ORIGINAL RESEARCH PAPER

General Medicine

STUDY OF SERUM URIC ACID LEVEL IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

KEY WORDS:

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ABSTRACT

BACKGROUND:Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.

AIM:To evaluate the serum uric acid level in patients with type 2 Diabetes mellitus.

MATERIALS AND METHODS: It was a prospective observational study conducted on 100 patients attending Medicine Department of Jhalawar Medical College, Jhalawar, Rajasthan. The study was done to assess the uric acid status in patients with diabetes mellitus and to find out its association with Age, Gender, Body Mass Index (BMI), Waist Hip Ratio (WHR), Dyslipidemia and Hypertension. Relevant history, vitals, clinical examination and laboratory investigations were done and recorded.

RESULTS: This study evaluated the level of serum uric acid in Type 2 diabetes mellitus patients and confirmed there significantly high prevalence of hyperuricemia among type 2 diabetes subjects and increased association with increasing age, BMI, WHR, Dyslipidemia, Hypertension and female sex.

CONCLUSION: Patients with Poor metabolic control and longer duration of diabetes were more susceptible to develop various complications including hyperuricemia. Early diagnosis and control of Diabetes Mellitus and its complications is indicated and potential therapeutic approaches (therapeutic life style changes and pharmacotherapy) should be initiated.

INTRODUCTION

DIABETES MELLITUS

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels[1]. Diabetes mellitus is associated with two to four-fold increased incidence of coronary artery disease[2]. Over recent years there has been renewed debate about the nature of the association between raised serum uric acid concentration and diabetic complications. Several large studies have identified the value, in populations, of serum uric acid concentration in predicting the risk of cardiovascular events, such as myocardial infarction.

MATERIALS AND METHODS

It was a prospective observational study conducted on 100 patients attending Medicine Department of Jhalawar Medical College, Jhalawar, Rajasthan. The present study was done to assess the uric acid status in patients with diabetes mellitus and to find out its association with age, gender, BMI, WHR, Dyslipidemia and Hypertension. The relevant history including sociodemographic data, clinical data like Body weight, Height, BMI, WHR, blood pressure, Cardiovascular risk factors and Clinical examination were recorded. All patients were subjected to following laboratory investigations: CBC, Fasting and post prandial blood sugar level, RFT, HbA1c, blood urea, serum creatinine, serum uric acid, lipid profile, ECG, urinalysis and CXR. The data were compiled and analysed using the Statistical Package for Social Sciences (IBM SPSS Inc.).

RESULTS

Out of the 100 subjects in the study, 58% were males and 42% were female subjects. The study sample included majority 41% in the age group of 61-70 years (Table 1). In the study 55% belonged to the category of 6-10 years of duration of diabetes whereas 18% subjects had a duration of >10 years of the disease and 27% had duration <5 years since the diagnosis. 19 subjects had a BMI which comes in the obese category. While 40 subjects belonged to normal range of BMI for Asian population and 41 were in the overweight category. Among the study subjects, 25 were having Ischemic heart disease and 29 were having hypertension. Dyslipidemia was present in 23 subjects. The mean uric acid level among study subjects was 5.35±1.19 mg/dl. Of the 100 subjects, 17% had hyperuricemia.

Table 1: Age wise distribution of study subjects

Age group	No.	%
Up to 50 years	16	16.0
51-60 years	30	30.0
61-70 years	41	41.0
71-80 years	13	13.0

ASSOCIATION OF GENDER WITH HYPERURICEMIA

Among the study subjects, 15 female participants had hyperuricemia while 2 male participants had hyperuricemia. Females had a significantly higher incidence of hyperuricemia compared to male subjects and which was statistically significant with a 'P' value of <0.001.

Table 2: Association of gender with hyperuricemia in diabetic subjects

Gender	No (n=83)		Yes (n=17)	
	No.	%	No.	%
Male	56	96.6	2	3.4
Female	27	64.3	15	35.7

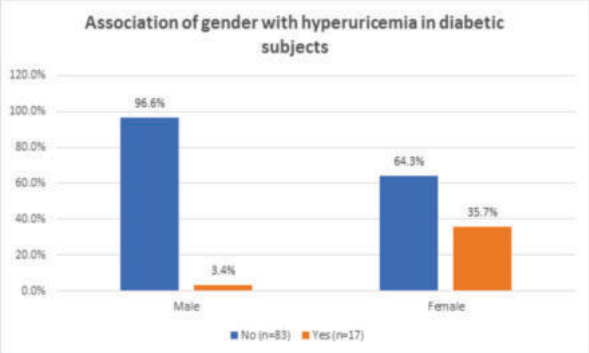


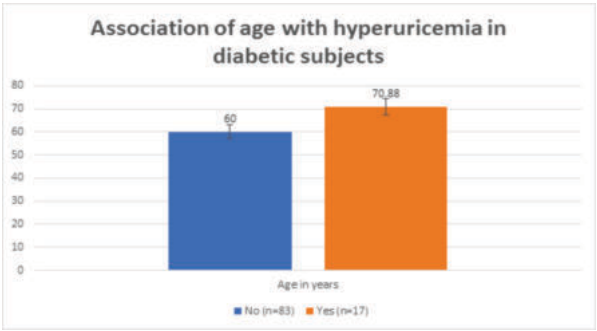
Figure 1: Association of gender with hyperuricemia

