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Incidence of Retinopathy among Patients of Type II Diabetes Mellitus with or without Microalbuminuria

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ABSTRACT

Background: Diabetic retinopathy is the most terrible complication for each of us and is the foremost source of blindness globally. Diabetic nephropathy is estimated based on the presence of microalbuminuria. Its association with retinopathy is well known in patients of type I diabetes mellitus, but still uncertain in type 2 diabetes. In this study, the incidence of retinopathy was determined in type 2 diabetic patients with and without microalbuminuria. Aim: To determine the incidence of micro-albuminuria in patients of type II diabetes mellitus and the frequency of diabetic retinopathy with and without microalbuminuria. Place and Duration: In the Endocrinology department and Eye Unit I of Jinnah Teaching Hospital Peshawar for one year duration from January 2019 to January 2020. Study design: A cross-sectional study. **Methods:** 280 type II diabetes mellitus patients were selected from the Diabetes Management Center. Their spot urine microalbuminuria was performed and selectees were alienated into two groups depending on the absence or presence of microalbuminuria. Patients with macroalbuminuria and hypertension are already excluded from the study. All patients underwent retinoscopy and the frequency of microalbuminuria and retinopathy was determined. **Results:** The age range was 35 to 70 years. 42.5% are men and 57.5% are women. Microalbuminuria was noted in 76(27.1%) of 280 patients with diabetes. The incidence of retinopathy was advanced in subjects with microalbuminuria (44.74%), while it was 23.04% in patients without microalbuminuria. **Conclusion:** The occurrence of retinopathy increases in the presence of microalbuminuria. No statistically significant relationship was found in this study.

Keywords: Microalbuminuria, Diabetic Nephropathy, Diabetic Retinopathy.

INTRODUCTION

Diabetes mellitus is a syndrome in which there is a combination of irregular metabolism, insulin resistance or insulin secretion, or insufficient secretion for compensation of hyperglycemia.[1] Diabetes is one of the leading causes of mortality and morbidity in the world and is the sixth chief reason for mortality in the USA. The USA has over 71,000 deaths annually.[2] The vast majority of patients with diabetes fall into two broad categories: absolute insulin deficiency and insulin secretion, characterized by type 2 diabetes, insufficient type of growth compensation and the presence of insulin resistance. In addition to the two main types, pregnancy and pancreatic disorders, endocrinopathies and drugs, etc are also the causes.[3] Prolonged hyperglycemia promotes glucose reactions with components of the artery wall, resulting in an increase in glycation end products.[4] These products are cross-linked with collagen, which increases the stiffness of the arteries supporting atherosclerosis in the presence of high density lipoproteins (LDL) and cholesterol. In this way, high blood sugar leads to endothelial damage that occurs as microvascular or macrovascular damage. A diabetic patient is sensitive to many complications that cause morbidity and early mortality. Diabetic complications pose a huge burden to healthcare, as poor glycemic control in diabetic patients is also directly related to increased overall healthcare costs. The microvascular disease also has a significant impact on the lives of type II diabetic patients. Diabetic retinopathy is the most serious of the various complications of diabetes.[5,6] The incidence of diabetic retinopathy is 21% to 60%, respectively, in people with diabetes below five years and at least 15 years. Proliferative retinopathy ranges from 1.2% to 67% in people with diabetes for less than a decade and for 35 or more years. The incidence of blindness was 16% in patients with DM. Retinopathy after ten years of diabetes is associated with longer hemoglobin glycine and proteinuria, increase diastolic pressure and infertility in males.[7]

Renal diseases linked with type II diabetes mellitus is the major cause of end-stage renal disease in the world. In the USA, the incidence of renal diseases linked with diabetes mellitus has augmented by 150% over the last ten years. The 1st clinical indication of renal dysfunction in diabetic patients is usually microalbuminuria, which progresses between two to five percent annually.[8,9] Microalbuminuria rarely reversible in type II

