Section: General Medicine

Original Research Article

TO STUDY SERUM URIC ACID LEVEL IN ST ELEVATED MYOCARDIAL INFARCTION AND ITS CORRELATE ION WITH AGE, BMI AND TRIGLYCERIDE LEVELS AMONG PATIENTS ATTENDING CARDIOLOGY DEPARTMENT OF TERTIARY HEALTH CARE CENTER

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ABSTRACT

Background: Cardiovascular diseases (CVD) have been the leading cause of morbidity and mortality in India. Recent trends indicate that this group of diseases has escalated to younger age groups also. In India, cardiovascular diseases are significantly increasing in males and females in both urban and rural population. Aim is to study serum uric acid level in ST elevated myocardial infarction and its correlation with age, BMI and triglyceride levels among patients. The objective is to study the association between levels of Uric acid and mortality among the study population. To determine the serum uric acid level on admission and Killip's class status on Acute Myocardial Infarction. To study the association between serum uric acid with age, BMI and triglyceride levels.

Materials and Methods: Comparative study was conducted in the Department of Medicine and Department of Cardiology of Hindu Rao Hospital, delhi. Study include 100 patients of Acute Myocardial Infarction of which patient who will have a normal Uric acid level will be taken as a control and the rest who will have elevated Uric acid level will be taken as study population. In both groups the complications and short term outcome will be compare. Hyperuricemia and mortality the proportion of hyperuricemics in the study population was 59%. Out of the 8 patients who succumbed to death following an acute myocardial infarction, all of them were hyperuricemic at presentation. This establishes a strong significant association between elevated serum uric acid levels and mortality rates in acute coronary syndrome.

Results: In our study out of 100 STEMI patients 70 male and 30 female patients with a mean age of 54.85 ± 12.78years. 90% of patients had hypertriglyceridemia. 51% had elevated serum uric acid (>7.0 mg/dl); Mean serum uric acid level 7.15±2.38 Overall in-hospital mortality was 8%; they had serum uric acid level >7mg/dl (p=0.02).

Conclusion: Serum uric acid levels are elevated in patients with acute myocardial infarction. There is a strong correlation between serum uric acid levels at the time of admission and in-hospital and short-term mortality in patients with acute myocardial infarction. Patients with elevated SUA levels had higher Killip class in STEMI and higher mortality rates and Major adverse cardiovascular outcomes. Patients with elevated Troponin T had higher mortality. Elevated serum uric acid had positive correlation with systemic hypertension and smoking. Patients with elevated serum uric acid had lower ejection fraction during echocardiographic study Uric acid may be considered as a reliable, noninvasive easily available and cheap independent prognostic marker in predicting the severity of myocardial infarction along with short term outcome.

Keywords: Serum uric acid, ST Elevation, Myocardial infarction.

INTRODUCTION

Cardiovascular diseases (CVD) have been the leading cause of morbidity and mortality in India. Recent trends indicate that this group of diseases has escalated to younger age groups also. In India, cardiovascular diseases are significantly increasing in males and females in both urban and rural population.[1] Following myocardial infarction (MI) some proteins and enzymes labeled as cardiac markers (CPK, MB/ Troponin T & I) are released in to the blood in large quantity from necrotic heart muscle. These markers viz. CPK-MB, Troponin-T, Troponin-I and myoglobin, have specific temporal profile in relation to MI; however, they do not correlate with myocardial function. Epidemiological studies have recently shown that uric acid may be a risk factor for cardiovascular diseases and a negative prognostic marker for mortality in subjects with pre-existing heart failure. Elevated serum uric acid is highly predictive of mortality in patients with heart failure or coronary artery disease and of cardiovascular events in patients.[2] There is evidence that high uric acid is a negative prognostic factor in patients with mild to severe heart failure,[3] although the development of hyperuricaemia is almost always associated with worsening of renal failure in these patients.[4] Therefore, it is difficult to dissect the roles played by reduced renal function and high uric acid in affecting prognosis of these patients. Some evidences suggest that uric acid may exert a negative effect on cardiovascular disease by stimulating inflammation, which is clearly involved in the pathogenesis of cardiovascular disease.[5,6] There is uncertainty whether uric acid level could be used as a prognostic marker in acute ST elevation myocardial infarction (STEMI) patients. Furthermore, there is a need to find a simple, less expensive but accurate marker that could be use in rural areas where fibrinolytic treatment is the first choice of acute reperfusion therapy. We studied the association of uric acid levels on cardiovascular event in patients with STEMI receiving fibrinolytic treatment.