ASSOCIATION OF AGE AND ANTHROPOMETRIC PARAMETERS WITH HYPERURICEMIA

Table 3: Association Age with hyperuricemia in diabetic subjects

	Hyperuricemia	
	No (n=83)	Yes (n=17)
Age in years	60.0±9.13	70.88±8.51
BMI	24.03±2.75	25.74±2.73
WHR	0.85±0.04	0.88±0.07

Figure 2: ASSOCIATION OF AGE WITH HYPER URICEMIA



ASSOCIATION OF BMIWITH HYPERURICEMIA

Table 4: Association of BMI with hyperuricemia in diabetic subjects

BMI category	No (n=83)		Yes (n=17)	
	No.	%	No.	%
18.5-22.99 kg/m^2	37	92.5	3	7.5
23-27.5 kg/m^2	33	80.5	8	19.5
>27.5 kg/m^2	13	68.4	6	31.6

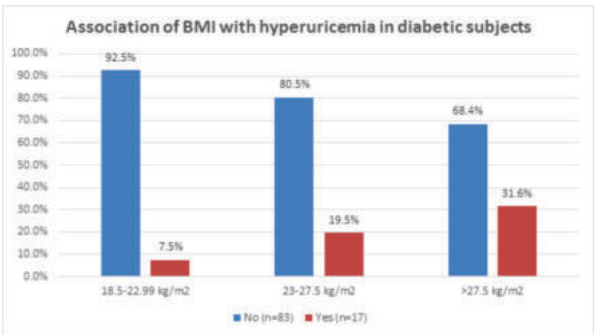


Figure 3: ASSOCIATION OF BMI WITH HYPER URICEMIA

ASSOCIATION OF DURATION OF DIABETES WITH HYPERURICEMIA

Table 5: Association of duration of diabetes with hyper uricemia in diabetic subjects

Duration of diabetes	No (n=83)		Yes (n=17)	
	No.	%	No.	%
1-5 years	26	96.3	1	3.7
6-10 years	50	90.9	5	9.1
>10 years	7	38.9	11	61.1

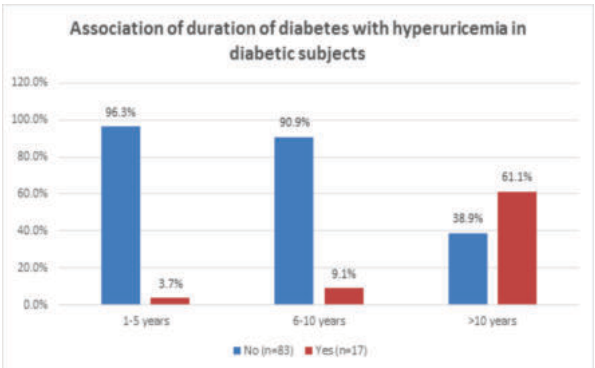


Figure 4: Association of duration of diabetes with hyperuricemia

ASSOCIATION OF HYPERTENSION WITH HYPERURICEMIA IN DIABETIC SUBJECTS

Table 6: Association of hypertension with hyperuricemia in diabetic subjects

Hypertension	No (n=83)		Yes (n=17)	
	No.	%	No.	%
No	61	85.9	10	14.1
Yes	22	75.9	7	24.1

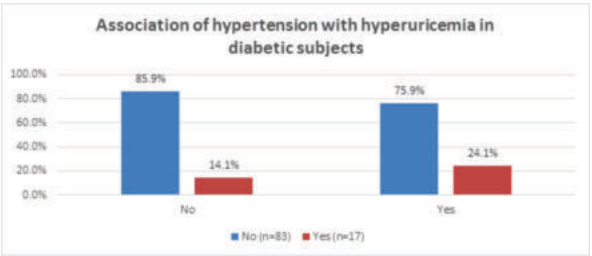


Figure 5: Association of hypertension with hyper uricemia in diabetic subjects

ASSOCIATION OF DYSLIPIDEMIA WITH HYPER URICEMIA IN DIABETIC SUBJECTS.

