RESEARCH ARTICLE

SERUM URIC ACID IN METABOLIC SYNDROME

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ABSTRACT
Background: The metabolic syndrome consists of a constellation of metabolic abnormalities including central obesity, hypertriglyceridemia, low high-density lipoprotein (HDL) cholesterol, hyperglycemia and hypertension.
Aims & Objective: To study serum uric acid level in metabolic syndrome.
Materials and Methods: The present study was conducted on fifty patients with metabolic syndrome as per IDF criteria and waist circumference, blood pressure, serum uric acid were estimated.
Results: There is significant correlation found between serum uric acid levels and hypertension and also between serum uric acid levels and waist circumference of metabolic syndrome patients.
Conclusion: Patients with higher serum uric acid levels has significant correlation with components of metabolic syndrome is one of the risk factor in development of atherosclerosis and cardiovascular disease.
Key Words: Metabolic Syndrome; Uric Acid; Hypertension

Introduction

Metabolic syndrome is wide spread among adult population in world and its prevalence increases with age. Defining the metabolic syndrome has not been an attempt to declare the existence of a new disease produced by a single pathogenesis, but rather to put together various risk factors, that as a group have a greater predictive ability for coronary heart disease. Metabolic syndrome is a cluster of risk factors which include hypertension, obesity, and dyslipidemia insulin resistance in a single patient.[1] It can be a signal to health care physicians that patients who present with such a cluster are at much greater danger of morbidity and mortality from Type 2 Diabetes Mellitus (T2DM) and Coronary Heart Disease (CHD). Insulin resistance is an underlying central component of the metabolic syndrome (MetS).[2]

Hyperuricaemia or elevated serum uric acid level (SUA) is a biochemical entity that is gaining increasing importance as it has been found by some researchers to be not only a cardiovascular risk factor but also play a role in the development of renal and metabolic diseases.[3-5] Some reports on SUA and the metabolic syndrome have noted that increased SUA concentration is associated with an increased prevalence of some of the parameters - obesity, dyslipidemia, insulin resistance and hypertension of the metabolic syndrome.[6] To estimate the prevalence of hyperuricemia and to study the association between uric acid levels and the various components of metabolic syndrome in age and sex matched controls and cases.

Materials and Methods

The present study was conducted on fifty (50) patients with metabolic syndrome as per IDF criteria in the outpatient department of Endocrinology, King George Hospital, Visakhapatnam. Their ages varied from 35 to 75 years (mean age - 54.58). Out of 50, 32 were females, 18 were males. The study also included 30 healthy controls who were age and sex matched with the patient. The control group comprised of 16 females and 14 males. Metabolic syndrome was diagnosed based on IDF guidelines.

Inclusion Criteria: (1) Central obesity (defined as waist circumference ≥ 90cm for men and ≥ 80 cm for women); (2) Plus any 2 of the following 4 factors: (i) Raised triglyceride level ≥ 150 mg/dL; (ii) Reduced HDL-C < 40 mg/dL in males, < 50 mg/dL in females; (iii) Raised BP: systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg; (iv) Raised fasting plasma glucose ≥ 100 mg/dL.

Exclusion Criteria: (i) Patients with known elevated uric acid level, chronic kidney disease, haematological malignancies, hypothyroidism; (ii) Patients on treatment with drugs like salicylates, diuretics, ethambutol, pyrizinamide which causes increased serum uric acid levels; (iii) Alcoholics; (iv) Smokers.

The parameters estimated were waist circumference, blood pressure, Serum Uric acid by Uricase method and all basic investigations were done.

Results

Table-1: Gender distribution of cases and controls

Category	Cases	Percentage	Controls	Percentage
Males	18	36	11	36.67
Females	32	64	19	63.33
Total	50	100	30	100

Table-2: Age wise distribution of cases and controls

Age in years	Cases	Percentage	Controls	Percentage
40-49	14	28	8	26.67
50-59	23	46	14	46.67
60-69	11	22	7	23.33
69-79	2	4	1	3.33

Table-3: Comparison of various parameters of cases and controls

Variable	Cases		Controls		P value
	Mean	S.D	Mean	S.D	
WC [cm]	96.42	8.478	77.60	7.010	<0.01 (Significant)
SBP [mm Hg]	131.20	15.471	115.33	9.732	<0.01 (Significant)
DBP [mm Hg]	85.60	6.440	79.33	2.537	<0.01 (Significant)
SUA [mg/dl]	6.19	2.174	4.03	0.810	<0.01 (Significant)

