Original research article

A Study of Prevalence of Microalbuminuria and Retinopathy in Pre-Diabetic Patients Presenting to a Tertiary Care Centre

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Abstract

Background : Diabetes is a non-communicable disease which affects 150 million individuals world wide has a prolonged prediabetic phase. Diet, environment, genetics play a major role in development of diabetes. 10%-50% of prediabetics may develop diabetes in 3-10 year period. Components of prediabetes include either an isolated impaired fasting glucose or impaired glucose tolerance or both. Microvascular complications are prone to occur during this stage.
Aim and Objective: Study aimed to determine the prevalence of microalbuminuria and retinopathy among prediabetic patients.
Material and Methods: A cross-sectional study conducted in Department of general Medicine, MNR medical college and Hospital, sangareddy, during period of February 2019 to August 2020. A total of 100 patients with prediabetes were selected during the study period. After fulfilling exclusion and exclusion criteria screening had done. American Diabetes Association Criteria(ADA) was used for screening.
Results : Present study comprised of 100 patients were screened for diabetes and included. Among the patients 11% of the patients had microalbuminuria and 14% of the of the patients had retinopathy. Male were dominant for the microalbuminuria and retinopathy. Patients having diabetes less than 5 years had microabinurea more followed by more than 15 years, also in 11-15 years of age retinopathy was more followed by 6-10 years and > 15 years.
Conclusion : Study can conclude that factors like age, duration of diabetes, body mass index are associated with increased prevalence of microalbuminuria and retinopathy. Elevated microalbuminuria and retinopathy were found to appear much earlier hence its use can enhance for early diagnosis of prediabetes.
Keywords: Prediabetic, Microalbuminuria, Retinopathy, American Diabetes Association Criteria

Introduction

Diabetes is a non-communicable disease which affects 150 million individuals[1] world wide. It has reached epidemic proportions in India in the 21st century, with 65.1 million people suffering from diabetes. According to International Diabetes Federation (IDF), by 2035 nearly 109 million people are likely to be affect from diabetes in India.[2, 3] It has long been recognized as a major public health problem[1] with far reaching consequences, not only for its adverse health impact on individuals, but also forits economic burden on the health care system and the society at large.

Prediabetes is a serious health condition where blood sugar levels are higher than normal, but not high enough yet to be diagnosed as type 2 diabetes. Approximately 96 million American adults—more than 1 in 3—have prediabetes. Of those with prediabetes, more than 80% don't know they have it. In India number of estimated case of diabetes is 79.4 million in 2030 compared to 31.7 million in 2000.[4] In India, over 30 million people have been diagnosed with pre-diabetes.[2]

Microalbuminuria is widely accepted as the first clinical sign of diabetic nephropathy. Current knowledge about the natural course of diabetic kidney disease is mostly derived from studies of patients with type 1 diabetes. As diabetic nephropathy progresses, the development of microalbuminuria eventually leads to macroalbuminuria and then to progressive loss of glomerular filtration rate (GFR). Among type 1 diabetic patients who have nephropathy, more than 95% will already have diabetic retinopathy. However, things are more complicated for patients with type 2 diabetes, because they are also susceptible to parenchymal renal disease other than classic diabetic glomerulosclerosis, which might include hypertensive atherosclerosis and lipid toxicity [5]. Despite many researchers suggesting the superior role of microalbuminuria in predicting adverse outcomes, including all-cause mortality, cardiovascular end-points and renal failure even among patients without diabetes, few studies have investigated the potential association of microalbuminuria and retinopathy in type 2 diabetic patients.

Diabetic retinopathy is the most common cause of preventable blindness in working-aged adults. Despite low prevalence rates being reported in some Asian countries (such as China and India) [6], because of the effect of urbanization, increasing obesity and longer lifespan, the frequency and severity of diabetic retinopathy is expected to increase in most Asian countries during the next decades. Hence early detection and therapeutic interventions can prevent its progression.[7] Retinopathy is the result of microvascular retinal changes. It may be present before the patient progresses to type 2 Diabetes mellitus. Early retinopathy may be a marker for more widespread vascular disease. Early identification and treatment of persons with prediabetic conditions has the potential to reduce both the incidence of diabetes and related complications.

Thus, in the present study aimed know about prevalence of microalbuminuria and retinopathy among the patients with prediabetics.

Materials and Method
This is a cross-sectional study conducted in Department of general Medicine, MNR medical college and Hospital, sangareddy, during period of February 2019 to August 2020. A total of 100 patients with prediabetes were selected during the study period. Study is approved by institutional ethical committee.

Inclusion Criteria :
- Patients who have Impaired Fasting Glucose (IFG) between 100-125 mg/dl
- Impaired Glucose Tolerance (IGT) between 140-199 mg/dl
- Age group above 30 years

Exclusion Criteria :
- Patients with age<30 years of age.
- Patients with Hypertension(Blood Pressure >140/90mmHg)
- Patients with Renal disease.

- Patients with urinary tract infection by history or investigations.
- Patients with raised serum creatinine [>1.5 mg/dl] or urine examination showing RBC, WBC, urine C & S yielding bacteria.
- Pregnant Women

Methodology :

Investigations done included:
1. Fasting blood sugar, 2Hour Oral Glucose Tolerance Test
2. Serum creatinine – Only those patients with normal value were taken up for the study.
3. Urine examination – Albumin, RBC, WBC, Bacteria, Urine culture, ketones. Only those patients with normal urine examination results were included.

