

Serum Uric Acid Level in Metabolic syndrome

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Abstract

In this paper we present results of a study carried out to explore the association of serum uric acid and metabolic syndrome .Serum uric acid level among 100 patients with metabolic syndrome attending An-Nassirryha General Hospital for non cardiac complaint was found to be higher than normal level and control group (405.98micromole/L., 378.51 micromole/L. respectively).serum uric acid level have a direct relationship with the number of metabolic syndrome components with significant higher levels among those with hypertriglyceridemia.

Key word: serum uric acid, metabolic syndrome

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Introduction

Metabolic syndrome is a combination of medical disorders that increase one's risk for cardiovascular disease and diabetes. It affects a large number of people in a clustered fashion. In some studies, the prevalence in the USA is calculated as being up to 25% of the population. A condition with some similarities to human metabolic syndrome is recognized in horses, equine metabolic syndrome. It is unknown if they have the same etiology. It is known under various other names, such as (metabolic) syndrome X, insulin resistance syndrome, Raven's syndrome or CHAOS (Australia). [1] The term "metabolic syndrome" dates back to at least the late 1950s, but came into common usage in the late 1970s to describe various associations of risk factors with diabetes, that had been noted as early as the 1920s.^{[2] [3]}

There are currently two major definitions for metabolic syndrome provided by 1) International Diabetes Federation (IDF) and 2) the revised National Cholesterol Education Program (NCEP), respectively. The revised NCEP and IDF definitions of metabolic syndrome are very similar and it can be expected that they will identify many of the same individuals as having metabolic syndrome. The two differences are that IDF excludes any subject without increased waist

circumference, while in the NCEP definition metabolic syndrome can be diagnosed based on other criteria. The National Cholesterol Education Program Adult Treatment Panel III (2001) requires at least three of the following:^[4]

central obesity: waist circumference ≥ 102 cm or 40 inches (male), ≥ 88 cm or 36 inches (female)

dyslipidaemia: TG ≥ 1.695 mmol/L (150 mg/dl)

dyslipidaemia: HDL-C < 40 mg/dL (male), < 50 mg/dL (female)

blood pressure $\geq 130/85$ mmHg

Fasting plasma glucose ≥ 6.1 mmol/L (110 mg/dl)

There is quite a bit of confusion about whether American Heart Association AHA/ NHLBI intended to create another set of guidelines or simply update the NCEP ATP III definition. According to Scott Grundy, University of Texas Southwestern Medical School, Dallas, Texas, the intent was just to update the NCEP ATP III definition and not create a new definition.^[5] Any 3 of 5 Criteria Constitute Diagnosis of Metabolic Syndrome)

Elevated waist circumference: Men — Equal to or greater than 40 inches (102 cm) Women — Equal to or greater than 35 inches (88 cm)

Elevated triglycerides: Equal to or greater than 150 mg/dL

Reduced HDL ("good") cholesterol: Men — Less than 40

mg/dL Women — Less than 50 mg/dL

Elevated blood pressure: Equal to or greater than 130/85 mm Hg or use of medication for hypertension

Elevated fasting glucose: Equal to or greater than 100 mg/dL (5.6 mmol/L) or use of medication for hyperglycemia

The metabolic syndrome has received increased attention in the past few years. It consists of multiple, interrelated risk factors of metabolic origin that appear to directly promote the development of atherosclerotic cardiovascular disease (ASCVD).^[5] This constellation of metabolic risk factors is strongly associated with type 2 diabetes mellitus or the risk for this condition. The metabolic risk factors consist of atherogenic dyslipidaemia (elevated triglycerides and apolipoprotein B, small LDL particles, and low HDL cholesterol [HDL-C] concentrations), elevated blood pressure, elevated plasma glucose, a prothrombotic state, and a proinflammatory state.^[6]

Serum uric acid (UA) level has been suggested to be associated with factors that contribute to the metabolic syndrome. Uric acid may be a marker of oxidative stress, and may have a potential therapeutic role as an antioxidant. On the other hand, like other strong reducing substances such as ascorbate, uric acid can also act as a prooxidant, particularly at elevated levels. Thus, it is unclear whether elevated levels of uric acid

in diseases associated with oxidative stress such as stroke and atherosclerosis are a protective response or a primary cause. However, the association between metabolic syndrome and UA has not been elucidated. We sought to determine the association between serum UA level and the number of components that contribute to the metabolic syndrome, and which component was associated most with higher serum UA level.^[7]

Patients and Methods

From March to September 2007, among adult patients who attended out patients clinic in An-Nassirrhya General Hospital for non-cardiac complaints. Samples from 100 patients with metabolic syndrome sent for blood uric acid. Metabolic syndrome diagnosed according to American Heart Association/Updated^[4]

At the same time 100 samples from those with no Criteria are considered as a control group

Exclusion criteria include:

Those with history of acute myocardial infarction or CVA

History of gout, psoriasis, malignancy, renal stone

History of chronic use of diuretics or steroid therapy

Blood pressure was measured using mercury sphygmomanometer and waist circumference was determined using tape measure.

Full history was taken especially for drug history and for medical illnesses considered in exclusion criteria

All patients are sending for ECG, serum cholesterol, low-density lipoprotein, high-density lipoprotein, and triglyceride and fasting blood glucose level.

Results

Mean serum uric acid was found to be higher in subjects with metabolic syndrome with mean increases in serum uric acid level by 27.47 micromol/L compared with subjects in the control group with no significant sex differences but there are significant differences in mean serum uric acid with different components of metabolic syndrome with highest level in those with high triglyceride components.

