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Original Research Article

Clinical profile of patients with acute coronary syndrome and its association with biomarker troponin I

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ABSTRACT

Background: In patients with acute coronary syndromes, it is desirable to identify a sensitive serum marker that is closely related to the degree of myocardial damage, provides prognostic information, and can be measured rapidly. Author studied the clinical profile of patients with Acute MI and its relation with troponin I level.
Methods: In this prospective study, 65 patients admitted with Acute MI were studied. Study patients were divided in Troponin I positive and Troponin I negative group. Patients were followed up to discharge or death in the hospital.
Results: Most common symptom present in the patients with Acute Coronary Syndrome was chest pain (94%) and most common risk factor was dyslipidaemia (72.3%). Most common complication was recurrent angina (72.3%). Out of total patients with significant CAD, almost 70 % belong to Troponin I positive group and it is statistically highly significant ($p<0.05$). Total 30 patients (46.2%) have more than 10 episodes of angina in our study. There is statistically significant association between number of angina episode and Troponin I positivity ($p<0.05$). Out of total deaths, 73.3% have occurred among Troponin I positive study patients and it is statistically significant ($p<0.05$).
Conclusions: In patients with acute coronary syndromes, cardiac troponin I levels provide useful prognostic information and permit the early identification of patients with an increased risk of death.

Keywords: Cardiac troponin, Chest pain, Dyslipidaemia, Recurrent angina

INTRODUCTION

The World Health Organization (WHO) indexed cardiovascular disease (CVD) as a leading foundation of human death in developing as well as developed countries. An annual number of deaths estimate above 17.5 million to 25 million from 2015 to 2030 representing 40% of all global deaths due to heart disease and stroke.[1] The national academy of clinical biochemistry guide of lines define MI as a detection of rise and fall of cardiac biomarkers(preferably cardiac troponin I, cTn) with at least one value above 99th percentile of upper reference limit based on 2007 universal definition of MI. Acute coronary syndrome (ACS) refers to a spectrum of clinical presentations ranging from those for ST-segment elevation myocardial infarction (STEMI) to presentations found in non-ST-segment elevation myocardial infarction (NSTEMI) or in unstable angina. In terms of pathology,

ACS is almost always associated with rupture of an atherosclerotic plaque and partial or complete thrombosis of the infarct related artery.

Primarily, the WHO has established criteria for the diagnosis of CVD, whereby patients must encounter a minimum two out of three conditions: characteristic chest pain, electrocardiogram (ECG) changes and elevation in biomarkers level in their blood samples.[2]

The MI examined mainly by electrocardiography (ECG) though only 57% of patients can be diagnosed accurately for acute myocardial infarction (AMI). Besides this, AMI patients can even show normal or non-diagnostic ECG when conferred to the Emergency Department that makes early diagnosis of CVD more difficult.[3-8] About 25% of AMI have occurred devoid of any symptoms like pain in chest, back, or jaw.[9,10]

Neither the clinical presentations nor the ECG had adequate clinical sensitivity and specificity for detecting MI without the use of biomarkers. Currently, myoglobin, creatine kinase-MB, cardiac forms of troponin (T and I) are relevant AMI diagnostic biomarkers. Among them, cardiac troponin I (cTnI) is recognized as the 'gold standard' biomarker for AMI, since it is normally produced only in the myocardium and displays high specificity to cardiac injury.[11]

On the incidence of cardiac injury (MI), cTnI is released into the bloodstream and the death risk is directly linked to troponin level in serum which increases drastically up to 50ng/mL within 3-6 h, lastly to a level around 550ng/mL, peak at 24-48 h and return to baseline over 5-14 days.[12-14] In a recent study, 0.5 to 2.0ng/mL cTnI concentrations is considered as the borderline between normal people and patients.[2]

A rapid and accurate diagnosis is critical in patients with presumed acute coronary syndrome for the initiation of effective evidence-based medical management and revascularization. The third universal definition of myocardial infarction defines an acute myocardial infarction (AMI) as evidence of myocardial necrosis in a patient with the clinical features of acute myocardial ischemia and defines the 99th percentile of cardiac troponins as the decision value for AMI.[15] Clinical assessment, 12-lead ECG and cardiac troponin (cTn) I or T form the diagnostic cornerstones of patients with acute onset chest pain. Contemporary sensitive and high-sensitivity cardiac troponin (hscTn) assays have increased diagnostic accuracy in patients with acute chest pain in comparison with conventional cardiac biomarkers.[16]

Objectives of present study were to observe the clinical profile of patients with acute coronary syndrome and to study how the clinical diagnosis acute coronary syndrome matches biochemical profile of cardiac biomarkers and how it affects prognosis.

