Prevalence of hyperuricemia and its correlation with cardiovascular risk factors in Iraqi subjects of karbalaa city.

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Fac Med Baghdad 2012; Vol. 54, No. 1
Received Oct 2011
Accepted Dec. 2011

Summary:

Background Uric acid an independent risk factor for cardiovascular mortality is still disputed as several studies have suggested that hyperuricemia is merely associated with cardiovascular diseases because of confounding factors such as obesity, dyslipidemia, hypertension, use of diuretics and insulin resistance .Moreover, there is still no well-established pathophysio-logical link between hyperuricemia and the development of cardiovascular complications

Objectives: The purpose of the present study is to investigate the prevalence and the clinical correlation of hyperuricemia with cardiovascular risk factors in Karbalaa city in Iraq.

Subjects and method: The investigations were performed between October 2009 and June 2010 on 130 subjects of different ages who attended the public clinic in AL- Hussainy teaching hospital in Karbala**.** Total cholesterol and triglycerides were determined enzymaticaly. High density lipoprotein-cholesterol was measured similarly after precipitation with magnesium phosphotungstate. Fasting blood glucose was obtained using enzymatic oxidation method. Uric acid was determined using enzymatic methods

Results: 19% of the subjects had the elevated level of serum uric acid. In the current study, positive correlations was found between serum uric acid levels and body mass index, plasma glucose, total and low density lipoprotein - cholesterol and triglyceride levels but a negative correlation between uric acid level and high density lipoprotein -cholesterol level.

Conclusion: In conclusion, these data show that hyperuricemia is closely linked to the various components of the metabolic syndrome and independently related to coronary artery disease.

Keyword: Uric acid, Hyperuricemia, Cardiovascular risk factors.

Introduction:

Hyperuricemia is a condition that results from increased production of uric acid, decreased excretion or a combination of both . Uric acid is the final product of purine degradation in humans.(1)

During adulthood, plasma concentration of uric acid increases overtime and this increase varies with height, body weight, blood pressure, renal function, diet and alcohol intake (2).

The most recognized complication of hyperuricemia is gouty arthritis and renal problems such as nephrolithiasis, urate nephropathy (3). Understanding this issue of association with cardiovascular disease risk factors, hyperuricemia deserves special attention regarding the progressive prevalence of cardiovascular disease throughout the world. Since hyperuricemia can be a accompaniment disorder with syndrome X (characterized by abdominal obesity, impaired glucose intolerance, increased low density lipoprotein -cholesterol & decreased high density lipoprotein -cholesterol), its presence is usually an indication for screening and aggressively treating any accompanying obesity, hyperuricemia, diabetes or hypertension (4).

Elevated serum uric acid levels are commonly seen in association with glucose intolerance, hypertension and dyslipidemia, a cluster of metabolic and hemodynamic disorders which characterize the so-called metabolic syndrome (6). Several population-based studies have examined the influence of a number of cardiovascular risk factors or components of the metabolic syndrome on serum uric acid levels. Thus, elevated serum uric acid levels have been linked to hypertension, hyperinsulinemia, reduced physical activity, increased body mass index, increased alcohol consumption and decreased HDL cholesterol (7).

Increased serum uric acid (SUA) concentrations have consistently been reported to be associated with the progression of CVD, and SUA concentrations have been documented over the past 5 decades to be modestly higher in patients with coronary heart disease (CHD) than in healthy control individuals (8). Much controversy exists, however, as to whether SUA is an independent risk factor, because a pathophysio-logical link between hyperuricemia and subsequent cardiovascular complications has yet to be confirmed and because SUA is related to many of the established risk factors, including hypertension, dyslipidemia, obesity, and excessive alcohol consumption (9).

Because of very controversial epidemiologic findings and a lack of consistent evidence, the role of SUA as an independent and causal risk factor for

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cardiovascular events remains unclear (10). On the one hand, several studies (9) have demonstrated an independent association between SUA and cardiovascular risk in general populations, suggesting that SUA may be an important causal agent for adverse cardiovascular outcomes. Conversely, different epidemiologic investigations (10),including the Framingham Heart Study (11), have indicated that uric acid per se does not play a causal role in the development of CHD, death from CVD, or death from all causes, after adjustment for well-established cardiovascular risk factors. Instead, these studies suggested that apparent associations are likely attributable to a correlation of SUA with other confounding risk factors for CVD (12).

