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Incidence Of Micro-Albuminura In Diabetes Mellitus Type 2; A Prospective Study In Association With Age, Sex, Weight And Creatinine Clearance In Weston Up (Hapur)

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Abstract: *Micro-albuminuria refers to the excretion of albumin in the urine at a rate that exceeds normal limits and is considered to be a earliest marker of diabetic nephropathy. If left untreated it will eventually lead to end stage renal disease (ESRD). The current study was conducted to establish the prevalence of micro-albuminuria in a sequential sample of diabetic patients attending hospital and OPD Clinic to determine its relationship with known and putative risk factors, to identify micro and normo-albuminuric patients in their sample for subsequent comparison in different age, sex, weight and creatinine clearance of the micro- and normo-albuminuric patients, This crossectional analytical study was conducted in one hundred patients at Sarswathi Institute of Medical Sciences, Anwarpur Hapur U.P. Patients having diabetes mellitus in deferent age group ranging from 30 to 70 years were selected. Data was analyzed by SPSS software. Micro-albuminuria was observed in 35% in patients with type 2 diabetes mellitus. It was observed that 65% patients were free from any type of albuminuria. Also micro-albuminuria was present in 10% of the patients less than 50 yrs of age while 15% of the patients more than 5o yrs of age were having micro-albuminuria. There was a statistically significant correlation of micro-albuminuria with duration of diabetes. Incidence of micro-albuminuria increases with age as well as increased duration of diabetes mellitus. Our study shows that only 5% patients developed macro-albuminuria. Glycosylated haemoglobin and fasting plasma glucose was significantly raised among all these patients.*

Keywords: *Albuminuria, diabetes mellitus, nephropathy.*

I. Introduction

Diabetes mellitus comprises a group of metabolic disorders presenting with hyperglycemia resulting from insulin deficiency or decreased glucose utilization and increased glucose production. Diabetes mellitus is not a single disease but a syndrome (Fajan,et al)[1]. The prevalence of diabetes mellitus is rapidly rising all over the globe at an alarming rate (Huizinga MM,et al)[2]. Recent statistic from WHO project an increase in prevalence of diabetes worldwide; particularly in developing country.[3] Currently India leads the world with largest number of diabetic subject and this is expected to further rise in coming year.[4] The primary driver of the epidemic of the diabetes is the rapid epidemiological transition associated with changes in dietary pattern and decreased physical activity as evident from the higher prevalence of diabetes in the urban population (mohan v,et al)[5]. Up to 30% of people with newly diagnosed type-2 diabetes will already have abnormally high urine albumin levels. About 75% of these people will have micro-albuminuria and about 25% have overt diabetic nephropathy (delcourt c,et al,[6]& krolewski A S ,et al [7]). Diabetes nephropathy is now the single most common cause of ESRD in worldwide.[8] Diabetic nephropathy presents in its earliest stage with low levels of albumin (micro-albuminuria) in the urine (Gall MA, et al)[9]. Diabetic nephropathy is typically defined by macro-albuminuria i.e a urinary albumin excretion of more than 300mg in a 24 hrs collection. Clinically diabetic nephropathy is characterized by a progressive increase in proteinuria and decline in GFR, hypertension, and high risk of cardiovascular morbidity and mortality. In diabetic patients with proteinuria the relative mortality is about 40 times higher than in diabetes without proteinuria. It is now established that in both type1 & type 2 DM, urinary excretion of small amounts of albumin (micro-albuminuria) is predictive of morbidity and mortality due to renal complication and cardiovascular disease.[10-12] Microalbuminuria is now recognized as an independent risk factor, even in the absence of diabetes. The determination of micro-albuminuria in diabetes mellitus is important as it is the earliest indicator of diabetic nephropathy which if left untreated, will eventually lead to end stage renal disease. Micro-albuminuria is best determined on a 24 hr urine sample. For convenience a random sample can also be used and the test done with the micral test strip (Leong S O,et al[13] & Ng WY, et al.[14]) Main objective of our present study is to detect the onset of albuminuria among diabetic patents and the effect of hyperglycaemia in causing this at an early stage, so that the renal complications can be prevented.

II. Materials And Method

Present study was carried out in the department of biochemistry, Sarswathi Institute of Medical Sciences, Anwarpur Hapur U.P, on the clinically diagnosed cases of diabetes mellitus. The study period was from October 2015 to December 2015. The patients were either on diet control or taking drugs. These cases were selected from the outdoor and indoor departments; permission from concerned authorities was dully obtained.

In our study 100 cases of known diabetes mellitus was selected from different age group ranging from 30 to 70 year. Their consent was taken. All the cases in the study group were clinically of non insulin dependent diabetes mellitus, type-2 (NIDDM). The diagnosis of diabetes mellitus was made on the basis of history, physical examination and the laboratory investigations of urine & blood. The criteria of the diagnosis of diabetes mellitus were of patients having the fasting blood glucose levels more than 126 mg/dl.