Discussion

Metabolic syndrome is strongly associated with atherosclerosis manifested by macrovascular diseases (coronary, cerebral, peripheral) and an excess mortality.^[8]

In this study, we found that metabolic syndrome is a recognized presentation in those who attending Al- Nassirryha General Hospital but we found there is under estimation to this combination of components risk by the patients and unfortunately by there doctors also.

Similar to other studies mean uric acid, was found to be higher in those with metabolic syndrome (4.0, 9.8 micromole/L.) compared with control group (3.7, 8.1 micromole/L.).^[7, 9, 10, 11]

Among those with metabolic syndrome we found that mean serum uric acid level elevated in both sexes without significant difference,^[10] in other studies the mean uric acid level in relation to sex was variable, in one study there was no difference, while in two other studies the female was found to have higher increase in there serum uric acid compared with control.^[9, 11]

Hypertension found to be the most common component of metabolic syndrome, this finding not differ from other studies^[7, 9, 10, 11] but e found that the frequency of central obesity was higher among our study patients (75%) compared to other studies [12], this finding suggest an urgent alarm about the prevalence of obesity in our community and the importance of multidirectional effort to prevent this health problem and it have been proved that maintenance of ideal body weight is essential step in management of metabolic syndrome [12].

Lifestyle measures such as weight loss, improved nutrition with reduced saturated fat, increased fiber, fruit and vegetables; and increased energy expenditure, have been shown to improve insulin sensitivity, decrease the

incidence of type II diabetes, and improve cardiovascular outcomes [13].

Mean serum uric acid level varies with variable components of metabolic syndrome, similar to other studies^[9, 11, 14], we found that higher mean serum uric acid level among those with hypertriglyceridemia compared with other components of metabolic syndrome, this finding should be considered as another alarm about the importance of serum triglyceride level as one of risk factors for the atherosclerotic cardiovascular disease (ASCVD). Similar to other studies^[10, 11], we found that there's a linear direct relationship between serum uric acid level and the number of metabolic syndrome the patients have, with men serum uric acid level of 422.82 micromole/L among those with more than 3 components compared with 403.90 micromole/L among those with only 3 components, this finding suggest the accumulative effects of metabolic syndrome components.

This study shows that serum uric acid level should be considered as an important marker in patients with metabolic syndrome and hyperuricemia is an associated abnormality that should be considered in those with metabolic syndrome.

It is wise to say, that this study indicate there's great need for larger studies to show many hidden health problems in our community including the prevalence of obesity, metabolic syndrome and hyperurecaemia, also more sophisticated studies may show whether treatment of hyperuricemia in metabolic syndrome will modify the cardiovascular risk or not.

It has been concluded that mean serum uric acid was found to be higher among patients with metabolic syndrome who attend out patient clinic in AN-Nassirrhya General hospital, this finding suggest the importance of serum uric acid level as one of cardiovascular risk factors.

Serum Uric Acid Level in Metabolic syndrome

Table (1): show the age and sex distribution of patients with metabolic syndrome and control group

parameter	Metabolic syndrome patients	Control group
Male:18-39 y.	13	10
40-59y.	26	26
More than 60	17	16
Male Total	56	52
Female: 18-39y.	6	10
40-59y.	22	24
More than 60	16	14
Female: Total	44	48
TOTAL	100	100

Table (2): show the distribution of metabolic syndrome components among patients with metabolic syndrome

components	No. of patients	male	female
Hypertension	82	50	32
central obesity	75	38	37
TG \geq 1.695 mmol/L	44	24	20
: HDL-C < 40 mg/dL(1.03 mmol/L(male), < 50 mg/dL(1.3 mmol/L) (female)	30	16	14
Diabetes Mellitus	79	46	33

Table(3): Shows mean uric acid level according to sex and age groups

parameters	Metabolic syndrome		Control group	
	No.	Mean uric acid level	No.	Mean uric acid level
○Age and sex				
Male:18-39	13	429.54	10	406.8
40-59	26	430.3	26	408.15
\geq 60	17	438.47	16	409.75
Male :total	56	432.6	52	408.38
Female:18-39	6	370	10	340.4
40-59	22	373.40	24	346.0
\geq 60	16	371	14	346.14
Female: total	44	372.1	48	346.16
Total	100	400.98	100	378.01

Metabolic syndrome components	Mean serum uric acid level among male patients	Mean serum uric acid level among female patients	Mean serum uric acid level
Hypertension	٤٣٣,٠٤	٣٨٣,٣٧	٤١٣,٦٦
central obesity	٤٣٣,١٦	٣٧١,٨٩	٤٠٢,٩٣
TG \geq 1.695 mmol/L	٤٣٨,٠٨	٣٩٦,٧٥	٤١٩,٢٩
HDL-C < 40 mg/dL (1.03 mmol/L) (male), < 50 mg/dL (1.3 mmol/L) (female)	٤٢٦,٧٥	٣٦٥,٧٩	٣٩٨,٣٠
Diabetes Mellitus	٤٣٢,٦٥	٣٧٣,٤٥	٤٠٧,٩٢

Table 4: Mean uric acid level in relation to different components of metabolic syndrome

Table(5): shows mean uric acid level variation in those with 3 and more than 3 components of metabolic syndrome

	Patients with more than 3 components	Patients with 3 components	Control group
Male(no.)	6	50	52
Mean uric acid	٤٥٣,٣٣	٤٣٠,١١	٤٠٨,٣٨
Female(no.)	5	39	48
Mean uric acid	٣٨٦,٢	٣٧٠,٢٩	٣٤٦,١٦
Total	11	89	100
Mean uric acid	٤٢٢,٨٢	٤٠٣,٩٠	٣٧٨,٥١

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