Table 7: Association of dyslipidemia with hyperuricemia in diabetic subjects

Dyslipidemia	No (n=83)		Yes (n=17)	
	No.	%	No.	%
No	70	90.9	7	9.1
Yes	13	56.5	10	43.5

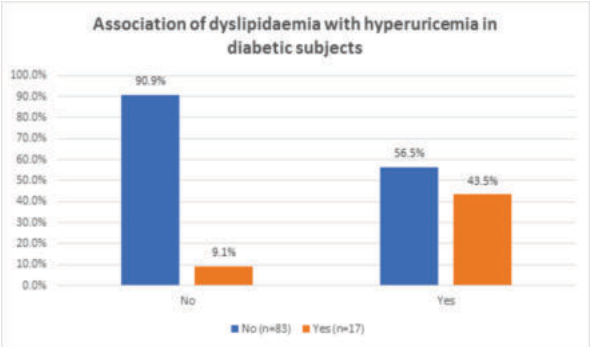


Figure 6: Association of dyslipidemia with hyper uricemia in diabetic subjects

CORRELATION OF HYPERURICEMIA WITH DIFFERENT PARAMETERS.

Table 8: Correlation of serum uric acid with different parameters

	r value	p value
Age in years	0.41	<0.001
Fasting blood sugar	0.14	0.15
PPBS	0.26	0.01
BMI	0.43	<0.001
WHR	0.41	<0.001

The Fasting blood sugar had no significant correlation with hyperuricemia while the Post prandial blood sugar has a significant correlation with 'P' value of 0.01

DISCUSSION

This study evaluated the level of serum uric acid in Type 2 diabetes mellitus patients and confirmed the following:

- Significantly high prevalence of hyperuricemia among type 2 diabetes subjects. Mean uric acid level among

diabetic patients was 5.35±1.19 mg/dl. Prevalence of hyperuricemia in general Indian population is still under-investigated. A study by Bandana Sachdev among select nomadic Rajasthani population reported a prevalence of hyperuricemia as found 13.5%[3].

- Serum Uric Acid (SUA) in males was 5.18+/-1.24 while in females it was 5.58+/-1.09. The gender difference in uric acid level was found to be not statistically significant. J Wang et al had reported among Chinese T2DM patients with central obesity the prevalence of hyperuricemia as 36.1% and in men as 28.4%[4].
- Significant correlation between increasing age and hyperuricemia in T2DM patients. Billa G et al in their Retrospective study in Indian subjects also reported this trend[5].
- SUA was also observed to be in the higher level with prolonged duration of illness and was found to be statistically significant with a 'P' value of <0.001. In contrast, Shabana S et al reported a negative relationship with increased duration of illness with SUA[6].
- Significant correlation between BMI and higher serum uric acid with a 'P' value of <0.001. Ali N et al also reported significant positive relationship between SUA and obesity among Bangladeshi adults in a cross-sectional study in 2017[7].
- Rathmann et al, assessed the various components of insulin resistance syndrome in young black and white adults. They concluded that body mass index showed strongest positive correlation with the uric acid among insulin resistant components[8].
- Patient with higher WHR had higher uric acid level when compared with low WHR and it is statistically significant with a 'P' value of <0.001.
- In this study the mean SUA in in subjects with hypertension was 6.01 +/-1.17 while non hypertensive subjects had a mean SUA of 5.08+/-1.10. The difference was statistically significant with a 'P' value of 0.001. Strong epidemiologic data have linked serum uric acid to hypertension in humans and experimental animal data suggests hyperuricemia causes -hypertension.[9,10.] The Olivetti heart study had shown an independent positive association between serum uric acid and development of hypertension.[11]
- Mean SUA among subjects with dyslipidemia was 6.26+/-0.91 while in non dyslipidemic subjects were 5.08+/-1.14 which was found statistically significant with a 'P' value of <0.001. Dyslipidemia accelerates atherosclerosis in diabetic subjects. The pathophysiological link between the elevated SUA and atherosclerosis are endothelial dysfunction and inflammation. Reactive Oxygen Species production by Xanthine Oxidase can induce endothelial dysfunction by reducing bioavailability of nitric oxide.[12]

CONCLUSION

- In our study prevalence of hyperuricemia was found to be 17% in diabetic population.
- Serum uric acid levels in female subjects was observed higher than males.
- Significantly higher uric acid level was found in subjects with long duration of diabetes and older subjects.
- Significant correlation was noticed between serum uric acid and BMI as well as WHR.
- Elevated uric acid levels were noticed among hypertensive and dyslipidemic subjects.
- Whether uric acid contributes independently to T2DM and coronary artery disease is still a matter of controversy. Multiple studies have shown link between metabolic syndrome and hyperuricemia and which can lead to T2DM and atherosclerotic vascular disease in long term. Patients with Poor metabolic control and longer duration of diabetes were more susceptible to develop various complication including hyperuricemia. Our study also indicates a possible link between higher uric acid levels and diabetes mellitus and metabolic syndrome.

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