Prognostic Role of Serum Uric Acid in Acute Myocardial Infarction- A Prospective Study

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ABSTRACT

Introduction: Globally, acute myocardial infarction (AMI) is one of the important cause of mortality especially > 40 years age group. Aim of present study is to compare Serum uric acid levels with KILLIP classification in predicting outcome, to evaluate uric acid levels in patients having myocardial infarction and to assess patients presenting in casualty as per KILLIP's classification.

Material and methods: Present study is prospective study comprise of a total of 80 acute Myocardial Infarction patients. These patients were diagnosed by ECG or via Cardiac biomarkers.

Results: About half of patients (55.0%) belong to the age group of 40-60 years age group and male (81.25%) outnumbered female patients (18.75%) with ratio of 4.33:1. 56.25% patients have the history of smoking. Majority of patients (58.75%) were in KILLIP class I Mortality was higher in class III and class IV (42.85% & 40.0% respectively) in comparison of class I and class II (10.63% & 14.28% respectively). In KILLIP class III and IV, abnormal uric acid was found in 42.85% and 80.0% patients respectively. Mortality was higher among abnormal uric acid at both Day 1 and Day 4.

Conclusion: Our study concludes that there was statistically significant association between KILLIP class and outcome (p value=0.01). There was statistically significant association between KILLIP class and outcome (p value=0.002). The association between outcome and uric acid levels at day 1 and day 4 were statistically significant (p=0.0001).

Keywords: KILLIP Class, Uric Acid, Predicting Outcome, Myocardial Infarction.

INTRODUCTION

Globally, acute myocardial infarction (AMI) is one of the important cause of mortality especially > 40 years age group. It is well known fact that high uric acid levels are associated with hypertension. Some biomarker like serum uric acid has unfavorable prognosis in patients with acute myocardial infarction.

Uric acid is final product of purine metabolism produced by the enzymatic activity of xanthine oxidase. Xanthine oxidase produces various oxidants having role in cardiovascular disease. Wasserman A et al.[1] found role of serum uric acid as prognostic significance or as a risk factor for cardiovascular disease controversial. Uric acid could be a marker of adverse prognosis in patients with acute myocardial infarction but various studies have showed no significant relation between serum uric acid level and mortality rate in patients suffering from AMI.[2-3]

Wasserman A et al.[1] observed that uric acid can cause intracellular stress and inflammation resulting in endothelial injury and enhancement of vasoconstrictor effects.

The KILLIP classification[4]: Used in patients suffering from an acute myocardial infarction and heart failure. It considers physical examination and development of heart failure in order to predict and stratify their risk of mortality. Patients were ranked by KILLIP class in the following way:

KILLIP CLASS I: Includes individuals with no signs of congestive heart failure.

KILLIP CLASS II: Presence of an S3 and/or lung rales.

KILLIP CLASS III: Pulmonary edema.

KILLIP class IV: Cardiogenic shock.

Several studies have shown that worsening KILLIP class has been found to be independently associated with increasing mortality in AMI patients. Aim of present study is to compare Serum uric acid levels with KILLIP classification in predicting outcome, to evaluate uric acid levels in patients having myocardial infarction and to assess patients presenting in casualty as per KILLIP's classification.

MATERIAL AND METHODS

The present study was conducted in the department of Medicine in a tertiary care hospital of Lucknow City from February 2018 to March 2019. A total number of 80 patients of Acute Myocardial Infarction admitted in department of Medicine during the study period were taken. Informed consent from patients and approval from Institutional Ethics Committee was taken prior to study.

Inclusion criteria:

1. Age ≥18 years
2. All the patients of Acute Myocardial Infarction admitted within 7 days of presentation.
3. Both ST segment elevation myocardial infarction (STEMI) and Non-ST segment elevation myocardial infarction (NSTEMI).

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Exclusion criteria:

1. Any patient with the history of medical illness known to increase uric acid level like Gout, Chronic Renal failure, Malignancy, Repeated blood transfusion etc.
2. Patient with history of intake of- Hyperuricemic drug (Thiazide, Salicylate, Ethambutol, Pyrazinamide, Allopurinol).
3. Impaired renal function (serum creatinine >2mg/dL).
4. Had an episode of MI within 3 months.

All participants were screened with 12 lead ECG & Trop-T test was conducted. Detailed past history of all participants was done. Serum uric acid level >6 mg/dl in women and >7 mg/dl in men is defined as Hyperuricemia. Serum uric acid levels of all patients were measured with fully automated biochemistry analyser machine by uricase peroxidase colorimetric method on the day of admission and on the 4th day of hospitalization. KILLIP class III and KILLIP class IV was considered as advanced heart failure. Cardiovascular death was defined as death due to acute myocardial infarction (AMI), heart failure or arrhythmia.

S.No.	Parameter	No of cases (%)
1	Age group in years	
	<40 years	11 (13.75%)
	40-60 years	44 (55.0%)
	>60 years	25 (31.25%)
2	Gender	
	Male	65 (81.25%)
	Female	15 (18.75%)
3	History of Smoking	
	Smoker	45 (56.25%)
	Non-smoker	35 (43.75%)
4	History of Tobacco chewing	
	Present	18 (22.50%)
	Absent	62 (77.50%)

Table-1: Demographic profile of cases in present study

RESULT

Present study was conducted in the Department of Medicine in a tertiary care hospital of Lucknow city on 80 patients diagnosed as acute myocardial infarction. These patients were diagnosed by ECG or via cardiac biomarkers.

