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Plasma Uric Acid in Diabetes Compare with IGT and Normal Study

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Abstract

1. *To define the relationship between serum uric acid and glucose levels in patients with impaired glucose tolerance test and diabetes mellitus.*
2. *To assess the prevalence of hyperuricemia in patients with impaired glucose tolerance test.*
3. *To assess the prevalence of hypouricemia in patients with diabetes mellitus.*
4. *To compare the serum uric acid levels to body mass index in patients with impaired glucose tolerance test and diabetes mellitus.*

Compare the uric acid levels between male and female diabetic subjects.

Introduction

Plasma uric acid, an end product of purine metabolism, is related to the purine bases of the nucleic acids. Its levels are genetically determined, but are influenced by multiple environmental factors. It had been thought to be a metabolically inert end product without any physiological significance.

Recently, it has been shown that there is a definite relationship between hyperglycemia and uric acid levels. Studies done so far have shown that, in the early stages of diabetes, the levels were high and as the diabetic status progresses, there is a gradual decline of uric acid levels in many patients.

There are evidences to suggest that low serum uric acid levels may precede the onset of diabetic retinopathy. It has been reported that hypouricemia may also predict the future progression and hence be an indicator of incipient nephropathy in Type 2 DM.

Materials and Methods

Source of data

Patients, with known diabetes or impaired glucose tolerance / newly detected patients of diabetes or impaired glucose tolerance treated on OPD basis or in patients admitted in V.M.K.V.M.C.H.. A detailed history was taken and thorough physical examination was done and BMI was calculated.

Methods of collection of data (including sampling procedure, if any):

Patients with known diabetes or impaired glucose tolerance/ newly detected patients of diabetes or impaired glucose tolerance treated on OPD basis or in patients admitted in V.M.K.V.M.C.H.. A detailed history was taken and thorough physical examination was done and BMI was calculated.

Results and Discussion

Table 1: Distribution of the study subjects based on the presence of microalbuminuria

Microalbuminuria	Known Diabetes (n=10)	Controls (n=50)	IGT (n=40)	P value
Present	6 (60%)	0	2 (5%)	<.001
Absent	4 (40%)	50 (100%)	38 (45%)	

P value was derived by using chi-square test

Table 1 shows the distribution of the study subjects based on the presence of microalbuminuria. Microalbuminuria indicated the early changes of nephropathy and it was found to be more common among the known diabetes patients than that of the newly diagnosed and IGT patients and the difference was found to be statistically significant (p<.05).

Fig 1: Distribution of the study subjects based on the presence of microalbuminuria

