



RAISED SERUM URIC ACID LEVEL IN PATIENTS PRESENTING WITH ACUTE CORONARY SYNDROME AND ITS OUTCOME

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Submission Date : 20-11-2018
Revision Date: 26-12-2018
Publication Date: 10-10-2019

Author's Contribution

SI:Conducted the study and wrote the article. AMA:Helped in review the article. SN:Re-arranged data and corrected article.MKZ:Tables and figures. IK and MAI were corrections and did the proof reading.

All authors declare no conflict of interest.

This article may be cited as: Iqbal S, Akbar AM, Naseem S, Zafar MK, Kharal I, Imran MA. Raised serum uric acid level in patients presenting with acute coronary syndrome and its outcome. (J Cardiovasc Dis 2019;15(2):43 - 47)

ABSTRACT

OBJECTIVE:The increased concentration of serum uric acid may lead to endothelial dysfunction thereby leading to coronary artery disease. This study was performed to determine the frequency of increased serum uric acid level in patients of acute coronary syndrome (ACS) and its subsequent 30 days outcome.

MATERIAL AND METHODS:This was a descriptive case study, performed in Cardiology Department, Punjab Institute of Cardiology, Lahore from 30-06-2011 to 29-12-2011. A total of 350 patients were included in this study. Patients with raised uric acid level were followed prospectively during a median follow-up period of 30 days and were assessed for major adverse cardiovascular events, especially congestive heart failure (CHF), and percutaneous coronary intervention (PCI).

RESULTS: Mean age of the patients was 56.9 ± 7.4 years. Out of 350 patients, 284 patients (81.1%) were male and 66 patients (18.9%) were female. Raised uric acid level was seen in 180 patients (51.4%). Out of these 180 patients, 24 had congestive heart failure (13.3%) and 15 patients (8.3%) underwent percutaneous coronary intervention.

CONCLUSION: Hyperuricemia was observed in about half of the patients presenting with acute coronary syndrome and among those every 8th patient had congestive heart failure and every 12th patient underwent percutaneous coronary intervention.

KEYWORDS: Raised serum uric acid level, (ACS) acute coronary syndrome, Congestive heart failure.

(J Cardiovasc Dis 2019;15(2):43 - 47)



INTRODUCTION

There are many important risk factors for the increased prevalence of cardiovascular disease.¹ The patients presenting with ischemic heart disease and increased serum uric levels are predisposed to poor outcomes. It is known that SUA levels are influenced by renal function². The increase in the level of uric acid may be secondary to increased activity of xanthine oxidase which leads to increased metabolism of purine. Increased serum uric acid level is linked with endothelial dysfunction, Ischemic heart disease and glucose intolerance³, which leads to development of atherosclerosis.⁴ Other common risk factors for ischemic heart disease include diabetes, hypertension, obesity, metabolic syndrome.^{5,6}

Young patients defined as age less than 35 years who present with myocardial infarction may have raised serum uric acid level.⁷ Bae et al³ included in his study the patients with CAD who had uric acid level in lowest quartile i.e. < 3.88 mg/dL and those having uric acid levels in highest quartile i.e. >5.74 mg/dL and it was noticed that patients having uric acid in highest quartile were predisposed to increased major adverse cardiovascular events (MACE) i.e. increased from 7.2% to 20.1%. It was shown that there is increased risk of acute myocardial infarction (0.6% vs 2.5%), stroke (3.0% vs 2.5%), coronary artery bypass surgery (0% vs 1.3%), percutaneous coronary intervention (0% vs 5.7%), congestive heart failure (3.0% vs 8.8%) and sudden cardiac death (0.6% vs 1.3%).⁷ Sarma P et al⁸ reported that in 222 patient with MI, 68.5% had serum UA >6 mg/dl and 31.5% had normal serum UA.

