Prevalence of Uric Acid in Patient with Acute Myocardial Infarction

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ABSTRACT

Background: The uric acid in serum (SUA) is significantly related with cardiovascular disease, it is proved by clinically. The increased level of uric acid in the serum lead to highly platelet reactivity mediating inflammation and stimulate of smooth muscle cell production which probably degrades acute thrombosis. **Methods:** The blood samples were collected and sent to biochemistry laboratory for estimation of uric acid. This study conducted in the Departments of Biochemistry, Dr. Ram Manohar Lohia Medical College Lucknow. **Results:** In this study 200 patients included with acute myocardial infarction. Among the 200 patients, 148 (74%) were male and 52 (26%) were female. Among the 25-70 Age group , most of people from 56-70 age group. Mean of uric acid level in male cases was 5.6 and female cases was 5.2 , male controls was 4.2 and female controls was 3.6. **Conclusion:** The uric acid level in the serum are high in patients which had acute myocardial infarction as compare to other persons. It is also higher with the killips classes. The Killips classification and uric acid level in the serum is a good analyst of mortality after acute myocardial infarction, if is combined.

Keywords: Uric acid, Killips classes, cardiovascular disease, Troponin T.

INTRODUCTION

The uric acid in serum (SUA) is significantly related with cardiovascular disease, it is proved by clinically.[1-3] Patients with coronary artery disease, it is an predictor of major adverse cardiovascular events (MACE).[4-5]

The increased level of uric acid in the serum lead to highly platelet reactivity mediating inflammation and stimulate of smooth muscle cell production which probably degrades acute thrombosis.[6-7]

Cardiac markers such as CPK-MB / Troponin T are released from necrotic heart muscle into the circulation in large quantity labeled as some enzymes and proteins following myocardial infarction. The Uric acid can be a risk factor of cardiovascular diseases showed in epidemiological studies. The high level of serum uric acid is highly prognostic of mortality in patients which are with heart failure in coronary artery disease.[8]

Cardiovascular disease has been known as major health burden worldwide. Incidence of CAD is rapidly increasing in India and other developing countries. CAD is leading cause of cardiovascular mortality worldwide.

- Epidemiological studies have recently shown that uric acid may be a risk factor for cardiovascular disease and a negative prognostic marker for mortality with pre-existing heart failure. Elevated serum uric acid level is highly predictive of mortality in patients with heart failure or coronary artery disease and of cardiovascular events in patients.

- There is evidence that high uric acid level is a negative prognostic factor in patients with mild to severe heart failure. Some evidence suggest that uric acid may exert a negative effect on cardiovascular disease by stimulating inflammation, which is clearly involved in pathogenesis of cardiovascular disease. Recent study shows that there was a close co relation between serum uric acid concentration and killip classification in patients of acute myocardial infarction.

Aims and Objectives

- To asses serum uric acid levels in acute myocardial infarction patients
- To study changes in serum uric acid levels over a period of 0,3 and 7 days.
- To associate changes in serum uric with clinical prognosis

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MATERIALS AND METHODS

Study population
Two hundred patients each of with acute myocardial infarction in age group 25-71 years were included as cases.

Study Area
This study conducted in the Departments of Biochemistry, Dr. Ram Manohar Lohia Medical College Lucknow.

Study duration
Duration of this study was one year.

Sampling technique & Data collection:-
The blood samples were collected and sent to biochemistry laboratory for estimation of uric acid.

Inclusion Criteria
- Heart pain
- ST elevation
- ECG changes

Exclusion Criteria
- Patients with chronic kidney disease
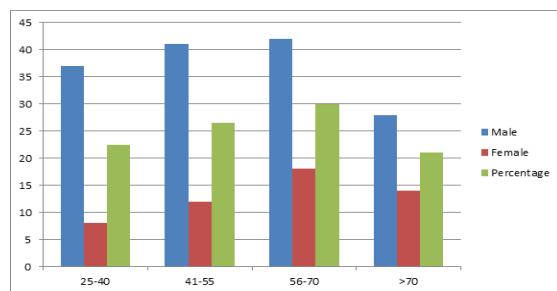- Patient with Gout
- Patients with hypothyroidism

Data Analysis
Data were analyzed by using Microsoft excel and by using unpaired t test.