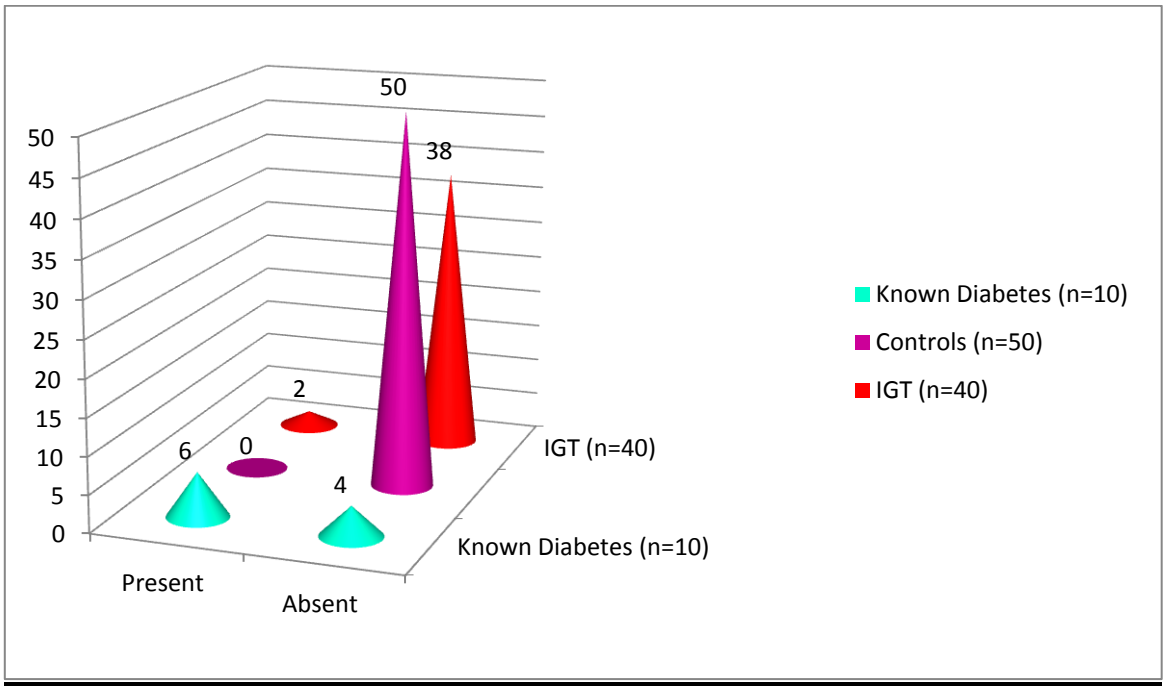


Table 2: Distribution of the study subjects based on the presence of dyslipidemia

Dyslipidemia	Known Diabetes (n=10)	Controls (n=50)	IGT (n=40)	P value
Present	8 (80%)	15 (30%)	17 (42.5%)	**<.001**
Absent	2 (20%)	35 (70%)	23 (57.5%)	

P value was derived by using chi-square test

Table 2 shows the distribution of the study subjects based on the presence of dyslipidemia. Dyslipidemia was assessed based on the LDL, total cholesterol and triglycerides levels. It is seen from the table that dyslipidemia was more common among the known diabetes group than that of the controls and IGT patients and the difference was found to be statistically significant (p<.05).

