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Study of Prevalence of Microalbuminuria in Patients with Type2 Diabetes Mellitus in Relation To Diabetic Retinopathy

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Original Research Article

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Abstract: Diabetes Mellitus (DM), a pan metabolic disorder characterized by chronic hyperglycemia. The two primary category of diabetes are Type1 and Type 2. Type2 DM accounts for 80-85% of patients with DM among various population of the world. The disease burden of DM is primarily due to its metabolic complications. The long term complications of the eye, kidney, and heart are mainly due to duration of exposure to hyperglycemia. Retinopathy particularly non proliferative retinopathy is seen in DM but is very rare in those without DM. There is also relation between duration of hyperglycemia and the development and progression of diabetic retinopathy. A nonlinear threshold value of 8.5% HbA1c, above which there is a steep rise in incidence of retinopathy. This study was under taken to know the prevalence of microalbuminuria and its relation with diabetic retinopathy in patients with type 2 DM. This cross section study was carried out on the patients with type2DM, at Raja Rajeswari Medical College and Hospital, Bangalore between Dec 2016 to April 2017. The study included patients with type 2 DM aged above 30 years diagnosed to be diabetic according to ADA guidelines for more than 5 years. A total of 198 patients were included in the study. We observed diabetic retinopathy in 40.6% (80) of patients (Table 4). We also observed nearly 41.9% of patients had urine microalbuminuria, between 30-300mg/g and around 58% patients had <30mg/g. Patients with positive microalbuminuria and abnormal ACR had high HbA1C >9 and also it was strongly noted that these patients had duration of diabetes was more than 6 years.
Keywords: Diabetic retinopathy, Micro albuminuria.

INTRODUCTION

Diabetes Mellitus (DM), a pan metabolic disorder characterized by chronic hyperglycemia. The two primary category of diabetes are, depending on whether it is occurring from subtotal destruction of beta cells of pancreas with predominant insulin deficiency (type1) or evolved out of a complex interaction between impairment of insulin action and/ or relative inadequacy of insulin secretion (type2). Type2 DM accounts for 80-85% of patients with DM among various population of the world. The disease burden of DM is primarily due to its metabolic complications. The long term complications of the eye, kidney, and heart are mainly due to duration of exposure to hyperglycemia.

Retinopathy particularly non proliferative retinopathy is seen in DM but is very rare in those without DM. There is also relation between duration of hyperglycemia and the development and progression of diabetic retinopathy. A nonlinear threshold value of 8.5% HbA1c, above which there is a steep rise in incidence of retinopathy [1].

Diabetic specific renal disease develops in about one third of all people with Type 1 or Type 2 diabetes and it contributes to 30% of end stage renal disease (ESRD) in various countries [2]. The natural history of diabetic kidney disease is progression from norm albuminuria to microalbuminuria and overt proteinuria and from here to end stage renal disease (ESRD). The level of diabetic glycemic control is the strongest risk factor for progression from norm albuminuria to microalbuminuria with threshold value of HbA1c value of 8.1% [3, 4].

Diabetic retinopathy is one of the leading causes of blindness in the world that increases the chances of losing the vision about 25 times higher compared to normal individual. Many studies have been under gone to find out the precipitated factors of retinopathy such as duration and type of diabetes, hyperglycemia, pregnancy, and change in hormonal level, genetics, and microalbuminuria.

This study was under taken to know the prevalence of microalbuminuria and its relation with diabetic retinopathy in patients with type 2 DM.

MATERIALS AND METHODS

This cross section study was carried out on the patients with type2DM, at Raja Rajeswari Medical College and Hospital, Bangalore between Dec 2016 to April 2017.

The study included patients with type 2 DM aged above 30 years diagnosed to be diabetic according to ADA guidelines for more than 5 years.

Patients with H/O Hypertension, Type 1 DM, UTI, sepsis, febrile illness, patients with preexisting renal disease, Congestive Heart Failure were excluded from the study.

A written informed consent was obtained before the study. Ethical Committee clearance was obtained before study.

All patients who met with inclusion criteria were examined, detail history and examination was carried out. They were subjected for fundoscopic examination for evaluation of retinopathy. Three consecutive days of early morning urine samples were taken for microalbuminuria test and if two samples were positive, microalbuminuria was confirmed. Urine Albumin Creatinine Ratio (ACR) was also done. FBS, PPBS, HbA1c, Renal function tests, Electro Cardio Gram, were done for all patients. Urine ACR <30mg/g was considered normal. Between 30-300mg/g was indicative of microalbuminuria. All relevant examinations were done. Patients were categorized according to the degree of retinopathy as No retinopathy, mild, moderate, severe non proliferative diabetic retinopathy.

All data and results were analyzed by Chi square and Fischer exact tests. P value <0.05 were considered significant.

