

## PREVALENCE AND RISK FACTORS OF MICROALBUMINURIA IN TYPE 2 DIABETES MELLITUS IN A PRIVATE HOSPITAL OF NEPAL

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### ABSTRACT

**Background:** Microalbuminuria is an indicator of diabetic nephropathy as well as a marker for cardiovascular diseases. The aim of this study was to determine the prevalence of microalbuminuria and identify the associated risk factors in patients with type 2 diabetes in a private hospital of Nepal. **Methods:** Cross-sectional study design was used for the collection of data. The study sample consists of 282 type 2 diabetes patients who met the inclusion criteria. The study was conducted for a duration of 3 months from July, 2014 to September, 2014 at the Endocrine Department of Alka Hospital Pvt. Ltd., Nepal. Ethical approval was taken from the institutional review board of Alka Hospital. **Results:** A total of 363 patients were included in this study. Microalbuminuria was observed in 35.5% of the patients who

met the inclusion criteria of the study. Parameters such as duration of diabetes and systolic and diastolic blood pressure were higher in patients with microalbuminuria as compared to those with normoalbuminuria. **Conclusion:** A high prevalence of microalbuminuria was observed in patients with diabetes. Early screening and detection of patients with diabetes is thus essential to reduce the future consequences of chronic kidney diseases.

**KEYWORDS:** Prevalence; Microalbuminuria; Type 2 Diabetes.

## INTRODUCTION

Diabetic Nephropathy (DN) is a leading cause of morbidity and mortality in patients with diabetes mellitus (DM). It has been estimated that about 25 to 40% of patients with Type 1 diabetes (T1DM) and 5 to 40% of patients with Type 2 diabetes (T2DM) ultimately develop diabetic kidney disease.<sup>[1,2]</sup> An early sign of impending DN is microalbuminuria (MA). Albuminuria in T2DM is the major renal risk marker for nephropathy and cardiovascular complications. As such reduction in albuminuria will have a positive impact on renal protection.<sup>[3]</sup>

The prevalence of MA ranges from less than 10% in United Kingdom<sup>[4]</sup> to about 35% in Hispanic Americans.<sup>[5]</sup> The prevalence of MA in Asians is among one of the highest in the world.<sup>[6]</sup> There are few studies with regard to the prevalence of MA in DM patients in Nepal. The primary objective of this study was to assess the prevalence of MA in patients with T2DM in Nepalese scenario.

## METHODS AND METHODOLOGY

A total of 363 confirmed T2DM patients attending the Endocrine Unit of Alka Hospital Pvt. Ltd., Nepal, from July, 2014 to September, 2014 (For duration of 3 months) were enrolled in this study. T2DM patients were diagnosed as per American Diabetes Association (ADA) criteria. Individuals with hematuria and/or pyuria, history of UTI within the last one year, subjects with overt nephropathy and women on menstrual period at the time of sample collection were excluded (n=81). Thus, a total of 282 individuals met the inclusion criteria. The study design was cross sectional and descriptive. Simple purposive non-probability sampling technique was used. The study was approved by the ethical review committee of Alka Hospital Pvt. Ltd. Informed consent was obtained prior to the study from all the patients included in this study.

Demographic characteristics of the study population were analyzed. Clinical parameters such as fasting plasma glucose (FPG), post prandial glucose level (PP), glycosylated hemoglobin (HbA1c), blood pressure (BP) levels, Body Mass Index (BMI), duration of diabetes, family history and serum creatinine levels were also noted.

MA is defined as an albumin excretion rate (AER) of 20 to 199  $\mu\text{g}/\text{min}$  in timed urine collection or 30 to 300  $\text{mg}/\text{dL}$  in a spot collection. In this study the diagnosis of MA was confirmed using spot urine collection method.

Hypertension was defined as systolic blood pressure >139 mmHg or diastolic blood pressure >89 mmHg or the use of antihypertensive medications.

Statistical analysis was performed using SPSS (version 20). Data were presented as mean  $\pm$  S.E.

