

Study of Hyperuricemia in Newly Diagnosed Type II Diabetes Patients

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Abstract

Introduction: Hyperuricemia is a condition in which individuals have higher uric acid (UA) concentration levels in the serum or serum levels of UA concentration are greater than the upper normal reference limits, particularly >7.2 and 6.0 mg/dl, respectively for both male and female adults.

Aim: To study serum UA levels in newly diagnosed type 2 diabetes mellitus patients.

Materials and Methods: In this observational study, newly diagnosed Type II diabetic patients were included in the study. Hyperuricemia was defined as a serum UA level >7.2 mg/dL for males and >6 mg/dL for females. Estimation of blood glucose level, hemoglobin A1c (HbA1c) level, and serum UA level were done.

Results: In sixty newly diagnosed type II diabetes patients, mean HbA1c was $9.26 \pm 1.29\%$; RBS was 172.14 ± 19.26 mg/dl; and serum UA was 7.81 ± 2.56 mg/dl. The total number of patients with newly diagnosed diabetes with hyperuricemia was 17 out of 60 (28.3%).

Conclusion: Hyperuricemia appears to be linked to people with diabetes who have recently been diagnosed. Hyperuricemia and other diabetes complications should be evaluated in patients with poor glucose control.

Key words: Diabetes mellitus, Hyperuricemia, Serum, Uric acid

INTRODUCTION

Diabetes mellitus (DM) is a chronic disorder associated with cardiovascular complications, renal complications, and various microangiopathy types, including metabolic syndrome. The International Federation of Diabetes reported that around 415 million adults around all over the world have diabetes, and they estimated that the numbers are likely to reach about 642 million by 2040.^[1]

Recent studies have demonstrated that serum uric acid (UA) levels are higher in patients with pre-diabetes and early type 2 diabetes than in healthy controls.^[2,3] Hyperuricemia has also been added to the set of metabolic abnormalities

associated with insulin resistance or hyperinsulinemia in metabolic syndrome.^[4-6]

Hyperuricemia increases morbidity and mortality among patients with diabetes. It results in a poor prognosis on the diabetic complications, correlated with increased prevalence of diabetic peripheral neuropathy, retinopathy, and nephropathy.^[7] Hyperuricemia has been implicated in cardiovascular disease (CVD) through atherosclerotic processes.^[8] Hyperuricemia in type 2 DM (T2DM) is associated with the progression of diabetes and markers of CVD and is also a significant risk factor for coronary artery disease.^[9,10] Hyperuricemia in T2DM has been correlated with its complications.^[11] Another study showed that hyperuricemia was associated with renal damage in patients with T2DM, and complications of T2DM are more severe to those with hyperuricemia than normouricemia. Hyperuricemia can promote the progression and deterioration of renal diseases in T2DM patients.^[12]

Aim

To study serum UA levels in newly diagnosed T2DM patients.

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MATERIALS AND METHODS

This observational study was conducted in the department of general medicine at Government Headquarters hospital, Ramanathapuram, in newly diagnosed Type II diabetic patients. All newly diagnosed patients (diagnosed within 3 months) with diabetic Mellitus were enrolled in the present study. All the study participants were subjected to recording demographic details as per the proforma. All the study participants who had previously diagnosed DM and patients who were in diabetes treatment, age <18 years, patients with chronic diseases or malignancies, patients taking thiazides, corticosteroids, and phenytoin were excluded from the present study. Diabetes was defined according to American Diabetes Association as a fasting blood plasma glucose ≥ 126 mg/dL, non-fasting plasma glucose (FPG) ≥ 200 mg/dL. Hyperuricemia was defined as a serum UA level >7.2 mg/dL for males and >6 mg/dL for females. Estimation of blood glucose level, hemoglobin A1c (HbA1c) level, Serum UA level was done by hexokinase methods, D-10 microcolumn methods, and uricase method, respectively.

RESULTS

In the present study, sixty newly diagnosed diabetic patients were included in the study. Most patients were in the age group of 41–50 years, followed by 28.3% in 31–40 years, and 56.7% of patients were male [Figures 1 and 2]. Mean HbA1c was $9.26 \pm 1.29\%$, RBS was 172.14 ± 19.26 mg/dl, and serum UA was 7.81 ± 2.56 mg/dl. The total number of patients with newly diagnosed diabetes with hyperuricemia was 17 out of 60 (28.3%) [Figure 3]. In 17 patients with hyperuricemia, 11 were male, and six were female. Patients with hyperuricemia shown higher HbA1c values.