RESULTS

Table 1: Distribution of age and sex.

| Age group	Male	Female	Total	Percentage
25-40	37 (25%)	8 (15.3%)	45	22.5%
41-55	41 (27.8%)	12 (48%)	53	26.5%
56-70	42 (28.3%)	18 (34.6%)	60	30%
>71	28 (18.9%)	14 (26.9%)	42	21%
Total	148 (74%)	52 (26%)	200	100%

Figure 1: Distribution of age and sex

Table 2: Patients with types of heart attack

| Types of heart attack	No. of patients	Percentage
Stemi	112	56%
Non-Stemi	88	44%
Total	200	100%

In this study 200 patients included with acute myocardial infarction. Among the 200 patients, 148 (74%) were male and 52 (26%) were female. Among the 25-70 Age group, most of peole from 56-70 age group. From the 200 patients, 56% patients were with STMI and 44% with NON-STMI. In all patients, 98% were thrombolysed and 4% were non-thrombolysed. Kllips classes suggested that uric acid levels were high with higher complications (Killips classification). Mean of uric acid level in male cases was 5.6 and female cases was 5.2, male controls was 4.2 and female controls was 3.6.
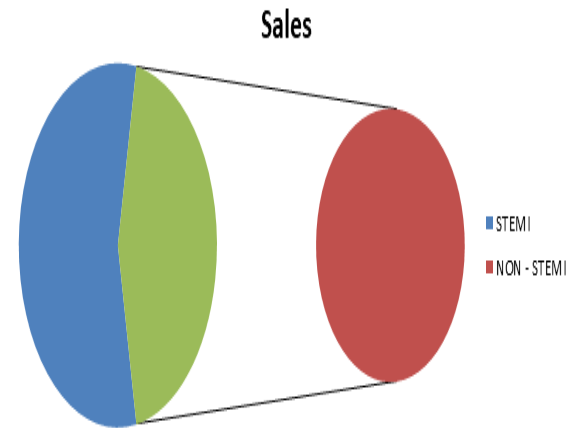
Figure 2: Patients with types of heart attack

Table 3: Patients with breakdown of blood clots, formed in blood vessels

Blood clots in patients' blood vessels	No. of patients	
Thrombolysed	192	98%
Non-Thrombolysed	8	4%
Total	200	100%
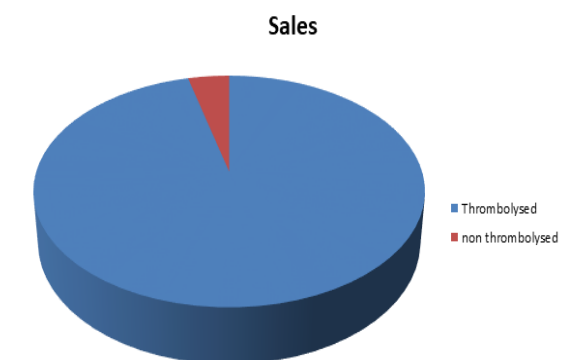
Figure 3: Patients with breakdown of blood clots, formed in blood vessels

Table 4: Comparison between killips classes at day 0, 3, 7 of mean uric acid.

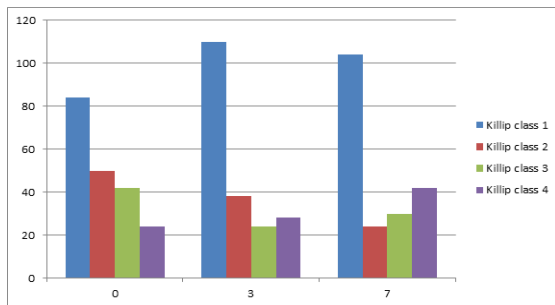| Day	Killips class I	Killips class ii	Killips class iii	Killips class iv
0	84	50	42	24
3	110	38	24	28
7	104	24	30	42

Figure 4: Comparison between killips classes at day 0, 3, 7 of mean uric acid

Table 5: Comparison between gender with mortality

Day	Survived		Died	
	Male	**Female**	**Male**	**Female**
0	148	50	0	2
3	146	46	2	4
7	138	38	8	8
Total	138 (93.2%)	38 (73%)	10 (6.7%)	14 (26.9%)

