

# “A Study to Assess the Relationship between Chest Pain and Elevated Troponin Levels in the Presence and Absence of Myocardial Infarction, Among Patients Admitted to Critical Care Units at Selected Hospitals.”

## “Chest Pain & Troponin Levels Related to Myocardial Infarction”

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### Abstract

#### ➤ Introduction:

Troponin refers to three different proteins. Troponin C binds calcium and transports troponin I so that muscles can contract. Troponin T binds troponin proteins to muscle fibers. The heart is essentially a muscle, and damage to the heart causes it to release troponin into the bloodstream. Troponin levels in the blood are normally very low, but injuries to the heart can cause the levels to increase significantly.<sup>1</sup>

Cardiac troponin T (cTnT) and troponin I (cTnI) are the most specific and sensitive laboratory markers of myocardial cell injury and therefore have replaced creatine kinase MB (CK-MB) as the gold standard. A rise of troponins reflects irreversible myocardial cell necrosis. Lower but elevated troponin levels may point to another diagnosis. Accordingly, abnormal values have been described in various conditions not related to acute coronary disease, such as myocarditis, pulmonary embolism, acute heart failure, septic shock, kidney failure, heart failure, or a traumatic injury to the heart. Heart damage from using recreational drugs, such as cocaine, chemotherapy-related damage to the heart and as a result of cardio-toxic drugs as well as after electrical cardio-versions.<sup>2</sup>

#### ➤ Aims:

The aims of this study are as follows:

- To assess troponin levels among patients with chest pain
- To find the relationship between chest pain and elevation in troponin levels
- To find the relationship between chest pain and troponin levels in patients with myocardial infarction
- To find an association between chest pain and elevated troponin levels in patients with absence of myocardial infarction

- To find an association between elevated troponin levels with selected demographic variables.

#### ➤ Materials and Methods:

**Study approach-** Descriptive observational research approach. The study includes determining the association between independent variable in terms of chest pain and its association with troponin levels among patients with Myocardial infarction and without myocardial infarction with cross sectional study design was used. The population involved in this study was patients having chest pain on admission to the hospital in Bangalore. By non-probability convenient sampling a total of 150 patients were included from critical care units of selected hospitals of Bangalore. A Structured questionnaire and check list on socio-demographic factors, co morbidity, presenting symptoms, ECG Variations, and troponin levels. Data was collected by patients admitted in selected hospitals of Bangalore through self report method.

#### ➤ Results:

Mean troponin level 0-6 Hrs after chest pain was 30.55 with minimum troponin level 16.5, maximum troponin level 32.1 and with the standard deviation of 24.27.

Mean troponin level 6-12 Hrs after chest pain was 29.07 with minimum troponin level 14.8, maximum troponin level 42.3 and with the standard deviation of 7.65.

Mean troponin level 12 Hrs after chest pain was 29.28 with minimum troponin level 17.7, maximum troponin level 50.7 and with the standard deviation of 7.67.

There is no significant association between socio-demographic variables of patients like age, gender, smoking, hypertension, hypercholesterolemia, liver disease, chronic kidney disease, bypass surgery and

**angioplasty with troponin levels 6 Hrs after admission. But there is a significant association between variables like myocardial infarction with troponin levels 6 Hrs after admission.**

➤ **Conclusion:**

After thorough analysis of the data, researcher concluded that there is no significant association between socio-demographic variables of patients like age, gender, smoking, hypertension, hypercholesterolemia, liver disease, chronic kidney disease, myocardial infarction, bypass surgery and angioplasty with troponin levels 3 Hrs after admission. But there is a significant association between variables like diabetes mellitus with troponin levels 3 Hrs after admission. And no chest pain is found among the patients without MI. out of 150 patients only 4 patients are there with chest pain without MI. hence the association could not be found.