Fig 2: Distribution of the study subjects based on the presence of dyslipidemia

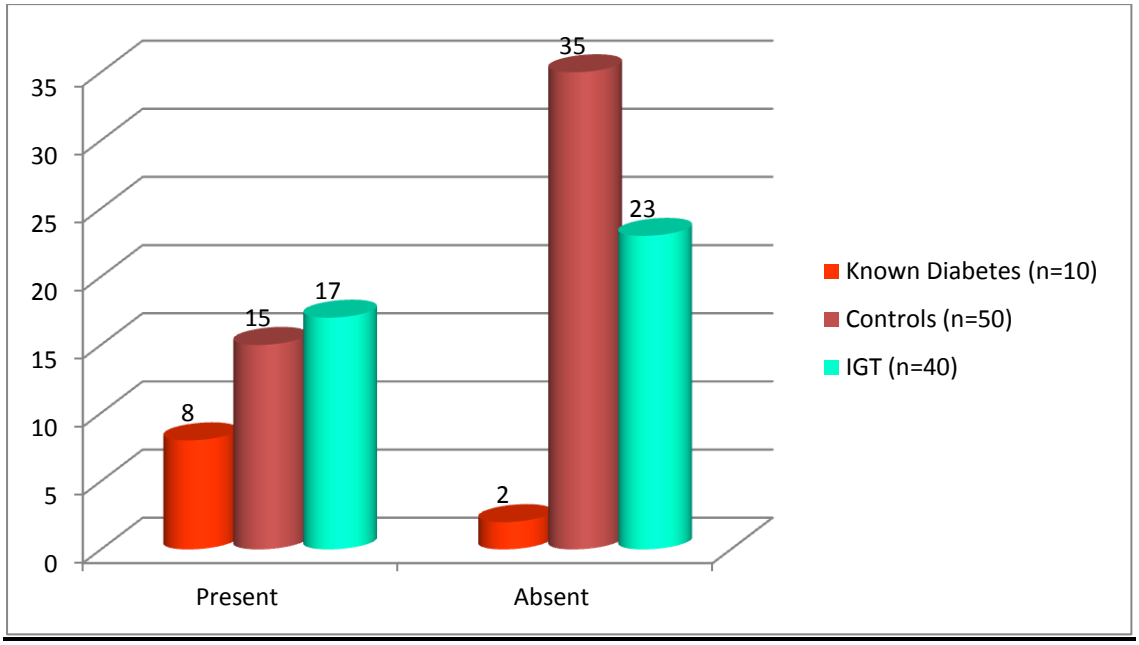


Table 3: Distribution of the study subjects based on the presence of ECG abnormality

ECG abnormality	Known Diabetes (n=10)	Controls (n=50)	IGT (n=40)	P value
Features of CAD	6 (60%)	2 (4%)	2 (5%)	**<.001**
LVH	2 (20%)	3 (6%)	10 (25%)	
Normal ECG	2 (20%)	45 (90%)	28 (70%)	

P value was derived by using chi-square test

Table 3 shows the distribution of the study subjects based on the presence of ECG abnormality. The most common ECG abnormality found was features of CAD and left ventricular hypertrophy and both these findings was more common among the known diabetes patients than the other two groups and the difference was found to be statistically significant (p<.05).

Fig 3: Distribution of the study subjects based on the presence of ECG abnormality

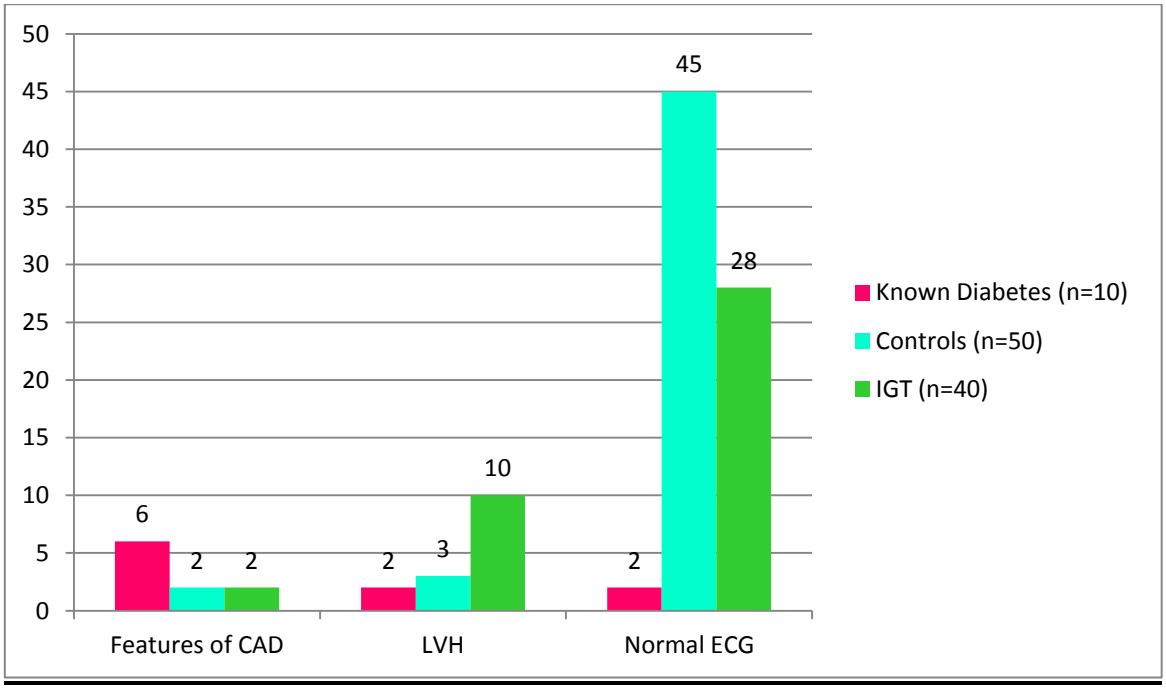


Table 4: Distribution of the study subjects based on the presence of ECHO abnormality