RESULTS

A total of 198 patients were included in the study. 114(57.6%) were males and 84(42%) were females (Table 1). Majority of where patients were in age group 55-59 years (41.9%) (Table 2). In our study we also observed 59% patients had duration of diabetes for 6-10 years, 35% patients had duration above 10 years and 5% had 5 years history of DM. (Table 3)

We observed diabetic retinopathy in 40.6% (80) of patients (Table 4). We also observed nearly 41.9% of patients had urine microalbuminuria, between 30-300mg/g and around 58% patients had <30mg/g(Table 5). About 59.6% of patients had HbA1C between6-9 and 40.4% had HbA1C > 9. It was also found that patients with high mean FBS and PPBS had high HbA1C (Table 6). Patients with positive microalbuminuria and abnormal ACR had high HbA1C >9 and also it was strongly noted that these patients had duration of diabetes was more than 6 years. There was also an observation that, among the patients with diabetic retinopathy 42% of patients had associated with high urine microalbumin and abnormal ACR. They also had high mean FBS, PPBS and high HbA1C. The mean microalbuminuria 136.6mg/g high in patients with diabetes with retinopathy compared to without retinopathy. The mean HbA1C was high in patients with diabetic with retinopathy.

Table-1: Age distribution of patients studied

Age in years	No. of patients	%
Up to 54	55	27.8
55-59	83	41.9
60 & above	60	30.3
Total	198	100.0

Table-2: Gender distribution of patients studied

Gender	No. of patients	%
Male	114	57.6
Female	84	42.4
Total	198	100.0

Table-3: Duration of year's distribution of patients studied

Duration of years	No. of patients	%
Up to 5 yrs	11	5.6
6-10 yrs	117	59.1
11-15 yrs	70	35.4
Total	198	100.0

Table-4: Incidence of DR of patients studied

DR	No. of patients	%
No	118	59.6
Yes	80	40.4
Total	198	100.0

Table-5: UMA distribution of patients studied

UMA	No. of patients	%
<30	115	58.1
30-300	83	41.9
>300	0	0.0
Total	198	100.0

Table-6: Comparison of Study variables in relation to incidence of DR of patients studied

Variables	DR		Total	P value
	No	Yes		
FBS (mg/dl)	234.08±7.25	281.71±8.68	253.33±5.80	<0.001**
PPBS (mg/dl)	329.25±7.68	380.79±9.50	350.07±6.23	<0.001**
HbA1c %	8.56±0.15	10.06±0.20	9.16±0.13	<0.001**
UMA	29.11±4.18	136.74±8.80	72.60±5.74	<0.001**
UACR	34.28±4.74	161.93±9.72	85.85±6.57	<0.001**

DISCUSSION

Diabetic retinopathy is now known for risk factor for all vascular events in diabetes mellitus. It is known to be associated with cardiovascular events and subclinical atherosclerosis. There are studies which shown us DR has some effects on increase in urine albumin excretion and also decline in GFR, especially in patients with normoalbuminuria[5]. In a study on type2 diabetic patients with DR with microalbuminuria showed rapid decline in GFR compared to diabetic without DR [5]. The presence of microalbuminuria and DR predict renal function loss. Most of the earlier studies found that age, duration of diabetes was known to be strong risk factor for development of DR. Recent studies showed that poor glycemic status is one of the strongest risk factor for development of Dr [6].

In our study, we observed Diabetic retinopathy (DR) was found in 40.9% of patients and most of patients with DR had microalbuminuria. It was strongly noted that patient's with microalbuminuria had high HbA1C of >9 also high FBS and PPBS. In a study done by Manaviat MR *et al.* on association between retinopathy and microalbuminuria, study showed

overall prevalence DR was 49% and micro albuminuria in 40% of patients. Majority of patients who had DR are almost positive for microalbuminuria [7].

In our study there was positive correlation between diabetic retinopathy and renal involvement. There was strong association between duration of diabetes mellitus and glycemic control in patients with DR. These microvascular complications are linked to the duration of diabetes, poor glycemic control and systolic hypertension [8]. Various epidemiological and cross sectional studies have reported marked variation in the prevalence of microalbuminuria. Microalbuminuria and DR share common risk factors, mainly duration of diabetes and blood pressure levels [8]. Microalbuminuria has also been noted to be associated with generalized vascular disease. Deckert T, Feldt Rasmussen B *et al*. Albuminuria reflects wide spread vascular damage [9]. There are other factors which damage vessels in both retina and kidney. Klein *et al*. showed that microalbuminuria in 29.2% of insulin taking patients and 22% of noninsulin dependent patients [10]. Kim *et al*. showed fasting plasma level of insulin and systolic blood pressure has independent correlation with micro albuminuria [11].

Hence achievement of good sugar control in type 2 diabetes might reduce the burden of diabetic kidney disease in future.

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