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diabetes, but in its place, 20 to 40 percent of patients exceed proteinuria. In 10 to 50 percent of CKD patients and proteinuria finally need transplantation or dialysis. 40 to 50 percent of diabetic patients with microalbuminuria sooner or later die of cardiovascular anomalies; this ratio is 3 times greater from cardiac causes, with diabetes, but without signs of renal disease. In cases of renal disease and diabetes mellitus, decreasing blood pressure and reduced albumin in urine are operative in declining the risk of myocardial infarction, end-stage renal disease, stroke and heart failure. Angiotensin II antagonists and ACE inhibitors supposed to be the utmost beneficial antihypertensive agents. Calcium channel blockers other than dihydropyridine also reduce urine albumin and the advancement of kidney disease, and the grouping of calcium channel blockers and dihydropyridine other than ACE inhibitor treatment is even more effective.[10] Many studies have shown that microalbuminuria is related to the retinopathy in people with diabetes mellitus and the appearance of proliferative diseases in young people. People with microalbuminuria are more likely to have retinopathy than people without microalbuminuria. This data propose that microalbuminuria may be an indicator of the proliferative retinopathy risk.

MATERIALS AND METHODS

This cross-sectional study was completed at the Endocrinology department and Eye Unit I of Jinnah Teaching Hospital Peshawar for one year duration from January 2019 to January 2020. The calculated sample size was 280 cases with a 5% error margin, taking predictable microalbuminuria percentage in type II diabetes mellitus i.e. 25.9% (minimum frequency between variables). All men and women are aged 25 to 70 with type 2 diabetes with random sugar> 200 mg /ml or fasting sugar> 126 mg/dl were included for the study. Laser retinal therapy, patients on ACE inhibitors, blood pressure> 140/90, a positive protein on dipstick (macroalbuminuria), BUN> 20 mg/dl and creatinine> 1.20 mg/dl and with WBC cast, tubular cast and RBC cast on urine microscopy were omitted from the analysis.

Data collection: Patients meeting the inclusion criteria were selected after obtaining informed consent. All information was collected using a specially designed proforma. The form contained demographic information such as name, age and gender. Microalbuminuria was confirmed in spot urine (threshold <28 mg / L). Into 2 groups; Patients were divided according to the absence or presence of microalbuminuria. Retinoscopy was then performed using a retinoscope to detect evidence of diabetic retinopathy (dot and blot hemorrhages, microaneurysm, soft and hard exudates, venous beading and looping, maculopathy and formation of new vessels). Effect regulators such as age, poor HbA1c glycemic control and treatment used were controlled by stratification.

RESULTS

A total of 280 patients with type 2 diabetes mellitus diagnosed over 10 years were selected from the Endocrinology department. [Table 1] shows that 42.5% of 280 patients are men and 57.5% are women.

Table 1: Gender of patient

Gender	Frequency	%age
Male	119	42.5%
Female	161	57.5%

The total percentage of women was higher than men. [Table 2] shows the age distribution of patients. According to him, the majority of patients with diabetes were aged 45-64 (70%). Few patients were reported at the extremes of the age groups with a minimum age of 35 years and a maximum of 70 years. The mean age was 53.20 ± SD 8.10.

Table 2: Frequency and percentages of age groups

Age in years	Frequency	%age
35-44	56	20.0%
45-55	114	40.7%
56-64	82	29.3%
65-70	28	10.0%

[Table 3] shows the prevalence of microalbuminuria among 76 (27.1%) of 280 patients with microalbuminuria among type II diabetics and not detected in 204 (72.9%).

Table 3: Frequency of microalbuminuria

Microalbuminuria	Frequency	%age
Yes	76	27.1%
No	204	72.9%

[Table 4] shows the frequency of retinopathy among type 2 diabetics. 86 (30.7%) of 280 patients have retinopathy and 194 (69.3%) did not have retinopathy.

Table 4: Frequency of retinopathy

Retinopathy	Frequency	%age
Yes	86	30.7%
No	194	69.3%

Table 5: Frequency of 'Retinopathy' in patients with and without 'Microalbuminuria'.