The purpose of this study is to investigate the prevalence and clinical correlation of hyperuricemia in Iraqi subjects of Karbala city on. The study population represents an even sample of population of Karbala.

Subjects and methods:

The investigations were performed between October 2009- June 2010 on 130 subjects of different ages who attended the public clinic in AL- Hussainy teaching hospital in Karbala seeking for general medical checkup or complaining from symptoms that indicate the presence of hypertension, dyslipidemia or certain metabolic and hemodynamic disorders. All the subjects were thoroughly examined clinically and then grouped according to their diagnosis. Informations regarding Name: , Age: , Sex: , Height: , Weight: , Occupation: , Family history: D.M, HT, ischemic heart disease, and Social history regarding smoking, alcohol consumption and physical activity were recorded.

All the subjects involved in the study were asked to fast for 12-14 hours before a blood sample was withdrawn from them (10 mls.) .The blood was then transferred to tubes without anticoagulant and left at room temperature for two hours before centrifugation at 3000 xg for 15 mins. To separate the serum this, was kept in tubes at -20ºC.

Total cholesterol and triglycerides were determined enzymaticaly using a Biomaghreb company- France Kit. HDL-cholesterol was measured similarly after precipitation with magnesium phosphotungstate. Fasting blood glucose was obtained using enzymatic oxidation method using RANDOX LABORATORIES LTD. Uric acid was determined using enzymatic methods based on the measurement of Jaffe chromogen and by the URICASE/ POD (Boehringer Mannheim, Mannheim, Germany) method implemented in an auto analyzer.

Anthropometrical test: The body mass index (BMI) was calculated as weight (kilogram) divided by square of height (in meters); this measurement was performed according to standardizes procedures.

Statistical analyses: Comparisons among dyslipidemia groups were performed using ANOVA for normally distributed data.Comparisons between groups for quantitative data and prevalence of dyslipidemia were performed using the t- test.

Results:

Table 1 shows the prevalence of the studied parameters in control and cases groups.

Distribution of studies group	Control group	Cases group
BMI		
Lean (BMI<25)	23.4%	76.6%
Overweight(BMI bet 25-29.9)	20.8%	19.2%
Obese (BMI >30)	12.5%	4.2%
Fasting blood glucose:	53.3%	45%
Normal≤99mg/dl	46.7%	42%
Prediabetic bet 100-125mg/dl		
Diabetic>126mg/dl	0%	13%
Serum uric acid:		
Hypouricemia	0%	2 %
Normal values	90%	97 %
hyperuricemia	9%	11 %
Total cholesterol:		
Less than 200mg.dl	93.3%	66%
Between 200-239mg/dl	6.7%	26%
More than 240mg/dl	0%	8%
Triglyceride:		
Less than 150mg/dl	96.7%	66%
Between 150-199mg/dl	3.3%	24%
Between 200-399mg/dl	0%	9%
More than 400mg/dl	0%	1%
High density lipoprotein categories.		
low (less than 40 mg/dl)(bad)	53.3%	35%
normal (41-59 mg/dl)	46.7	65%
Low density lipoprotein categories.		
optimal≤ 129mg/dl	86.7%	
borderline high (130-159 mg/dl)	13.3%	
	0%	
Systolic blood pressure:	15.4%	56.9%
Optimal<129 mmHg	7.7%	36.9%
Borderline bet 130-159 mmHg		
high>160 mmHg	0%	6.2%
Diastolic blood pressure:		
Normal<80 mmHg	16.9%	50.8%
Prehypertension bet 80-89 mmHg	2.3%	30.8%
hypertension>90mmHg	3.8%	18.4%

