

**HYPERURICAEMIA AS A PREDICTOR OF COMPLICATION IN TYPE II DIABETES MELLITUS**

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**ABSTRACT: OBJECTIVE:** Increased uric acid level in case of Type II Diabetes Mellitus patient is associated with increased risk of Coronary Artery Disease (CAD) compared to those Type II Diabetes Mellitus who have normal uric acid level. **METHOD:** Total 100 patients of Type II Diabetes Mellitus (known case of Type II Diabetes Mellitus under treatment and also newly diagnosed cases.) were selected. 50 patients admitted or attending OPD selected as controls who were non-diabetic, diagnosed by screening with Fasting Blood Sugar, Random Blood Sugar and without any symptoms of Hyperglycaemia. **RESULTS:** In overall diabetics with CAD, serum uric acid level is >7.0mg/dL in 14/49 patients compared to without CAD having serum uric acid levels <7.0mg/dl in all 51 patients. The results were significant with  $p < 0.001$ . Mean Serum Uric Acid Levels of all cases of Type II Diabetes Mellitus was higher than controls, with value of  $5.14 \pm 1.25$ mg/dl, which was statistically significant with  $p < 0.0001$ . **CONCLUSION:** Serum Uric Acid level in both group that is in those who were known case of Type II Diabetes Mellitus and also newly diagnosed cases of Type II Diabetes Mellitus is higher than control group. Also increased serum uric acid level is also responsible for the complication of Type II Diabetes Mellitus like Coronary Artery Disease.

**KEYWORDS:** Type II Diabetes Mellitus, Hyperuricaemia, Uric Acid.

**INTRODUCTION:** The world today is witnessing an epidemic of Diabetes Mellitus globally and nationally. Diabetes has become the most important contemporary and challenging health problem.<sup>1</sup> It has been estimated that by 2025 AD world will have 300 million patients and that with India having highest number of diabetes patients (57 million).<sup>2</sup>

Uric Acid is the final breakdown product of purine degradation in humans. Although purine nucleotides are degraded in all tissues, urate is produced only in tissues that contain xanthine oxidase mainly liver and small intestine. Normally 2/3 or 3/4 urate is excreted by kidneys.<sup>3</sup> Increase in Uric Acid with Hyperglycaemia<sup>4</sup> suggests increased oxidant stress in body. Uric Acid is significantly associated with metabolic syndrome.<sup>5-9</sup> Another study says that hyperglycaemia can cause increase in free radicals which leads to antioxidant consumption (i.e. uric acid).<sup>10</sup> This leads to hypouricaemic status. It will be interesting to know if increase in uric acid in diabetes has potential to cause complication as an adjunctive factor or just is a marker of complication. If it is reduced in diabetes then what can be the cause.

**AIMS AND OBJECTIVES:** To study serum uric acid level in patients with Type II Diabetes Mellitus (DM-II) and its complications in comparison with control patient.

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**MATERIALS AND METHODS:** All the patients of DM-II who are admitted in JAH group of hospitals, Gwalior, (M. P.) were enrolled in present study. Total of 100 patients were included in the study.

In addition 50 patients were randomly selected who were admitted or attending the OPD of JAH group of hospitals, Gwalior, (MP) were enrolled in the present study as controls who were Non-Diabetic diagnosed by screening Fasting Blood Sugar (FBS), Random Blood Sugar(RBS) and without any symptom of hyperglycaemia.

Student t test (Two tailed, independent) was used to find the significance of study parameters on continuous scale between two groups and chi square test was used to analyze the data having ordinal variables. Significant value used was  $p < 0.05$ .

### Inclusion Criteria:

1. Known case of DM-II and already on treatment.
2. New case of diabetes patient with fasting blood sugar  $>126\text{mg/dl}$  and a Post prandial glucose level  $>200\text{mg/dl}$ . RBS  $>200\text{mg/dl}$  with symptoms of diabetes (Polyphagia and Polydipsia).
3. Non-Diabetics (Controls).

### Exclusion Criteria:

1. Patient with creatinine  $>1.4\text{mg/dl}$ .
2. Patient with stress hyperglycaemia.
3. Patient with uricosuric drugs.
4. Patients with Malignancy.
5. Patients taking long time salicylates.

**OBSERVATIONS:** Our study included 100 Type II Diabetes Mellitus (DM-II) diabetic patients admitted in JAH group of hospital, Gwalior (MP), over a period of 1 year and also 50 controls admitted or attending OPD of JAH group of hospitals over a period of 1 year. DM-II patients were classified on the basis of being previously diagnosed with the treatment and newly diagnosed, in to known cases and new cases respectively.

