

ASSOCIATION OF HYPERURICEMIA WITH ACUTE CORONARY SYNDROME

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ABSTRACT

Background: Hyperuricemia as an independent risk factor of cardiovascular disease or not is debated for years. **Objective:** To determine the association of high serum uric acid level with acute coronary syndrome (ACS). **Subjects and Methods:** This was a case control study, conducted from 1st January to 31st August, 2014, in Department of Cardiology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. A total of 367 study subjects, with 193 patients taken as cases, having acute coronary syndrome (ACS), diagnosed and labeled after thorough relevant investigations and 174 controls donot having acute coronary syndrome, selected from accompanying attendants, were included in study. The variables included in study were age, sex, BMI, hypertension, smoking, serum cholesterol, HDL, LDL, triglyceride, serum uric acid level and disease status of ACS. Serum uric acid >7mg/dl in males and >6mg/dl in female was taken as high. Informed verbal consent was taken from all the cases and controls before including them in study. The data was entered and analyzed in SPSS version 16. **Results:** A total of 367 study subjects, with 193 patients having coronary heart disease and 174 controls donot having coronary heart disease, were included in study. The mean age of patients of ACS was 52±11 years, versus controls 47±15 years, 84% among patients of ACS versus 75% among control were male, BMI was 27±3 among patients of ACS versus 25±6 among control, HDL was 41.92±8mg/dl among patients of ACS versus 43±6mg/dl in controls, triglyceride was 172.68±98mg/dl among patients versus 168±78mg/dl in controls, LDL was 119±37mg/dl among patients versus 118±32mg/dl in controls, and serum uric acid was 6.1±1.2mg/dl among patients versus 5.1±0.3mg/dl in controls. Those who have ACS, 37.3% have high serum uric acid as compared to 24% among Non CHD subjects. (p value 0.00) **Conclusion:** This study showed that elevated serum uric acid level was statistically significantly associated with Acute Coronary Syndrome.

Key words: Hyperuricemia, Acute Coronary Syndrome, Risk factors

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INTRODUCTION

Uric acid is the end product of purine metabolism.¹ High serum uric acid level is common finding in patients with high blood pressure, insulin resistance, obesity and CV disease. Uric acid as an independent predictor of CV disease or not is debated for years. It was proven that both renal vasoconstriction and various CV drugs and insulin were associated with reduced urate excretion, however, further studies showed that it was more accurate to regard hyperuricemia as a consequence of the existence of previously related CV risk factors, whereas, some studies showed that increased uric acid levels has beneficial effect

as antioxidant properties.² This controversy caused uric acid to be no longer regarded as a true CV risk factor.³

With increased knowledge of the uric acid role in cardiorenal disease,⁴ controversy is resurfacing. Studies have shown that uric acid concentrations predict the progression of chronic kidney disease, the development of stroke,⁵ and a recent meta-analysis reported that uric acid is associated with the presence of hypertension,⁶ diabetes,⁷ and metabolic syndrome.⁸ Relationship between coronary artery disease and uric acid, however, remains controversial. Another recent meta analyses studying the relationship between uric acid and CHD showed that serum uric acid levels are not likely to be a main determinant of CHD and may not contribute significantly to the prediction of CHD in the general population.^{9,10,11} There is conflicting information that serum uric acid is a prognostic marker of CV events and among patients with heart failure there is significant confirmation that elevated uric acid levels predict an increase in morbidity and mortality. The current study was conducted to determine the association of high serum uric acid level with acute coronary syndrome.

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SUBJECTS AND METHODS

This was a case control study, conducted from 1st January to 31st August, 2014, in Department of Cardiology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. A total of 367 study subjects, with 193 cases having acute coronary syndrome (ACS), diagnosed and labeled after thorough relevant investigation, such as ST elevation/ depression on ECG, positive cardiac biomarkers like troponin T, CKMB in Cardiology Department and 174 controls donot having acute coronary syndrome, selected from accompanying attendants, were included in study. The variables included in study were age, sex, BMI, hypertension, smoking, serum cholesterol, HDL, LDL, triglyceride, serum uric acid level and disease status of ACS. Serum uric acid >7mg/dl in males and >6mg/dl in female was taken as high. Patients of all ages and both sex were included in study. The subjects having any chronic disease like DM, renal or hepatic disease were excluded from study. Informed verbal consent was taken from all the cases and controls before including them in study and ethical approval from Institutional Review Board was sought. The numerical data was presented as mean and standard deviation, whereas, categorical data was presented as percentages. Chi square test was applied to determine the association of hyperuricemia with ACS. The data was entered and analyzed in SPSS version 16.

