



MICROALBUMINURIA AND DIABETIC RETINOPATHY IN PATIENTS OF TYPE 2 DM - A ONE YEAR CROSS SECTIONAL STUDY AT A TERTIARY CARE HOSPITAL IN NORTH KARNATAKA

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ABSTRACT

Background: Diabetes Mellitus is one of the most common chronic disorders. The magnitude of the problem is compounded by the various complications targeting vital organs. Diabetic nephropathy is the leading cause of End Stage Renal Disease which affects 25 to 40% of type 2 diabetics. The earliest evidence of nephropathy is microalbuminuria. Our aim is to study the prevalence of microalbuminuria and diabetic retinopathy and to study the association with respect to duration. **Materials and Methods:** This study explored the prevalence data of 100 patients of type 2 diabetes mellitus, admitted to tertiary care medical college hospital in Bagalkot, North Karnataka from January 2019 upto January 2020, after fulfilling the inclusion criteria as defined by American Diabetes Association 2019 (5), through a retrospective approach. **Results:** This study observed that 45% had diabetic retinopathy on fundus examination, 35 % had microalbuminuria while 28% had both retinopathy and microalbuminuria ($p < 0.000$). The mean duration of diabetes was 10.64 years with 54% having duration of diabetes more than 5 years. Normal BMI was noted in 74 % of patients. Majority of patients (57%) had uncontrolled blood sugars with HbA1c value more than 7%. The correlation between microalbuminuria and diabetic retinopathy was highly statistically significant with p value < 0.000 . **Conclusion:** The present study has shown that there is significant association between the presence of microalbuminuria and retinopathy. It has also shown that there is increase in the prevalence of microalbuminuria and retinopathy with increasing age, HbA1c $> 7\%$, BMI > 25 Kg/m².

KEYWORDS :

Diabetes mellitus is one of the most common metabolic diseases characterised by long-term microvascular and macrovascular complications. At present globally, nearly 382 million people suffer from DM, of which 80% are in developing countries (1). In India 65.1 million people suffer presently, while the International Diabetes Federation (IDF) has declared that by 2035 nearly 109 million Indians will be affected (2).

Of the microvascular complications the relationship between Microalbuminuria and retinopathy, neuropathy, and ischemic heart disease has been demonstrated in Type 1 Diabetes Mellitus. However, little information is available on Type 2 DM.

Diabetic nephropathy an important cause of morbidity and mortality occurs in 25% of non-insulin dependent. However microalbuminuria, prevalence of which is 15 – 20 percent, a marker and a powerful predictor of widespread microvascular damage heralds the incipient stage of diabetic nephropathy if detected in time, with therapeutic intervention can arrest the progression to end stage renal disease as it precedes overt diabetic nephropathy by 10 – 15 years (3).

Diabetic retinopathy which includes maculopathy and proliferative complications (4), is one of the leading acquired cause of blindness in the world and has a 25 times higher risk compared to normal individuals which could be precipitated based on duration of diabetes, hyperglycemia, pregnancy, change in hormonal level, genetics and microalbuminuria.

AIMS AND OBJECTIVES

- To study the prevalence of microalbuminuria and retinopathy in type 2 diabetes mellitus patients.
- To study the association with duration between microalbuminuria and retinopathy in type 2 diabetes mellitus.

MATERIALS AND METHODS

This study explored the prevalence data of 100 patients of type 2 diabetes mellitus, admitted to tertiary care medical college hospital from January 2019 upto January 2020, after fulfilling

the inclusion criteria as defined by American Diabetes Association 2019 (5), through a retrospective approach. The demographic details of the patients, fasting blood sugar, post prandial blood sugar, glycosylated haemoglobin values were noted. Microalbuminuria estimated by MICRAL test – screening test in an ambulatory setting, Blood urea, Serum creatinine, comorbidities eg. associated Hypertension etc. noted. Detailed ophthalmic examination (visual activity, slit lamp examination, fundus examination) of every patient report noted. The inclusion criteria (5) :

- Fasting blood glucose ≥ 126 mg/dl (7.0mmol/l). Fasting is defined as no caloric intake for at least 8 hours. (or)
- HbA1C $\geq 6.5\%$ (48mmol/mol) (or)
- Two-hour plasma glucose ≥ 200 mg/dl (11.1mmol/l) during an oral glucose tolerance test (OGTT) (or)
- In a patient with classical symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥ 200 mg/dl (11.1mmol/l)

RESULTS

Our study sample comprised of 100 patients of Type 2 DM, of which 46% were males and 56 % were females with majority of patients (62%) were in the age group of 40- 59 years. The mean age among our study population was 55 years with SD ± 10.43 years as demonstrated in table 1.

Table 1: Characteristics of study population

Characteristics of the study population	Frequency	Percent
Age in Yrs	33	33.0
40-49		
50-59	29	29.0
60-69	25	25.0
≥ 70	13	13.0
Gender	46	46.0
Male		
Female	54	54.0
Microalbuminuria	35	35.0
Positive		
Negative	65	65.0
Diabetic Retinopathy	45	45.0
Positive		
Negative	55	55.0
Duration of DM (in Yrs)	46	46.0
≤ 5		
6-10	26	26.0
11-15	17	17.0
≥ 16	11	11.0
Body Mass Index	74	74.0
< 25		
≥ 25	26	26.0
HbA1c%	23	23.0
< 6.5		
6.5 - 7	20	20.0
7.1 - 7.5	18	18.0
> 7.5	39	39.0

We observed that 45% had diabetic retinopathy on fundus examination, 35 % had microalbuminuria while 28% had both retinopathy and microalbuminuria (p<0.000).