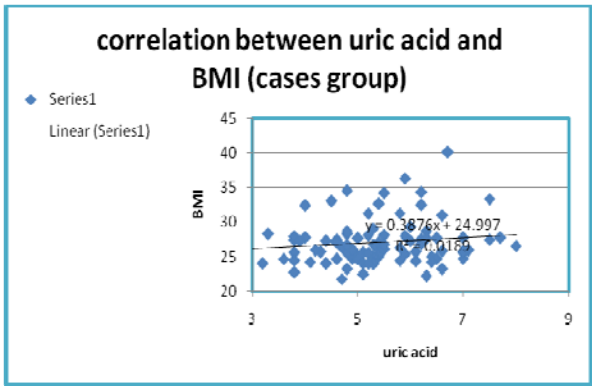

Fig 1 shows a positive significant correlation between serum uric acid and BMI with r^2=0.018

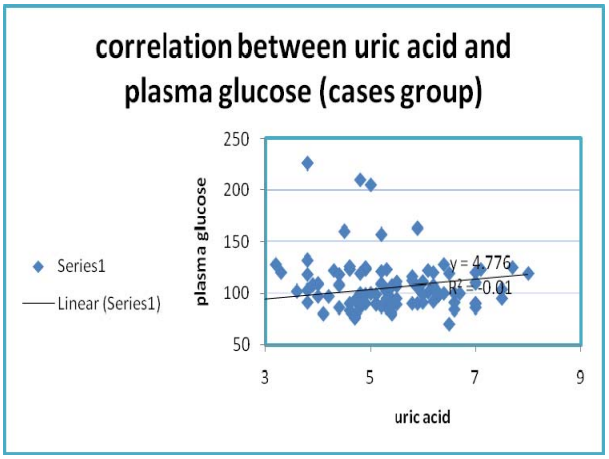

Fig 2: demonstrates positive significant correlation between serum uric acid and plasma glucose with r^2 =0.01.

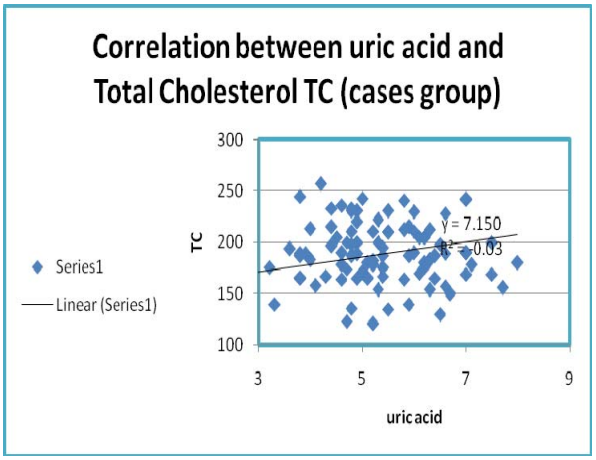

Fig 3: shows a positive significant correlation between serum uric acid and total cholesterol with r^2 =0.03

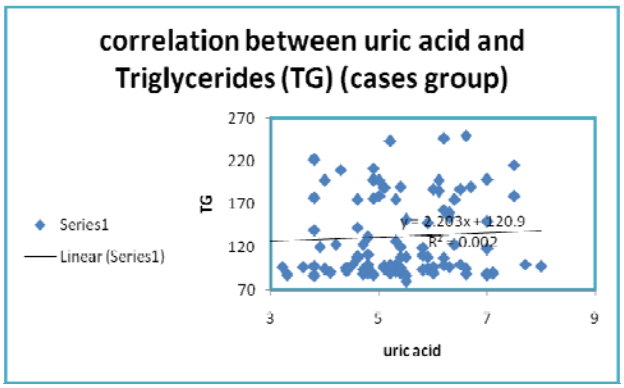

Fig 4: demonstrates a positive significant correlation between serum uric acid and triglyceride level with r^2 =0,002.

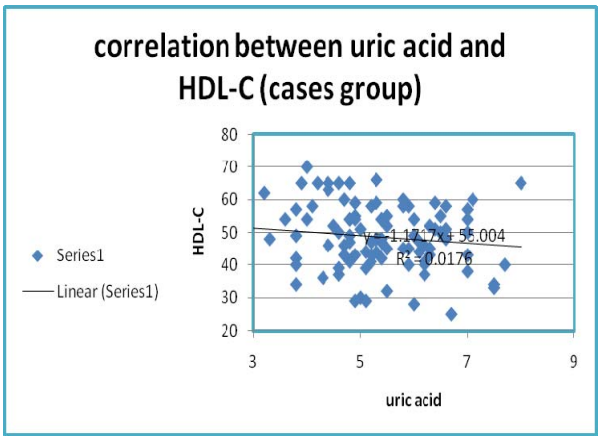

Fig5: demonstrates a negative significant correlation between serum uric acid and high density lipoprotein -cholesterol with r^2 =0.017.