ECHO abnormality	Known Diabetes (n=10)	Controls (n=50)	IGT (n=40)	P value
Systolic dysfunction	2 (20%)	0	0	**<.001**
Diastolic dysfunction	5 (50%)	5 (10%)	7 (17.5%)	
Normal	3 (30%)	45 (90%)	33 (82.5%)	

P value was derived by using chi-square test

Table 4 shows the distribution of the study subjects based on the presence of ECHO abnormality. The systolic and diastolic dysfunction was found to be more common among the known diabetes patients than controls and IGT group and the difference was found to be statistically significant (p<.05).

Fig 4: Distribution of the study subjects based on the presence of ECHO abnormality

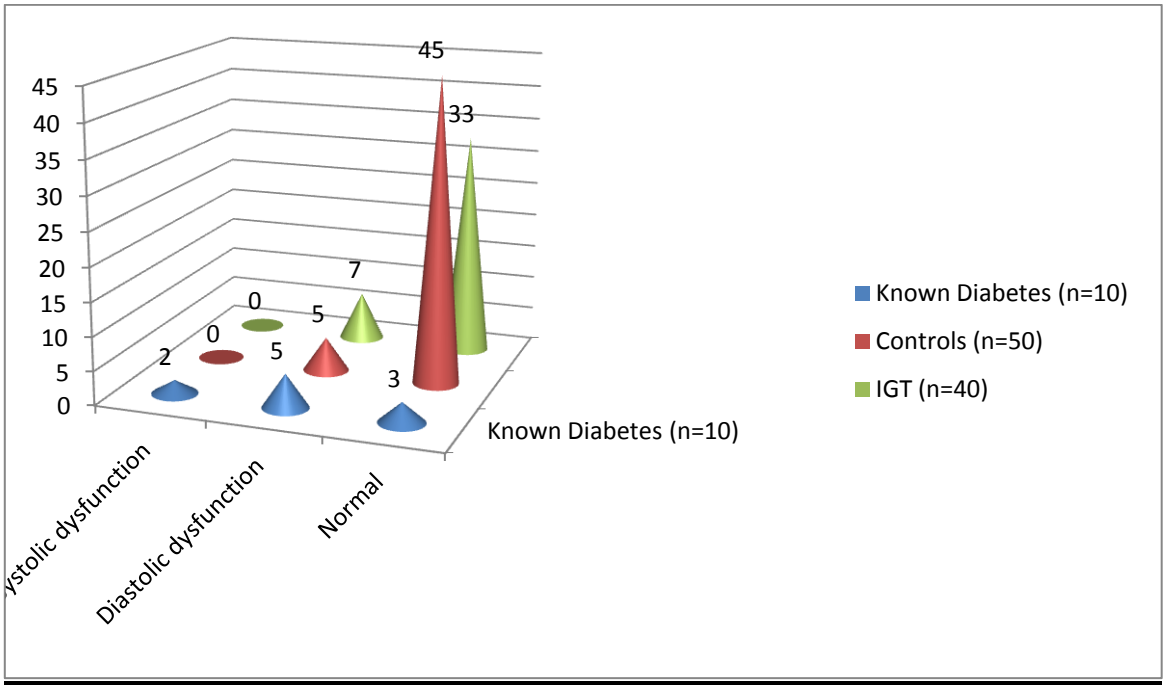


Table 5: Association between serum uric acid levels and the various factors among the study subjects

