Microalbuminuria - A maker for widespread micro vascular damage in a patient with type 2 diabetes mellitus, a study of 230 cases in tertiary care hospital.

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Abstract

Introduction: The prevalence of diabetes is on the rise, and is more alarming in the developing countries.

Aim: To study clinical profile of patients of type II diabetes Mellitus with respect to micro albuminuria at a tertiary care hospital.

Material and methods: OPD and IPD Patients of Type 2 Diabetes Mellitus attending Tertiary government hospital, which fulfil the following criteria for study.

Result and observations: A statistically significant association was seen between Hypertension and micro albuminuria (p=.005), Smoking and micro albuminuria (p=. 004), Physical inactivity and micro albuminuria (p=. 0006) and Duration of DM and micro albuminuria (p=. 001) among patients of type II DM. However, no statistically significant association was seen between age, Obesity and hyper chole sterol Mia and micro al buminuria in present study. (p>0.05).

Discussion: Early diagnosis of diabetic nephropathy can be done using spot urine micro albumin in type 2 diabetes mellitus patients. Prevalence of micro al buminuria was 35%. Hypertension, Smoking, Physical inactivity and long duration of DM were risk factors associated with micro albuminuria among patients of type II DM. Positive correlation was seen between BMI, HbA1C, Systolic BP, Duration of DM and urine albumin. However, larger trials with bigger sample size should be carried out to confirm this finding from our study.

Keywords: BMI, HbA1C, Systolic BP

Introduction

The prevalence of diabetes is on the rise, and is more alarming in the developing countries. Besides increasing the risks for coronary heart disease, diabetes enhances the incidences of cerebro vascular accidents too. Moreover, it is the leading cause of acquired blindness and accounts for about a quarter of the cases with end-stage renal diseases as well as half of the cases of non-traumatic lower limb amputations. [1,2]

The International diabetes federation estimates that there are 463 million people with type 2 diabetes. Throughout the world 50 percent of these patients (232 million) remain undiagnosed and the number of diabetic patients predicted to increase to 700 million by 2045.[3] Nephro pathy is a frequent cause of morbidity & mortality in type 2 diabetes mellitus.[4] Diabetic nephro pathy is accompanied with significant microvascular risk and is the leading cause of kidney disease. Micro albuminuria, defines the wide substantial range of hyper secretion of albumin, ranging between 20 and 200 μg/ min. [5] Normal persons excrete less than 30 mg/day of albumin. Microalbuminuria is not detected by reagent sticks for urinary protein, which generally become positive only when proteinuria is greater than 550 mg/ day.

This degree of leakage is termed as macro al buminuria.[6] Diabetic nephropathy manifests after 10 years duration of type 1 DM, but may be exists at the time of diagnosis of type 2 DM. [7] Onset of al buminuria assists to diagnose the development of diabetic kidney disease has significant un fortunate con sequences. Diabetic nephropathy may progress from micro al buminuria to macro al buminuria with prog ressive loss of glomerular filtration rate (GFR) until End Stage Renal Disease (ESRD).[8]

Aim

To study clinical profile of patients of type II diabetes Mellitus with respect to Micro albuminuria at a tertiary care hospital.

Primary objectives

To study various clinical presentations in patients of type II diabetes mellitus with respect to micro albuminuria.

Secondary objectives

1.To study the proportion of microalbuminuria.

2. To study the association of microalbuminuria with lipid profile, age of diabetics and duration of diabetes.

Material and methods

Study design: Cross Sectional Study period November 2020 to November 2022

study setting: Medicine department of a Tertiary government hospital.

Study population: OPD and IPD Patients of Type 2 Diabetes Mellitus attending Tertiary government hospital, who fulfil the following criteria for study.

Sampling method: A consecutive sampling method was used till desired sample size was achieved.

Ethical Clearance: Ethical clearance was obtained from institutional ethics committee.

Inclusion criteria

All diagnosed patients of Type 2 Diabetes Mellitus attending OPD and IPD of Tertiary Hospital.