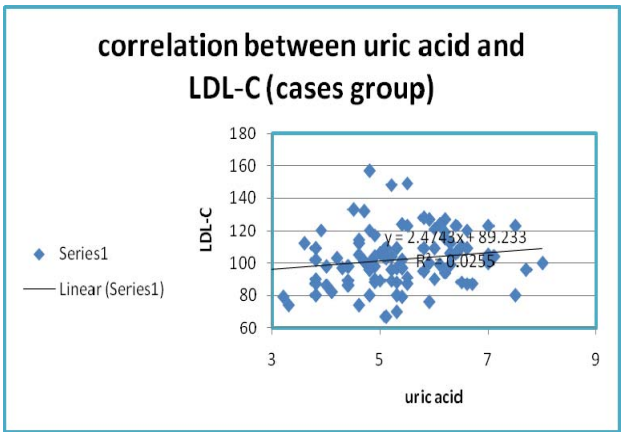

Fig 6: this fig shows a positive significant correlation between serum uric acid and low density lipoprotein-cholesterol with r^2 =0.025

Discussion:

The study carried out among population of Karbala city shows that some subjects have high values for the parameters tested which make them within the risk of the so called metabolic syndrome. 9% of the subjects had elevated concentration of uric acid and which makes it possible risk factor. Although hyperuricemia is well recognized as a risk factor for atherosclerotic diseases such as myocardial

infarction and stroke (13), the independence of this association from other confounding factors has remained controversial. This is mostly because serum uric acid is associated with component of metabolic syndrome, such as hypertension, dyslipidemia and obesity (14). In the current study, there were positive correlations between serum uric acid levels and BMI, plasma glucose, total and LDL- cholesterol and triglyceride levels in both control and cases group, and a negative correlation between uric acid level and HDL-cholesterol level in patients group only.

Several possible pathophysiological mechanisms have been evoked to explain these associations including insulin resistance (14), the use of diuretics (15) or impaired renal function accompanying hypertension (16). Indeed the kidney seems to play an important role in the development of the metabolic syndrome (15).Insulin-resistant individuals secrete larger amounts of insulin in order to maintain an adequate glucose metabolism. The kidney which is not insulin-resistant responds to these high insulin levels by decreasing uric acid clearance, probably linked to insulin-induced urinary sodium retention (15). Insulin resistance may increase blood pressure directly via enhanced proximal tubular sodium reabsorption (16).or indirectly by the sympatho-adrenal system (17). 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. Several previous studies have analyzed possible associations between hyperuricemia and coronary heart disease and their independence. Although some studies reported a positive association between hyperuricemia and coronary heart disease (18), other did not (19). Most of the studies showing negative results advocated, as expected, that the association between uric acid and coronary heart disease is not truly independent, but it is dependent on other risk factors for coronary heart disease (20). On the other hand, it is possible that uric acid is an independent risk factor for coronary heart disease in some selected populations (21). Because uric acid is also known to have anti oxidant activity in the serum, its level may rise as a compensatory mechanism to counteract the increased oxidative stress under the conditions of metabolic syndrome (22)or atherosclerosis (23). The interpretation of the present results is confronted by some limitations. Firstly, the data analysis was restricted to a cross-sectional study (public clinic in AL- Hussainy teaching hospital in Karbalaa). Only a prospective study could confirm the independencies of changes in the metabolic syndrome components and serum uric acid levels. Secondly, no serum insulin levels were measured as an index for insulin resistance. As insulin resistance is believed to play a major role in the metabolic syndrome.

Conclusion:

In conclusion, these data show that hyperuricemia is closely linked to the various components of the metabolic syndrome and independently related to coronary artery diseases. Considering the rapidly increasing incidence of obesity and metabolic syndrome around the world and the potential link between hyperuricemia and coronary heart disease or stroke, more attention should be protected about the increasing burden of hyperuricemia in Iraqi subjects of karbalaa city in Iraq.

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