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Characteristics of microalbuminuria among patients with type 2 diabetes mellitus treated at Saigon general hospital

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Abstract: Early detection of microalbuminuria in patients with type 2 diabetes mellitus is essential for preventing diabetic kidney disease. Microalbuminuria testing is widely recommended from the time of diagnosis to monitor complications. To describe the characteristics of microalbuminuria in T2DM patients treated at Saigon General Hospital in 2025. Materials and Methods: A prospective cross-sectional study was conducted on 89 T2DM patients at the Department of General Internal Medicine from April to September 2025. The prevalence of microalbuminuria (MAU ≥30 mg/L) was 23.6%. Mean MAU levels were 71.5±92.6 mg/L in males and 64.7±89.8 mg/L in females. Patients with positive MAU had higher HbA1c (8.0±1.4%), serum creatinine (89.8±22.1 µmol/L), and BMI (25.3±3.2 kg/m²), indicating an association between poor glycemic control, increased body weight, and early renal impairment. Hypertension was present in 66.7% of patients with MAU. Microalbuminuria is relatively common in T2DM patients and is associated with modifiable risk factors. Routine screening is important for early detection and timely intervention to prevent progression to diabetic nephropathy.

Keywords: *Complications, Diabetes Mellitus, Microalbuminuria.*

1. Introduction

Diabetes mellitus is a chronic metabolic disorder and one of the fastest-growing non-communicable diseases worldwide. It is associated with multiple long-term complications that result in significant morbidity and mortality, among which renal, ocular, cardiovascular, and microvascular complications are particularly common [1-3].

Diabetes mellitus can be effectively managed, and its complications may be prevented or delayed through appropriate dietary modification, physical activity, pharmacological treatment, regular screening, and timely management of complications [2-4]. Among diabetes-related complications, diabetic kidney disease is one of the most frequent and severe, often associated with a poor prognosis. The presence of microalbuminuria, also referred to as moderately increased albuminuria, represents the earliest clinical manifestation of diabetic nephropathy. Microalbuminuria is associated with an increased risk of progression to chronic kidney disease and significantly elevates both all-cause and cardiovascular mortality in patients with diabetes mellitus [1, 3, 5-7].

Urinary albumin excretion rate is considered one of the most reliable indicators for the early detection and monitoring of diabetic kidney disease in patients with diabetes mellitus [1, 5-7]. Therefore, early identification of microalbuminuria in patients with type 2 diabetes mellitus is of critical clinical importance. Globally, numerous studies and clinical guidelines recommend the use of microalbuminuria or moderately increased albuminuria testing for the early detection and follow-up of diabetic complications, including at the time of initial diagnosis of type 2 diabetes mellitus [3-5, 7].

1.1. Objectives

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This study aimed to describe the characteristics of microalbuminuria in patients with type 2 diabetes mellitus treated at the Department of General Internal Medicine, Saigon General Hospital, in 2025, including the prevalence of microalbuminuria and its associated clinical and laboratory factors such as glycated hemoglobin (HbA1c), serum creatinine, body mass index (BMI), and other relevant parameters [2, 3].

2. Materials and Methods

2.1. Study Population

The study population consisted of patients with type 2 diabetes mellitus treated at the Department of General Internal Medicine, Saigon General Hospital, from April 1, 2025, to September 30, 2025, and who provided informed consent to participate in the study.

Patients were excluded if they met any of the following criteria: presence of severe or acute complications, including diabetic ketoacidosis, hyperosmolar hyperglycemic state, or acute infections; known renal diseases such as urinary tract infection, nephrolithiasis, gross or microscopic hematuria; decompensated heart failure, liver cirrhosis; pregnancy or menstruation at the time of enrollment; malignant hypertension; or overt (macro) proteinuria.

2.2. Study Design

This was a prospective cross-sectional descriptive study.

2.3. Data Collection and Statistical Analysis

Data were collected, managed, and analyzed using EpiData software version 3.1 and STATA software version 14.0.

2.4. Ethical Considerations

The study protocol was reviewed and approved by the Scientific and Technological Council (Ethics Committee) of Saigon General Hospital.

3. Results

A total of 89 patients with type 2 diabetes mellitus who met the inclusion criteria were enrolled in the study between April 1, 2025, and September 30, 2025, at the Department of General Internal Medicine, Saigon General Hospital.