AIM: To study serum uric acid level in ST elevated myocardial infarction and its correlation with age, BMI and triglyceride levels among patients.

Objectives

1. To study the association between levels of Uric acid and mortality among the study population.
2. To determine the serum uric acid level on admission and Killip's class status on Acute Myocardial Infarction.
3. To study the association between serum uric acid with age, BMI and triglyceride levels.

MATERIALS AND METHODS

This study was conduct in the Department of Medicine and Department of Cardiology of Hindu Rao Hospital, delhi from the year 2016 to 2019. This study is a comparative study. This study had 100 patients of Acute Myocardial Infarction of which patient who had normal Uric acid level were taken as a control and the rest who had elevated Uric acid level were taken as study population. In both groups the complications and short term outcome were compare. Sample size was calculate using the formula N=Z2P*Q/L2.

Considering the prevalence of hyperuricemia as 24% according to Surya dharma et al, with the 95% of confidence interval Z=1.96, allowable error as 9%. sample size was attained was 87% which was rounded to N=100. The population then divided into 2 group one with hypercupremia and other without hyperuricemia.

Methods using URICASE, the enzyme that catalyzes the oxidation of uric acid to allantoin are most specific.[7] The simplest of these methods measures the differential absorption of uric acid and allantoin at 293 nm.[8] The difference in absorbance before and after incubation with URICASE is proportional to the uric acid concentration. This method has been proposed as candidate reference method.[9] This method will done in our study.

All the patients will be follow up for a period of 7 days. During follow up any changes in killip's classification, features of Cardiac patients. Routine daily physical examination will be done. ECG's will be taken daily and additional investigations carry out if necessary. Patients will be discharged on 8th day if they will be stable otherwise their hospital stay will be prolonged.

Inclusion Criteria

Patients with a diagnosis of Acute ST Elevation Myocardial Infarct. A definite diagnosis of Acute ST Elevation Myocardial Infarction will be made if the patients satisfies the following criteria:

1. A History of typical retrosternal compressive chest pain lasting for more than 30 minutes, not relieved by rest or nitrates.
2. Typical ECG changes of Acute ST Elevation Myocardial Infarction (ST,T changes in two contiguous leads).
3. Elevated enzymes (CPK-MB or TROPONIN-T or both).

Exclusion Criteria

1. Patients with elevated renal parameters.
2. Patients with Gout.
3. Patients with History of chronic alcoholism.
4. Patients with previous History of Ischemic Heart Disease and on Aspirin therapy.
5. Patients on Diuretic theraphy. Above patients will be excludes because the coexisting disease or drug therapy might itself produce a high Uric acid level.
6. Very late presentations of patients more than 72 hours.

RESULTS

Present study was conducted among N=100 Patients. The average age of the study group was 54.85 years.

31% of the patients belonged to the age group between 51 to 60 years. The age of the subjects ranged from as low as 27 years to as high as 89 years. Among total study male constituted 70% of the population and 30% constituted by female. Mortality was reported among N=8(8%) patients admitted with ST elevate MI with raised serum uric acid compared to patients with normal serum uric acid. BMI <25 Constituted by 96% of the population and > 25 Constituted by 4% of the population.

Table 1: Association between the Various variables among study groups

Age	Normal uric acid among ST elevated MI patients	Raised uric acid ST elevated MI patients	P value
<40	6	5	0.109(non significant)
41-50	15	12	
51-60	13	18	
61-70	5	17	
>71	2	7	
Total	41	59	
Gender	Normal uric acid among ST elevated MI patients	Raised uric acid ST elevated MI patients	P value 0.143(non significant)
Female	9	21	
Male	32	38	
Mortality Yes	0	8	0.020(significant)
No	41	51	
Kllip's 1.00	34	7	<0.0001(significant)
2.00	6	24	
3.00	1	22	
4.00	0	6	
Triglycerides Abnormal	34	56	0.086 non significant)
Normal	7	3	
Ejection fraction(EF)	MORTALITY(-)	MORTALITY(+)	0.055(significant)
<45	61	8	
>45	31	0	
CK-MB <25	8	0	1.000 non significant)
>25	84	8	
BMI	Normal uric acid	Raised uric acid	1.000 non significant)
<25	39	57	
>25	2	2	

