IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 3 Ser. 15 (March. 2019), PP 26-29
www.iosrjournals.org

Microalbuminuria and Serum Creatinine Levels in Diabetic and Non-Diabetic Group - A Comparative Study

Dr. P.Sudha Rani[1]$_{MD}$, Dr.Y. B.D.Suchetha[2*]$_{MBBS}$, Dr. P.Srinivasa Rao[3]$_{MBBS,}$ Dr. M. Sarala[4]$_{MBBS}$

[1]*(Civil Assistant surgeon,Dept of Biochemistry, Guntur medical college, Guntur, Andhra Pradesh, India)*
[2]*(PG, Department of Biochemistry, Guntur medical college, Guntur, Andhra Pradesh,India)*
[3]*(PG, Department of Biochemistry, Guntur medical college, Guntur, Andhra Pradesh, India)*
[4]*(PG, Department of Biochemistry, Guntur medical college, Guntur, Andhra Pradesh, India)*
Corresponding Author: Dr. Y.B.D.Suchetha $_{MBBS}$

Abstract: *To compare the concentrations of Serum creatinine and urine albumin creatinine ratio (UACR) and to detect early decline in GFR in type 2 Diabetic patients and controls .80 proven cases of type 2 Diabetic patients &50 age and sex matched healthy controls.Fasting plasma glucose byTrinder's method, Serum& urine creatinine byJaffe' s Method, urine dipstick analysis for protein, urine albumin byImmunoturbidimetry method , & calculated Urinary albumin creatinine ratio(UACR) were estimated. Glomerular filtration rate was estimated based on the Serum Creatinine concentrations according to Modification of Diet in Renal Disease (MDRD).In 80 cases, 48 comes under Normoalbuminuria & 32 under microalbuminuria.There was increase in the levels of FPG,Sr Creatinine & urine albumin significantly (p<0.01) with increasing urinary albumin creatinine ratio. In this study, the estimated GFR tend to decrease with increasing degrees of albuminuria (P = <0.01) but in controls it was more. Pearson's correlation coefficient (r) shows significant positive correlation between Serum creatinine and DM duration, FPG, UACR and there was a negative correlation between eGFR(r = -0.96 , p = < 0.001) .We concluded that type 2 DM patients who are at risk of developing renal impairment must be regularly monitored for microalbuminuria, Serum Creatinine, UACR, & eGFR irrespective of urine microalbumin levels.*

Keywords: *Microalbuminuria, Urinary albumin creatinine ratio, estimated glomerular filtration rate*.

Date of Submission: 11-03-2019 Date of acceptance: 27-03-2019

I. Introduction

Diabetes Mellitus is one of the most common diseases of current era, which is characterized by Hyperglycemiaeither due to insulin deficiency or due to insulin resistance [(1)]. The recently published ICMR-INDIAB national study reported that there are 62.4 million people with type 2 diabetes (T2DM) and 77 million people with pre-diabetes in India. These numbers are projected to increase to 101 million by the year 2030[(2)]. Diabetes is usually irreversible, its late complications result in reduced life expectancy and major health costs. These include macrovascular disease, leading to an increased prevalence of coronary artery disease, peripheral vascular disease and stroke, and microvascular damage causing diabetic retinopathy, nephropathy and neuropathy[(3)]. Diabetic Nephropathy is clinically characterized by decline in Glomerular Filtration Rate (GFR)[(4,5)]andincreasing rates of urinary albumin excretion (UAE), starting from normoalbuminuria, which progresses to microalbuminuria, macroalbuminuria, and eventually to End Stage Renal Disease (ESRD).Glomerular filtration rate (GFR) is considered the best marker of renal function, and is often estimated from plasma creatinine [(3)].Microalbuminuria is the earliest clinically detectable stage of diabetic kidney disease at which appropriate interventions can retard, or reverse, the progress of the disease [(6)]. This study is conducted to compare the concentrations of Serum creatinine and urine albumin creatinine ratio (UACR) and also to detect early decline in GFR in type 2 Diabetic patients and controls.

II. Material And Methods

This was a prospective observational study of patients attending the Department of General Medicine, at Government General Hospital, Guntur for the duration of six months with the approval of the Institutional Ethical committee.

80 proven cases of type 2 Diabetic patients & 50 age and sex matched healthy controls.

Inclusion Criteria:
1) **Cases:** 80 proven cases of type 2 Diabetic patients in the age group 40 to 70 years.
2) **Control Group:** 50 age and sex matched healthy controls

Exclusion criteria:
1) Patients with thyroid disorders
2) Under thyroid medications
3) Under steroid therapy
4) Uncontrolled hypertensive patients
5) Cardiovascular disease patients

Methodolgy: Fasting plasma glucose byTrinder's method, Serum& urine creatinine byJaffe' s Method, urine dipstick analysis for protein, urine albumin byImmunoturbidymetry method , & calculated Urinary albumin creatinine ratio(UACR) were estimated. Glomerular filtration rate was estimated based on the Serum Creatinine concentrations according to Modification of Diet in Renal Disease (MDRD).
MDRD formula: eGFR= 186 × (Serum creatinine [mg/dL])$^{-1.154}$×(age)$^{-0.203}$× 0.742 if female [7].

