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## **Prevalence of microalbuminuria in newly diagnosed type 2 diabetes mellitus and association with other risk factors**

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**Abstract**---Background-Microalbuminuria is a major risk factor for renal and cardiovascular events, and the early identification and treatment of patients at increased risk for Microalbuminuria may be instrumental to limit the excess renal and cardiovascular disease associated with type 2 diabetes. Objectives-To evaluate the prevalence of Microalbuminuria in newly detected patients of Diabetes mellitus type and to evaluate the association between age, BMI, glycosylated haemoglobin, levels of fasting plasma glucose, post-prandial plasma glucose, smoking and alcoholism and microalbuminuria in patients of newly detected Type 2 Diabetes mellitus. Methods- It was a Cross Sectional Study for a period of 18 months (January 2019 to June 2020) in patients attending the general medicine OPD and/or getting admitted in MEDICITI INSTITUTE OF MEDICAL SCIENCES. We have enrolled patients with new onset diabetes mellitus at Medici Hospital over a period of 18 months. All data is collected in individual case record forms with sample size was found to be 104. Chi-square and Fisher Exact test have been used to find the significance of proportion of incidence of microalbuminuria between various levels of study parameters namely BMI, Age, Duration of DM, GHB %, abnormal lipid

profile. Results-The mean age of study population was 57.92 years. Out of 42 females in the study 8 had microalbuminuria and out of 62 males in the study 13 had microalbuminuria. Sex is not an association factor for microalbuminuria indicated by P value (0.811). Overall BMI, blood pressure and triglycerides are most common associated factor with microalbuminuria which was found to be statistically significant. ( $p < 0.05$ ). Conclusion-The occurrence of microalbuminuria is estimated to be 20.2% in this study HbA1C value above 7% is associated with nearly 23% occurrence of microalbuminuria.

**Keywords**---microalbuminuria, diabetes mellitus, lipid profile, chronic kidney disease, obesity, hypertension.

## **Introduction**

Diabetes has become a major cause of morbidity and mortality throughout the world especially more alarming in developing countries as its effect on economy is profound in the 21st century. The prevalence of diabetes has increased rapidly over the past several decades [1]. Type 2 diabetes constitutes about 85% to 95% of all diabetes cases in developed countries and accounts for an even higher percentage in developing countries [2]. India leads the global top ten in terms of the highest number of people with diabetes, with a figure of 50.8 million in 2010 [2]. One of the most severe complications of diabetes is the development of Diabetic Nephropathy and it is the leading cause of end-stage renal disease (ESRD) worldwide. Nearly 30% of chronic renal failures in India are due to diabetic nephropathy. [4,5,6] Kidney disease (Diabetic Nephropathy) in diabetic patients is clinically characterized by increasing rates of urinary albumin excretion, starting from normo-albuminuria, which progresses to Microalbuminuria, Macro albuminuria and eventually to ESRD. Without specific interventions, 20–40% of type 2 diabetic patients with Microalbuminuria progress to overt nephropathy [7].

Thus, Microalbuminuria is a major risk factor for renal and cardiovascular events, and the early identification and treatment of patients at increased risk for Microalbuminuria may be instrumental to limit the excess renal and cardiovascular disease associated with type 2 diabetes. There's limited study data available on Microalbuminuria and its relations with clinical profiles of newly diagnosed Type 2 Diabetes mellitus in India. In South India, there are related data available which are only restricted to few unpublished reports. Therefore, the present study made an attempt to look at the albumin excretion levels (microalbuminuria) in relation to risk factors in newly diagnosed type 2 DM patients.