Microalbuminuria	Percentage retinopathy		Total
	Yes	No	
Yes	34 (44.74%)	42 (55.26%)	76(100%)
No	47 (23.04%)	157 (76.96%)	204 (100%)
Total	81	199	280

[Table 5] shows a cross table of microalbuminuria and retinopathy in Table 2x2, 34 of 86 (44.74%)

patients with microalbuminuria had retinopathy and the remaining 42 (55.26%) had no retinopathy. It is clear that patients with microalbuminuria have higher retinopathy (44.74%) than patients without microalbuminuria (23.04%).

DISCUSSION

The incidence of diabetes is growing rapidly in our world. Because it is a chronic disease, most of its morbidity and mortality are associated with complications associated with long-term treatment. According to the WHO, 170 million people globally are affected with diabetes and by 2030; it will progress to 370 million. About 1/3rd of those will progressively have worsened kidney function. The 1st clinical indication of renal dysfunction in diabetic patients is usually microalbuminuria, which progresses between two to five percent annually. Microalbuminuria rarely reversible in type II diabetes, but in its place, 20 to 40 percent of patients exceed proteinuria. Blindness is a terrifying complication of diabetes.[11] In 2002, 124 million people suffered a visual impairment, and 37 million were blind. In western countries, diabetes is an important cause of blindness among young patients.[12] The pathogenesis of diabetic retinopathy and nephropathy is the same. Therefore it is assumed that microalbuminuria can be used as a predictor of retinopathy and can be used as a marker to identify patients for detecting retinopathy. A study was conducted to determine the microalbuminuria frequency in type 2 diabetes and to determine the frequency of DR with and without microalbuminuria.[13] Various studies have been performed to evaluate the incidence of microalbuminuria and retinopathy in type 2 diabetes with a prevalence of retinopathy of 16 to 53.4%. In one study, the incidence of diabetic retinopathy was 44.74%. In our study, the incidence of microalbuminuria was 27.1%. Parving et al. In type 2 diabetes, the incidence of microalbuminuria was reported as 22% and Lunetta as 15%. In another study, the incidence of microalbuminuria was 153 (25.9%) out of 590 patients. Previous studies indicated that there is an important association between microalbuminuria and the degree of retinopathy. Though there are insufficient studies that oppose this association. Erasmus et al. The frequency of microalbuminuria was 54% in men and 59% in women in 113 patients with Type 2.[14] The incidence of retinopathy was 16%. They determined that microalbuminuria may not forecast retinopathy and ensues freely of high blood pressure or glycemic control.

This study shows that patients with microalbuminuria have a high frequency of retinopathy, i.e. 44.74%, and patients without microalbuminuria have a low frequency, i.e. 23.03%. The method used to measure microalbuminuria also has a significant impact on the difference in the frequency of microalbuminuria. In my study, the immunoturbidimetric method was used and only one sample was sent for microalbuminuria, but in Manaviat Clinitek analysis 100 samples (Bayer Corporation-Elkhart, USA) was used to study microalbuminuria. Three samples of urine were taken for 3 to 6 months, and if 2 samples were positive, microalbuminuria was indicated. In this study, the method of measuring microalbuminuria is simple and inexpensive, and the results did not differ significantly from the results measured three times in microalbuminuria.[15] This study shows the incidence of retinopathy in patients with and without microalbuminuria, which clearly shows that the frequency of retinopathy increases in the presence of microalbuminuria. More research is needed to better understand the relationship between microalbuminuria and retinopathy. Understanding this relationship will allow a better understanding of the pathophysiology of microvascular diabetic complications. This will enable us to offer new treatments and diagnoses that can reduce morbidity and mortality due to complications of microvascular diabetes.

CONCLUSION

This study shows that patients with microalbuminuria develop retinopathy more often than people without microalbuminuria. However, it is uncertain whether microalbuminuria can be used as a forecaster of the presence of diabetic retinopathy in patients with type 2 diabetes, and more research is needed in one or more potential patients with type 2 diabetes to confirm its effectiveness. If it turns out to be effective, you can be referred to an ophthalmologist in the early stages of retinopathy.

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