Exclusion criteria

(1) Patient with macroalbuminuria

(2) Patient with urinary tract infection

(3) Pregnant patient

(4) Patient with overt diabetic nephropathy Research Metho dology specified for Data collection The patients fulfilling to the inclusion criteria were enrolled into the study after being explained the proceedings of the study and after they signed the consent form. Predesigned and pretested case record form was used as tool for data collection. Data was collected about sociodemographic chara cteristics of study subjects like age, sex, occupation, socioeconomic status and education.

•Anthropometric measurements were done to calculate BMI and WHR.

•BMI = Weight in kgs / height in m 2 Classification (kg/m2).

Underweight- < 18.

Normal - 18.5 – 22.99

Overweight - 23 – 24.99

Obesity - >/= 25

Weight was measured with help of Analogue Weight Machine.

Operational definitions

Diabetes Mellitus

The classic signs of DM includes polyuria, polydipsia, unexplained weight loss and random blood glucose of greater than or equal to 200 mg/dl. Diabetes is diagnosed at fasting blood glucose of greater than or equal to 126 mg/dl.

OR

Diabetes is diagnosed at fasting blood glucose of greater than or equal to 126 mg/dl

OR

2 hr post prandial glucose >/= 200mg/dl(11.1mmol/l).

OR

HbA1c - Normal - less than 5.7% Prediabetes- 5.7% to 6.4% Diabetes-6.5% or higher Micro albuminuria was calculated by turbidimetric immune assay and graded as: - Mild: 20-50 mg/dl

• Moderate:50-100 mg/dl

• Severe:100-300 mg/dl

Statistical Analysis

The collected data was entered in Microsoft excel. The categorical variables were presents as number and percentage whereas for continuous variable were presented as mean and SD. Chi square test $\chi2$ and Pearson's correlation coefficient (r) were used as test of

significance. p value of <0.05 was considered statistically significant.

Result and observations

majority of study participants were from age group > 50 years contributing 107 (46.52%) followed by 40-50 years 93 (40.43%) and <40 years 30(13.04%) respectively and most of the study subjects were males contributing 138 (60%) and females 92(40%).M:F ratio is 1.5:1. Prevalence of microalbuminuria among patients of type II DM was 35.65%.

Table 1: Prevalence of microalbuminuria among patients of type II DM (N=230)

Microalbuminuria	Frequency	Percentage
Present	82	35.65
Absent	148	64.35
Total	230	100

Table 2: Grades of micro albuminuria among study participants (N=82)

Grade	Frequency	Percentage
Mild (20-50 mg/g)	39	47.56
Moderate (50-100 mg/g)	27	32.93
Severe (100-300 mg/g)	16	19.51
Total	82	100

Most of study participants were having Mild (20-50 mg/g) micro albuminuria contributing 39 (47.56%) followed by Moderate (50-100 mg/g) 27(32.93%) and Severe (100 - 300 mg/g) micro albuminuria in 16 (19. 51%) participants respectively.

Table 3: Association between micro albuminuria and various risk factors (N=230)

Risk Factor	Sub Group	Microalbuminuria				Total	P value
		Present		Absent			
		N	%	N	%		
Age	<50 yrs	38	31.93	81	68.07	119	0.222
	≥50 yrs	44	39.63	67	60.37	111	
HTN	Yes	49	44.95	60	55.05	109	.005*
	No	33	27.27	88	72.73	121	
Obesity	Yes	41	39.80	62	60.20	103	.236
	No	41	32.28	86	67.72	127	
Smoking	Yes	46	46	54	54	100	.004*
	No	36	27.69	94	72.31	130	
Phy. Inactivity	Yes	65	43.62	84	56.38	149	.0006*
	No	17	20.98	64	79.02	81	

Duration of DM*(n=87)	<5 Yrs	8	30.76	18	69.24	26	.001*
	≥5 yrs	41	67.21	20	32.79	61	
T. Cholesterol>200	Yes	43	41.34	61	58.66	104	.101
	No	39	30.95	87	69.05	126	

HTN – Hyper tension, DM-Diabetes Mellitus, Phy. Inactivity - Physical inactivity, T. Cholesterol-Total Cholesterol Table N0.11: Interpretation Above table shows that, a statistical significant association was seen between Hypertension and micro albuminuria (p=.005) , Smoking and micro albuminuria (p=.004), Physical inactivity and micro albuminuria (p=.0006) and Duration of DM and microalbuminuria (p=.001) among patients of type II DM. However, no statistical significant association was seen between age, Obesity and hyper cholesterolemia and micro albuminuria in present study. (p>0.05).