## **Materials and Methods**

It was a Cross Sectional Study for a period of 18 months (January 2019 to June 2020) in patients attending the general medicine OPD and/or getting admitted in MEDICITI INSTITUTE OF MEDICAL SCIENCES. We have enrolled patients with

new onset diabetes mellitus at Medciti Hospital over a period of 18 months. All data is collected in individual case record forms with sample size was found to be 104. This is done after taking consent and detailed history from the patient or his/her relatives, complete physical examination and necessary investigations. After which prevalence of microalbuminuria in newly diagnosed type 2 diabetes mellitus and correlation with other risk factors will be estimated. Patients were considered to be diabetic based on WHO [2] criteria for diagnosis of diabetes mellitus which is: -

- Symptoms of diabetes mellitus plus a random glucose concentration  $>200$  (11.1 mmol/l). The classic symptoms of diabetes mellitus include polyuria, polydipsia and unexplained weight loss
- OR
- Fasting blood glucose  $>126$  mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 hours
- OR
- 2 hour post prandial glucose  $> 200$  mg/dl (11.1 mmol/l).

#### **Inclusion criteria**

- Newly diagnosed Type 2 Diabetes mellitus.
- Age more than 30 yrs.

#### **Exclusion criteria**

- Patients with history of Hypertension.
- History of any previous renal disorders.
- Patient's having Confounding Factors like Fever, pregnancy, women in Menstrual period, Urinary tract Infections, Congestive Cardiac failure etc.
- Patients who have done strenuous physical activity in the last 24 hours. The selected patients were studied in detail with history and physical examination in terms of demographic details, investigation was taken.

All patients having overt macroalbuminuria detected by albustix were excluded from study. Micral test, an immunological rapid dip stick semi qualitative technique for detection of microalbuminuria, was used for estimation of microalbuminuria. All patients were afebrile during the course of collection of urine and were kept at rest during the collection of urine. Urine of the patient was first tested for albumin by albustix method. Patients who were negative for albumin by the albustix method were only included in this study. First morning mid-stream urine sample that was collected in a sterile container was used for determining microalbuminuria.

#### **Statistical Analysis**

The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis. Chi-square and Fisher Exact test have been used to find the significance of proportion of incidence of microalbuminuria between various levels of study parameters namely BMI, Age, Duration of DM, GHB %, abnormal lipid profile. The

Odds ratio has been used to find the strength of relationship between the incidence of microalbuminuria and other study parameters. Student t test has been used to find the significance of mean levels of lab parameters between the presence and absence of microalbuminuria.

## **Results**

Table 1  
Age and Gender wise distribution of Study Participants (N=104)

AGE	FEMALE		MALE		TOTAL NO
	NO	%	NO	%	
31-40	2	4.8	7	11.3	9
41-50	12	28.6	20	32.3	32
51-60	9	21.4	15	24.2	24
61-70	12	28.6	12	19.4	24
71-80	5	11.9	6	9.7	11
81-90	2	4.8	2	3.2	4
TOTAL	42	100.0	62	100.0	104
MEAN AGE	56.48		60.05		57.92

As per table 1 Nine patients were in the age group between 31 and 40 years, among whom 2 were male and 7 were female patients. The mean age of male patients in the study was 56.48 years and that of the female patients was 60.05 years. The mean age of study population was 57.92 years. Type 2 DM is commonly seen in middle and elderly aged population 32 patients were in the age group between 41 and 50 years, among whom 12 were male and 20 were female patients.

Table 2  
Prevalence of Micro-Albuminuria by sex

Gender	Micro-Albuminuria	
	Present	Absent
Female	8 (19.0)	34 (81.0)
Male	13 (21.0)	49 (79.0)
Chi-Square Test, P Value = 0.811, Not Significant		

As per table 2 Out of 42 females in the study 8 had microalbuminuria and out of 62 males in the study 13 had microalbuminuria. Sex is not an association factor for microalbuminuria indicated by P value (0.811). Among the male population under study maximum prevalence of microalbuminuria is seen to be noted in age group 41-50 next to age groups 51 to 60 and 61 to 70 with 13% and 11% respectively Among the female population under study maximum prevalence of

microalbuminuria is seen to be noted in age group 41-50 next to age groups 51 to 60 and 61 to 70 with 7% and 9% respectively.

