



CORRELATION OF SERUM URIC ACID AND KILLIP'S CLASS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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ABSTRACT

Background: Acute myocardial infarction (AMI) is a form of ischemic heart disease (IHD) which has emerged as a major contributor to increase in morbidity and mortality. Various studies have found uric acid as a risk factor for cardiovascular disease and a negative prognostic marker for mortality of patients.

Aim: To study if there is any correlation between serum uric acid levels and Killip's class in patients of acute myocardial infarction.

Material and Methods: It was an observational study done for 2 years in a tertiary health care centre, in which 75 patients with AMI were included. Serum UA (Uric Acid) level was measured on day 0, 3 and 7 with uricase method and a detailed history in relation to Killip's class was taken. The data collected was analysed to see the pattern of elevation of serum uric acid level and compare it with Killip's class of patients on days 0, 3 and 7.

Results: We observed that serum uric acid levels were elevated in patients with acute MI and the levels were almost same on days 0, 3 and 7. Patients who had higher Killip's class also had higher SUA levels. Almost all patients who expired had SUA > 7.

Conclusion: Our study strengthens the previous reports that, serum uric acid could be marker for predicting acute MI-related prognosis and the combination of Killip's class and serum UA level after acute MI could be a good predictor of mortality in patients who have acute MI.

KEYWORDS : Acute myocardial infarction, Serum Uric acid, Killip's class

Background

Acute myocardial infarction (AMI) is a form of ischaemic heart disease (IHD) which continues to be the leading cause of death in the industrialized and developing countries like India, despite spectacular progress in their prevention, detection and treatment over the last three decades. Many risk factors for MI are well known, but some new have also been recognized.¹ Various studies have recently found that uric acid may be a risk factor for cardiovascular diseases and a negative prognostic marker for mortality in subjects with pre-existing congestive heart failure.

Many studies including the National Health and Nutrition Examination Survey (NHANES) study² concluded that uric acid is an independent risk factor for development of cardiovascular and cerebrovascular diseases. In contrast the Framingham Heart study³ 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.

Hence, this study was performed to determine the correlation of serum uric acid levels on days 0, 3 and 7 and compare them with Killip's class for any correlation.

Material and methods:

It was an observational study at a tertiary health care centre which was performed from December 2015 to September 2017. Total 75 cases of Acute MI were studied and the study was approved by the Institutional Ethics committee.

Patients more than 18 years of age diagnosed to have acute MI who presented to hospital within 24 hours of onset of symptoms were included in the study. Acute MI was defined as, 'increased myocardial enzyme concentrations with typical chest pain persisting for more than 30 minutes, or electrocardiographic changes (including ischemic ST-segment depression, ST-segment elevation or pathologic Q waves). Increased enzyme concentrations were defined as peak creatine phosphokinase level more than two times upper limit of normal⁴.

Patients with a condition known to elevate UA levels e.g. chronic kidney disease, gout, haematological malignancy and

hypothyroidism, chronic alcoholic, patients receiving drugs affecting serum UA levels and who did not give consent were excluded.

A detailed history and physical examination with special reference to Killip's class was carried out. Killip's Classification was described as follows:

Class I: No signs of pulmonary or venous congestion

Class II: Mod heart failure (rales at lung bases, S3 gallop, tachypnea or signs of RHF)

Class III: Severe heart failure (pulmonary edema)

Class IV: Shock (systolic pressure <90mm of Hg, peripheral vasoconstriction, peripheral cyanosis, oliguria, mental confusion)

All patients underwent routine investigations including hemoglobin, CBC, renal function test, ECG, chest X-ray. They were followed up till 7 days. Serum UA level was measured on days 0, 3 and 7 with the Uricase Method^{5,6,7}. Uricase converts UA to allantoin and hydrogen peroxide. Hydrogen peroxide further reacts with a phenolic compound and 4 aminoantipyrine by the catalytic action of peroxidase to form a coloured dye complex. Intensity of the colour formed is directly proportional to the amount of UA in the sample.