Table 6: Uric acid level between cases and control

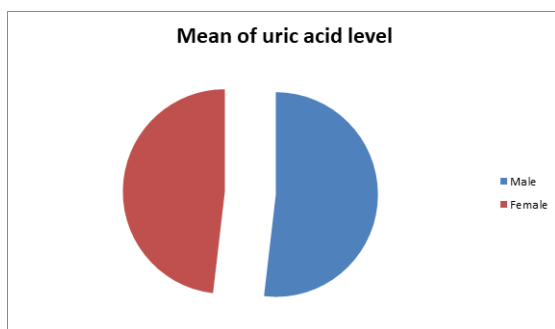| Patients	Mean of uric acid level	Control
male	5.6	4.2
female	5.2	3.6

Figure 6: Uric acid level between cases and control

DISCUSSION

Following myocardial infraction some proteins and enzymes labeled as cardiac markers are released in large quantity from necrotic heart muscle in to the circulation.

Epidemiological studies have shown that uric acid may be a risk factor for cardiovascular diseases. Elevated serum uric acid is highly predictive of mortality in patients with heart failure in coronary artery disease. Clinical studies have proved that serum uric acid (SUA) is significantly associated with cardiovascular disease. Uric acid is an independent predictor of major adverse cardiovascular events (MACE) in patients with coronary artery disease. High serum uric acid causes increasing platelet reactivity mediating inflammation and stimulation of smooth muscle cell proliferation, which probably worsens acute thrombosis.

Normal uric acid level is 3.4-7.2 mg/dL for men and 2.4-6.1 mg/dL for women.

Effects of high uric acid

Hereditary- Lesch-Nyhan syndrome, an extremely rare inherited disorder, associated with very high serum uric acid levels. Spasticity, involuntary movement and cognitive retardation, gout is seen. High intake of dietary purine, high fructose corn syrup and table sugar can cause increased levels of uric acid .Serum uric acid can be elevated due to reduced excretion by the kidneys .Certain drugs like thiazide diuretics can increase uric acid levels.

In our study, we had 200 patients. Among the 200 patients,74% were males and 26% females. Most of the people near about 30% were 56-70 age group. This study similar with another study, in which showed 74% males and 26% females and mostly people (39%) from the 56-70 age group.[9]

Severity of heart failure is classified in Killip classification. Here was a relationship between Killip class on day of admission and serum uric acid level.[10] Another studies showed that serum uric acid level rises in cardiac failure.[11] In present study, statistically significant correlation found between the uric acid level in serum and (p=0.001) on day 3 in Killip class and patients for Killip class 3 and 4 had increased levels of uric acid as paralleled to patients of class 1 and 2.

In case of hypertriglyceridemia, Hyperuricemia is related with dyslipidemia,.[12] The mechanism behind the association between lipid metabolism and uric acid level is not clearly understood. It enhances the growth of atherosclerosis. The may increase level of uric acid damage oxidation of LDL-C and the peroxidation of lipid, formation of oxygen radicals in inflammatory reaction, increases platelet aggregation and the creation of uric acid crystals in the arterial wall which damages the tunica intima of arteries and helps coronary thrombosis.[13]

In our study, mean of uric acid 5.6 were in male group and in female group 5.2 while in control group in male 4.2 and in female 3.6. Uric acid is a general marker of cell death and elevated serum uric acid is linked with obesity, dyslipidemia, hypertension, insulin resistance, male gender, aging, menopause, excessive alcohol intake and diuretic use. Uric acid level reflects xanthine oxidase pathway activity, which has the potential to contribute in to the progression of left ventricular dysfunction by interfering with myocardial energetics and myofilament calcium sensitivity.[14]

CONCLUSION

The uric acid level in the serum are high in patients which had acute myocardial infarction as compare to other persons. It is also higher with the killips classes. The Killips classification and uric acid level in the serum is a good analyst of mortality after acute myocardial infarction, if is combined.

Serum uric acid levels are higher in patients of acute myocardial infarction as compared to normal healthy

persons. Serum uric levels increases in patients with higher Killip class. Combination of Killip class and serum uric acid level after acute myocardial infarction is a good predictor of mortality after acute myocardial infarction.

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