Table 1 shows demographic profile of cases in present study. About half of patients (55.0%) belong to the age group of 40-60 years followed by 31.25% patients of >60 years and 13.75% patients <40 years. In present study, male (81.25%) outnumbered female patients (18.75%) with ratio of 4.33:1. Chest pain was most common clinical presentation (91.25%). 45 patients (56.25%) have the history of smoking while 18 patients (22.50%) having history of tobacco chewing. 20 patients (25.0%) had the history of both tobacco chewing and smoking.

Table 2 shows correlation of outcome with KILLIP classification. Majority of patients (58.75%) were in KILLIP

KILLIP classification	No. of patients (%)	Outcome				p-value
		Expired		Discharged		
		No.	%	No.	%	
I	47 (58.75%)	5	10.63%	42	89.36%	0.01
II	21 (26.25%)	3	14.28%	18	85.71%	
III	7 (8.75%)	3	42.85%	4	57.14%	
IV	5 (6.25%)	2	40.0%	3	60.0%	

Table-2: Correlation of outcome with KILLIP classification

KILLIP classification	No. of patients (%)	Uric acid				p-value
		Abnormal		Normal		
		No.	%	No.	%	
I	47 (58.75%)	11	23.40%	36	76.59%	0.002
II	21 (26.25%)	6	28.57%	15	71.42%	
III	7 (8.75%)	3	42.85%	4	57.14%	
IV	5 (6.25%)	4	80.0%	1	20.0%	

Table-3: Correlation of KILLIP class with Uric Acid at Day 4

Uric Acid	No. of patients (%)	Outcome				P value
		Expired		Discharged		
		No.	%	No.	%	
DAY 1						
Abnormal	26 (32.50%)	12	46.15%	14	53.85%	0.0001
Normal	54 (67.50%)	3	5.56%	51	94.44%	
DAY 4						
Abnormal	24 (30.0%)	10	41.67%	14	58.33%	0.0001
Normal	56 (70.0%)	4	7.14%	52	92.86%	

Table-4: Correlation of outcome with Uric Acid

class I followed by 26.25% patients belong to KILLIP II class. Mortality was higher in class III and class IV (42.85% & 40.0% respectively) in comparison of class I and class II (10.63% & 14.28% respectively). There was statistically significant association between KILLIP class and outcome (p value=0.01).

Table 3 shows the correlation of KILLIP class with uric acid at Day 4. In KILLIP class III and IV, abnormal uric acid was found in 42.85% and 80.0% patients respectively who are higher in comparison of class I & class II. There was statistically significant association between KILLIP class and outcome (p value=0.002).

Table 4 shows the correlation of outcome with uric acid at Day 1 and Day 4. Mortality was higher among abnormal uric acid at both Day 1 and Day 4. The association between outcome and uric acid levels at day 1 and day 4 were statistically significant (p=0.0001).

Discussion:

In present study about half of patients (55.0%) belong to the age group of 40-60 years followed by 31.25% patients of >60 years and 13.75% patients <40 years. About 86% patients of acute MI belong to age >40 years. Similar results were observed by the study done by Dahiya N et al.[5], Omidvar B et al.[6] and Shetty S et al.[7]

In present study, male (81.25%) outnumbered female patients (18.75%) with ratio of 4.33:1. Result of present study correlates with Shetty S et al.[7] in which also male outnumbered female patients. 45 patients (56.25%) have the history of smoking while 18 patients (22.50%) having history of tobacco chewing. 20 patients (25.0%) had the history of both tobacco chewing and smoking. Present study result coincides with study done by Dahiya N et al.[5] but is in contrast of study done by Tatli E et al.[8] observed 95% of their patient had history of smoking.

Table 2 shows correlation of outcome with KILLIP classification. Majority of patients (58.75%) were in KILLIP class I followed by 26.25% patients belong to KILLIP II class. Mortality was higher in class III and class IV (42.85% & 40.0% respectively) in comparison of class I and class II (10.63% & 14.28% respectively). There was statistically significant association between KILLIP class and outcome (p value=0.01). Similar observation was drawn by Nadkar MY et al.[9] who had maximum cases in Killip class I. However in contrast to present result, Shetty S et al.[7] had maximum number of cases in Killip class II. In our study 12 patients (15.0%) had history of hypertension and receiving treatment and 68 patients (85.0%) were normotensive. This is in contrast to Shetty S et al[7] where > 50% of their patients had hypertension.

Table 3 shows the correlation of KILLIP class with uric acid at Day 4. In KILLIP class III and IV, abnormal uric acid was found in 42.85% and 80.0% patients respectively who are higher in comparison of class I & class II. There was statistically significant association between KILLIP class and outcome (p value=0.002). Similar results were observed by the Dahiya N et al.[5] Studies done by Kojima et al.[10] and Nadkar MY et al.[9] have observed similar correlation between serum uric acid level and various KILLIP classes. In contrast to present study, Julaarattanaporn et al.[11] observed no association between high uric acid levels and KILLIP classes.

CONCLUSION

Killip's classes have very important role in predicting the outcome of patients suffering from acute myocardial infarction. Our study concludes that there was statistically significant association between KILLIP class and uric acid levels. There is also significant association between KILLIP class and outcome. Developing countries like India where majority of patients belong to middle and lower socio-economic status, those patients can be easily monitored by using serum uric acid level as biomarker for outcome of acute myocardial infarction.

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