



## MICROALBUMINURIA AND ITS ASSOCIATION WITH GLYCEMIC CONTROL IN PATIENTS WITH DIABETES MELLITUS TYPE II.

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### Article received on:

29/10/2019

### Accepted for publication:

30/12/2019

**ABSTRACT:** Diabetes mellitus is chronic condition with defect in regulation of insulin. Microalbuminuria is one of the early appearing markers of overt diabetic nephropathy. Uncontrolled glycemic status has been postulated to be associated with increase urinary albumin levels. **Objectives:** To find out the association of increased urinary albumin with poor glycemic status of patients with diabetes mellitus type II. **Study Design:** Cross Sectional study. **Setting:** Department of Pathology, Indus Medical College Hospital Tando Muhammad Khan. **Period:** November 2018 to June 2019. **Material & Methods:** Patients were divided into two groups: Group I (Poor glycemic control, HbA1c >7%) and Group II (Good glycemic control, HbA1c <7%). Glycated hemoglobin and microalbuminuria were evaluated in all patients. Data was analyzed using SPSS 21.0. P – value of <0.05 was considered as statistically significant. **Results:** Total of 213 patients were included in the study with male ratio (56.8%) slightly higher than females (43.19%). Mean age of patients was  $42.3 \pm 2.1$  years. Mean glycated hemoglobin in Group I and II was  $8.12 \pm 0.97\%$  and  $5.98 \pm 0.41\%$  respectively. In Group I, 57.54% patients were detected with microalbuminuria as compared to Group II (12.26%). P value was statistically significant (<0.001). **Conclusion:** Microalbuminuria was found more frequently in patients with poor glycemic control. Early detection of urinary microalbumin in these patients may decrease the risk of kidney damage and appropriate and adequate management in initial stage.

**Key words:** Diabetes Mellitus, Diabetic Nephropathy, Glycemic Control, Hyperglycemia, Microalbuminuria.

**Article Citation:** Jiskani SA, Singh D, Meghji KA, Talpur RA, Khan J, Khanzada HN. Microalbuminuria and its Association with Glycemic Control in Patients with Diabetes Mellitus Type II. Professional Med J 2020; 27(8):1617-1620.  
**DOI:** 10.29309/TPMJ/2020.27.08.4305

## INTRODUCTION

Diabetic nephropathy is one of the leading causes of chronic kidney failure.<sup>1</sup> Diabetes mellitus is a chronic condition of carbohydrate, protein and fat metabolism due to deficiency of insulin and/or resistance of insulin. Chronic hyperglycemia of diabetes results in various dysregulation of immune system which is related to irreversible and permanent structural and functional changes in the cells of body with long – term damage.<sup>2,3</sup> Microalbuminuria has been defined as excretion of urinary albumin in 24 – hour urine or short time collection of urine during daytime in the range of 30 – 300 mg/24 hour (20 – 200 µg/min).<sup>4,5</sup> The increased level of albumin in the urine may represent more generalized damage to the vasculature than microvasculature injury alone to the renal parenchyma. Hyperperfusion

to the glomerulus and hypertrophy of the renal calyces occurs in initial phase after onset of diabetes mellitus, which is reflected by increase in glomerular filtration rate (GFR).<sup>6-8</sup>

Screening of microalbumin can be done using quantitative methods including measurement of albumin to creatinine ratios in random sample of urine, 24 – hour collection with creatinine, which allows the simultaneous measurement of creatinine clearance, timed (e.g. 4 hourly) overnight collection of urine for protein, or it can be measured using semi – quantitative reagent dipsticks.<sup>9</sup>

Microalbuminuria is found in more than one – third of diabetic patients. Mortality of diabetic patients is increased 40 times with proteinuria.

It denotes the single most and most sensitive prognostic factor to assess the risk of evident diabetic nephropathy and it reflects the initial stage of progressive diabetic renal disease.<sup>10,11</sup>

The objective of this study was to evaluate the association between poor glycemic control and presence of microalbuminuria in patients with diabetes mellitus type II.

**MATERIAL & METHODS**

This was a cross sectional study carried out in Department of Pathology, Indus Medical College Tando Muhammad Khan from November 2018 to June 2019. Patients included were ages above 30 years and below 55 years, both genders, patients with both controlled and uncontrolled diabetes mellitus type II.

Diabetic patients were divided into two groups: Patients with poor glycemic control (HbA1c >7%) in Group I and with good glycemic control (HbA1c<7%) in Group II. Participants with history of hypertension, kidney disease and persons on medication which function of kidney like ACE inhibitors, ARBs, diuretics and NSAIDs were excluded from the study.

Taking all antiseptic and aseptic precautions, 3mL of blood was taken from anterior cubital vein and 24-hours sample of urine was collected in sterilized container for HbA1c and microalbuminuria detection respectively. HbA1c was measured by cation – exchange resin method using Spectrophotometer. Microalbuminuria was detected by dipstick method in urine.

