European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 9, Issue 6, 2022

ORIGINAL RESEARCH

Assessment of correlation between HbA1cand microalbuminuria among diabetics

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ABSTRACT

Background: Diabetes is an important metabolic disorder worldwide and is characterized by a variable degree of insulin resistance, impaired insulin secretion, and increased glucose production. The present study was conducted to assess the correlation between HbA1cand microalbuminuria among diabetics.

Materials & Methods:

Results: Group I had 20 males and 20 females and group II had 18 males and 22 females. In group I and group II, mean HbA1c (%) was 7.9 and 5.2, fasting blood sugar (FBS) (mg/dL) was 174.2 and 86.2, postprandial blood sugar (PPBS) (mg/dL) was 258.6 and 124.8, blood urea (mg/dL) was 28.4 and 14.2, serum sodium (mEq/L) was 127.2 and 138.9, serum potassium (mEq/L) was 2.7 and 3.8, serum creatinine (mg/dL) was 1.5 and 0.84 and microalbuminuria (mg/L) was 43.6 and 10.6. The difference was significant (P< 0.05). There was positive correlation of microalbuminuria and duration of DM (r- 0.521, p- 0.03), microalbuminuria and FBS (r- 0.316, p-0.05), microalbuminuria and PPBS (r- 0.412, p- 0.02) and microalbuminuria and HbA1c (r- 0.833, p-0.01).

Conclusion: The prevalence of microalbuminuria in diabetic patientswas found to be high. There was a correlation between glycated hemoglobin and microalbuminuria among diabetics.

Keywords: Diabetic, Microalbuminuria, Glycated hemoglobin

INTRODUCTION

Diabetes is an important metabolic disorder worldwide and is characterized by a variable degree of insulin resistance, impaired insulin secretion, and increased glucose production.[1] India is one of the epicenters of the global diabetes mellitus pandemic. Rapid socioeconomic development and demographic changes, along with increased susceptibility for Indian individuals, have led to the explosive increase in the prevalence of diabetes mellitus in India over the past four decades.[2]

In type 2 DM, >80% of the patients were diagnosedwith the single most end-stage renal disease. Some western studies have shown that out of 44% end stage renal disease (ESRD) patients, >80% were suffering from Type 2 DM. Some Indian studies have shown that the prevalence of microalbuminuria ranged from 19.7% to 28.5% in type 2 DM.[3] Diabetic nephropathy is a common consequence of prolonged DM, which appears to result from the

involvement and complex interaction between genetic and environmental factors. The pathological basis of elevated urinary albumin excretion which is caused by protein glycosylation, with advanced glycated end products and their deposition, results in hypertrophy of glomerular and renal systems, which in turn, leads to the leakage of low molecular weight proteins (albumin).[4]Poor glycemic control has been identified as one of the risk factors of microalbuminuria, which hastens the progress of the renal disease. Diabetic nephropathy is a common consequence of diabetes mellitus. Its pathogenesis appears to involve complex interactions between genetic and environmental factors.[5]The present study was conducted to assess the correlation between HbA1cand microalbuminuria among diabetics.

MATERIALS & METHODS

The present study comprised 40 Type II diabetic patients and 40 healthy controls of both genders. All gave their written consent for participation in the study. Patients with congestive cardiac failure, urinary tract infections, nephritic syndrome, chronic glomerulonephritis, ketoacidosis, pregnancy, and alcoholics were excluded

Data such as name, age, gender, etc. were recorded. Patients were kept in group I and controls in group II. 5 ml of fasting venous blood samples were taken from all, allowed to stand for 30 minutes, and centrifuged for 10 minutes. The serum sample was used for the estimation of FBS, PPBS, creatinine (Jaffe's method), urea, sodium, and potassium. The whole blood sample was used for the estimation of HbA1c with the latex agglutination inhibition method. 10 ml of urine sample was collected for the estimation of urine microalbumin with immunoturbidimetric method. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Status	Type II DM	Healthy control
M:F	20:20	18:22

Table I shows that group I had 20 males and 20 females and group II had 18 males and 22 females.

