

## Study of Serum Uric Acid and C-Reactive Protein In Metabolic Syndrome Subjects With And Without Diabetes

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### Abstract:

**Objectives:** Uric acid and highly sensitive C reactive protein (hs-CRP) are risk factors associated with the metabolic syndrome. The objective of study is to assess the level of uric acid and CRP in metabolic syndrome subjects and to compare the levels in metabolic syndrome subjects with and without diabetes mellitus **Materials and methods:** Detailed history and clinical examination, routine investigations and the following investigations Serum triglycerides, HDL, LDL, FBS, Serum uric acid, hs-CRP test were collected **Results:** Those with higher Uric acid levels had significantly higher systolic blood pressure ( $p=0.027$ ) and FBS ( $P=0.033$ ) than those with lower uric acid levels. 76% of patients had hs-CRP  $> 3$  mg/l and none of the patients had hs-CRP  $< 1$  mg/l. Among diabetics, 64% had higher hs-CRP level ( $> 3$ mg/l) while in non diabetics 88% had hs-CRP  $> 3$  mg/l and high hs-CRP level are significantly more associated with non-diabetic ( $p=0.005$ ) than diabetic. In those with uric acid  $> 6$  mg/dl, 78.4% had hs-CRP  $> 3$ mg/l. **Conclusion:** Treating higher Uric acid and hs-CRP can decrease the progression of metabolic syndrome. Better and more strict life style changes and interventions can be implemented in those with higher uric acid and hs-CRP levels so that we can prevent complications of metabolic syndrome, specifically cardiovascular complications

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### I. Introduction

Studies suggest that CRP (a marker of inflammation) level predicts the development of type 2 diabetes in metabolic syndrome. It has effect on atherothrombosis and acts as a useful risk marker for cardiovascular disease. Circulating C Reactive protein may predict the development of albuminuria in patients with type 2 DM and it also plays a role in progression of Chronic Kidney disease in diabetes. Hyperuricemia, hyperhomocysteinemia, reactive oxygen species, and highly sensitive C-reactive protein (hs-CRP) each play an important role in expanding the original Syndrome X.

Uric acid has anti oxidant effect, but it become a strong oxidant in the environment of metabolic syndrome. It stimulates vascular smooth muscle proliferation, induces endothelial dysfunction, decreased Nitric Oxide production, insulin resistance and causes TNF-alpha and CRP production. Uric acid is also associated with microalbuminuria. Hyperuricemia is an independent risk factor for development of chronic kidney disease in type 2 diabetes.

Combined assessment of CRP and uric acid will help in prediction of diabetic nephropathy and identifying diabetic patients who may require interventions to prevent and delay kidney injury and other complications.

### Inclusion Criteria:

1. Those subjects of age  $> 13$  meeting the IDF criteria for metabolic syndrome, who are able to give valid informed written consent.
2. Those fulfilling IDF criteria of metabolic syndrome

**Exclusion Criteria**

- 1.Type 2 diabetes with chronic kidney disease
- 2.Subjects Who are on Non steroidal anti inflammatory drugs(NSAIDS) or xanthine oxidase inhibitors or uricosuric agents for last 14 days
- 3.Known case of gouty arthritis and other arthritis or connective tissue disorders

**II. Observations And Results:**

200 Patients with metabolic syndrome were enrolled in the year

**Age:** Age of patients >18years with mean age of 56.52+/-10.13 years

**Sex:** They were 46% males and 54% females

**Mean uric acid in different categories**

Categories	Uric acid in mg/dl
Whole group	6.1+/-1.75
Diabetic	6.15+/-1.75
Non diabetic	6.05+/-1.77
Hypertensive	6.2+/-1.79
Smoker	6.39+/-1.92
Alcoholic	6.14+/-1.79

**hs-CRP levels in different categories**

	hs-CRP 1-3mg/dl	hs-CRP >3mg/dl
Diabetic	36%	64%
Non diabetic	12%	88%
Hypertensive	27.9%	72.1%
Non hypertensives	15.6%	84.4%
Smokers	21.20%	78.80%
Non smokers	25.40%	74.6%
Alcoholic	16.7%	83.3%
Non alcoholic	72.9%	27.1%

**III. Discussion:**

1)Uric acid and hs-CRP in metabolic syndrome:

The mean of uric acid was 6.1+/-1.75mg/dl which was towards the higher side. There was not even single subject with hs-CRP less than 1mg/DL and 76% had hs-CRP>3mg/DL.