In overall diabetic patients with coronary artery disease (CAD), serum uric acid  $>7.0\text{mg/dl}$  was seen in 14/49 patients, while in patients without CAD serum uric acid level  $<7.0\text{mg/dl}$  in all 51 patients, and was significant ( $p < 0.001$ ) (Table no. 1). This is also seen in Fig. 1. While diabetic patients with hypertension, retinopathy and dyslipidemia have no correlation with serum uric acid levels as p value was not significant (Fig. 1).

Value of serum uric acid with the presence of coronary artery disease was significant as value  $<4.0\text{mg/dl}$  was present in all 11 non-CAD patients while all 14 CAD patients have serum uric acid  $>7.0\text{mg/dl}$ . It was significant with p value  $< 0.0001$  (table 2 and Fig. 2)

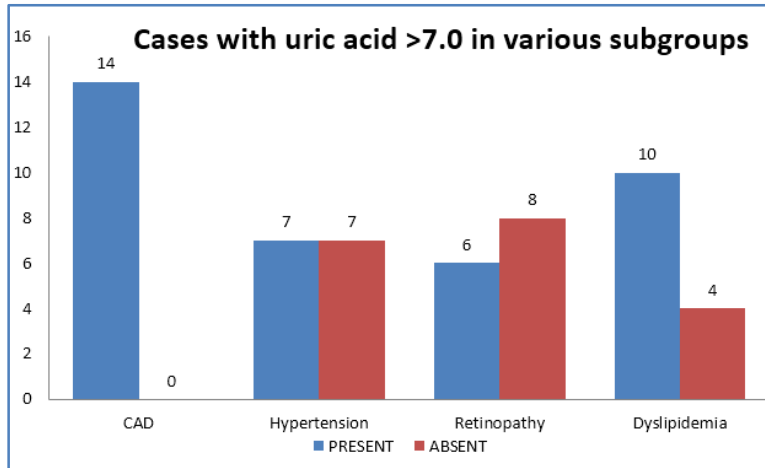
Sub Groups		Serum Uric Acid $<7.0$	Serum Uric Acid $>7.0$	Significance
CAD	Present	35	14	P $< 0.001$ Significant
	Absent	51	0	
Hypertension	Present	28	07	P=0.21 Non-significant
	Absent	58	07	
Retinopathy	Present	42	06	P=0.67 Non-significant
	Absent	44	08	

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Dyslipidemia	Present	59	10	P=0.83 Non-significant
	Absent	27	04	

**Table 1: Comparison of serum uric acid in patients of both known and new cases of diabetes mellitus on the basis of Co-morbidities**

**Fig. 1: Cases with Serum Uric acid >7.0mg/dL in various subgroups.**

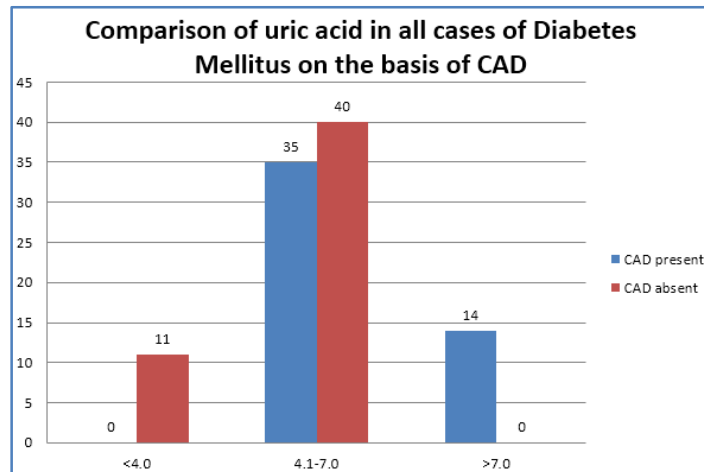


**Fig. 1**

Serum Uric Acid	CAD Present	CAD Absent	Significance
<4.0	00	11	P<0.0001
4.1-7.0	35	40	P=0.42
>7.0	14	00	P<0.0001