Table II Measurement of biochemical parameters

Parameters	Group I	Group II	P value
HbA1c (%)	7.9	5.2	0.05
FBS (mg/dL)	174.2	86.2	0.01
PPBS (mg/dL)	258.6	124.8	0.02
Blood urea (mg/dL)	28.4	14.2	0.03
Serum sodium (mEq/L)	127.2	138.9	0.05
Serum potassium (mEq/L)	2.7	3.8	0.04
Serum creatinine (mg/dL)	1.5	0.84	0.02
Microalbuminuria (mg/L)	43.6	10.6	0.01

Table II shows that in group Iand group II, mean HbA1c (%) was 7.9 and 5.2, FBS (mg/dL) was 174.2 and 86.2, PPBS (mg/dL) was 258.6 and 124.8, blood urea (mg/dL) was 28.4 and 14.2, serum sodium (mEq/L) was 127.2 and 138.9, serum potassium (mEq/L) was 2.7 and 3.8, serum creatinine (mg/dL) was 1.5 and 0.84 and microalbuminuria (mg/L) was 43.6 and 10.6. The difference was significant (P< 0.05).

Graph I Measurement of biochemical parameters

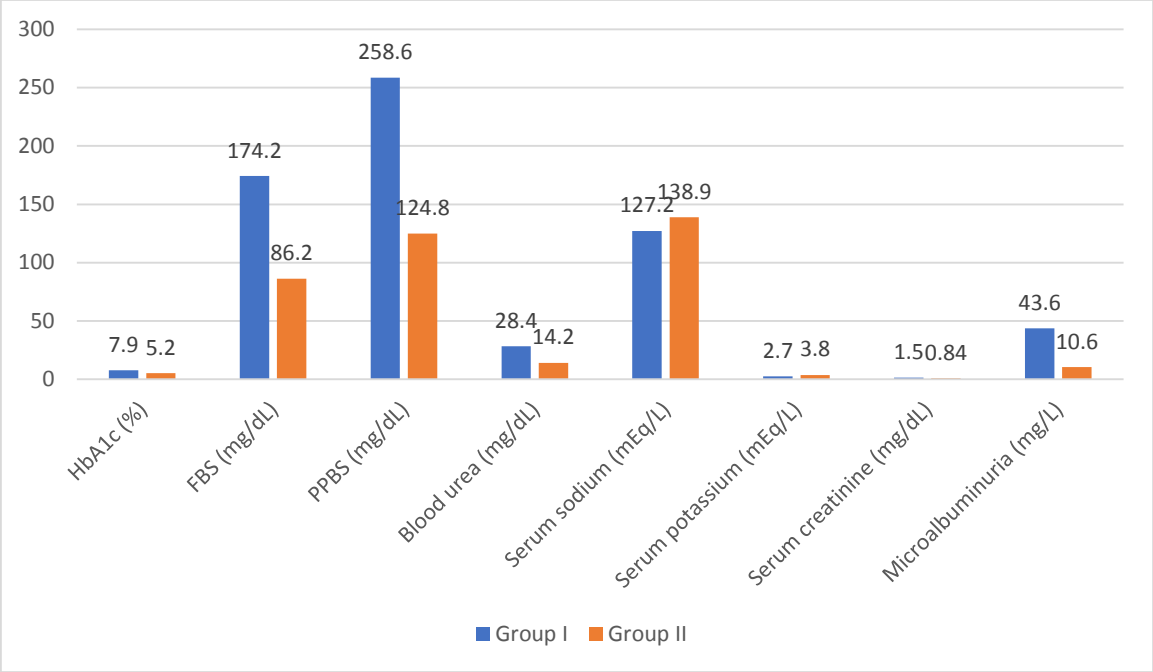

Table III Pearsons correlation coefficient (r)

Parameters	R value	P value
Microalbuminuria and duration of DM	0.521	0.03
Microalbuminuria and FBS	0.316	0.05
Microalbuminuria and PPBS	0.412	0.02
Microalbuminuria and HbA1c	0.833	0.01

Table III shows that there was positive correlation of microalbuminuria and duration of DM (r- 0.521, p- 0.03), microalbuminuria and FBS (r- 0.316, p-0.05), microalbuminuria and PPBS (r- 0.412, p- 0.02) and microalbuminuria and HbA1c (r- 0.833, p-0.01).