III. Results

SPSS V22 software was used for statistical analysis. Microsoft Excel (windows-8) was used for data entry and graphs. The data is presented as mean ± SD &Pearson's correlation coefficient (r) was employed to test the correlations between different variables.

The present study was carriedout on 80 patients with type 2 diabetes mellitus and 50 apparently healthy controls.

Table 1: Comparison of Mean ± SD of Different Parameters in Cases and Controls

Parameter	Normo(48) Mean ±SD	Micro (32) Mean ±SD	Control (50) Mean ±SD
FPG (mg/dl)	124 ± 42.4	156.9 ± 43.8	89.4 ± 9.9
Se Creatinine (mg/dl)	0.9 ± 0.2	1.5 ± 0.6	0.9 ± 0.1
U Albumin	10.9 ± 5.6	54.8 ± 31.8	8.1 ± 5.0
U Creatinine	141.7 ± 211.1	127.7 ± 97.8	60.5 ± 41.2
UACR (mg/g)	12.4 ± 8.2	53.1 ± 31.2	13.8 ± 6.9
Creat eGFR **(ml/min/m^2)**	80.3 ± 20.4	47.4 ± 15.5	85.2 ± 16.9

Means of Normo, Microalbuminuria Cases &Controls

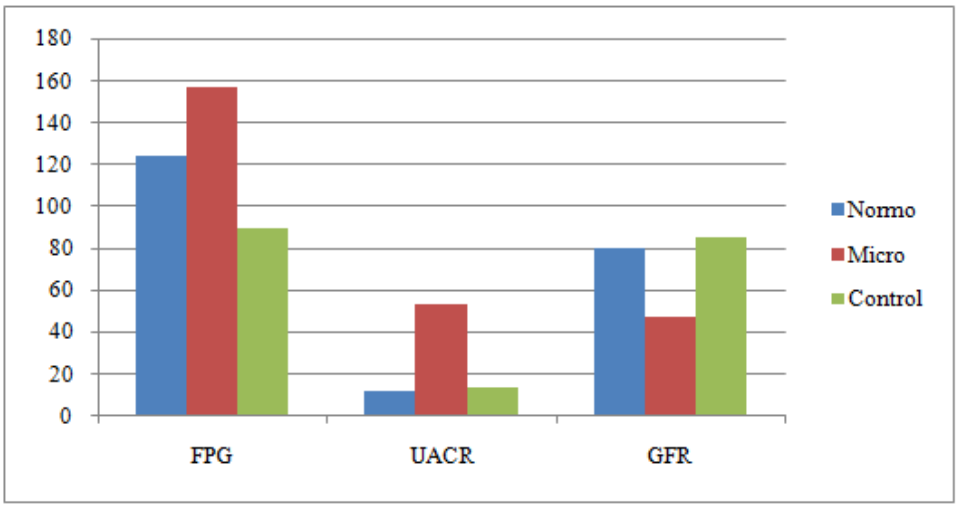

Table 2: Pearson correlation coefficient (r) between Sr Creatinine and different studied patients parameters

Variable	Sr Creatinine	
	r	P-value
DM duration	0.491	<0.001 SIG
FPG	0.412	<0.001 SIG
UACR	0.748	<0.001 SIG
eGFRcre	-0.96	<0.001 SIG

IV. Discussion

Diabetic nephropathy occurs as a result of an interaction between hemodynamic and metabolic factors, which leads to renal damage [(8)].An early physiological abnormality is glomerular hyper filtration associated with intra glomerular hypertension. This is accompanied by the onset of microalbuminuria, the first clinical sign of renal involvement in diabetes[(9)]. More than 40% of persons with diabetes have elevated urinary albumin excretion, and the prevalence is higher in those with diabetes of longer duration. The primary constituent of urinary protein in diabetic nephropathy is albumin[(10)] .

Microalbuminuria described more than three decades ago as a predictor of nephropathy and associated with higher cardiovascular risk .Once diabetic nephropathy develops, renal function deteriorates rapidly and renal insufficiency develops . Microalbuminuria is recognized as a sign of abnormal vascular function and increased vascular permeability . However, it has also been considered the first indication of renal injury in patients with diabetes.Thus, screening for microalbuminuria is currently recommended for all patients with diabetes or kidney disease .In addition to the qualitative detection of overt microalbuminuria by dipstick methods, quantitative determination of albumin is essential for assessing the renal state, for optimizing diabetes care and for monitoring success of therapy [(11)].