The blood glucose level was estimates by glucose oxidase peroxidise (GOD/POD) accurex biomedicals pvt. Ltd.) and glycosylated hemoglobin by ion exchange resin separation method. The glycosylated hemoglobin (HbA1c) test was done by test kit, (menufatured by Erba diagnostics Mannheim Gmbh germany and marketed by Transasia Pvt. Ltd.) Microalbumine was estimated in all samples by the kit supplied by biosystems S.A. Costa Brava 30, Barcelona, Spain. Serum urea and creatinine were estimated by kit supplied by span diagnostics. Two ml of blood was withdrawn from the selected site (antecubitel vein) and transferred to EDTA vial for the estimation of HbA1c levels. The blood was mixed properly with the anticoagulant by genital shaking. For the estimation of blood glucose, 2 ml of blood was withdrawn from the antecubitel vein and transferred to sodium fluoride- potassium oxalate vials.

Micro-albuminuria has been defined using different units of measurements. According to Gento-Montecatini, Micro-albuminuria is present when the urinary albumin excretion rate (UAER) in 24 hour urine or short time collected urine during daytime is in the range of 30-300 mg/24 hr (20-200 microgram/min), which is equivalent to 0.46 to 4.6 micro mol/24 hr. urine sample should be collected when the patient is at rest and his diabetes is under average clinical control. No measurements should be made in patients with ketosis or poor control until proper control is established. If excretion is lower than 20 microgram/min, the patient is considered to have Normo-albuminuria, and if excretion is higher than 200 microgram/min, he is considered to have Macro-albuminuria or clinical proteinuria. Micro-albuminuria should be present in at least two or three urine samples collected over a period of several months[9,10] the data for biochemical analysis are expressed as Mean S.E.M. the entire data was analyzed by using the statistical package program SPSS.

Observations

Table 1:- Diabetic patients with or without micro-albuminuria.

Below table shows that 35 % of the total patients develop albuminuria and 65% patients were free from any type of albuminuria.

Type of patients studied	Percentage
Patients with micro-albuminuria	35
Patients without micro-albuminuria	65

Table 2- Age wise distribution of diabetic patients with micro-albuminuria and frank proteinuria.

Age of patients (in years)	Number of patients with micro-albuminuria	Number of patients with frank proteinuria
Less than 50 years	10	5
More than 50 years	15	5

Table 3- Level of micro-albuminuria, fasting plasma glucose and HbA1c among diabetic patients less than 50 years of age.

Serial no.	Age(in years)	Micro-albuminuria (in mg /day)	Fasting plasma glucose (in mg /dl)	HbA1c (In %)
1	32	44	159	9.3
2	38	101	152	7.8
3	44	250	198	9.6
4	48	72	146	7.9
5	32	280	129	9.8
6	38	95	130	9.8
7	47	52	203	8.6
8	35	160	196	9.3
9	36	96	160	8.7
10	41	156	165	9.3
Mean ± S.E.M		131 ± 26.46	163±8.55	9.01±0.23

The data present in the above table shows that micro-albuminuria was directly correlated with fasting plasma glucose and HbA1c among the person who is less than 50 years of age. There is an increase in the micro-

albumin with increase Hba1c and fasting plasma glucose. It also appears that the total number of patients with micro-albuminuria were only 10 out of 100. That indicates only 10 % Patients developed micro-albuminuria who was less than 50 years.

Table 4- Level of fasting plasma glucose, micro-albuminuria & HbA1c among diabetic patients more than 50 years of age.

Serial no.	Age(in years)	Micro-albuminuria (in mg /day)	Fasting plasma glucose (in mg /dl)	HbA1c (In %)
1	70	185	170	7.7
2	60	234	134	10.5
3	51	280	195	8.2
4	58	232	132	10.5
5	62	234	220	7.9
6	67	52	129	8.9
7	81	79	165	8.8
8	70	96	182	7.8
9	71	272	156	8.0
10	62	256	220	8.2
11	60	108	198	8.0
12	77	208	152	9.2
13	60	48	145	8.1
14	75	170	139	9.6
15	78	92	160	9.2
Mean ± S.E.M		169.73±21.37	166.46±7.91	8.706±24

The data available in the above table shows that there is an increase in urinary micro-albumin with increase in HbA1c and fasting plasma glucose in the patients of more than 50 years of age. It also appears that total no. of patients with micro albuminuria were only 15 out of 100. That indicates only 15% of patients developed micro-albuminuria who were more than 50 years of age.

Table 5- level of micro-albuminuria, serum urea & serum creatinine among diabetic patients less than 50 years of age.