Factor		Serum uric acid		P value
		Mean	SD	
Age	**<50**	3.56	0.92	**0.0278**
	>50	4.71	1.03	
Gender	**Male**	3.82	0.86	**0.0315**
	Female	4.98	0.79	
BMI	**<25**	3.51	1.06	**0.0182**
	>25	4.76	0.94	
Duration of diabetes	**<5 years**	5.24	1.06	**<.0001**
	>5 years	3.91	0.84	

P value was derived by using chi-square test

Table 5 shows the association between serum uric acid levels and the various factors among the study subjects. It is inferred from the table that age more than 50 years, female gender, BMI more than 25 and long duration of diabetes found to have a higher serum uric acid levels and the association was found to be statistically significant (p<.05).

Fig 5: Association between serum uric acid levels and the various factors among the study subjects

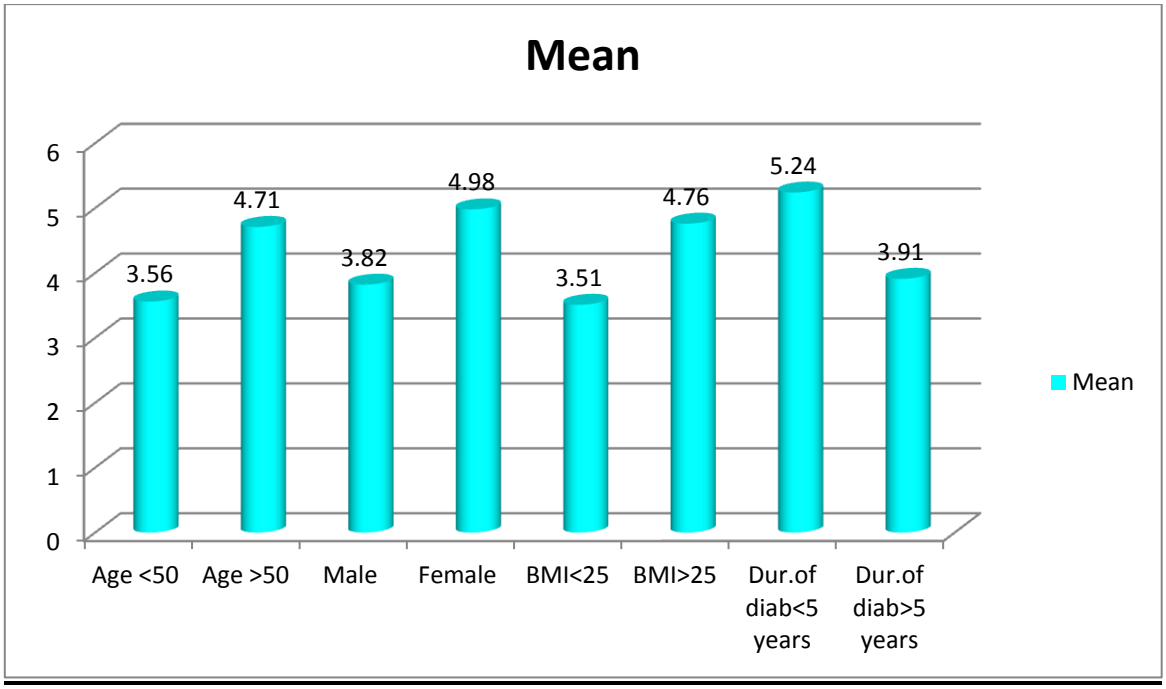


Table 6: Correlation values between serum uric acid and the various demographic factors

Factors	R value	P value
Age	0.514	**<.001**
BMI	0.851	**<.001**
Duration of diabetes	0.755	**<.001**

Table 6 shows the correlation values between serum uric acid and the various demographic factors. It is inferred from the table that age, BMI and duration of diabetes had shown a strong positive correlation with serum uric acid levels, as the age, BMI and duration of diabetes increases serum uric acid levels also increases and it was found to be statistically significant (p<.05).