DISCUSSION

The average age of study population in the present study was 54.85years, reflecting the statement that AMI occurs 5-10 years earlier then western world. This study included 70% males and 30% females. Male predominance was observed in all the age subgroups included in the study. Our study showed no significant association between gender and mortality. Similarly there is no significant association between elevated uric acid levels and male gender, though the mean uric acid levels were higher in males compared to females. This is in accordance with the studies done by Nadkar et al.[10]

Hyperuricemia and mortality

The proportion of hyperuricemics in the study population was 59%. Out of the 8 patients who succumbed to death following an acute myocardial infarction, all of them were hyperuricemic at presentation. This establishes a strong significant association between elevated serum uric acid levels and mortality rates in acute coronary syndrome. According to Vladimir Trkulja et al,[11] higher serum uric acid on admission was independently associated with thirty day mortality.

Uric acid and ejection fraction

LV dysfunction is an important prognostic indicator in myocardial infarction. In our study, there exists an inverse relation between serum uric acid levels and ejection fraction. 69 subjects in the study population had ejection fraction <45%, all of whom had serum uric acid> 9mg/dl. 66.67% of the subjects that expired during the study period were included in this subgroup. This is further proof that serum uric acid can be used to predict mortality and severity of left ventricular dysfunction and heart failure. This is supported by the study done by Li Chen et al.[12]

Uric acid and killip class

The mean serum uric acid level has a linear relation with killip class, indicating that serum uric acid levels correlate with the severity of myocardial infarction as assessed by killip classification. 59 patients in the study group had uric acid levels more than 7mg/dl and 47.46 % belonged to killip classes 3 and 4. This is a significant association. Similar results were brought out by Li Chen et al.[12] in their studies, thereby highlighting the prognostic significance of uric acid in myocardial infarction. Mortality in this study was 8% and all the subjects had serum uric acid >7mg/dl. Nadkar et al10 reported hyperuricemia in

100% of the deaths that occurred in their study. SUA levels > 7mg/dl was the strongest independent predictor of mortality according to Dharma et al.[13]

Uric acid and dyslipidemia

In this study, SUA levels were correlated positively with serum TG levels (P=0.196). Epidemiologic studies have shown that SUA level is affected by many factors, and it is closely related to the metabolism of lipids. The mechanism of the close relationship between SUA level and lipid metabolism has not been understood completely. Studies done by Li Chen et al,[12] showed a positive correlation between triglyceride level and hyperuricemia4. The proportion of hyperuricemics in the dyslipidemic subgroup was 63.6%.

Serum uric acid with CK-MB

Statistically significant increase in the levels of serum uric acid ($P < 0.001$) and a highly positive correlation between Serum Uric acid and CKMB levels among cases was observed in our study. Our study is in accordance with the study done by Nadkar et a1,[10] who found significant increase in the serum uric acid levels in patients with MI and stated that it was a good predictor of mortality in those patients. Sokhanvar S et al,[14] concluded that there was a meaningful relation between hyperuricaemia and MI wherein serum uric acid behaved as an independent variable and had no relationship with other risk factors.

CONCLUSION

Serum uric acid levels are elevated in patients with acute myocardial infarction.

There is a strong correlation between serum uric acid levels at the time of admission and in-hospital and short-term mortality in patients with acute myocardial infarction. Patients with elevated SUA levels had higher Killip class in STEMI and higher mortality rates and Major adverse cardiovascular outcomes.

Patients with elevated Troponin T had higher mortality.

Elevated serum uric acid had positive correlation with systemic hypertension and smoking.

Patients with elevated serum uric acid had lower ejection fraction during echocardiographic study

Uric acid may be considered as a reliable, noninvasive easily available and cheap independent prognostic marker in predicting the severity of myocardial infarction along with short term outcome.

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