DISCUSSION

Variations in UA levels have been increasingly associated with insulin resistance, hyperinsulinemia, and diabetes. Diabetic patients who are hyperuricemia appear to be at increased risk for developing diabetic complications, predominantly renal and CVD. In Type 2 diabetes, hyperuricemia seems to be associated with insulin resistance syndrome, impaired glucose tolerance, and an early onset of nephropathy. In contrast, hypouricemia is associated with non-adequate metabolic control, hyperfiltration, and late-onset of overt nephropathy. Although one of the major antioxidants in circulation, UA can induce oxidative stress in various cells, including vascular smooth muscle cells, thus, mediating CVD progression. Hyperuricemia is also closely linked to the various metabolic syndrome components and represents a possible link between UA levels and cardiovascular morbidity and mortality.^[13-15]

The prevalence of hyperuricemia reported from China is comparable to the current finding; however, the prevalence of hyperuricemia was high among female study patients in case of the finding reported from China in contrast to our finding in which male study patients were more hyperuricemic than female. Male study patients were about two times more hyperuricemic than females.^[16]

Studies have shown that UA is significantly elevated in prediabetic stages and low in diabetes and rises again after five developing renal insufficiency. Hyperuricemia is associated with obesity and insulin resistance, and consequently, with type 2 diabetes. Further, potentially important biological effects of UA related to endothelial dysfunction by inducing antiproliferative effects on endothelium and impairing nitric oxide production and inflammation through increased C reactive protein expression, although these issues are considered controversial. UA may play a role in immune activation with subsequent increased chemokine 6 and cytokine expression.^[17,18]

Choi and Ford in their study of HbA1c, fasting glucose, serum C-peptide, and insulin resistance in relation to serum UA levels, observed that serum UA levels and the frequency of hyperuricemia increased with moderately increased levels of HbA1c and FPG and then decreased with further increasing levels of HbA1c (a bell shaped relation).^[17]

However, in the study reported by Rao and Sahayo,^[19] the UA levels were higher only for pre-diabetes and not for people with diabetes. The studies done by Shabana *et al.*^[20] reported a decreased UA level. As per our study, it was concluded that hyperuricemia was positively associated with hyperglycemia. Patients having higher UA have the ability for more insulin secretion than patients having lower UA.^[21] In a study by Zoppini *et al.* in type 2 diabetic patients, hyperuricemia was an independent and vital risk factor for developing chronic renal disease.^[22] A study by Tanaka showed that UA increase results in declining renal function in diabetic patients.^[23] A study by Siu *et al.* had reported that as UA levels were lowered in renal disease patients with hyperuricemia, there was an associated decrease in kidney disease.^[24]

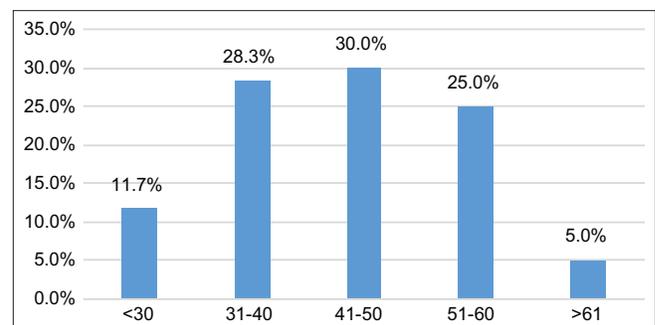


Figure 1: Age group distribution

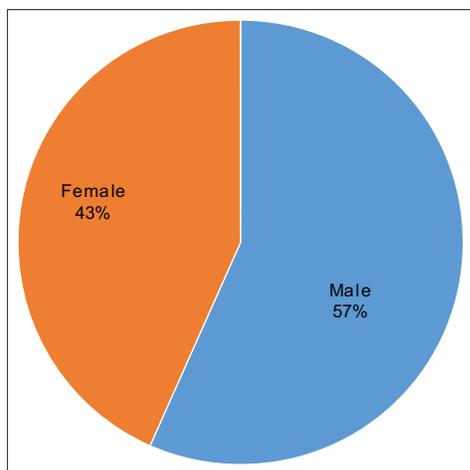


Figure 2: Gender distribution

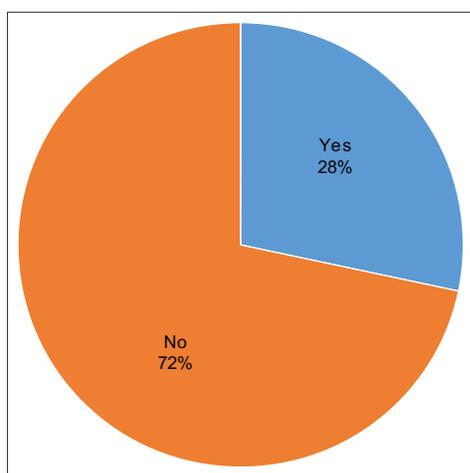


Figure 3: Hyperuricemia distribution

CONCLUSION

Hyperuricemia appears to be linked to people with diabetes who have recently been diagnosed. Serum UA may be considered a separate risk factor for the development of diabetes and associated microvascular and macrovascular consequences. Hyperuricemia and other diabetes complications should be evaluated in patients with poor glucose control.