Diabetic nephropathy is characterised by an increased urinary albumin excretion (UAE) in the absence of other renal diseases. The earliest clinical evidence of nephropathy is the presence of low but abnormal levels of albumin in the urine (>30 mg/day or 20 μg/min; urinary albumin/creatinine ratio [UACR] >3.0 mg/mmol). This is known as microalbuminuria or incipient nephropathy . Progression to macroalbuminuria, or overt nephropathy, is heralded by a UAE of >300 mg/day or 200 μg/min (urinary ACR >30 mg/mmol) and is associated with a progressive decline in glomerular filtration rate (GFR) and hypertension[(9)] .

The mean UACR values in Normo-albuminuria group was 12.3±8, Micro-albuminuria group 53 ± 31.2, Macro-albuminuria group 390.5± 102.3& in control group was 13.8±7 mg/G which was statistically significant in micro & macro-albuminuria groups(P-value<0.01).There is no significant difference between normo-albuminuria & controls. This findings are consistent with other study by Durga Prasad Kedam etal[(12)], in Normo-albuminuria group was 16.4±3, Micro-albuminuria group 71.77±1.09 & in Macro-albuminuria group 642.5± 114.7 (P-value<0.0001).

There was increase in the levels of FPG,S Creatinine & urine albumin significantly (p<0.01) with increasing urinary albumin creatinine ratio. In this study the estimated GFR tend to decrease with increasing degrees of albuminuria (P = <0.01) but in controls it was more. Pearson's correlation coefficient (r) shows significant positive correlation between Serum creatinine and DM duration, FPG, UACR and there was a negative correlation between e GFR(r = -0.96 , p = < 0.001) . Our study was correlated with a similar study done by Hany S.Elbarbary et al [(3)].

V. Conclusion

We concluded that type 2 DM patients who are at risk of developing renal impairment must be regularly monitored for microalbuminuria, Serum Creatinine, UACR, & eGFR irrespective of urine microalbumin levels.

References

[1]. HabtamuWondifrawBaynes ;Classification, Pathophysiology, Diagnosis and Management of Diabetes Mellitus. J Diabetes Metab2015 ; 6: 541.
[2]. Whiting DR, Guariguata L, Weil C, Shaw J. IDF Diabetes Atlas: Global estimates of the prevalence of diabetes for 2011 and 2030. Diabetes Res ClinPract 2011;94:311-21
[3]. Hany S. Elbarbary, Nabil A. El-Kafrawy et al. Serum Cystatin C an Early Indicator of Renal Function Decline in Type 2 Diabetes. American Journal of BioScience. Vol. 2, No. 3, 2014, pp. 89-94.
[4]. M. Kannapiran , D. Nisha , A. Madhusudhana Rao .Underestimation of Impaired Kidney Function with Serum Creatinine. Ind J ClinBiochem . 2010; 25(4):380–384.
[5]. Levey As, Coresh J, Balke et al. National Kidney Foundation practice guidelines for Chronic Kidney Disease; Evaluation,Classification and Stratification Ann inter Med 2003;139(2)137-147.
[6]. RanjitUnni krishnan,Mohan , Reema,RajendraPradeepa et al. Prevalence and Risk Factors of Diabetic Nephropathy in an Urban South Indian Population .Diabetes Care . 2007; 30 : 2019–2024.
[7]. Myers GL, Miller WG, Coresh J, Fleming J et al.National KidneyDisease Education Program Laboratory Working Group. Recommendationsfor improving Serum creatinine measurement: a report from thelaboratory working group of the national kidney disease education program.ClinChem 2006; 52: 5-18.

[8]. Cooper, M.Interaction of metabolic and hemodynamic factors in mediating experimental diabetic nephropathy. Diabetologia2001;44 (11):1957–1972.
[9]. Bennett K,Aditya BS .An overview of diabetic nephropathy: Epidemiology, pathophysiology and treatment. Journal of Diabetes Nursing2015;18: 61–7.
[10]. Mogensen CE, Christensen CK, Vittinghus E: The stages in diabetic renal disease. With emphasis on the stage of incipient diabetic nephropathy. Diabetes 32 (Suppl. 2):64-78, 1983.
[11]. Vilas U. Chavan, Anjum K. Sayyed et al .Practical Aspects of Calculation, Expression and Interpretation Of Urine Albumin MeasurementNJIRM 2011; Vol. 2(1).29-34.
[12]. Durga Prasad Kedam ,HavilahPolur , PanditvinodhBandela .Cystatin-C as a Biomarker in Predicting Early Renal Impairment in Normo-Albuminuric Patients with Type 2 Diabetes Mellitus; J. Pharm. Sci. & Res. Vol. 7(11), 2015, 913-916.

Dr. P.Sudha Rani MD."Microalbuminuria and Serum Creatinine Levels in Diabetic and Non-Diabetic Group - A Comparative Study." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 3, 2019, pp 26-29.