Fig 6: Correlation values between serum uric acid and the various demographic factors

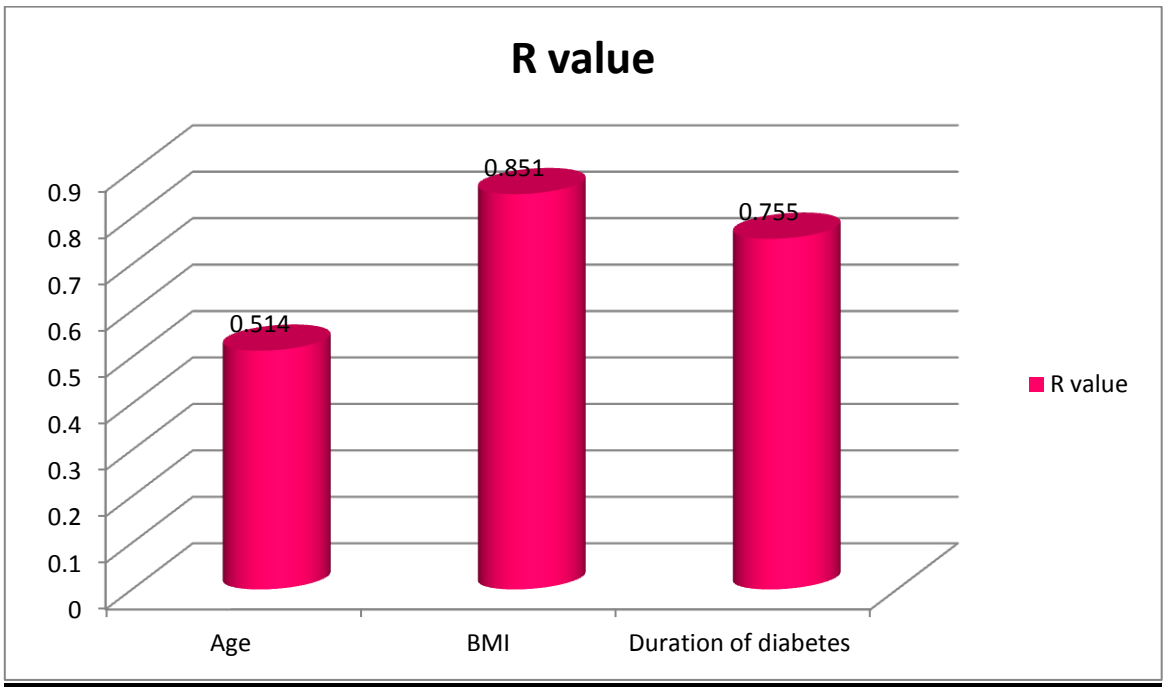
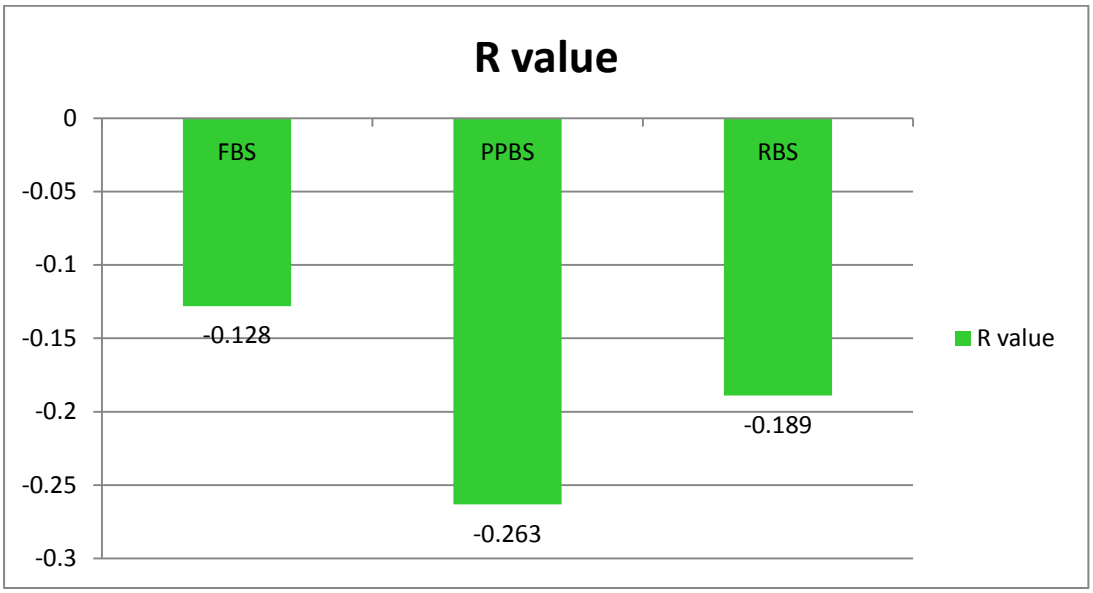