Microalbuminuria: It was assessed by urine albumin: creatinine ratio (ACR) based on the recommendations of National Kidney Foundation and American Diabetic Association.
The average of the ACR values from 3 urine samples were used. Urine albumin was estimated by turbidimetry. 1st voided midstream early morning sample of 5ml urine. Patients were asked to avoid exercise prior to collection, urine examination done in women in non menstrual phase. Any value in between 30 – 300 mg/mg creatinine was taken as microalbuminuria.

Observation and Results
In the present study we observed that maximum patients were in the age of group of 50 to 70 years of age also proportion of male were maximum. 42% of the patients had duration of diabetes was less than 5 years, among the patients 11% of the patients had microalbuminuria and 14% of the of the patients had retinopathy, 32% of the patients were with their body mass index was greater than 25 as shown in the bellow table number 1

Table 1 : Basic Characteristics of study Population

Parameters	No. of patients	Percentage
Gender		
Male	58	58
Female	42	42
Age (In Years)		
30 – 39	13	13
40 – 49	18	18
50 – 59	30	30
60 – 69	34	34
70 – 79	5	5
Microalbuminuria		
Present	11	11
Absent	89	89
Retinopathy		
Present	14	14
Absent	86	86
Body Mass Index		
< 25	68	68
>25	32	32

Duration of Diabetes Mellitus		
< 5 Years	42	42
6 -10 Years	38	38
11 - 15 Years	15	12
>15 Years	5	5

Table 2 : Microalbuminuria and Retinopathy in demographic profiles

Parameters	No. of patients	Microalbuminuria		Retinopathy	
		Present	Absent	Present	Absent
Gender					
Male	58	7	51	8	50
Female	42	4	38	6	36
Age (In Years)					
30 – 39	13	1	12	2	11
40 – 49	18	2	16	1	17
50 – 59	30	4	26	4	26
60 – 69	34	3	31	6	28
70 – 79	5	1	4	1	4
Body Mass Index					
< 25	68	9	59	9	59
>25	32	2	30	5	27
Duration of Diabetes Mellitus					
< 5 Years	42	6	34	2	41
6 -10 Years	38	1	37	3	35
11 - 15 Years	15	1	14	6	9
>15 Years	5	3	2	3	2

Above table showing that, male were dominant for the microalbuminuria and retinopathy. Patients having diabetes less than 5 years had microabinurea more followed by more than 15 years, also in 11-15 years of age retinopathy was more followed by 6-10 years and > 15 years.

Table 3 : Basic Characteristics of study Population

	Present	Absent	Total
Microalbuminuria			
IFG	4	53	57
IGT	7	36	43
Retinopathy			
IFG	4	56	60
IGT	10	30	40

There was increased prevalence of microalbuminuria in IGT when Compared to IFG, and it is statistically significant(P=0.02) also There was increase in prevalence of retinopathy as the blood sugar rises within prediabetic range in IGT and it is statistically significant. (P-value<0.01)

Discussion

The present study evaluated the prevalence of microalbuminuria and retinopathy in pre-diabetic patients and association between Microalbuminuria, retinopathy with age, gender, duration of diabetes and BMI. In our study we observed more male than female, so the male was predominant observed compared to female. And also, maximum patients were lying from the age group of 50-70 years of age.

The prevalence of microalbuminuria in this study was 11% and that of retinopathy was 14 %. The prevalence of microalbuminuria is more in IGT (16.27%) compared to IFG (7.01%). Study done in a private hospital in Andhra Pradesh and Iran. [8, 9] the prevalence of microalbuminuria was 12.8%. In comparison with IFG, IGT microalbuminuria (62.5%) was prevalent in both who had IFG and IGT. Similar study by Wang XL[10] et al showed a prevalence of microalbuminuria as 11.1% in IGT and 5.8 % in IFG. When the blood sugar rises in the pre-diabetic range in IFG and IGT the prevalence of microalbuminuria also rises. The prevalence of retinopathy was also more in IGT (12%) compared to IFG (3-6%). The prevalence was higher in those with higher blood sugar both in IFG and IGT. The DPP Outcome Study (Diabetes Prevention Program) showed a prevalence of retinopathy as 7.6% in those with pre-diabetes using Fasting blood glucose. A higher proportion of patients with retinopathy had microalbuminuria and association prevalence was statistically significant.
In the present study, for both microalbuminuria and retinopathy there was no significant difference of prevalence in men and women. Study by B. Purushottam Rao et al [11] also observed that there was no significant difference of prevalence of microalbuminuria and retinopathy in men and women

Study encountered with some limitation like sample size of the study was small, we were not able to get significant results on comparing the variables. Even though we got significant results of prevalence of microalbuminuria and retinopathy. We have not studied the fundus changes in the study.

Conclusion : From overall results and observation we can conclude that factors like age, duration of diabetes, body mass index are associated with increased prevalence of microalbuminuria and retinopathy. Elevated microalbuminuria and retinopathy were found to appear much earlier hence its use can enhance for early diagnosis of prediabetes.
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