



## PODOCYTURIA-A NEW MARKER FOR DIABETIC NEPHROPATHY

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**Abstract:** Constant efforts are ongoing to identify reliable and reproducible non-invasive biomarkers for acute and chronic kidney injury targeted toward identifying kidney injury not only in its early stages, but also in classifying kidney disease according to severity, predict disease outcomes, and monitor response to therapeutic interventions. The number of podocytes in urine or podocyturia increases with active kidney disease even before proteinuria appears and seems to improve with treatment. Also, podocyturia seems to be confined to active disease, in contrast to proteinuria, which is present during both active and chronic phases of glomerular damage. It will be particularly interesting to explore podocyturia, as a marker of subclinical early renal damage, which may be a detectable way before the occurrence of overt proteinuria and development of full blown glomerular disease.

**Keywords:** Biomarkers, Podocyturia, Proteinuria

### INTRODUCTION

Diabetic nephropathy is clinically characterized by proteinuria and pathologically by glomerular hypertrophy and GBM thickening with foot process effacement<sup>(1,2)</sup>, podocytes have been the focus in the field of research on diabetic nephropathy. Many investigations have demonstrated that the diabetic milieu per se, hemodynamic changes, and local growth factors such as transforming growth factor-beta and angiotensin II, which are considered mediators in the pathogenesis of diabetic nephropathy, induce directly and/or indirectly hypertrophy, apoptosis, and structural changes, and increase type IV collagen synthesis in podocytes. Glomerular visceral epithelial cells, namely podocytes, are highly specialized cells and give rise to primary processes, secondary processes, and finally foot processes<sup>(3)</sup>. The foot processes of neighboring podocytes interdigitate, leaving between them filtration slits. Podocytes are known to synthesize matrix molecules to the glomerular basement membrane (GBM), including type IV collagen, laminin, entactin, and agrin<sup>(4)</sup>.

### Aims and Objectives

Urinary albumin excretion of 20-200 µg/ml is called micro-albuminuria. Micro-albuminuria is an early indication of renal disease. Detection of micro-albuminuria can aid diagnosis and treatment of incipient nephropathy in persons with diabetes. Researchers have shown that podocyte damage occur in patients of diabetic nephropathy. The aim of this study is to find out the presence of podocytes in urine before appearance of micro-albumin and to find out whether there is increase in podocytes in urine with increasing level of micro-albumin in the patients of diabetic nephropathy.

### MATERIALS AND METHODS

The patients for the study were selected from the Medicine OPD, KIMS and were divided into three groups. 10 healthy patients were (non-diabetic) were included as controls. 10 patients were included with diabetic history of more than five to less than ten years. 10 patients were included with diabetic history of more than ten to less than fifteen years. 10 patients were included with diabetic history of more than fifteen years. Micro-albuminuria was measured and podocytes were detected in the urine in all the four groups along with fasting glucose levels.

FBS was measured by Glucose Oxidase Peroxidase method using Cobas Biochemistry Auto analyzer. Micro-albuminuria was detected in urine semi quantitatively using Roche's Micral strip. Podocytes was detected in urine by indirect immune florescence using antibodies against podocin.

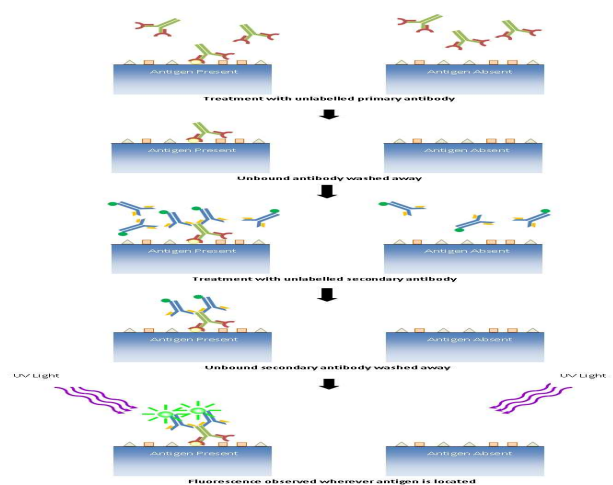


Figure.1: Indirect Immuno fluorescence

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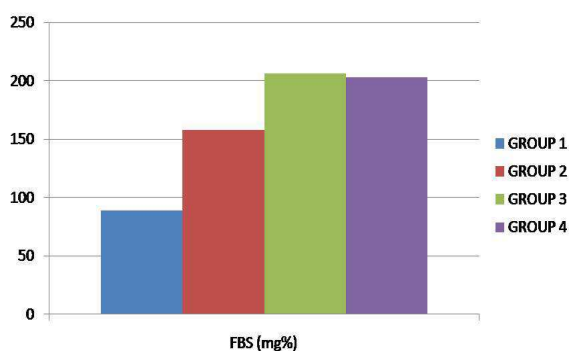
### RESULTS

**Table.1:** showing comparison of micral +ve and podocytes +ve cases in different groups

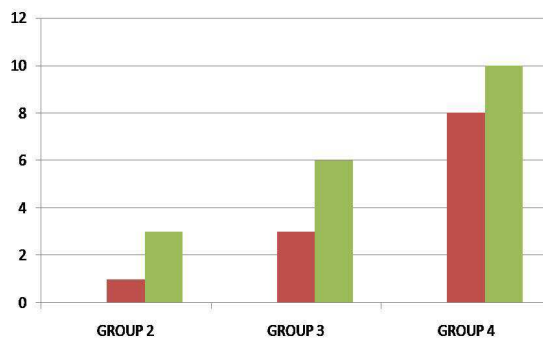
VARIABLES	GROUP 1	GROUP 2	GROUP 3	GROUP 4
FBS (mg%)	89.2 ± 9.8	158.1 ± 21.6	206 ± 36.2	203 ± 34.8
Urine Micral (No. of +ve cases)	Nil	1	3	8
Podocyte (No. of +ve cases)	Nil	3	6	10

### DISCUSSION

The mean glucose level in healthy subjects (Group.1) was around 89mg% and no podocytes were found in urine signifying podocytes are absent in urine of normal persons. Podocytes appeared in urine of 3 patients in Group 2 compared to micro-albuminuria which appeared in only one patient signifying it appears earlier in patient of chronic diabetes before nephropathy. Number of patients increased in each group with +ve podocytes in urine which indicates diabetic nephropathy incidence increases with duration of diabetes. Number of patients with podocytes in urine and micro-albumin in urine increased as duration of diabetes increased, proving podocyturia can also act a marker of DN in DM Type II patients



**Figure.2:** Fasting glucose in different groups



**Figure.3:** Comparison of micral +ve and podocytes +ve cases in different groups

### CONCLUSION

Podocyturia appears to be an earlier marker of nephropathy in patients of Diabetes Mellitus Type II than micro-albuminuria. However larger studies have to be conducted before using it as a marker and all other causes of podocytes in urine have to be ruled out before conducting such studies.

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