



RELATIONSHIP BETWEEN SERUM URIC ACID LEVEL AND CLINICAL SEVERITY OF ACUTE MYOCARDIAL INFARCTION

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ABSTRACT

Acute myocardial infarction (AMI) is one of the leading causes of mortality and morbidity globally. Certain markers have been evaluated which indicate unfavorable prognosis in AMI. Uric acid is one such marker that has been evaluated to assess the prognosis in patients with AMI. However, data on the prognostic implication of serum uric acid on outcome in AMI is limited especially from India. With this background the present study was undertaken in hospital to determine the role of serum uric acid levels in predicting outcome in AMI. **METHODS:** This is an observational study conducted on 75 patients admitted in cardiology, medicine wards and ICU in Geetanjali medical college & hospital with AMI. **RESULTS-** Mean serum uric acid for discharged patients was 5.54 ± 1.36 mg/dl and it was 6.45 ± 0.62 mg/dl for the patients who died in the hospital. Serum uric acid levels were significantly higher in the patients who succumbed as compared to those who were discharged from the hospital ($p = 0.003$). **CONCLUSION-** There is a substantial link between serum uric acid levels at the time of admission and short-term mortality in patients with acute myocardial infarction. Thus, in this study we found that serum Uric acid can be considered a reliable, non-invasive, easily accessible, and inexpensive independent prognostic marker for predicting the severity of myocardial infarction with a short-term outcome.

KEYWORDS : Acute myocardial infarction, Uric acid, prognostic marker.

INTRODUCTION

Acute myocardial infarction (AMI) is one of the leading causes of mortality and morbidity globally. Certain markers have been evaluated which indicate unfavourable prognosis in AMI. Uric acid is one such marker that has been evaluated to assess the prognosis in patients with AMI. Previous studies have reported positive associations of increased serum uric acid levels with a greater risk of ischemic heart disease, higher blood pressure, and an overall adverse cardiovascular risk profile.

Adenosine which is synthesized locally by vascular smooth muscle in cardiac tissue, is rapidly degraded by the endothelium to uric acid, which undergoes rapid efflux to the vascular lumen due to low intracellular pH and negative membrane potential. Xanthine oxidase and uric acid synthesis are increased in vivo under ischemic conditions, and therefore elevated serum uric acid may act as a marker of underlying tissue ischemia. The mechanism by which UA may play a pathogenetic role in cardiac disease is unclear, hyperuricemia is associated with deleterious effects on endothelial dysfunction, oxidative metabolism, platelet adhesiveness, haemorrheology and aggregation.

The role of serum uric acid (UA) in the development of cardiovascular disease has been debated for over 50 years. Several large studies have provided conflicting results regarding the clinical significance of elevated serum uric acid levels in cardiovascular or cerebrovascular diseases. Many studies including the National Health and Nutrition Examination Survey (NHANES) study concluded that uric acid is an independent risk factor for development of cardiovascular and cerebrovascular diseases. In contrast the Framingham Heart study concluded that an association between hyperuricemia and cardiovascular diseases merely reflects the link between serum uric acid and other risk factors, including hypertension, renal disease, elevated lipoprotein levels and the use of diuretics.

Multiple molecules have been studied and used as prognostic predictors in Acute Myocardial Infarction. Purine metabolism results in the production of Uric Acid. Serum levels of uric acid is influenced by multiple factors like production and elimination rates, race, demography, diet, habituations, organ failure and medications. On the molecular level, uric

acid acts as an antioxidant, and can result in the dysfunction of endothelial cells, proliferation of vascular smooth muscles and aggregation of platelets on vessel walls resulting in micro inflammation and tubulo-interstitial inflammation. Increased serum uric acid has been associated with increased incidence of metabolic syndrome, chronic kidney diseases, diabetes mellitus and cerebro-vascular accidents, proving uric acid as an important secondary marker of cardiovascular disease on the basis of pathophysiological and etiological processes, according to some researchers. Another important factor supporting the use of Uric acid as a prognostic indicator of Myocardial infarction is that it is cheap to be tested. Keeping all this in mind and the idea that uric acid can be used as an important yet independent prognostic predictor for worse outcomes, it would be helpful for earlier and accurate assessment of Acute Myocardial Infarction going in for deterioration and for implementation of more effective and timely therapeutic strategies.