**Keywords:-** Troponin levels, chest pain, hypercholesterolemia, myocardial infarction.

## I. INTRODUCTION

Health is a fundamental human right. It is central to the concept of quality of life. Health and its maintenance is a major social investment and is World-wide social goal. Health is multidimensional. This health may be assessed by such indicators as death rate, morbidity rate and expectation of life. Ideally, each piece of information should be individually useful and when combined should permit a more complete health profile of individuals and communities.<sup>3</sup>

Leading a sedentary lifestyle is becoming a significant public health issue. Sedentary lifestyles appear to be increasingly widespread in many nations despite being linked to a range of chronic health conditions. Recent research is starting to confirm the health risks associated with a sedentary lifestyle. A sedentary lifestyle also appears to have a negative impact on mental well-being. The combination of the physical and mental impact to health makes a sedentary lifestyle particularly problematic leading to non communicable diseases such as obesity, cancer, heart diseases and early death. These diseases tend to affect patients in the most productive years of their lives and result in catastrophic social and economic consequences.<sup>4</sup>

Chest pain is the symptom related to loss of homeostasis in the body. Several reasons are responsible for chest pain. Angina: A blockage in the heart blood vessels that reduces blood flow and oxygen to the heart muscle itself, causing pain but not permanent damage to the heart. The chest pain may spread to your arm, shoulder, jaw, or back. It may feel like a pressure or squeezing sensation. Chest pain from angina can be triggered by exercise, excitement, or emotional distress and is relieved by rest. Myocardial infarction (heart attack): This reduction in blood flow through heart blood vessels causes the death of heart muscle cells. Though similar to angina chest pain,

a heart attack is usually a more severe, crushing pain and is not relieved by rest. Sweating, nausea, or severe weakness may accompany the pain<sup>5</sup>.

Very high levels of troponin typically indicate that a person has had a heart attack, which can occur if the blood supply to some of the heart muscle suddenly becomes blocked. The range for normal troponin levels can vary between laboratories, Laboratories measure troponin in nanograms per milliliter of blood (ng/ml). According to the University of Washington's Department of Laboratory Medicine provides the following ranges for troponin I levels: 1. Normal range: below 0.04 ng/ml. 2. Probable heart attack: above 0.40 ng/ml. Result between 0.04 and 0.39 ng/ml often indicates a problem with the heart. Higher than normal levels of troponin can also indicate other injuries and conditions that affect the heart.<sup>6</sup>

➤ **Aims**

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- To find an association between chest pain and elevated troponin levels in patients with absence of myocardial infarction
- To find an association between elevated troponin levels with selected demographic variables.

➤ **Materials & methods**

Study approach- Descriptive observational research approach. The study includes determining the association between independent variable in terms of chest pain and its association with troponin levels among patients with Myocardial infarction and without myocardial infarction with cross sectional study design was used. The population involved in this study was patients having chest pain on admission to the hospital in Bangalore. By non-probability convenient sampling a total of 150 patients were included from critical care units of selected hospitals of Bangalore. A Structured questionnaire and check list on socio-demographic factors, co morbidity, presenting symptoms, ECG Variations, and troponin levels. Data was collected by patients admitted in selected hospitals of Bangalore through self report method.

## II. RESULTS

➤ **Table No. 1 Description of sample according to their demographic variables**

Majority 47.33% were in the age group of 61 to 70 years, 21.33% were in the age group of 71 to 80 years, 20.67% were in the age group of 51 to 60 years, 9.33% were above 80 years, 1.33% were in the age group of below 50 years with minimum age 47 years, maximum age 96 years and mean score was 67.61 Years with SD  $\pm$  8.57 years. Majority 64% were male, 36% were female with 52.67% was non-smokers and 47.33% was smokers. Among 54 females 12.96% were smoking and 87.04% were not smoking. Among 96 males 74% were smoking

and 48% were not smoking. 52% of sample was with 71 to 80 kg, 36% were with 61 to 70 kg, 7.33% were with 81 to 90 kg, 3.33% were below 60 kg, 1.33% were above 90 kg

with minimum weight 59 kg, maximum weight 92 kg and mean score 72.05 kg with SD 6.49 kg.