Discussion

Type 2 Diabetes Mellitus (T2DM) constitutes 90 to 95% of diabetes in the adults and is characterized by a combination of insulin resistance and insulin secretory defect.[9] Complications from diabetes mellitus can be micro vascular (retinopathy, neuropathy, nephropathy) and macro vascular (acute myo cardia infarction, peri pheral vascular disease, stroke) that result in significant morbidity and mortality.[10]

Risk factors for Microalbuminuria among patients of Type 2 DM Hyper tension among patients of Type 2 DM was present in 109(76%) subjects followed by obesity (BMI>25 Kg/m2) 103 (44.78%), Physical Inactivity 149(64.78%), Hypercholesterolemia (TC > 200 mg/dl) in 104(45.21%), Alcohol consumption in 75 (32.60%) and Smoking 100 (43.47%) respectively. Positive correlation was seen between BMI and urine albumin (p=0.020), HbA1C and urine albumin (p=0.016), Systolic BP and urine albumin (p=0.021) and Duration

of DM and urine albumin (p=0.028). Weakly positive correlation was seen between age and urine albumin, however not statistically significant (p=0.184).

A statistically significant association was seen between Hypertension and micro al buminuria (p=.005), Smoking and micro al buminuria (p=.004), Physical inactivity and micro al buminuria (p=.0006) and Duration of DM and micro al buminuria (p=.001) among patients of type II DM.

However, no statistical significant association was seen between age, Obesity and hypercholesterolemia and micro albuminuria in present study. (p>0.05). A study by Ahmad T et al (2017) [11] revealed that, Micro albuminuria was diagnosed in 404(31.56%) patients and among these al buminuric patients 335(82.9%) had hyper tension. They were also dyslipidemic, having raised triglyceride levels, lower HDL levels, with more prevalence of background diabetic retinopathy and peripheral neuropathy. They also showed higher HbA1C levels and longer duration of diabetes. Another study by Amrit Anshu K et al. (2015) [12] shown that, factors associated with microalbuminuria in diabetic patients included duration of diabetes mellitus, higher blood pressure, higher cholesterol and triglyceride levels.

A similar study by Shrestha S et al (2021) [13] revealed that, micro albuminuria was found in 35% of the sample and the rate was significantly higher among males (P =0.027). Micro albuminuria was significantly related to Body mass index (P = 0.018), duration of diabetes (P = 0.000), retinopathy (P = 0.000) and stroke (P = 0.043).

A Study by Bhavya N et al (2017) [14] done an ob servation aL study among 100 participants in Karnataka. It was seen that, the occurrence of micro albuminuria showed a direct relationship with increasing age (p = 0.053) and increasing duration of diabetes since diagnosis. A hemoglobin (Hb)A1c value above 7% is associated with 50% or higher incidence of micro albuminuria (p = 0.018). Patients with a body mass index of more than 25kg/m2 have increased risk of developing type II DM and significant increase in micro albuminuria. The incidence of micro albuminuria is significantly associated with the presence of retinopathy (p = 0.061), peri pheral neuro pathy (p = 0.009), and hyper tension (p ≤ 0.001). Micro albuminuria is inversely associated with high-density lipoprotein (p = 0.089).

Another study by Dhonde S et al (2022) [15] observed that, highly significant difference (p<0.000) was found among the results of the three groups based on duration of diabetes. It was found that, microalbuminuria was more predominant in patients having age more than 60 years as well as inpatients having more than 10 years of duration of DM. Findings of these studies are consistent with present study.

Conclusion

• Early diagnosis of diabetic nephropathy can be done using spot urine micro albumin in type 2 diabetes mellitus patients. Prevalence of micro albuminuria was 35%. Hypertension, Smoking, Physical inactivity and long duration of DM were risk factors associated with micro albuminuria among patients of type II DM. Positive correlation was seen between BMI, HbA1C, Systolic BP, Duration Of DM and urine albumin. However, larger trials with bigger sample size should be carried out to confirm this finding from our study.

• Limitation of study: As a cross-sectional single center study and small sample size may not be able to generalize the entire population.

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