Positive microalbuminuria (MAU ≥30 mg/L) was identified in 21 patients, accounting for 23.6% of the study population, while 68 patients (76.4%) had negative MAU results. Results are shown in Table 1.

Table 1.
Multivariate analysis of factors associated with microalbuminuria (n = 89).

Variable	MAU negative (n=68)	MAU positive (n=21)	p-value
HbA1c (%)	6.8 ± 1.1	8.0 ± 1.4	<0.05
Serum creatinine (µmol/L)	69.8 ± 15.2	89.8 ± 22.1	<0.05
BMI (kg/m²)	23.1 ± 2.4	25.3 ± 3.2	<0.05
Hypertension (%)	39.7	66.7	<0.05
Insulin therapy (%)	27.9	57.1	<0.05

The prevalence of MAU observed in this study was comparable to that reported at Military Hospital 103 (24.3%) and higher than at Thai Binh Provincial General Hospital (18.1%), but lower than at the University Medical Center Ho Chi Minh City (35%) and Ca Mau Provincial General Hospital (55.5%) [8-13].

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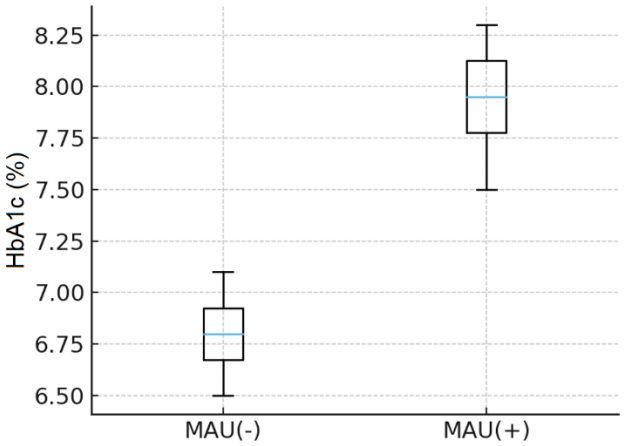

Figure 1.
Distribution of HbA1c according to MAU status.

Median HbA1c levels were significantly higher in the MAU-positive group than in the MAU-negative group, indicating poorer glycemic control among patients with microalbuminuria (**Figure 1**).

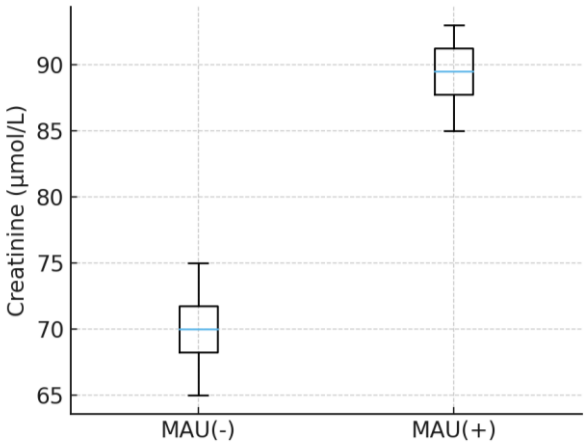

Figure 2.
Distribution of serum creatinine according to MAU status.

Median serum creatinine levels were higher in patients with MAU positivity. Although most patients had not yet developed overt renal failure, this difference suggests early renal impairment (Figure 2).

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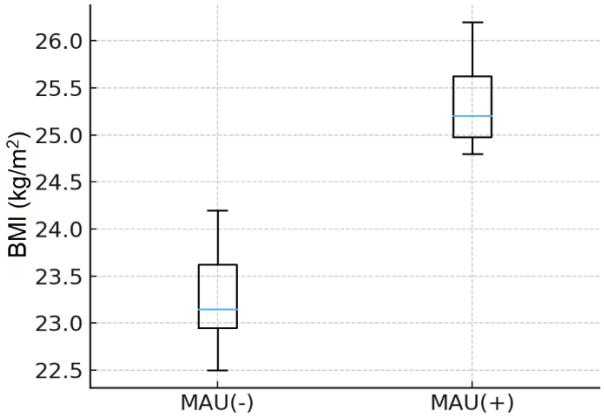

Figure 3.
Distribution of BMI according to MAU status.

Patients in the MAU-positive group had higher BMI values compared with those in the MAU-negative group (Figure 3).

Table 2.
Comparison of risk factors between MAU groups (n = 89).