Table 7: Correlation values between serum uric acid and the various glucose parameters

Factors	R value	P value
FBS	- 0.128	0.0817
PPBS	-0.263	0.186
RBS	-0.189	0.0971

Table 7 shows the correlation values between serum uric acid and the various glucose parameters. It is inferred from the table that the fasting blood sugar, post-prandial sugar and the random blood sugar showed a weak negative correlation with serum uric acid levels but they are not statistically significant.

Fig 7: Correlation values between serum uric acid and the various glucose parameters



Discussion

Of the 100 patients who presented to V.M.K.V. Medical College and Hospital, 10 patients with Type 2 DM and 40 patients with IGT formed the study group and 50 normal patients were taken as controls.

Study was made in detail regarding age, sex, history, glycemic status, duration of diabetes and investigations.

Age distribution of the study ranged from 35-80 years. There was no significant difference among cases and controls in relation to age and sex.

The present study showed that there is a mild decrease in serum uric acid levels in patients with Type 2 DM.

The present study showed that as the duration of diabetes increases there is decrease in serum uric acid levels.

The present study showed that patients with type 2 DM having poor glycemic control had less levels of serum uric acid.

The factors contributing to decreased level of serum uric acid in diabetics are

1. Increased excretion of uric acid during hyperglycemia and glycosuria.
2. Modification of diet in renal disease.

The present study showed that patients shown to have IGT had high serum uric acid values. Factors contributing to hyperuricemia are still unclear.

The B.M.I of the study group was >25 in 78% and is significantly more than controls, which correlated with mean serum uric acid levels.

Significant decrease of serum uric acid levels was observed in male than female diabetics. Significant increase of serum uric acid levels was observed in females than males with IGT.

Routine annual estimation of uric acid among diabetics will help the clinician to find out the changing trends of uric acid levels which is likely to be influenced by control of blood sugar. Such cases should be carefully monitored for CAD as well as other vascular episodes.

Let us have a motto of:

"Assess diabetics for risk factors;
Assist to control them and
Arrest the development of complications"
With the pharmacological and non pharmacological means.

Conclusion

- Plasma uric acid levels was mildly decreased in patients with Type 2 DM Plasma uric acid decreased in patients with Type 2 DM of longer duration and the degree of reduced plasma uric acid levels were directly proportional to the duration of Type 2 DM.
- Plasma uric acid was significantly decreased in patients with Type 2 DM having poor glycemic control compared to controls and IGT patients.
- Plasma uric acid was significantly elevated in patients with IGT
- Significant correlation was noticed between serum uric acid and B.M.I in patients with Type 2 DM
- Significant decrease of serum uric acid was observed in male diabetics
- Age, BMI and duration of diabetes had shown a strong positive correlation with serum uric acid levels
- Fasting blood sugar, post-prandial sugar and the random blood sugar showed a weak negative correlation with serum uric acid

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