Data was analyzed using SPSS 21.0. Chi – square test was applied. P – value of <0.05 was found

statistically significant.

**RESULTS**

Total of 213 patients participated in the study. Males were 121 (56.8%) and 92 (43.19%) were female (Figure-1). Group I consisted of 107 (50.23%) patients and Group II consisted of 106 (49.76%) patients. Mean age of patients was 42.3 ± 2.1 years. Mean glycated hemoglobin in Group I was 8.12 ± 0.97% and 5.98 ± 0.41% in Group II (Table-I). In Group I, 61 (57.54%) patients were detected with microalbuminuria, while in Group II 13 (12.26%) were detected with microalbuminuria (Table-II), with P value was <0.001.

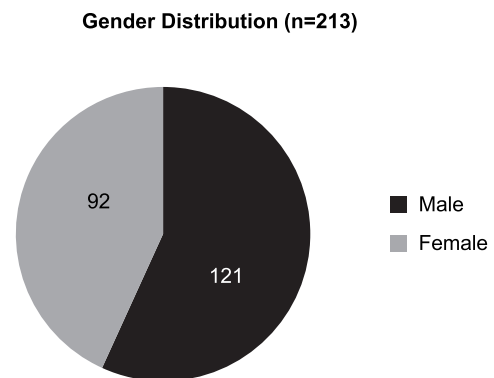


Figure-1. Gender Distribution (n=213).

**DISCUSSION**

Diabetes mellitus type II is increasing as a fatal disease, with nephropathy identified as endothelial dysfunction and it usually occurs in generalized manner in patients with diabetes mellitus type II.<sup>5,12</sup> There is high prevalence of both micro – and macrovascular complications in diabetic patients including nephropathy etc.<sup>13</sup>

Groups	Number of Participants (%)	HbA1c (%)	P-Value
Group I (Uncontrolled DM)	107 (50.23%)	8.12% ± 0.97%	<0.001
Group II (Controlled DM)	106 (49.76%)	5.98 ± 0.41%	

Table-I. Comparison of Glycated Hemoglobin in Both Groups (n=213).

Groups	Microalbuminuria (N)	P-Value
Group I (Uncontrolled DM)	61 (57.54%)	<0.001
Group II (Controlled DM)	13 (12.26%)	

Table-II. Detection of Microalbuminuria in Both Groups (n=213).

In our study, the patients with uncontrolled diabetes mellitus were proven to be more prevalent by the presence of microalbumin in their urine. The p – value was statistically significant as compared in both groups (<0.001). Although patients with controlled glycemic status show less detection of microalbuminuria. A significant correlation was also found in various studies.

Showail et al showed in study that uncontrolled glycemic control was highly associated with microalbuminuria development, having good therapeutic implications.<sup>14</sup> Efundem et al proved that microalbuminuria is associated with high systolic and diastolic blood pressure, and declining kidney function, suggesting the leading mechanism towards the kidney damage.<sup>15</sup> Chen et al explained the role of microalbuminuria with glycemic control, with his results proving the relationship of high – normal albuminuria and glycemic control on microalbuminuria development among patients with diabetes mellitus type II.<sup>16</sup> Khalid et al showed in his study and proved the positive correlation between increased frequency of microalbuminuria and glycemic control.<sup>17</sup> Memon et al showed that by improving the glycemic control of diabetic patients, maintenance of the blood pressure can be ensured; and early diagnosis of the disease may decrease the risk of development and progression of microalbuminuria and finally end stage damage of kidney and mortality.<sup>18</sup> Habib et al showed that microalbuminuria showed little or no association with age of the patients and highly associated with HbA1c levels in diabetic patients.<sup>19</sup> Verma et al showed that impaired control of glucose is related to increased urinary levels of albumin and is proven to be high risk marker of diabetic nephropathy.<sup>20</sup>

Kumar et al showed that high prevalence of microalbuminuria was present among the patients of diabetes mellitus with poor glycemic control.<sup>13</sup>

Similar findings were present in this study with high rate of urinary albumin, 61 (57.54%) in diabetic patients with poor glycemic control. In our society, various causes of microalbuminuria are found, including race, smoking, heavy

poisoning with metals, exercise, connective tissue disorders, use of drugs (e.g. NSAIDs), sickle cell disease, obesity, and family history of hypertension or diabetes mellitus.<sup>21,22</sup>

## CONCLUSION

Microalbuminuria was found frequently in diabetic patients with poor glycemic control. Early detection of urinary microalbumin in these patients may decrease the risk of renal damage and appropriate management at early stage.


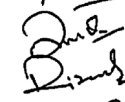
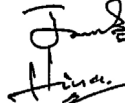


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