The mean duration of diabetes was 10.64 years with 54% having duration of diabetes more than 5 years.

Normal BMI was noted in 74 % of patients. Majority of patients (57%) had uncontrolled blood sugars with HbA1c value more than 7%. We observed that in those with HbA1c level >7% retinopathy was found in 73 % patients (33/45) (p=0.001) whereas microalbuminuria was seen in 71% patients (25/35) (p<0.000).

Compared to overall prevalence of microalbuminuria and retinopathy, patients with age more than 50 years, showed higher prevalence of 77.14% (27) and 77.7% (35) respectively (p=0.001).

Microalbuminuria (52.45%) and diabetic retinopathy (57.37%) were more likely with duration of diabetes above 6 years (p=0.001). Microalbuminuria and retinopathy were found in 59.09% (p=0.024) and 68.18% (p=0.059) of the diabetic patients respectively having BMI >25 kg/m²

Table 2: Correlation of Microalbuminuria and Retinopathy with various parameters

Characteristics of the study population	Microalbuminuria		Chi Square Test		Characteristics of the study population	Diabetic Retinopathy		Chi Square Test		
	Positive (n=35)	Negative (n=65)	P Value	Significance		Positive (n=45)	Negative (n=55)	P Value	Significance	
Age in Yrs	40-49	8	26	0.03	S	40-49	16	28	0.002	HS
	50-59	9	20			50-59	11	16		
	60-69	9	18			60-69	12	13		
Gender	Male	16	30	0.966	NS	Male	23	23	0.354	NS
	Female	19	35			Female	22	32		
	Duration of DM	≤ 5	11			35	≤ 5	15		
6-10	8	18	6-10	12	14					
11-15	6	11	11-15	7	10					
HbA1c%	≥ 16	10	1	0.01	S	≥ 16	11	0	0.001	HS
	<6.5	6	17			<6.5	8	15		
	6.5 - 7	4	16			6.5 - 7	4	16		
	7.1 - 7.5	4	14		7.1 - 7.5	6	12			
	> 7.5	21	18		> 7.5	25	12			

S= Significant, HS=Highly Sig, NS=Not Sig

The correlation between microalbuminuria and diabetic retinopathy was highly statistically significant with p value <0.000.

Table 3: Correlation of Duration of Microalbuminuria and Retinopathy

Duration of DM (In Yrs)			
Variables	No of cases	Mean	Std. Deviation
Microalbuminuria & DR Both +ve	28	10.64	5.27
Microalbuminuria & DR Both -ve	48	5.59	3.16
Only Microalbuminuria +ve	7	6.57	3.60
Only Diabetic Retinopathy +ve	17	6.76	3.63

Mean Duration of DM (in yrs)		
	Diabetic Retinopathy	Microalbuminuria
Positive	9.2 ± 5.0	9.8 ± 5.2
Negative	5.7 ± 3.2	5.9 ± 3.3
Unpaired t test	P<0.000, HS	P<0.000, HS

DISCUSSION

Microalbuminuria marks the onset of endothelial dysfunction related to the kidney. In our study the prevalence of microalbuminuria was 35%. Similar observations were made by Narang U et al (2) who observed microalbuminuria in 39% while Abdelghaffar W et al (6) an Egyptian study found the prevalence to be 30.7%. The prevalence of diabetic retinopathy was observed in 45% patients which are consistent with Narang U et al (2), Rani et al (7) and Reddy et al (8) who observed prevalence of retinopathy in 45%, 31% and 36.5% respectively.

Our study showed that longer the duration of diabetes higher is the prevalence of both microalbuminuria and retinopathy, similar to data obtained from Chowta et al (9) and Maiti et al (10) who showed significant correlation of duration of diabetes with microalbuminuria and retinopathy while

Narang et al (2) concluded that with duration of diabetes more than 15 the prevalence of microalbuminuria was 91.6% while retinopathy was 100 % which is consistent with our study.

According to Jadhav et al (11) those with higher body mass index had higher albuminuria and those with HbA1c values more than 7.0%, 51.78% had microalbuminuria while 62.5% showed evidence of retinopathy. Poor glycemic control as a risk factor for microalbuminuria as mentioned in ADVANCE (12)

The limitation of our study is the smaller sample size, and the MICRAL test adopted for the study is just a screening test.

CONCLUSION

The present study has shown that there is significant association between the presence of retinopathy and microalbuminuria. Most patients, who were positive for microalbuminuria, also had retinopathy. It has shown that there is increase in prevalence with increasing age, HbA1c>7%, BMI>25 kg/m². Subjects with microalbuminuria are more likely to have diabetic retinopathy than those without albuminuria. Hence all diabetic patients with microalbuminuria should be screened for retinopathy so that treatment can be instituted in the required patients to prevent ocular morbidity/blindness.

As frequent tests of microalbuminuria and annual eye examinations become the standard of care in diabetes management, healthcare professionals could pay more attention to the relationship between them in order to optimize the screening frequency for diabetic retinopathy in patients with type 2 diabetes.

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