Navaneethan et al documented increased frequency coronary artery diseases in patients with ACS and it reported between 4 to 7% while other cardiovascular complications were also common in subjects with high serum uric level.⁹

This study helped to determine increased serum uric acid level as an important risk factor of ischemic heart disease, like other risk factors of IHD i.e. hypertension, diabetes mellitus, smoking and hyperlipidemia. This study was performed to determine the frequency of raised serum uric acid level in patients of acute coronary syndrome and to determine the outcome of patients presenting with ACS and raised uric acid level.

DATA COLLECTION AND ANALYSIS:

This was a descriptive case series which was performed at Cardiology Department of PIC, Lahore, over a period of six months from 30-06-2011

to 29-12-2011. Sample size of 350 patients was calculated with confidence level of 95%, error margin of 2.5% and taking predictable percentage of percutaneous coronary intervention i.e 5.7% (least among all) in patients with ACS and increased serum uric acid level. Non-probability purposive sampling was done. A total of 350 patients of ACS, admitted in CCU of PIC, Lahore were included in study after fulfilling the inclusion criteria (Age 30-70 years, both genders and patients of acute coronary syndrome).

The exclusion criteria was patients with renal failure (serum creatinine > 3mg/dL), on haemodialysis, hypothyroidism (TSH level >20mU/L), hypertension (B.P > 140/90mmHg), already on anti-hypertensive medication, diabetes mellitus (defined as random blood sugar level of >200mg/dL), already using anti-diabetes treatment, myeloproliferative disorders i.e. polycythemia vera increased hematocrit >54% in male and >51% in female, lymphoproliferate disorders, like acute leukemias which is a combination of pancytopenia with circulating blast cells and chronic leukemias usually have elevated WBC count of >20,000/UL, with premature cells on peripheral picture, alcohol abuse, pregnant females, patients already on chemotherapy. Informed consent was taken from all patients as a part of ethical concern. Variables like age, gender, uric acid level, major adverse cardiovascular events, like CHF and PCI were recorded on specially designed proforma. Serum uric acid level was determined by Enzymatic colorimetric test done in pathology laboratory of the institute.

Those patients with raised uric acid level were followed prospectively during a follow-up period of 30 days and assessed for major adverse cardiovascular events, especially congestive heart failure (CHF), and percutaneous coronary intervention (PCI). The information was recorded using a specific proforma.

Raised serum uric acid level was taken as > 6 mg/dL in females > 7 mg/dL in males. Congestive Heart Failure was defined as patients with impaired function of left ventricle and ejection fraction of less than 50%. PCI was performed using a radial or femoral artery approach and narrowing in coronary artery was corrected by deploying a metallic stent. It included patients who had anginal symptoms despite the medical treatment diagnosed by ECG changes and raised enzymes (CPK > 195 u/l, CKMB > 24 u/l, Trop-T >100pg/ml).

DATA ANALYSIS:

SSPS version 16.0 was used to enter and ana-



lyze the data. The variables like age and serum uric acid level were presented by calculating mean and standard deviation. Frequency and percentages were calculated for gender and patients with raised serum uric acid level, those with congestive heart failure and percutaneous coronary intervention.

RESULTS:

A total of 350 patients were studied. Mean age of the patients was 56.9 ± 7.4 years (Table-1). According to age distribution, 57 patients (16.3%) were between 30-40 years, 105 patients (30.0%) were between 41-50 years, 120 patients (34.3%) were 51-60 years old while 68 patients (19.4%) were 61-70 years of age. Out of 350 patients, 284 patients (81.1 %) were male and 66 patients (18.9%) were female (Table-2). Raised uric acid level was seen in 180 patients (51.4%). Out of these 180 patients, 24 had congestive heart failure (13.3%) and 15 patients (8.3%) had percutaneous coronary intervention (Table 3 & 4).

