



A STUDY ON THE ASSOCIATION BETWEEN SERUM URIC ACID AND URINARY ALBUMIN LEVEL IN PAITENT OF TYPE 2 DIABETES MELLITUS

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ABSTRACT

Background - Diabetes mellitus is one of the leading disorders in India and across the world, prevalence of diabetes in India has shown an increasing trend in the last thirty years and by 2025, it is estimated that around 79 million Indians will be diabetic. So, it is very important to diagnose and treat diabetes at its earliest to avoid further complications, as diabetes affect many organ systems and are reason of morbidity and mortality. These complications are vascular (Microvascular – retinopathy, neuropathy, and nephropathy and Macrovascular - CHD, PVD). Non vascular (Infections, skin changes, hearing loss). **Aim** - A Study on The Association Between Serum Uric Acid and Urinary Albumin level in Patients of Type 2 Diabetes Mellitus. **Methodology** - This was an Analytical Study and conducted on patients who were admitted in ward and ICU in Pacific institute of medical sciences, Udaipur who are having type 2 diabetes mellitus. Fasting, Random and post prandial blood samples were taken to estimate blood Glucose level throughout the day. Blood samples And Urine sample from the patient were taken for the estimation of uric acid and albumin level. **Result** - The mean uric acid level was 6.07 mg/dl. The mean urinary ACR was 246.49 mg/dl. There was significantly association between serum uric acid and various category of urinary albumin level. **Conclusion** - The study population had microalbuminuria and increased uric acid levels due to type 2 diabetes mellitus. Therefore, it is sense to examine the levels of urine albumin and uric acid in people with type 2 diabetes to prevent complication.

KEYWORDS : Diabetes mellitus, Uric acid, Albuminuria

INTRODUCTION

Diabetes mellitus (DM) is a long-term condition marked by a lack of insulin or peripheral resistance to it, which causes hyperglycemia and nonenzymatic protein glycation.[1] Despite the fact that poor glycemic control has been linked to nephropathy, retinopathy, and cardiovascular disease. Smoking, hypertension, and dyslipidemia have all been shown to hasten the progression of cardiovascular events. [2] Additionally, higher urine albumin excretion (UAE) is accompanying to an augmented hazard of CVD, particularly in people with diabetes mellitus. [3]

In patients with CVD, elevated blood uric acid concentration has been seen. [4,5] While some researchers have hypothesized that uric acid contributes to the onset of CVD [6], others have come to the conclusion that uric acid just serves as a reflection of another coexisting risk influences such blood Pressure, insulin resistance, or dyslipidemia.[7] Additionally, hyperuricemia is unrelated risk factor for renal impairment in the general population, as well as in those with hypertension, diabetes, and diabetes-related illnesses. [8]

Diabetes mellitus is a diverse range of metabolic illnesses that can lead to consequences in both the macrovascular and microvascular systems. Insulin deficit, varying degrees of insulin resistance, impaired insulin production, and impaired glucose utilization are the hallmarks of type 2 diabetes mellitus. Decease from macrovascular disease is more frequent in those with type 2 diabetes mellitus. [9] Higher blood insulin levels may reduce the kidneys' ability to remove uric acid (UA) and increase the risk of UA damage. [10] Elevated serum UA concentration has been linked to cardiovascular disease, according to several sizable epidemiologic investigations. [11] A considerable rise in albumin excretion rate (AER), known as microalbuminuria, may indicate a systemic deficiency in vascular penetrability and a concurrent atherogenic disease. A pivotal condensing of the vascular wall, especially the intima media layer, is the first sign of atherosclerosis. [12]

Vascular (Microvascular: retinopathy, neuropathy, and nephropathy; Macrovascular: CHD, PHD) and non-vascular (Infections, skin changes, hearing loss) consequences of

diabetes mellitus exist. Diabetic type 2 patients experience renal damage. Microalbuminuria, albuminuria, or a decreased glomerular filtration rate are the possible symptoms. When compared to patients with normoalbuminuria, type 2 diabetes patients with raised urine albumin excretion had higher rates of morbidity and death. [13]

Increased risk of hypertension, cardiovascular problems, and nephropathy are all linked to hyperuricemia. The function of the kidneys is harmed by excessive uric acid levels, which are also indicative of the development of various renal diseases, according to several research. Mild hyperuricemia can advance renal illness by causing glomerular hypertension and thickening of the renal afferent arteriolar walls. The initiation of glomerular hypertrophy by uric acid in hyperuricemia is autonomous of blood pressure regulation and, additionally, the instigation of the renin-angiotensin system may simply support this induction. [14]

AIM AND OBJECTIVE

AIM

- To study the association between Serum Uric acid and Urinary Albumin level in patients of type 2 Diabetes Mellitus

OBJECTIVES

- To estimate serum uric acid levels in type 2 diabetes patients
- To estimate urinary albumin levels in type 2 diabetes patients
- To study the association between Serum Uric acid and Urinary Albumin level in patients of type 2 Diabetes Mellitus

METHADODOLOGY

This was an analytical study conducted on patients of type 2 diabetes mellitus came to General medicine department (OPD and IPD) in Pacific Institute of Medical Sciences, Udaipur fulfilling the study criteria was studied using purposive conservative sampling during 1st March 2021-30th September 2022. Random blood sugar levels, fasting blood sugar levels, HBA1C and routine blood and urine examinations was done. Data for this study was collected in a

pre-set proforma meeting the objectives of the study. A detailed history and clinical examination were done. Other investigations which were required for the patient was carried out accordingly.

Sample Size: A total of 138 patients will be taken according to the inclusion and exclusion criteria.

$$n = Z^2 \times \sigma^2 / d^2$$

Blood Sampling Method- Patients blood sample collected for measurement of serum uric acid level and for other investigation.