Results:

Total 75 patients were included in the study. Out of them 59% were males and 41% were females. 18% patients were in age group 30-45yrs, 43% patients were in age group 45-60 yrs and 39% patients were in age group 60-75yrs. Serum Uric acid levels were measured on days 0, 3, 7. on all three occasions, day 0, 3 and 7. It was observed that uric acid level was elevated but in the same range on all three days. (Table 1)

Table 1: Descriptive statistics of serum uric acid concentration:

	Number of patients	Range of Serum Uric acid	MEAN±SD
UA-DAY 0	75	3.2 - 9.6	5.24 ± 1.53
UA-DAY 3	74	3.0 - 9.0	5.30 ± 1.68
UA-DAY 7	69	3.3 - 9.2	5.05 ± 1.5987

Table 2 : Frequency distribution of patients according to killips class on day 0,3 and 7

KILLIPS CLASS	DAY 0 N(%)	DAY 03 N(%)	DAY 07 N(%)
1	45(60%)	47(64%)	52(75%)
2	11(15%)	6 (8%)	9 (14%)
3	14(19%)	9 (13%)	6 (8%)
4	5(6%)	9 (15%)	2 (3%)
TOTAL	75	74	69

Thorough examination was done daily to grade killips class on days 0,3 and 7. It was found that although six patients expired, those who survived showed improvement by killips class over the 7 days.

Table 3 : Cross tabulation between serum uric acid and killips class on day of admission (Day 0)

KILLIPS CLASS	<4.1	4.1-5.5	5.5-7	>7	TOTAL
1	21	21	3	2	47
2	4	1	7	0	12
3	1	0	8	3	12
4	0	0	0	4	4
TOTAL	26	22	18	9	75

On applying chi-square test, p value was significant (<0.05)

Killip's class of the patients was compared with their serum uric acid levels. It was observed that serum uric acid levels were higher in patients who were in higher killips class on day of admission. (Table 3) Similar observation was made on day 3 (Table 4) and day 7 (Table 5) also.

Table 4: Cross tabulation between serum uric acid and killips class on 3rd day after admission (Day 3)

KILLIPS CLASS	<4.1	4.1-5.5	5.5-7	>7	TOTAL
1	28	13	6	0	47
2	1	1	3	0	5
3	1	1	5	6	13
4	0	0	0	9	9
TOTAL	30	15	14	15	74

p value <0.05

Table 5 : Cross tabulation between serum uric acid and killips class on 7th day after admission (Day 7)

KILLIPS CLASS	<4.1	4.1-5.5	5.5-7	>7	TOTAL
1	31	11	10	1	53
2	0	0	6	0	6
3	0	0	1	6	7
4	0	0	0	3	3
TOTAL	31	11	17	10	69

Discussion

Killip's classification is an indicator of severity of heart failure. Our study showed that the patients who were graded higher in killips class had higher uric acid levels. Similar observation was made on days 0, 3 and 7. Patients of Killip's class III and IV had higher levels of uric acid as compared to patients of class I and II.

Out of 75 patients, 6 expired during 7 days follow up. All the patients who died had SUA level more than 7.0 mg/dl. Of these 6 patients, 2 were in Killip's class III and 4 were in Killip's class IV at the time of admission. Thus, 100% of patients who died were in higher class i.e. class III and IV at the time of admission and had significantly elevated serum uric acid levels also. One patient of Killip's class III shifted to Killip's class IV on day 3. It therefore shows that serum uric acid concentration is significantly correlated with Killip's class. This finding is consistent with following referral studies.

MY Nadkar et al 7 (2008) studied relationship between uric acid and

acute myocardial infarction, They observed a significantly higher level of serum UA in patients with MI as compared to controls (p<0.05). They also studied if serum uric acid levels were correlated to Killip's class and reported that patients in higher Killip's class had higher serum UA levels. Also higher UA level was associated with higher mortality and higher chances of developing congestive cardiac failure following MI. Combination of Killip's class and serum UA level after acute MI was proposed as good predictor of mortality after MI.

The Japanese Acute Coronary Syndrome Study3 (2005) by Sunao Kojima et al also showed prognostic usefulness of serum uric acid after acute myocardial infarction. They evaluated 1,124 consecutive patients who were hospitalised within 48 hours of onset of symptoms of acute MI and found that patients who developed short term adverse events had high serum UA concentrations. Hyperuricemia after acute MI was associated with the development of heart failure. There was a close correlation between serum UA concentrations and Killip's classification. It was concluded that serum UA is a suitable marker for predicting acute MI-related future adverse events and the combination of Killip's class and serum UA level after acute MI is a good predictor of mortality in patients who have acute MI.

Conclusion

Our study confirms previous reports that serum uric levels are correlated with killip's classification. Patients of higher killips class have higher uric acid levels. Also serum uric acid levels were high with higher killips class in the patients who died in the seven day follow up period. Thus, this study strengthens the previous observations that serum uric acid could be a marker for predicting acute MI-related prognosis and the combination of Killip's class and serum UA level after acute MI could be a good predictor of mortality in patients who have acute MI.

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