Table 1: Age Distribution

Age (year)	Numeral	Percentage(%)
30-40	57	16.3
41-50	105	30.0
51-60	120	34.3
61-70	68	19.4
Total	350	100.0
Mean ± SD	56.9 ± 7.4	

Table 2: Gender Distribution

Gender	Numeral	Percentage(%)
Male	284	81.1
Female	66	18.9
Total	350	100.0

Table 3: Raised Uric Acid Level Distribution

Raised uric acid level	Numeral	Percentage (%)
Yes	180	51.4
No	170	48.6
Total	350	100.0

Table 4: Distribution outcome n= 180 (raised uric acid level)

Out come	Numeral	Percentage(%)
Congestive heart failure	24	13.3
Percutaneous coronary intervention	15	08.3

DISCUSSION:

We found that nearly half of the patients presenting with acute coronary syndrome had raised levels of uric acid. There are many causes for raised levels of serum uric acid. The most common causes, includes increased intake of products which include purines, increased manufacturing of uric

acid and decreased excretion. Transient elevation of serum uric acid level may be secondary to excessive exercise, alcohol consumptions or increased dietary intake of purine products.¹⁰

The increase in serum uric acid level is linked with increased activity of xanthine oxidase which is responsible of production of oxygen free radicals¹. The elevated oxidative stress can lead to abnormal function of endothelium of myocardial blood vessels which precipitates dysfunction of myocardium⁴. Oxidative stress is responsible for the decomposition of nitric oxide which can modify the Frank-Starling phenomena of myocardium which lead to decreased cardiac function secondary to hyperuricemia.

Recent research data has shown that serum uric acid may be a risk for mortality of patients with CAD and there is a link between serum uric acid and subsequent cardiovascular diseases.^{11,12} High uric acid level is associated with endothelial dysfunction and resistance of insulin that may lead to the cardiovascular diseases.¹³ These observations were not noticed in the Framingham heart study.¹⁰

Taken together, it is still not clear that hyperuricemia is associated with CAD, although previous statistical data suggested that there is a powerful correlation of CAD with hyperuricemia¹⁴. The results of our data showed the raised serum uric acid level in patients with ACS in 180 patients (51.4%) and this was comparable with the previous studies^{11,14}.

In an another study which included middle-aged healthy males, it was shown that the serum uric acid level was an important risk factor for CVD diseases during 12 years of follow-up. It was concluded that uric acid was a strong indicator of mortality¹⁰.

Traditionally CAD has been labeled as a disease of males and females have not been included in surveillance of cardiovascular research programs.

Gertlen et al¹⁵ incorporated the SUA level in their CUP ratio: K equals cholesterol level (mg/dl) multiplied by SAU level (mg/dl) and divided by phospholipid level (mg/dl). This ratio may be used in evaluating the predisposition to CAD and it was observed that higher the serum UA level, the higher is the chance of the CAD.¹⁶

Trasak AM et al reported in a study of 21 years. 28,613 elderly women with elevated Serum UA was associated with increased risk of CVD¹⁷. Gur et al reported that increased uric acid level was linked with the presence of CAD but it cannot predict the severity of the CAD¹⁸.



In the MONICA Augsburg study, which evaluated 1044 male patients and it was reported that the higher uric acid level is linked to increased morbidity secondary to cardiovascular disease, and elevated serum uric acid level is a risk factor for mortality due to cardiovascular disease.¹⁹

Raised serum uric acid level was noticed to be associated with high rate of fatal or non-fatal MI. In another study by Niskanen et al¹⁰, it was shown that raised serum uric acid level resulted in two and half fold elevated risk of mortality due to cardiac disease. The National Health and Nutrition Examination Survey have indicated that mortality due to cardiovascular disease increases 2-3 fold in patients with uric acid levels in the up-

per quartile²⁰. The increase of uric acid levels in patients with CVD may be a result of the presence of others diseases like decreased GFR, use of diuretics, tissue ischaemia, oxidative stress or renal vasoconstriction^{21,22}.

In an another study by Culleton et al²³, that was carried out on 6763 individuals from the Framingham heart study, it was concluded that high uric acid level have no etiological role for CAD; it is, however, associated with certain other risk factors of CAD.

To conclude, hyperuricemia is quite common (about 50%) among patients presenting with acute coronary syndrome and these patients may be more prone to suffer congestive heart failure and undergo percutaneous coronary intervention.

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