DISCUSSION

The effects of diabetes mellitus include long–term damage, dysfunction, and failure of various organs. Noninsulin-dependent diabetes mellitus (NIDDM) type 2 occurs at any age, but is more common between 40-80 years of age and also has a strong genetic component.[6]Patients with type 2 diabetes often have a long asymptomatic period of hyperglycemia and many have complications at the time of diagnosis.[7] Microvascular complications including nephropathy, retinopathy, and neuropathy are initiated by chronic hyperglycemia.[8] Many association studies suggested a strong correlation between the level of hyperglycemia and the progression of microvascular complications in diabetic patients.[9,10]The present study was conducted to assess the correlation between HbA1cand microalbuminuria among diabetics.

We found that group I had 20 males and 20 females and group II had 18 males and 22 females. Patil et al[11]correlated the HbA1c levels and microalbuminuria with respect to duration in type 2 diabetes mellitus cases and also studied microalbuminuria as a marker of nephropathy in type 2 diabetes mellitus. 100 subjects were recruited, 50 were healthy controls and 50 were type 2 DM patients. A statistically significant difference was observed in values of FBS, PPBS, blood urea, serum creatinine, HbA1c, serum sodium, serum potassium, and urinary microalbumin levels in cases compared to controls. In our study the mean HbA1c values were 5.132±1.11% in controls and 7.512±1.19% in cases &the mean HbA1c value in

patients without microalbuminuria is 7.13±0.84 and in patients with microalbuminuria is 8.12±1.44 which is statistically significant.

We observed that in group I and group II, mean HbA1c (%) was 7.9 and 5.2, FBS (mg/dL) was 174.2 and 86.2, PPBS (mg/dL) was 258.6 and 124.8, blood urea (mg/dL) was 28.4 and 14.2, serum sodium (mEq/L) was 127.2 and 138.9, serum potassium (mEq/L) was 2.7 and 3.8, serum creatinine (mg/dL) was 1.5 and 0.84 and microalbuminuria (mg/L) was 43.6 and 10.6. Kare et al[12]evaluated the prevalence of microalbuminuria in patients with diabetes mellitus patients. A total of 60 type-2 diabetes patients were enrolled. The average duration of diabetes among the study group was 8 years and most of the patients were between 6-10 years. In type 2DM patients, microalbuminuria and glycemic control have shown a significant linear correlation with the duration of diabetes.

We found that there was positive correlation of microalbuminuria and duration of DM (r- 0.521, p- 0.03), microalbuminuria and FBS (r- 0.316, p-0.05), microalbuminuria and PPBS (r- 0.412, p- 0.02) and microalbuminuria and HbA1c (r- 0.833, p-0.01). Kondaveeti et al[13] determined whether GA and microalbuminuria are early risk markers along with the duration of uncontrolled diabetes mellitus in type 2 diabetic nephropathy. The present cross-sectional study included randomly selected uncontrolled type 2DM (n = 75), controlled type 2DM (n = 75) and healthy controls (n = 75). Their fasting venous blood samples were obtained for GA and serum creatinine, while their morning urine samples were obtained for the detection of microalbuminuria. The mean GA, microalbuminuria, and serum creatinine were the highest in Uncontrolled DM as compared to those in controlled DM respectively. Microalbuminuria and GA had a significant correlation with the duration of diabetes.

Joshi PP et al[14] studied 158 cases of first AMI. Microalbuminuria was present in 66 (42%) cases as compared with 15 (20%) controls. Patients with microalbuminuria also had a significantly higher frequency of heart failure (16 out of 66 patients (24%) vs 11 out of 92 (12%), and had higher mortality (8 out of 66 (12%) vs 3 out of 92 (3%), as compared to those without microalbuminuria and concluded that microalbuminuria is an independent risk factor for AMI and is associated with higher in-hospital heart failure and mortality in AMI. Microalbuminuria helps in risk stratification.

The limitation of the study is the small sample size.

CONCLUSION

The authors found that the prevalence of microalbuminuria in diabetic patientswas found to be high. There was a correlation between glycated hemoglobin and microalbuminuria among diabetics.

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