Table 3

Association between Age, BMI, glycosylated haemoglobin, levels of fasting plasma glucose, post-prandial plasma glucose, Lipid profile and microalbuminuria in patients of newly detected Type 2 Diabetes mellitus Males and Females

ASSOCIATIONFACTOR	TOTAL	M	F
AGE	NS	NS	NS
SEX	NS	NS	NS
BMI	<0.001	<0.001	NS
SBP	<0.001	0.015	<0.001
DBP	<0.001	<0.001	<0.001
PP	NS	NS	NS
FBS	NS	NS	NS
HbA1c	NS	NS	NS
Sr.creat	NS	NS	NS
TC	NS	NS	NS
TG	0.003	NS	<0.001
LDL	NS	NS	NS
HDL	NS	0.004	NS

s per table 3 Overall BMI, blood pressure and triglycerides are most common associated factor with microalbuminuria which was found to be statistically significant. ( $p < 0.05$ )

### **Discussion**

A prospective clinical study consisting of 104 type 2 Diabetes mellitus patients is undertaken to investigate the pattern and magnitude of microalbuminuria and its relationship with microvascular and macrovascular complications of type 2 Diabetes mellitus. This variation in prevalence can be attributed to factors such as differences in populations, in the definitions of Microalbuminuria, method of urine collection, etc. However this could also reflect true differences in the ethnic susceptibility to nephropathy. The microalbuminuric patients were older in comparison to normoalbuminuric group Type 2 Diabetes mellitus is being increasingly recognized as a disease, which is characterized by dysfunction of the endothelium. Endothelial dysfunction occurs in a generalized and widespread manner in diabetic subjects. The severity of the dysfunction is directly proportional to the age of the patient and duration of the diabetes. The clinical markers of the generalized endothelial dysfunction becomes manifest in several forms.

Microalbuminuria marks the onset of endothelial dysfunction related to the kidney. Since its original description by Mogensen, the estimation of

microalbuminuria is made easy and practical. Microalbuminuria serves as a warning for imminent nephropathy. But its true value is that it heralds generalized endothelial dysfunction. Thus diabetic subjects with microalbuminuria not only have ongoing progressive nephropathy but are also likely to have retinopathy, neuropathy and cardiovascular problems including coronary artery disease and hypertension. An effort has been made in this study to highlight this issue. Even among randomly selected patients an incidence of 20.2% for microalbuminuria is evident. Among various other studies the prevalence of microalbuminuria ranges from 25% to 35%[7,8,9,10,11,12]

In our Prevalence of Micro-Albuminuria by Age Group in females study microalbuminuria was twice more common in the age group of above 50 years as compared to the age group of less than 50 years. There are many reasons for this phenomenon. Firstly deterioration in the  $\beta$ -cell function, which occurs with increasing duration of diabetes, is likely to contribute to worsening glycemic control. Higher values of HbA1C are known to be associated with increasing incidence of microalbuminuria. In our study only 6 out of 39 patients who had a good control HbA1C (< 7%) manifested microalbuminuria, whereas with HbA1C values more than 7%, 15 out of 65 (nearly 23%) had microalbuminuria. It is also interesting to note that when HbA1C rises above 8.0 %, 38 percentage of the patients had microalbuminuria. Although this is a cross sectional study, these findings raise concern regarding the association between poor glycemic control and microalbuminuria in a rural setting.[13]

This study has also brought out a significant association of microalbuminuria with body mass index. Of the 26 patients with BMI  $\geq$  25 kg/m<sup>2</sup>, 11 had microalbuminuria (42%). Similar findings have been brought forth by other studies[8,9,10]. The possible explanation for this could be:

- Increasing body mass index is a reflection of insulin resistance which in turn leads to endothelial dysfunction and microalbuminuria.
- Poor glycemic control which in turn is due to insulin resistance is also held responsible.

In our study significant correlation could be found between microalbuminuria and hypertriglyceridemia, Mean triglyceride levels in patients with microalbuminuria is 255.95 whereas in patients without microalbuminuria it is only 176.5. The incidence of microalbuminuria is more likely for the patients who present with HDL values of less than 40 mg/dl. A similar inverse relationship between HDL and microalbuminuria has been described in many studies[14,10-12].