Risk factor	MAU negative (n=68)	MAU positive (n=21)	p-value
Hypertension (%)	39.7	66.7	<0.05
Insulin therapy (%)	27.9	57.1	<0.05
Smoking (%)	19.1	23.8	NS
Alcohol consumption (%)	17.6	19.0	NS

Patients with MAU positivity showed a significantly higher prevalence of hypertension and insulin therapy compared to those without MAU (66.7% vs. 39.7% and 57.1% vs. 27.9%, respectively; $p < 0.05$ for both). This suggests that both hypertension and more advanced or insulin-requiring diabetes are important factors associated with the presence of microalbuminuria. In contrast, no significant differences were observed between the two groups regarding smoking and alcohol consumption (p = NS), indicating that these lifestyle factors were not significantly associated with MAU status in this cohort (Table 2).

Table 3.
Distribution of microalbuminuria severity (n = 89).

MAU category	Albumin level (mg/L)	n	Percentage (%)
Normal	<30	68	76.4
Microalbuminuria	30–300	16	18.0
Macroalbuminuria	>300	5	5.6

The majority of participants had normal urinary albumin levels (<30 mg/L), accounting for 76.4% of the study population. However, a notable proportion (18.0%) exhibited microalbuminuria, indicating early renal involvement and a potential window for intervention. In contrast, only 5.6% had macroalbuminuria, suggesting that advanced renal damage was relatively uncommon in this cohort. Overall, while most subjects were within the normal range, nearly one-quarter showed evidence of abnormal albumin excretion, highlighting the importance of early screening and management (Table 3).

4. Discussion

In this study, the prevalence of positive microalbuminuria among patients with type 2 diabetes mellitus was 23.6%, representing a moderate rate compared with other domestic studies. This

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prevalence was lower than that reported in Ca Mau (55.5%) and at the University Medical Center Ho Chi Minh City (35%), but similar to findings from Military Hospital 103 (24.3%) and higher than those reported in Thai Binh (18.1%) [1, 5, 8-10].

These differences may be explained by several factors. First, population characteristics varied across studies. Patients treated at tertiary or specialized centers often have a longer duration of diabetes and more advanced complications, leading to higher rates of MAU. In contrast, our study population may have included patients diagnosed at earlier stages of the disease, resulting in a lower prevalence [2-4, 14-17].

Second, glycemic control played a critical role. HbA1c levels were significantly higher in the MAU-positive group, confirming that poor glycemic control is a major risk factor for early diabetic kidney disease. This finding aligns with both domestic and international studies, which have consistently shown that elevated HbA1c is a strong predictor of diabetic nephropathy [11-13, 18-20].

Third, renal function differed between groups. Although most patients had not yet developed overt renal insufficiency, higher serum creatinine levels in the MAU-positive group indicate early renal damage. These findings highlight the importance of MAU as an early biomarker, capable of detecting renal injury even when estimated glomerular filtration rate (eGFR) remains relatively preserved [6, 21-23].

Regarding other risk factors, hypertension was significantly more common in patients with MAU positivity. This association is consistent with the pathophysiology of diabetic nephropathy, as elevated blood pressure increases intraglomerular pressure and accelerates damage to the glomerular filtration barrier. Similarly, the higher prevalence of insulin therapy in the MAU-positive group likely reflects longer disease duration or poorer glycemic control.

In contrast, smoking and alcohol consumption were not significantly associated with MAU in this study. However, this finding does not exclude their potential role, as the sample size was limited and lifestyle behaviors may have been underreported. Larger-scale studies are needed to further clarify the contribution of these factors [7, 24, 25].

Importantly, 18.0% of patients were identified at the microalbuminuria stage, a clinically meaningful finding because this represents a potentially reversible phase. Early detection at this stage allows timely intervention to slow or prevent progression to advanced chronic kidney disease and end-stage renal failure.

5. Conclusion

Based on the analysis of 89 patients with type 2 diabetes mellitus treated at the Department of General Internal Medicine, Saigon General Hospital, between April 1, 2025, and September 30, 2025, the findings of this study highlight the importance of routine screening for microalbuminuria in patients with type 2 diabetes mellitus to enable early detection and timely intervention

Future research should focus on large-scale, longitudinal cohort studies to clarify causal relationships and develop predictive models for diabetic kidney disease in patients with type 2 diabetes mellitus in Vietnam.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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