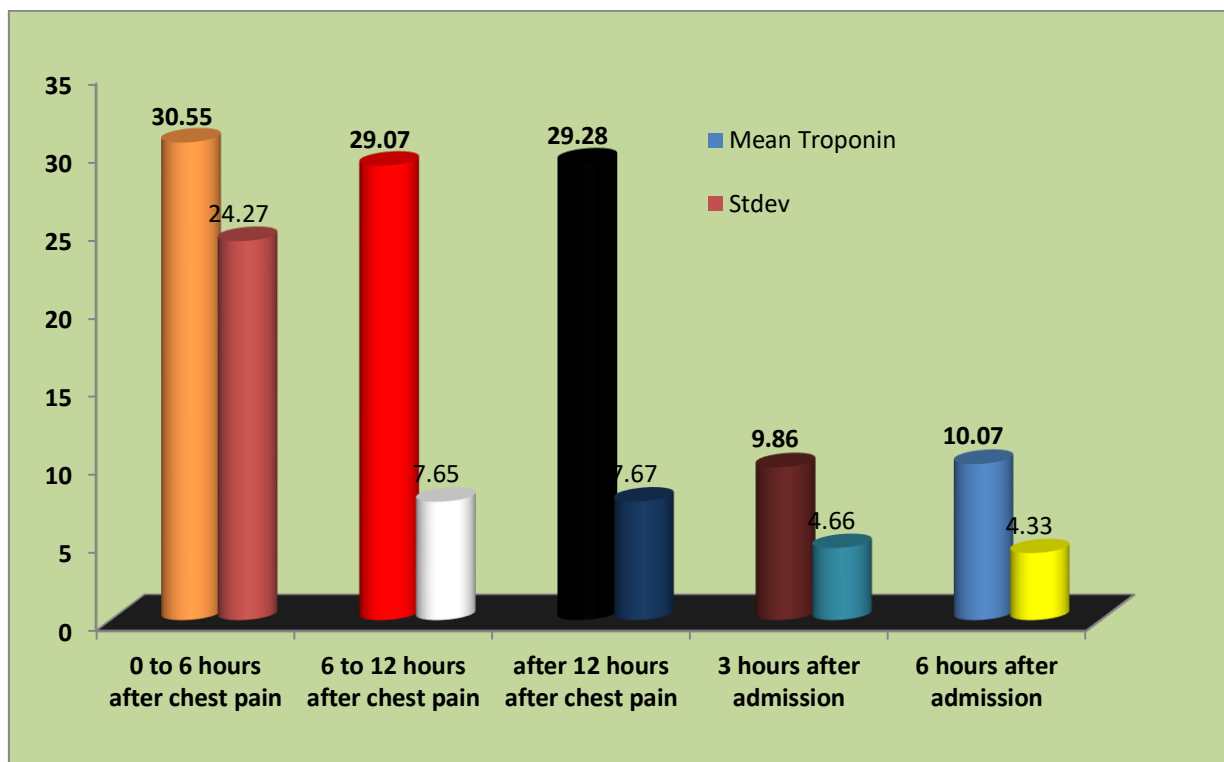


Table 1:- Distribution of sample according to their mean Troponin levels & standard deviation

S No.	ECG Interpretation	YES	%	No	%
1	Normal ECG	18	11.33%	132	138.67
2	T wave inversion	90	60%	60	40
3	S T Segment Elevation	121	80.7%	29	18.3
4	S T segment depression	31	20.7%	119	79.3
5	RBB	4	2.7%	146	97.3
6	LBB	1	0.7%	149	99.3

Table 2:- Distribution of sample according to their ECG report (N=150)

➤ Association between Chest pain and troponin levels among patients with MI

There is no significant association between troponin levels in the blood and chest pain 3 Hrs after admission, whereas there is a significant association between troponin levels in the blood and chest pain at 0 to 6 hours after chest pain, 6 to 12 hours after chest pain, after 12 hours after chest pain and 6 hours after admission.