RESULTS

A total of 367 study subjects, with 193 patients having coronary heart disease and 174 controls donot having coronary heart disease, were included in study. The mean age of patients of ACS was 52±11 years, versus controls 47±15 years, 84% among patients of ACS versus 75% among control were male, BMI was 27±3 among patients of ACS versus 25±6 among control, HDL was 41.92±8mg/dl among patients of ACS versus 43±6mg/dl in controls, triglyceride was 172.68±98mg/dl among patients versus 168±78mg/dl in controls, LDL was 119±37mg/dl among patients versus 118±32mg/dl in controls, and serum uric acid was 6.1±1.2mg/dl among patients versus 5.1±0.3mg/dl in controls. (Table I).

Table I: Characteristics of patients of ACS and control in study subjects.

Serum uric acid level	Cases (CHD+ ve)	Control (CHD- ve)	Total
	High	72(37.3%)	
Normal	121(62.9%)	132(75.9%)	253(68.9%)
Total	193 (100%)	174 (100%)	367 (100%)

Table II: Hyperuricemia association with coronary heart disease

Variable	Cases(ACS patients)	Control	P value
Age (Years)	---	47±15	0.12
Males	84%	75%	0.2
Females	16%	25%	-
BMI	27±3	25±6	0.21
Hypertension	40%	24%	0.1
Smoker	38%	30%	0.1
Triglyceride (mg/dl)	172.68±98	168±78	0.19
HDL (mg/dl)	41.9±8	43±6	0.35
LDL (mg/dl)	119±37	118±32	0.4
Serum Uric Acid (mg/dl)	6.1±1.2	5.1±0.3	0.1
Hyperuricemia	37.3%	24.1%	0.00
STEMI	83%	-	-
Single Vessel Disease	57%	-	-
Double Vessels Disease	22%	-	-
Triple Vessels Disease	21%	-	-

It was noted that those who have ACS, 37.3% have high serum uric acid as compared to 24% among Non CHD subjects. (p value 0.00) This means that high serum uric acid level is significantly associated with CHD. (Table II)

DISCUSSION

In this analytical study, which was planned to find out the association of ACS with hypercemia, 193 patients (having ACS) and 174 controls (donot having ACS) were included. The base line characteristics of the cases and controls were almost comparable as for as age, sex, BMI, and lipid profile are concerned such as, mean age of patients of ACS was 52±11 years, versus controls 47±15 years, BMI was 27±3 among patients of versus 25±6 among control, HDL 41.92±8mg/dl in cases versus 43±6mg/dl in controls, triglyceride 172.68±98mg/dl in patients of ACS versus 168±78mg/dl in controls, however, serum uric acid was high (6.1±1.2mg/dl) among patients of ACS as compared to controls (5.1±0.3mg/dl). Raised serum uric acid concentrations are a powerful predictor of cardiovascular risk and poor outcome, although the underlying mechanism remains unclear. Several potential explanations have been put forward to explain the apparent association between hyperuricaemia and cardiovascular risk. Studies have demonstrated mechanisms by which uric acid could be directly injurious to the endothelium and to cardiovascular function.¹¹ Most epidemiological studies have shown a significant association between

serum uric acid and CV morbidity and mortality.^{12,13,14}

A previous study has labeled high serum uric acid levels as strong predictor of cardiovascular disease mortality in healthy middle-aged men, independent of variables commonly associated with gout or the metabolic syndrome.¹⁵ This is comparable to our finding in current study, where it was noted that those who have ACS, 37.3% have high serum uric acid as compared to 24% among Non CHD subjects, (p value 0.00) showing that high serum uric acid level is significantly associated with ACS.

Nonetheless, the debate cannot be complete since conflicting information has put forward that uric acid could be a prognostic marker of CV events including myocardial infarction, heart failure, stroke and death.¹⁶ In another study, serum uric acid (SUA) was not an independent predictor of cardiovascular disease and death in these high-risk overweight/obese people. There results suggested that SUA was an independent predictor of all cause mortality in women.¹⁷ These findings although differ from current study, may be due to other risk factors or even due to protective effects of serum uric acid. Recent evidence has emerged in parallel suggesting uric acid is an inflammatory factor that also plays a role in endothelial dysfunction. Thus, uric acid can induce proinflammatory changes in the adipocyte that are similar to those observed in the prediabetic subject.¹⁷ This favors our finding where high serum uric acid was found significantly associated with coronary heart disease, and endothelial dysfunction may be the underlying process.

CONCLUSION

This study showed that elevated serum uric acid level was statistically significantly associated with Acute Coronary Syndrome and it added more evidence to support that the risk of ACS is increased in subjects with hyperuricemia.

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