Bioanalysis Method- Serum Uric Acid and Urinary Albumin will be measured in Transasia Biochemical Analyser EM360, Serial No 60551.

Inclusion Criteria:

- Type 2 diabetes mellitus patients diagnosed based on American Diabetes Association (ADA) criteria.

Exclusion Criteria:

- Patients using diuretics, Patients on angiotensin converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB).
- Patients of alcohol abuse, Urinary tract infection.
- Patients with malignancy.
- Haemolysed samples will be excluded.

Assessment To Be Done

Age, Body weight, Height, Body mass index (BMI), CBC, RBS, Serum uric acid, Liver Function Test, Kidney Function Test, Urine Routine Microscopy, Urinary albumin to creatinine ratio (ACR), Fasting blood glucose (FBG), Glycated haemoglobin (HbA1c), Lipid profile

RESULT

- The average age of study participants was 56.73 ± 10.8 years.
- Most of (34.05%) cases were belonged to 61-70 years of age group followed by 26.8% cases from 51-60 years of age group
- The mean uric acid level was 6.07 mg/dl. The mean urinary ACR was 246.49 mg/dl. The mean S. creatinine level was 1.09 mg/dl. The mean Serum Urea level was 37.23 mg/dl.
- The mean Urinary ACR among Normoalbuminuria was 23.56 mg/dl, in Microalbuminuria was 165.52 mg/dl and in Macroalbuminuria was 534.41 mg/dl.
- The mean Serum uric acid level in Normoalbuminuria was 5.017 ± 1.51 mg/dl, in Microalbuminuria was 6.09 ± 1.17 mg/dl and in Macroalbuminuria was 7.48 ± 1.39 mg/dl.

Table 1. Association between Serum uric acid and Urinary albumin level

Serum uric acid	Normoalbu minuria	Microalbu minuria	Macroalb minuria	p-value
Normouricemia	32	31	8	0.00001
Hyperuricemia	10	26	31	

There was highly significantly association between serum uric acid and urinary albumin level.

Table 2. Correlation between Serum uric acid and category as per Albumin level

	Normoalbu minuria	Microalbumin uria	Macroalbmi nuria	p-value
Serum uric acid	5.017 + 1.51	6.09+ 1.17	7.48 + 1.39	0.00001

DISCUSSION

Diabetes mellitus is a diverse range of metabolic illnesses that can lead to consequences in both the macrovascular and microvascular systems. Insulin deficit, varying degrees of

insulin resistance, impaired insulin production, and impaired glucose utilization are the hallmarks of type 2 diabetes mellitus. [15] Higher blood insulin levels may reduce the kidneys' ability to remove uric acid (UA) and increase the risk of UA damage. [16] Elevated serum UA concentration has been linked to cardiovascular disease. Microalbuminuria means Significant rise in AER. [17]

The mean age of study participants was 56.73 + 10.8 years. Most of cases were belonged to 61-70 years of age group followed by 26.8% cases from 51-60 years of age group. Only 9 participants were aged in between 31-40 years of age group. Out of total, 59% were males and 41% were females. The Saeed et al. study's [18] observation of a comparable mean age (57 ± 8.3 years) to the current study's was made. In the current survey, there were 42.50 percent women and 57.50 percent men. There were primarily men in Prabhuswamy et al's [19] and Prashant et al's [20] studies, which is comparable to the one at hand. 55% of the patients had diabetes mellitus that had just been discovered. Among the patients, 66% had family history of diabetes mellitus. Among the patients, 61% had history of hypertension. More than half of participants had required insulin for management. The mean HbA1C level was 8.94 mmol. The mean RBS level was 226.8 mg/dl. The study by Talwar et al mean FBS was 222 ± 14.82.[21]

The mean S. Cholesterol was 186.64 mg/dl. The mean S. HDL was 53.9mg/dl. The mean S. LDL was 98.09 mg/dl. The mean S. Triglycerides was 170.51 mg/dl. There was significantly association between serum uric acid and urinary albumin level.

The mean urea level in the research by Prabhuswamy et al [22] was lower at 22.28 than in the present study. Most research participants (58.33%) had creatinine levels between 1.3 and 2, while the remaining (41.67%) had values between 0.6 and 1.3. In a study by Akshay Shirsath et al., [23] a significant correlation between 24-hour urine albumin and uric acid levels was found (p = 0.032). As the patients' uric acid levels rose, a rise in 24-hour urinary albumin was also noticed.

In the research by Chin-Hsiao Tseng et al., the uric acid levels for normoalbuminuria (N = 166), microalbuminuria (N = 130), and macroalbuminuria (N = 47) were [24] 5.2 ± 1.6 mg/dL, 5.6 ± 1.9 mg/dL, and 6.7 ± 2.1 mg/dL, respectively (P 0.001). The mean SD values of uric acid were, respectively, 3.4 ± 0.6 (1.7-4.2), 4.9 ± 0.4 (4.3-5.4), 6.0 ± 0.3 (5.5-6.5), and 8.1 ± 1.2 (6.6-12.2) for the first to fourth quartiles.

There was significantly association between serum uric acid and various category of urinary albumin level.

CONCLUSION

Most of the study participants were aged over 60 years old. As noted, participants with high blood sugar levels had greater amounts of uric acid. Microalbuminuria was seen in around two-thirds of the participants with type 2 diabetes mellitus and increased uric acid levels. The study shows microalbuminuria and increased uric acid levels due to type 2 diabetes mellitus. Therefore, it is sense to examine the levels of urine albumin and uric acid in people with type 2 diabetes to prevent renal problems.

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