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Research Article

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A Study On HbA1c And Serum Uric Acid Level In Diagnosed Patients Of Diabetes Mellitus Type 2

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ABSTRACT

The association between serum uric acid levels and glycemic control in diabetic patients was not fully clarified. This study aimed to investigate the correlation between uric acid levels and glycemic control in patients with type II diabetes mellitus. A total of 140 patients were recruited and their uric acid levels and glycated hemoglobin (HbA1c) levels were measured. The results showed a significant positive correlation between uric acid levels and HbA1c levels, indicating that higher levels of uric acid were associated with poorer glycemic control in patients with type II diabetes. Moreover, patients with higher uric acid levels were found to have a higher risk of developing diabetic complications. These findings suggest that monitoring uric acid levels may be a useful marker for assessing glycemic control and predicting diabetic complications in type II diabetic patients.

Key Words: *Uric acid, Creatinine, FBS, HbA1c*

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INTRODUCTION

Uric acid is a by-product of purine metabolism and is usually excreted by the kidneys. However, in individuals with type II diabetes, uric acid levels can be elevated due to impaired renal function[1]. Studies have shown a positive correlation between high uric acid levels and poor glycemic control in individuals with type II diabetes[1, 3].

Glycemic control refers to the management of blood glucose levels in diabetic individuals. It is important for individuals with diabetes to maintain normal blood glucose levels as it can help prevent long-term complications such as cardiovascular disease, neuropathy, and retinopathy.

Some studies conducted on this topic, but the number of studies is relatively small compared to other areas of diabetes research. This may be due to the fact that the relationship between uric acid and glycemic control is not fully understood, and further research is needed to establish a clear correlation[1]. Additionally, other factors, such as lifestyle and dietary habits, can also affect uric acid levels and may complicate the interpretation of study results.

The study included 70 diabetic patients and 70 healthy controls, recruited from the outpatient clinic of Central Laboratory NMCH, Kota. Uric acid, creatinine, and FBS were measured by Roche COBAS C111analyzer diagnostics commercial kits. HbA1c was estimated using Humameter A1c Analyser. All the newly diagnosed subjects between 30 years to 60 years with type 2 diabetes mellitus were included in the study. Patients with associated Hypertension, Chronic renal disorders and liver disorders, Congestive heart failure or Thyroid dysfunction were excluded from the study.

Results

Mean FBS 176.2±18.00 for cases and 96.58±8.47 for controls, these all differences are statistically significant ($p<0.05$). FBS showed a highly significant difference ($p < 0.01$) between diabetic patients and the healthy controls (mean FBS 176.2±18.00 for cases and 96.58±8.47 for controls). Similarly, Mean HbA1c is 7.77±0.65 for cases and 5.00±0.43for controls, the difference is statistically significant ($p<0.05$). The serum Uric Acid levels in cases and controls Show mean serum Uric Acid is 6.62±0.99 mg/dl for cases and 4.93±1.20 mg/dl for controls. This difference is

statistically significant (p<0.05). FBS is positively correlated with HbA1c and HbA1c is moderately positively correlated with serum U.A. These differences are statistically significant (p<0.05).

Table 1: Mean difference in blood parameters between diabetics and controls.

Variable	**Cases (Mean ± SD)**	**Controls (Mean ± SD)**	**P -value**
FBG (mg/dl)	176.20±18.00	96.58±8.48	<0.001
HbA1c	7.77±0.65	5.00±0.43	<0.001
Sr. U.A. (mg/dl)	6.62±0.99	4.93±1.20	<0.001

As shown in table (1), there was a statistically significant difference (p < 0.01) in the mean serum uric acid concentration between diabetic patients and the healthy control subjects (mean= 6.62±0.99 mg/dl in diabetic compared to 4.93±1.20 mg/ dl in the control group).

Discussion

In this study, we found that mean serum Uric Acid is higher in Type 2 Diabetes Mellitus cases than in controls as depicted in Table no.1.0; mean serum Uric Acid is 6.62±0.99 mg/dl for cases and 4.93±1.20 mg/dl for controls. This difference is statistically significant (p<0.05). Similar findings were observed by Xue Bai et al[4]who reported that UA levels are strongly associated with type 2 diabetes diagnosed using HbA1c levels, independent of age and sex and other established risk factors, suggesting a significant role of UA in the deterioration of glucose toleration.