METHODS

A prospective study was conducted in the patients admitted with unstable angina at Dhiraj General Hospital, Piparia, Gujarat during the period from December 2012 to November 2013. Total 65 patients with unstable angina were enrolled in the study.

Diagnosis of Acute Coronary Syndrome (ACS) was made by history, clinical examination and ECG. All patients were undergone Echo Doppler Study, Troponin-I levels Blood sugar (FBS, PP2BS), complete lipid profile, serum uric acid, blood urea, serum creatinine and complete blood count at the onset of the study. Patients were followed up to discharge from hospital or death in the hospital. These patients were divided in 2 groups.

- Group A: Patients with raised troponin-I levels (Troponin I positive)
- Group B: Patients with normal troponin-I levels (Troponin I negative)

Inclusion criteria

- Patients of age 18 years or more who are willing to participate in study and give their consent for same.
- Patients with confirmed diagnosis of ACS

Exclusion criteria

Patients with congenital heart diseases, alcoholics with past history of liver disease, pulmonary embolus, sepsis, chest trauma and renal failure were excluded from the study.

Statistical analysis

Data entry was done in MS Excel. Simple Quantitative data was analyzed by using descriptive and inferential statistical techniques via Epi-Info (7.1 version) and simple qualitative data was analyzed by Chi-Square test.

RESULTS

Table 1: Baseline characteristic of study patients.

Characteristic	Troponine I positive	Troponine I negative	Total
Gender			
Male	21 (51.2 %)	20 (48.8 %)	41(63.1%)
Female	11 (45.8 %)	13 (54.2 %)	24(36.9%)
Age group (years)			
30-49	10 (50.0 %)	10 (50.0 %)	20(30.8%)
50-69	19 (55.9 %)	15 (44.1 %)	34(52.3%)
≥70	3 (27.3 %)	8 (72.7 %)	11(16.9%)

Among the total study patients, 41 (63.1 %) were male. In this study, half of the study patients belong to the age group of 50-69 years. Among the patients of age group

≥70 years, 72.7% were in the Troponine I Negative group (Table 1).

Most common symptom present in the patients with Acute Coronary Syndrome was chest pain (94%) followed by cough, oedema, breathlessness and palpitation. Most common risk factor present among the study patients was dyslipidemia (72.3%) followed by IHD, smoking, hypertension, diabetes mellitus and family history of IHD (Table 2, 3).

Table 2: Clinical profile of study patients with acute coronary syndrome.

Symptom present	No. of study patients* (%)
Chest pain	61 (94 %)
Cough	44 (68 %)
Oedema	31 (48 %)
Breathlessness	29 (45 %)
Palpitation	10 (15 %)

* Multiple symptoms present

Table 3: Presence of risk factors among study patients.

Risk factor	Troponine I positive (%)	Troponine I negative (%)	Total* (%)
Dyslipidemia	25 (53.2)	22 (46.8)	47 (72.3)
IHD	22 (59.5)	15 (40.5)	37 (56.9)
Smoking	20 (55.6)	16 (44.4)	36 (55.4)
Hypertension	11 (37.9)	18 (62.1)	29 (44.6)
Diabetes mellitus	12 (44.4)	15 (55.6)	27 (41.5)
Family history of IHD	13 (52.0)	12 (48.0)	25 (38.5)

* Multiple symptoms present

Table 4 shows occurrence of different type of complications among study patients. Most common complication was recurrent angina (72.3%). Deaths have occurred in 15 (23.1%) study patients.

Event rate of recurrent angina, reinfarction, heart failure and death were comparatively higher among the Troponin I positive group.

Table 4: Occurrence of different complications in study patients.

Complication	Troponine I positive (%)	Troponine I negative (%)	Total* (%)
Recurrent angina	26 (55.3)	21 (44.7)	47 (72.3)
Re infarction	27 (84.4)	5 (15.6)	32 (49.2)
Heart failure	8 (61.5)	5 (38.5)	13 (20.0)
Cardiogenic shock	3 (50.0)	3 (50.0)	6 (9.2)
Arrhythmia	2 (40.0)	3 (60.0)	5 (7.7)
Death	11 (73.3)	4 (26.7)	15 (23.1)

* Multiple symptoms present

Significant CAD was defined as at least 50% diameter narrowing of a major coronary artery. Table 5 shows the association between significant CAD and Troponin I level. Out of total patients with significant CAD, almost 70% belong to Troponin I positive group and it is statistically highly significant ($p<0.05$).