2)Uric acid and hs-CRP in diabetic and nondiabetic:

The present study showed that in those with diabetes, 64% of subjects had hs-CRP >3 mg/l and in non diabetics, 88% had hs-CRP >3 mg/dl(p=.005) which showed higher level of hs-CRP in non diabetics than in diabetics.

The mean uric acid in diabetics was 6.15+/-1.81 and non diabetics was 6.05+/-1.71mg/DL.

3) Uric acid and hs-CRP between male and female:

Mean value of uric acid in males and females were 6.15+/-1.81mg/dl and 6.05+/-1.71mg/dl. In males and females, there was no significant difference in the

mean uric acid level as well as the hs-CRP level. 50% of males had uric acid >6 mg/dl and 51.8% of females had uric acid >6 mg/dl. 82.61% of males and 74.06% of females were having hs-CRP >3 mg/l.

4)hs-CRP and uric acid groups:

The mean of uric acid in those with hs-CRP>3mg/DL was 6.2+/-1.65mg/DL which was higher than those with hs-CRP 1-3mg/DL.

5) Metabolic syndrome variables in diabetic and non diabetic:

Waist circumference, LDL, triglyceride, SystolicBP, diastolic BP tend to be higher in non-diabetic than diabetic. HDL is significantly lower in non-diabetic than in diabetic.6)Metabolic syndrome variables in hs-CRP and uric acid group:

In those with hs-CRP>3 mg/l, waist circumference, LDL, Triglyceride, systolic BP tend to be a higher value even though it is not a significant change. PBS (p=0.033) and systolic blood pressure (p=0.027) are significantly higher in of those with uric acid>6mg/dl.7)Hypertensives:68% have hypertension. Mean uric acid level was 6.1mg/DL in hypertensives. Majority of hypertensives have hs-CRP>3mg/dl.

8)Alcohol users:

Mean uric acid who uses alcohol was 6.14mg/DL. 83.3% alcoholics had hs-CRP>3mg/DL.

**LIMITATIONS:** CRP can increase due to any inflammation. Both CRP and uric acid can vary depending upon patients dietary habits, alcohol drinking pattern and type of alcohol. All the parameters vary if patient is more health conscious. The duration of all co morbidities and diabetic control have role in CRP and uric acid levels.

#### **IV. Conclusion And Summary:**

- By monitoring uric acid and hs-CRP we can classify risk and severity of metabolic syndrome. Treating this can decrease the progression of metabolic syndrome and atherosclerotic cardiovascular complications
- Mean uric acid in metabolic syndrome was 6.1+/-1.75 g/dl which was in the upper limit of normal.
- Mean uric acid level in diabetics was 6.15+/-1.71 mg/dl and in non-diabetics, it was 6.05+/-1.71 mg/dl
- Those with higher uric acid levels had significantly higher systolic blood pressure (p=0.027) and FBS (p=0.033) than those with lower uric acid levels.
- 76% of patients had hs-CRP > 3 mg/l and none of the patients had hs-CRP <1 mg/l
- Among diabetics, 64% had higher hs-CRP level (>3mg/l) while in non diabetics 88% had hs-CRP >3 mg/l and high hs-CRP level are significantly more associated with non-diabetic (p=0.005) than diabetic.
- In those with uric acid >6mg/dl, 78.4% had hs-CRP >3mg/l which means those with higher uric acid had higher CRP levels also.

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