In the study conducted by Anju Gill et al[5], all three parameters, HbA1C, serum insulin and serum uric acid were found to be increased in the patients of Type 2 Diabetes Mellitus as compared to their levels in the control (p<0.001, so it was concluded that the serum uric acid levels linearly increased with increasing serum insulin levels, in newly diagnosed diabetic patients.

In our study, the level of HbA1c and uric acid were found to be moderately positively correlated. A similar finding was there in the study conducted by Alaa Abbas Fadhel et al in which the correlation of HbA1c with serum uric acid was positive (r = +0.103, p = 0.042) and statistically significant.

In the study conducted by Walid G Babikr et al[6] in diabetic patients, serum uric acid level was found to correlate positively with HbA1c probably reflecting the adverse effect of the elevated serum uric acid in glycemic control, although other researchers assume that the possible mechanism for the association between increasing serum uric acid and uncontrolled hyperglycemia in diabetic patients may be related to the inhibition of uric acid reabsorption in the proximal tubule by high glucose levels in diabetic individuals.

We have observed the results of some of the studies conducted on similar topics from 2012 to 2019.

Out of these some researchers viz. Ellen Gobusamang et al[7] and Rusdiana et al[8] didn't find any correlation between HbA1c and serum uric acid level in type 2 diabetic patients. Some even found an inverse relationship between these two as is evident in the studies done by Tangigul Haque et al[3], Yuliang Cui et al, Fengjiang Wei et al and Dr. Vibha Sushilendu et al[9].

The findings in our study are also consistent with the findings of Qing Xiong et al, Dr.UddhavKhaire et al and V. Pavithra[10].

Furthermore, A systematic review and meta-analysis by Yi-Li Xu et al[11] indicated that each 1 mg/dl increase in SUA led to a 13.1% increase in the risk of T2DM and a 48.4% increase in the risk of T2DM. Stratified analysis by age, gender, geographical area, SUA, study design, duration of follow-up, and confounding factors further indicated that SUA was positively related to T2DM. In addition, multiple meta-regression did not show these variables influenced the correlation between SUA and T2DM.

Conclusion

There is a positive correlation between uric acid levels and glycemic control in individuals with type II diabetes. It is important for diabetic individuals to monitor their uric acid levels and take steps to maintain normal levels in order to improve their overall glycemic control and reduce the risk of long-term complications. Therefore, regular monitoring and management of uric acid levels should be considered an important part of the overall treatment plan for patients with type II diabetes. Future studies should focus on the mechanisms underlying the association between uric acid and glycemic control to identify potential therapeutic targets to improve diabetes management and reduce the risk of cardiovascular complications.

Ethical approval and consent from patients

Approval from theethical committee of Govt. Medical College, Kota, Rajasthan. Letter no. F3Acad/Ethical Clearance/2020/07; Date 19/06/2020 was obtained from the office of the ethical committee, Govt. Medical College, Kota for the start of the research work. Informed consent was taken from each patient included in the study.

List of abbreviations:

✓	IDDM	-	Insulin Dependent Diabetes Mellitus
✓	NIDDM	-	Non-Insulin Dependent Diabetes Mellitus
✓	ADA	-	American Diabetes Association
✓	OGTT	-	Oral Glucose Tolerance Test
✓	HBA1c	-	Haemoglobin A1c
✓	GLUT	-	Glucose Transporter
✓	ER	-	Endoplasmic Reticulum
✓	FBG	-	Fasting Blood Glucose
✓	CLIA	-	Chemilluminescence Immunoassay
✓	CVD	-	Cardiovascular Disease
✓	WHO	-	World Health Organization
✓	IDF	-	International Diabetes Federation
✓	SD	-	Standard Deviation
✓	IFG	-	Impaired Fasting Glucose
✓	IGT	-	Impaired Glucose Tolerance

Data availability:

The subjects were selected amongst those attending outdoor and indoor in NMC Hospital and MBS Hospital, Kota Rajasthan.

Conflicts of interest: None
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Authors' contribution: The contribution of all four authors was equal in this study.

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