There is strong & significant association between borderline serum uric acid levels & risk of both coronary heart disease & stroke. Hyperuricemia has been associated with elevated circulating endothelin level and one of the major sites for production of uric acid in cardiovascular system is the vessel wall and particularly endothelium. It is supposed that UA may have a role in atherosclerotic process directly or indirectly because atherosclerotic plaque contains more uric acid than control arteries. Hyperuricemia via purine metabolism may also promote thrombus formation.

The relation between UA and cardiac disease is observed not only with frank hyperuricemia (defined as more than 6mg/dl in women & more than 7 mg/dl in men) but also with uric acid levels considered to be normal but at high range.

Various mechanisms have been postulated for the deleterious effects of hyperuricemia with adverse cardiovascular outcomes, which includes endothelial dysfunction, oxidative metabolism, platelet adhesiveness and aggregation, intracellular stress and inflammation leading to endothelial injury and enhancement of vasoconstrictor effects. Out of the various prognostic markers for AMI, like brain natriuretic peptides, C-reactive protein, cell free DNA levels, serum uric acid level is relatively cheap and easily available. However, data on the prognostic implication of serum uric acid on

outcome in AMI is limited especially from India. With this background the present study was undertaken in hospital to determine the role of serum uric acid levels in predicting outcome in AMI.

AIM

To determine the relationship of serum uric acid levels in predicting outcome in AMI (STEMI& NSTEMI) .

OBJECTIVES

To study the relationship between serum uric acid levels and clinical severity of Acute myocardial Infarction.

CASE STUDY

This study was conducted to study the role of serum uric acid in acute MI and its effect on outcome. A total of 75 patients of acute MI and were enrolled in the study. Detailed history and thorough physical examination along with detailed clinical examination was done and classify according to killip's classification. The result was statistically performed.

RESULT

Table 1 : Relation Between Serum Uric Acid And Mi Outcome

| Outcome (n=75) | Discharge (n=69) | Death (n=6) | P value |
|----------------|------------------|-------------|-----------|
| Mean | 5.54 | 6.45 | 0.003 (S) |
| SD | 1.36 | 0.62 | |

Mean SUA for discharged patients was 5.54 ± 1.36 mg/dl and it was 6.45 ± 0.62 mg/dl for the patients who died in the hospital. SUA levels were significantly higher in the patients who succumbed as compared to those who were discharged from the hospital ($p = 0.003$).

Table 2: Distribution Of Cases According To Type Of Mi.

| Type of MI | | | CASES |
|--------------|--------|----|--------|
| STEMI (n=58) | AWMI | 34 | 45.33% |
| | IWMI | 24 | 32.00% |
| | NSTEMI | 17 | 22.67% |
| | TOTAL | 75 | 100% |

In the present study out of 75 cases, 58 cases were ST-elevation myocardial infarction (STEMI) whereas 17 cases were non-ST elevation myocardial infarction (NSTEMI). Out of 58 cases of STEMI, 34 cases were anterior wall MI (AWMI) and 24 cases were inferior wall MI (IWMI).

Table 3: Cross Tabulation Between Serum Uric Acid And Killips Class On Day Of Admission

| KILLIP'S CLASS | Serum uric acid level | | | | TOTAL |
|----------------|-----------------------|---------|-------|----|-------|
| | <4.1 | 4.1-5.5 | 5.5-7 | >7 | |
| 1 | 2 | 12 | 19 | 1 | 34 |
| 2 | 0 | 3 | 4 | 19 | 26 |
| 3 | 0 | 0 | 0 | 10 | 10 |
| 4 | 0 | 0 | 0 | 5 | 5 |
| TOTAL | 2 | 15 | 23 | 35 | 75 |

On applying chi-square test, p value significant (<0.05). As p value is significant, so there is association between serum uric acid concentration and Killip's class on day of admission. serum uric acid levels are higher in patients who are in higher Killip's class.

Conclusions

We can say that there is a substantial link between serum uric acid levels at the time of admission and short-term mortality in patients with acute myocardial infarction. Patients with higher Serum Uric Acid levels had higher mortality rates. Serum uric acid level showed linear relationship with Killip's classification. Thus, in this study we found that serum Uric acid can be considered a reliable, non-invasive, easily accessible, and inexpensive independent prognostic marker for predicting the severity of myocardial infarction with a

short-term outcome.

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