**Table 2: Comparison of serum uric acid in all cases of diabetes mellitus on the basis of CAD**

**Fig. 2: Comparison of Uric acid in all cases of Diabetes Mellitus on the basis of Coronary Artery disease.**



**Fig. 2**

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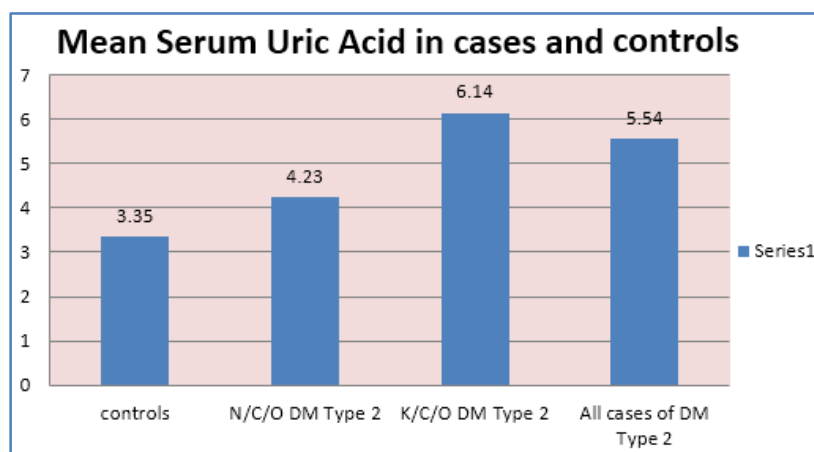
As shown in table 3 and fig 3 in patients with known case of DM-II mean serum uric acid was 6.14+0.95mg/dl and was significantly higher than new cases of DM-II and controls. Mean serum uric acid of all cases of DM-II was significantly higher than controls with value 5.54+1.25mg/dl.

Comparative Groups		Total No.	Mean	S.D.	Significance
K/C/O DM Type 2 v/s Controls	K/C/O DM Type 2	69	6.14	0.95	P=0.0001
	Controls	50	3.35	0.58	
N/C/O DM Type 2 v/s Controls	K/C/O DM Type 2	31	4.23	0.70	P=0.14
	Controls	50	3.35	0.58	
K/C/O DM Type 2 v/s N/C/O DM Type 2	K/C/O DM Type 2	69	6.14	0.95	P=0.002
	N/C/O DM Type 2	31	4.23	0.70	
All cases of DM Type 2 v/s Controls	cases of DM Type 2	100	5.54	1.25	P<0.0001
	Controls	50	3.35	0.58	

**Table 3: Comparison of serum uric acid levels in patients with known cases, new cases and total cases with each other and controls**

Abbreviations-K/C/O-known case of, N/C/O- not a known case of.

**Fig. 3:** Mean Serum Uric acid in cases and controls.



**Fig. 3**

**DISCUSSION:** In patients with known case of DM-II, mean serum uric acid level in patients with CAD was significantly higher than Non CAD with value 6.7+0.69mg/dl. These results are similar to the study by Nadkar MY<sup>11</sup> and Uzma Bano.<sup>12</sup> In overall diabetic patients with CAD, serum uric acid >7.0mg/dl was seen in 14/49 patients, while in patients without CAD serum uric acid level <7.0mg/dl in all 51 patients and was significant.

In overall diabetic patients with hypertension, serum uric acid >7.0mg/dl was seen in 7/35 patients, while in patients without hypertension serum uric acid level <7.0mg/dl in 58/65, and it was not significant. While a study by Shabana<sup>13</sup> showed significant relationship in hypertensives. But Nadkar<sup>11</sup> did not found any significance similar to our study.

In overall diabetic patients with retinopathy, serum uric acid >7.0mg/dl was seen in 6/48 patients, while in patients without retinopathy serum uric acid level <7.0mg/dl in 44/52 patients,

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and it was not significant. This shows uric acid levels in diabetics have no bearing on retinopathy, hypertension and dyslipidaemia.

In cases of DM-II serum uric acid level  $>7.0\text{mg/dl}$  was significantly seen in cases with CAD patient. Serum Uric Acid  $<4.0\text{mg/dl}$  was significantly seen in cases without CAD. This data shows hyperuricaemia is a significant risk factor for CAD and DM-II.

In patients with known case of DM-II mean serum uric acid was  $6.14+0.95\text{mg/dl}$  and was significantly higher than new cases of DM-II and controls.

Mean serum uric acid of all cases of DM-II was significantly higher than controls with value  $5.54+1.25\text{mg/dl}$ . This is similar to the study by Sudhindra Rao,<sup>14</sup> M Modan,<sup>15</sup> Nakanishi,<sup>16</sup> Abbas D,<sup>4</sup> While R Pfister<sup>17</sup> found no correlation and Pavani Bandaru<sup>18</sup> found inverse correlation of level of uric acid and duration of diabetes. Our study confirms the finding of other studies that uric acid increases as the duration of diabetes increases.

**CONCLUSION:** In a study done in 100 diabetes and 50 controls, mean serum uric acid level was in higher side of normal range in all diabetic patient (Both known and newly diagnosed) with respect to control. Its level was higher in patient with history of diabetes as compared in newly diagnosed diabetics. Serum uric acid level  $>7.0\text{mg/dl}$  is a risk factor for CAD but not for Dyslipidaemia, hypertension and Retinopathy.

Thus DM-II is a normouricaemic state with hyperuricaemic tendency and this level of hyperuricaemia act as additional risk factor for CAD.

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