REFERENCES

1. Akhtar SN, Dhillion P. Prevalence of diagnosed diabetes and associated risk factors: Evidence from the largescale surveys in India. *J Soc Health Diabet* 2017;5:28.
2. Alberti KG, Zimmet P, Shaw J. Metabolic syndrome-a new worldwide definition. A consensus statement from the international diabetes federation. *Diabet Med* 2006;23:469-80.
3. Poulsen P, Kyvik KO, Vaag A. Heritability of Type 2 (non-insulin

- dependent) diabetes mellitus and abnormal glucose tolerance-a population-based twin study. *Diabetologia* 1999;42:125-7.
4. Rich SS. Mapping genes in diabetes: Genetic epidemiological perspective. *Diabetes* 1990;39:1315-9.
5. Cook JT, Shields DC, Page RC, Levy JC, Hattersley AT, Shaw JA, *et al.* Segregation analysis of NIDDM in Caucasian families. *Diabetologia* 1994;37:1231-40.
6. Perley MJ, Kipnis DM. Plasma insulin responses to oral and intravenous glucose: Studies in normal and diabetic subjects. *J Clin Invest* 1967;46:1954-62.
7. Rao TMV, Vanukuri NK. A study on serum uric acid levels in Type 2 diabetes mellitus and its association with cardiovascular risk factors. *IAIM* 2016;3:148-55.
8. So A, Thorens B. Uric acid transport and disease. *J Clin Invest* 2010;120:1791-9.
9. Agarwal AK, Singh M, Arya V, Garga U, Singh VP, Jain V. Prevalence of peripheral arterial disease in Type 2 diabetes mellitus and its correlation with coronary artery disease and its risk factors. *J Assoc Physicians India* 2012;60:28-32.
10. Khare S, Vishandasani JK, Kansal A. To study serum uric acid in Type 2 diabetes mellitus patient. *IOSR J Dent Med Sci* 2015;14:82-6.
11. Muruganandam U, Maniappan M, Manshur M. Study of impact of serum uric acid in Type 2 diabetic patients and its relationship with development of complications. *IOSR J Dent Med Sci* 2017;16:58-62.
12. Li G, Jiao X, Cheng X. Correlations between blood uric acid and the incidence and progression of Type 2 diabetes nephropathy. *Eur Rev Med Pharmacol Sci* 2018;22:506-11.
13. Oda E, Kawai R, Sukumaran V, Watanabe K. Uric acid is positively associated with metabolic syndrome but negatively associated with diabetes in Japanese man. *Int Med* 2009;48:1785-91.
14. Feig DI, Kang DH, Johnson RJ. Uric acid and cardiovascular risk. *N Engl J Med* 2008;359:1811-21.
15. Rosolowsky ET, Ficociello LH, Maselli NJ, Niewczas MA, Binns AL, Roshan B, *et al.* High-normal serum uric acid is associated with impaired glomerular filtration rate in nonproteinuric patients with Type 1 diabetes. *Clin J Am Soc Nephrol* 2008;3:706-13.
16. Wang J, Chen P, Song Q, Zhang RY, Li YB, Yang C, *et al.* Prevalence and determinants of hyperuricemia in Type 2 diabetes mellitus patients with central obesity in Guangdong province in China. *Asia Pac J Clin Nutr* 2013;22:590-8.
17. Choi HK, Ford ES. Haemoglobin A1c, fasting glucose, serum Cpeptide and insulin resistance in relation to serum uric acid levels-the third national health and nutrition examination survey. *Rheumatology* 2008;47:713-7.
18. Wolfgang Koenig, Christa Meisinger. Uric acid, Type 2 diabetes, and cardiovascular diseases: References: Fueling the common soil hypothesis? *Clin Chem* 2008;54:231-3.
19. Rao MS, Sahayo BJ. A study of serum uric acid in diabetes mellitus and pre-diabetes in a South Indian tertiary care hospital. *Nitte Univ J Health Sci* 2012;2:18-23.
20. Shabana S, Sireesha M, Satyanarayana U. Uric acid in T2DM associated with hypertension. *J Clin Diagn Res* 2012;6:1140-3.
21. Tang W, Fu Q, Zhang Q, Sun M, Gao Y, Liu X, *et al.* The association between serum uric acid and residual beta cell function in Type 2 diabetes. *J Diabetes Res* 2014;2014:709691.
22. Zoppini G, Targher G, Conchola M, Ortalda V, Abaterusso C, Pichiri I, *et al.* Serum uric acid levels and incident chronic kidney disease in patients with Type 2 diabetes and preserved kidney function. *Diabetes Care* 2012;35:99-104.
23. Tanaka K, Hara S, Hattori M, Sakai K, Onishi Y, Yoshida Y, *et al.* Role of elevated serum uric acid levels at the onset of overt nephropathy in the risk for renal function decline in patients with Type 2 diabetes. *J Diabetes Investig* 2015;6:98-104.
24. Siu YP, Leung KT, Tong MK, Kwan TH. Use of allopurinol in slowing the progression of renal disease through its ability to lower serum uric acid level. *Am J Kidney Dis* 2006;47:51-9.

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