Table 5: Coronary artery disease among study patients.

CAD	Troponine I positive (%)	Troponine I negative (%)	Total* (%)
Significant	25 (69.4)	11 (30.6)	36 (55.4)
NS	7 (24.1)	22 (75.9)	29 (44.6)
Total	32 (49.2)	33 (50.8)	65 (100.0)

*The chi-square =13.1908; p-value 0.000281; $p < 0.05$; $d_f = 1$

Total 30 patients (46.2%) have more than 10 episodes of angina in present study. Out of these, 29 (96.7%) patients belong to Troponin I positive group. There is statistically significant association between number of angina episode and Troponin I positivity ($p<0.05$) (Table 6). Out of total deaths, 73.3 % have occurred among Troponin I positive study patients and it is statistically significant ($p<0.05$) (Table 7).

Table 6: Frequency of angina among study patients.

Frequency of angina	Troponine I positive (%)	Troponine I negative (%)	Total* (%)
≤10 episode	3 (8.6)	32 (91.4)	35 (53.8)
>10 episode	29 (96.7)	1 (3.3)	30 (46.2)
Total	32 (49.2)	33 (50.8)	65 (100.0)

*Chi-square with Yates correction. Chi squared equals 46.696 with 1 degrees of freedom. The P value is less than 0.0001

Table 7: Mortality among study patients.

Mortality	Troponine I positive (%)	Troponine I negative (%)	Total* (%)
Yes	11 (73.3)	4 (26.7)	15 (23.1)
No	21 (42.0)	29 (58.0)	50 (76.9)
Total	32 (49.2)	33 (50.8)	65 (100.0)

*The chi-square 4.5324; p-value 0.03326; $p < 0.05$; $d_f = 1$

DISCUSSION

Out of the 65 patients in present study, 41 were males and 24 females. The study done by Heeschen et al, shows 69% male patients while study done by Janorkar et al, shows 79% male patients.[17,18] So all the study was comparable to present study and it is found that women present less often with unstable angina, comprising 20-40 percent of patients with unstable angina.

The dyslipidaemia in the study done by Roe MT et al was 45.50%.[19] It was 73% in study done by Till Keller et al

and is comparable to present study 72%.[20] The high amount of dyslipidaemia might be because of eating habits of the population of Gujarat and Madhya Pradesh which comprises major part of study patients. Previous history of IHD was present in 57% patients in this study, while it was 49% in study done by Luscher et al and 35.8% in the study done by Till killer et al.[20,21] The present study shows hypertension in 45% of patients and is comparable with study done by Heeschen et al (45% patients) and Mathew et al (43% patients).[17,22]

In this study, most common complication was recurrent angina (72.3%). Deaths have occurred in 15 (23.1%) study patients. Event rate of recurrent angina, re infarction, heart failure and death were comparatively higher among the Troponin I positive group. The event rate of recurrent angina was 46% in study done by Luscher et al.[21] Event rate of Heart failure and event rate of death was 10.9% and 4.9% respectively in the study done by Roe MT et al.[19]

Significant CAD was defined as at least 50% diameter narrowing of a major coronary artery. In present study significant CAD was seen in 55.4% patients as compared to 74% in the study done by Maqsood et al. While non-significant CAD was seen in 44.6% patients in this study as compared to 26% in the study done by Maqsood et al.[23]

Out of total deaths, 73.3% have occurred among Troponin I positive study patients and it is statistically significant ($p<0.05$). In this study mortality rate for Troponin I positive group is 34.4% while mortality rate for Troponin I negative group was 12.1%. The mortality is 11% In the study done by Eggers et al., mortality rate for Troponin I positive and Troponin I negative patients was 11% and 5% respectively.[24] The study done by Janorkar et al. shows mortality rate of 2.9% in Troponin I positive group and 2.17% in Troponin I negative group.[18]

Mathew et al, study shows 1.8% mortality in Troponin I positive group while none in Troponin I negative group.[22] The study done by Meyer et al, shows 9.52% mortality in Troponin I positive group compared to 1.51% in Troponin I negative group.[25]

CONCLUSION

There was a male preponderance and majority of the patients were between 50 to 70 years of age group. Cardiac troponin I help us to risk stratify the patients with acute myocardial infarction. Even small increases in cardiac Troponin I level is associated with increased risk of mortality and adverse cardiac events. Measurement of cardiac TnI in the serum allowed a useful prediction of cardiac risk in patients with unstable angina. Troponin I positive patients with dyslipidemia and history of smoking constituted a high-risk group for in-hospital adverse cardiac events.

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