### **Conclusion**

The occurrence of microalbuminuria is estimated to be 20.2% in this study HbA1C value above 7% is associated with nearly 23% occurrence of microalbuminuria. There is significant correlation between increased Triglyceride levels and prevalence of microalbuminuria at time of diagnosis of Diabetes Mellitus There is correlation between increased systolic, diastolic, mean arterial pressures and

prevalence of microalbuminuria at time of diagnosis of Diabetes Mellitus. It is important to understand and early preventive measures must be taken to control these lifestyle disorders in avoiding complications.

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### **References**

1. Michael J. Fowler,MD, Diabetes: Magnitude and Mechanisms, CLINICAL DIABETES Volume 25, Number 1, 2007.
2. Richard Sicree, Jonathan Shaw, Paul Zimmet Baker, The Global Burden, Diabetes and Impaired Glucose Tolerance, IDF Diabetes Atlas fourth edition, 2009.
3. Mani M.K. Prevention of chronic renal failure at community level. *Kidney Int. suppl* 2003 (83), S86 – 89.
4. Management of diabetes in chronic renal failure, *Indian J Nephrol* 2005;15, Supplement 1: S23-S31.
5. V Viswanathan, Diabetes Could Cost You Your Kidneys, Act Now, *JAPI • VOL. 51 • November 2003*, 1043-1044.
6. American Diabetes Association (2004). Nephropathy in diabetes (Position mStatement). *Diabetes Care*, 27(1):79-83.
7. Ghai R, Verma NDS, Goel A. Microalbuminuria in NIDDM and essential hypertension as a marker of severe disease. *JAPI* 1994; 42(10): 771-774.
8. Patel KL, Mhetras SB, V arthakavi PK, Merchant PC, Nihalani KD.
9. Microalbuminuria in non-insulin dependent diabetes mellitus. *JAPI* 1999; 47(5): 596-601.
10. Taneja V, Sircar S, Kansra U, Lamba IMS. Microalbuminuria in normotensive non-insulin dependent diabetic subjects - Associations and predictions. *J Diab Assoc India* 1997; 37(2): 30-36.
11. Jadhav UM, Kadam NN. Association of microalbuminuria with carotid intimamedia thickness and coronary artery disease - A cross sectional study in western India. *JAPI* 2002; 50: 1124-1129.
12. A Varghese, R Deepa, M Rema, V Mohan. Prevalence of microalbuminuria in type 2 diabetes mellitus at diabetes centre in southern india. *Postgrad Med J* 2001; 77: 399-402.
13. M Afkhami-Ardekani, M Modarresi, E Amirchaghmaghi. Prevalence of microalbuminuria and its risk factors in type 2 diabetic patients. *Indian Journal of Nephrology* 2008; 18(3): 112-117.
14. Gilbert RE, Akdeniz A, Jerums G. Detection of microalbuminuria in diabetic patients by urinary dipstick method. *Diabetes Res Clin Pract* 1997; 35(1): 57-60.
15. Chakravarthy B, Taneja V, Sircar S, Kansra U. Microalbuminuria. Association with dyslipidemia in non-insulin dependent diabetes mellitus. *JAPI* 1997; 45(8):608-611

17. Suryasa, W. (2019). Historical Religion Dynamics: Phenomenon in Bali Island. *Journal of Advanced Research in Dynamical and Control Systems*, 11(6), 1679-1685.
18. Suryasa, W., Sudipa, I. N., Puspani, I. A. M., & Netra, I. (2019). Towards a Change of Emotion in Translation of Kṛṣṇa Text. *Journal of Advanced Research in Dynamical and Control Systems*, 11(2), 1221-1231.
19. Akbarov, A. N., & Xabilov, D. N. U. (2021). The condition of the oral cavity in patients who have had a viral infection COVID-19. *International Journal of Health & Medical Sciences*, 4(4), 381-383. <https://doi.org/10.21744/ijhms.v4n4.1796>