## RESULTS

In the present study, the prevalence of MA in patients with T2DM was shown to be 35.5%. Among the 282 individuals who met the inclusion criteria, 153 individuals were having normoalbuminuria and the rest 129 individuals were having microalbuminuria. The mean age of the study population was  $57.44 \pm 11.4$  years. The mean BMI was  $25.59 \pm 4.04$  kg/m<sup>2</sup>. About 45% of the patients were overweight. The mean duration of DM was  $8.9 \pm 6.1$  years. Patients were divided as normoalbuminuric and microalbuminuric. The clinical characteristics of the study population are mentioned in Table I.

The mean age of the patients was higher in the microalbuminuric subjects than compared to the patients in normoalbuminuric group. Duration of DM was also higher in patients with MA. Both systolic BP and diastolic BP were higher in patients with MA. The MA subjects had increased post prandial glucose and HbA1C levels.

**TABLE I: Clinical and Biochemical Characteristics of the Study Population.**

Characteristics	Normoalbuminuric	Microalbuminuric
Gender (M/F)	81/72	71/58
Age	$52.8 \pm 11.1$	$57.44 \pm 11.4$
Duration of DM (years)	$6.1 \pm 4.5$	$8.9 \pm 6.1$
Body Mass Index	$26.1 \pm 3.4$	$25.59 \pm 4.04$
Systolic BP (mmHg)	$133.3 \pm 16.9$	$142.1 \pm 18.7$
Diastolic BP (mmHg)	$82.1 \pm 10.3$	$89.8 \pm 18.2$
Fasting Plasma Glucose (mg/dL)	$145.1 \pm 34.9$	$138.5 \pm 28.6$
Post-prandial Plasma Glucose (mg/dL)	$202.6 \pm 55.7$	$208.6 \pm 49.7$
HbA1C (%)	$7.1 \pm 0.9$	$7.1 \pm 0.7$

*Values expressed as Frequency (%) or mean  $\pm$  SD.*

## DISCUSSION

MA predicts progression to DN and is an independent marker for cardiovascular mortality in patients with DM.<sup>[7]</sup>

In the present study, the prevalence of MA in patients with DM was shown to be 35.5%. A previous study conducted in Kavre reported an overall prevalence of 36.79%, which is comparable to our study,<sup>[8]</sup> whereas, another similar study had reported a prevalence of 45.5% among 143 T2DM patients.<sup>[9]</sup> The prevalence of MA was higher than the rate of 17 to 21% reported from studies conducted in Western countries.<sup>[10]</sup> The variation in results could be due to numerous underlying results such as study sample, duration of DM and prior treatment, definition of MA and racial differences.

Higher levels of systolic and diastolic BP in patients with MA suggest that there is association between hypertension and MA. Various studies have shown a significant association between the prevalence of MA and diastolic BP.<sup>[11,12]</sup> Hypertension is a risk factor of MA and thus, adequate control of blood pressure is essential to prevent the progression to DN.

Patients with MA were older than those with normoalbuminuria. The duration of onset of DM was also greater in patients with MA. Studies have shown a significant association between MA and various other risk factors such as older age, male gender, longer duration of DM, BMI, smoking habit, plasma glucose levels.

The prevalence of MA was high in this study. Albuminuria is a well-known predictor of poor renal outcomes in patients with T2DM and thus, early screening of MA and strict control of glucose and blood pressure is essential to prevent further complications.

There are certain limitations in this study. This study was carried out in a relatively small number of patient populations; thus studies on a larger scale, and if possible, a multicenter trial, is required. Furthermore, a different diagnostic criterion for the identification of MA could have been more appropriate.

## CONCLUSION

In this study, a high prevalence of MA was observed in patients with T2DM. With more than 436,000 people suffering from DM in Nepal, the economic burden this could impose in the future is a concern. Thus, early detection and good control of DM is essential to reduce the burden of kidney disease on health sector. Screening for MA in diabetic patients should be done on a regular basis so that further complications can be prevented at an earlier state and thus indeed reduce the progression of renal disease.

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