Serial no.	Age(in years)	Micro-albuminuria (in mg /day)	Serum urea (in mg /dl)	Serum creatinine (In mg\dl)
1	30	50	31	09
2	40	103	38	1.1
3	45	250	22	1.2
4	49	72	35	0.8
5	32	290	33	1.3
6	38	85	20	0.7
7	47	52	24	0.7
8	35	170	38	0.8
9	36	86	38	0.4
10	41	156	40	0.8
Mean ± S.E.M		131.40±2.46	31.90±2.27	0.88±0.084

Above table shows that the group of patients ow 50 years of age who developed micro- albuminuria (131.40±26.46) did not had increase level of serum urea and creatinine. The urea and creatinine levels were in the normal range.

Table 6- level of micro albuminuria, serum urea & serum creatinine among diabetic patients more than 50 years of age.

Serial no.	Age(in years)	Micro-albuminuria (in mg /day)	Serum urea (in mg /dl)	Serum creatinine (In mg\dl)
1	70	188	30	0.7
2	60	231	27	0.8
3	51	280	34	0.9
4	58	232	29	0.8
5	62	234	22	0.9
6	67	52	24	0.9
7	81	79	30	1.1
8	70	96	40	1.2
9	71	272	24	0.9
10	62	256	23	0.9
11	60	108	39	1.0
12	77	208	32	0.8
13	60	48	32	1.1

14	75	170	30	0.8
15	78	92	24	1.2
Mean ±S.E.M		169.73±21.37	29.3±1.42	0.93±0.039

Above table shows that group of patients above 50 years of age who developed micro-albuminuria (169.73±21.37) did not had increased serum urea and creatinine levels. There serum urea and creatinine levels were in normal range.

Table7: level of frank proteinuria, HbA1c and fasting plasma glucose among diabetic patients less than 50 years of age.

Serial no.	Age in years	Total urinary protein (in mg/day)	HbA1 (in %)	Fasting plasma glucose (in mg/dl)
1	49	1200	11	168
2	48	3200	32.2	133
3	39	2900	10.2	152
4	42	2600	12.8	194
5	41	2200	11.2	178
Mean ± S.E.M		2420±346.98	11.68±56	165±10.04

Above table shows that only 5% of the patients developed macro-albuminuria, HbA1c as well as fasting plasma glucose was significantly raised among all these patients. All these patients belongd to less than 50 years of age group.

Table8: level of frank proteinuria, HbA1c and fasting plasma glucose among diabetic patients more than 50 years of age.

Serial no.	Age in years	Total urinary protein (in mg/day)	HbA1 (in %)	Fasting plasma glucose (in mg/dl)
1	60	2740	11.1	170
2	70	2400	9.8	194
3	69	1560	9.3	210
4	52	2580	12.6	155
5	52	3300	12.2	178
Mean ± S.E.M		2516±285	11.0±0.64	181.40±9.29

Above table shows that only 5% of the patients developed macro-albuminuria. HbA1c as well as fasting plasma glucose was significantly raised among all these patients. All these patients belongd to more than 50 years of age group.

III. Discussion

In this study, it was observed that 35% of total patients developed and 65% patients were free from any type of albuminuria. Also micro-albuminuria was present in 10% of the patients less than 50 yrs of age while 15% of the patients more than 5o yrs of age were having micro-albuminuria. Various epidemiological and cross sectional studies have reported marked variation in the prevalence of micro-albuminuria.[15-18] Gupta et al reported a prevalence of 19.7% from a tertiary hospital in vellore.[20] vijay et al reported that 15.7% had proteinuria among 600 type -2 diabetic patients studied at a diabetic centre in Chennai city [21], The variation in the prevalence can be attributed to factors such as difference in populations, method of urine collection etc. Our study also shows that there is association between albuminuria and age of the patients, level of HbA1c, and levels of serum urea and creatinine. Gupta et al[19] reported HbA1c to be associated with micro-albuminuria. John et al[20] reported male sex, older age, longer duration of diabetes, poor glycemic control, and raised blood pressure as risk factors of micro-albuminuria, vijay et al[21] reported duration of diabetes, systolic and diastolic blood pressure, age of the patients, and serum creatinine to be associated with proteinuria. Age was reported as one of the risk factors in the wiscosin study,[17] in a Danish population study[22] and in pima Indians.[2] Early stage of diabetic nephropathy (DN) is characterized by a small increase in urinary aibumin excretion (UAE), also called micro-albuminuria or incipient DN. More advanced disease is defined by the presence of macro-albuminuria or proteinuria. The latter is classically named overt DN. Hyperglycaemia is a significant risk factor for the development of micro-albuminuria in diabetes mellitus (Ravid m et al)[26]. Proteinuria of more than 2gm/24 hr is associated with a greater risk of ESRD (Ruggeneti P, et al[27,]& Remuzzi G,et al[28]).

IV. Conclusion

It was observed in our study that the normal subjects, in which the blood sugar (FBS & PPBS), HbA1c was in normal range, micro-albuminuria was not observed significantly. There was an increase in micro-

albumin with the increase in HbA1c and fasting plasma glucose. It was also observed that the highest number of patients with having micro-albumin belonged to more than 50yrs.

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