duration of diabetes between one and five years. BMI in both was below 19. None had hypertension (systolic pressure equal to or more than 160 and/or diastolic pressure equal to or more than 90mmHg). Fasting blood glucose was more than 150 mg% in both. Serum creatinine was more than 1.5 mg% in one and less than 1.5 mg% in the other. Similarly 24 hour urinary albumin excretion was less than 500 mg in one and more than 500 mg in the other.

Among the NIDDM patients with retinopathy (7/13) there were three males and four females. The duration of diabetes ranged from 5 to 18 years. Systolic hypertension (> 159 mmHg) was present in three and diastolic hypertension (> 89 mmHg) also in three. Fasting blood glucose was below 150 mg% in four and above 150 mg% in three. Serum creatinine was below 1.5 mg% in three and more than 1.5 mg% in four. Twenty four urinary albumin excretion was less than 500 mg in four and above 500 mg in three.

Discussion

Two of eight patients with MRDM showed diabetic retinopathy. The retinopathy, was correlated with the following factors : age of the patient, age at diagnosis and duration of diabetes. Later age of onset of MRDM was positively correlated with retinopathy. Although the mean BMI of MRDM patients with retinopathy was lower than those without retinopathy, there was no statistically significant difference (BMI 16 vs l7.2).

Retinopathy in MRDM was not correlated with renal decompensation. Increased serum, creatinine and urinary excretion of albumin were inversely correlated with retinopathy.

Interestingly, none of the MRDM patients with retinopathy had hypertension (> 160/90 mmHg) in this study. The degree of hperglycemia showed a weak association with retinopathy ($p<0.5$).

Six of the thirteen patients of NIDDM had diabetic retinopathy. Although there was no correlation between the age at diagnosis and retinopathy, retinopathy showed significant correlation; with age of the patient ($p <0.01$ duration of diabetes ($p <0.5$).

Obesity was not related to retinopathy in NIDDM.

Unlike in MRDM, retinopathy in NIDDM was significantly associated with diastolic ($p<0.01$) and systolic ($p<0.05$) hypertension.

Even though elevated serum creatinine showed a weak correlation diabetic retinopathy m NIDDM, urinary excretion of albumin/24 hours did not show any correlation.

Summary

Retinopathy was evaluated in eight patients with MRDM and 13 patients with NIDDM using the non-mydriatic retinal camera. Two patients with MRDM and six with NIDDM had retinopathy. Retinopathy was not positively associated with elevated serum creatinine and urinary albumin levels. It was correlated with age at diagnosis, duration of diabetes and age of the patient. There was a negative correlation with the blood pressure level. Retinopathy in NIDDM showed a significant relation with diastolic and systolic hypertension. There was also correlation with age of the. patient, and duration of diabetes. Obesity and renal status were not correlated with retinopathy in NIDDM.

Acknowledgement : We thank Dr. P. Vishnupriya Rao for his help in computerization and statistical analysis of the data.

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