S No.	Socio demographic factor	Chi square/ eta square value	DF	P value	Table value	Association
1	Age	8.36	6	0.371	12.59	NS
2	Gender	5.43	3	0.715	7.81	NS
3	Smoking	3.65	3	0.177	7.81	NS
4	hypertension	4.21	3	0.464	7.81	NS
5	Diabetes Mellitus	3.69	3	0.175	7.81	NS
6	Hyper-cholestrolemia	4.12	3	0.166	7.81	NS
7	Liver disease	5.12	3	0.178	7.81	NS
8	Chronic kidney disease	3.62	3	0.538	7.81	NS
9	Myocardial Infarction	4.23	3	0.356	7.81	NS
10	Bypass surgery	3.61	3	0.74	7.81	NS
11	Angioplasty	4.36	3	0.817	7.81	NS

Table 3:- Association between socio-demographic factors and troponin levels 0-6 hours after chest Pain

➤ *Association between socio-demographic factors and troponin levels 6 -12 hours after chest pain*

There is no significant association between socio-demographic variables of patients like age, gender, smoking, hypertension, diabetes mellitus, hypercholesterolemia, liver disease, chronic kidney disease, myocardial infarction, bypass surgery and angioplasty with troponin levels 6-12 Hrs after chest pain.

➤ *Association between socio-demographic factors and troponin levels 12 hours after chest pain*

There is no significant association between socio-demographic variables of patients like gender, smoking, hypertension, diabetes mellitus, hypercholesterolemia, liver disease, chronic kidney disease, myocardial infarction, and angioplasty with troponin levels 12 Hrs after chest pain. But there is a significant association between variables like age and bypass surgery with troponin levels 12 Hrs after chest pain.

➤ *Association between socio-demographic factors and troponin levels 3 hours after*

• *Admission*

There is no significant association between socio-demographic variables of patients like age, gender, smoking, hypertension, hypercholesterolemia, liver disease, chronic kidney disease, myocardial infarction, bypass surgery and angioplasty with troponin levels 3 Hrs after admission. But there is a significant association between variables like diabetes mellitus with troponin levels 3 Hrs after admission.

➤ *Association between socio-demographic factors and troponin levels 6 hours admission.*

There is no significant association between socio-demographic variables of patients like age, gender, smoking, hypertension, hypercholesterolemia, liver disease, chronic kidney disease, bypass surgery and angioplasty with troponin levels 6 Hrs after admission. But there is a significant association between variables like myocardial infarction with troponin levels 6 Hrs after admission.

**H<sub>1.1</sub>:** There is a significant association between chest pain and elevated troponin levels among patients with absence of myocardial infarction.

As per the data given no chest pain is found among the patients without MI. out of 150 patients only 4 patients are there with chest pain without MI. hence the association could not be found.

### III. DISCUSSION

➤ *Association between Chest pain and troponin levels among patients with MI*

Eta squared technique was used to determine the association between period of troponin levels and chest pain. A significant association was found between chest pain and troponin levels at 0 to 6 hours, 6 to 12 hours, after 12 hours of after chest pain and 6 hours after admission to hospital. Hence the hypothesis; There is a significant association between chest pain and elevated troponin levels among patients with myocardial infarction was accepted at 5% level of significance. Similar results were found in a study where the prevalence of cTnT elevation increased in a graded manner with increasing LV mass. Similarly, the prevalence of cTnT elevation increased with an increasing number of components of the CHF factor (history of CHF, EF <0.40, or BNP >100 pg/mL). Decreasing eGFR was also associated with increased prevalence of cTnT elevation in a steep, dose-dependent fashion.

➤ *Association between socio-demographic factors and troponin levels 0-6 hours after chest pain*

A significant association was found between socio demographic factors; Age (P < 0.001), Diabetes mellitus (P < 0.002), History of Myocardial infarction (P < 0.001), and history of Bypass surgery (P < 0.032), among patients with myocardial infarction and elevated troponin Hence the hypothesis **H<sub>3</sub>**: There is a significant association between Socio-demographic factors and elevated troponin levels among patients with myocardial infarction was **accepted** at 5% level of significance.

Similar results were found in a study done to determine Clinical Determinants of Myocardial Injury, Detectable and Serial Troponin Levels among Patients with Hypertensive Crisis. About one-third of patients with the hypertensive crisis have detectable troponin. Still, among these, less than half have troponin levels >99th percentile URL and the majority of these patients have minimal changes in serial troponin. Low BMI was associated with higher initial and serial troponin levels, and this obesity paradox was stronger among females and older patients<sup>3</sup>.

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