Table-4: Mean serum uric acid levels in cases with increased waist circumference

WC range (cm)	Number of patients (n)	S. Uric acid (mg/dl)
86-90	17	4.30 ± 0.810
91-95	8	5.20 ± 0.926
96-100	9	6.18 ± 1.075
101-105	7	7.04 ± 1.686
106-110	5	8.16 ± 2.016
111-115	4	10.78 ± 2.968

Table-5: Mean serum uric acid levels in cases with and without hypertension

Hypertension	Yes [24]	No [26]	P value
S. uric acid	6.933 ± 2.548	5.038 ± 1.227	< 0.01 (Significant)

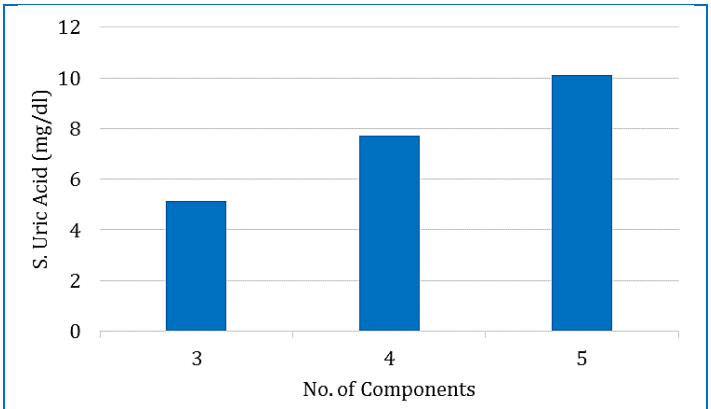

Figure-1: Mean serum uric acid levels of cases in relation to number of components

Discussion

Present study was conducted in 50 patients of metabolic syndrome, who presented to the outpatient department of endocrinology, KGH. They were studied for serum uric acid level and its association with components of metabolic syndrome. Thirty age and sex matched healthy controls were also evaluated for comparison of serum uric acid. Mean age of patient group was 54.58. Most of them were middle aged (40-59 years of age). Two thirds of our patients (64%) were females. (Table 1 and 2)

The results obtained in the present study is Serum uric acid levels were significantly higher in patients with MS compared to healthy controls shown in table-3 and figure-1. We defined hyperuricemia as SUA > 7 mg/dl in males and > 6 mg/dl in females. In various studies, significant correlations were found between serum uric acid and several components of the MS. Several possible pathophysiological mechanisms have been evoked to explain these associations including insulin resistance, the use of diuretics or impaired renal function accompanying hypertension. Insulin resistance may increase blood pressure directly via enhanced proximal tubular sodium reabsorption, or indirectly by the sympatho-adrenal system. Thereby, the kidney has been implicated as the potential link between muscle insulin resistance and compensatory hyperinsulinemia and the development of hyperuricemia and eventually hypertension. The patients showed higher serum uric acid level probably because of metabolic syndrome. Similar findings were seen in Anthonia Ogbera et al[6], Li-Ying Chen[7], Wen-Hua Zhu et al[8].

Serum uric acid levels were found to be increased with increase in WC as shown in table-4. So there is positive correlation between serum uric acid levels and waist circumference. This was similar to Anthonia Ogbera et al[6], Li-Ying Chen[7], Wen-Hua Zhu et al[8], Bedir et al[9] Fruehwald-Schultes et al[10] found that the serum uric acid concentration is independently associated with the serum leptin. Leptin could be a pathogenic factor responsible for hyperuricemia in obese patients.

In our study 24 hypertensive patients had high serum uric acid compared with non-hypertensive patients (table-5). There was significant correlation between serum uric acid level and hypertension which was similar to study by D Conen, V Wietlisbach et al[11], Remedios Shah[12]. Serum uric acid concentration was found to independently correlate with hypertension. A study done by Krishnan et al.[13] found that men with hyperuricemia had more risk for incident hypertension. Each unit increase in serum uric acid was associated with a 9% increase in the risk for incident hypertension. Hyperuricemia is associated with deleterious effects on endothelial function, platelet adhesion and aggregation, or oxidative metabolism.

Conclusion

Serum uric acid levels are higher in patients of metabolic syndrome as compared to normal healthy individuals.There is significant correlation found between serum uric acid levels and hypertension.There is positive

association between serum uric acid levels and waist circumference of metabolic syndrome patients. Patients with higher serum uric acid levels and its statistical significant correlation with components of metabolic syndrome is one of the risk factor in development of atherosclerosis and cardiovascular disease.

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