JAMP

Research

ASSOCIATION OF GAMMA GLUTAMYL TRANSFERASE WITH ACUTE CORONARY SYNDROME AND CORRELATION WITH IN HOSPITAL OUTCOMES

K Rajani Kumari[1], Thota Srikanth[2], Bingi Srinivas[3], P. Sammaiah[3]

[1]Associate Professor of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal, Telangana, India.
[2]Assistant professor of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal, Telananga, India
[3]Associate Professor of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal, Telananga, India

Abstract

Background: Chest pain is considered as one of the commonest cause for admitting the hospital casualty. Although, most often the acute onset chest pain is assumed to be acute coronary syndrome (ACS), of which only 15% to 25% of the patients have MI. The enzyme Gamma Glutamyl Transferase(GGT) is one of the latest molecule used for the diagnostic and more importantly in prognosticating myocardial infarction. It has gained significant importance in recent years as a marker of ACS. The Aim & Objective is to determine the frequency of raised serum Gamma Glutamyl Transferase levels in cases presenting with acute coronary syndromes To determine the possible association between raised serum GGT levels and different subsets of ACS. **Materials and Methods:** The present cross sectional study was conducted on 150 Patients admitted to Intensive coronary care unit with acute coronary syndrome in between November 2018 to January 2020. **Result:** In the present study out of 150, 46 of 60 patients with STEMI were positive for GGT. 28 of 48 patients with NSTEMI were positive for GGT while none of the unstable angina subset had a positive GGT value. P value is 0.00001. Our study population included patients admitted to the Intensive Coronary Care Unit of our hospital with Acute Coronary Syndrome during the period from November 2018 to January 2020. **Conclusion:** Gamma glutamyl transferase levels are significantly elevated above normal in patients presenting with acute coronary syndrome. GGT levels were independently correlated with STEMI and NSTEMI but had no correlation with unstable angina.

INTRODUCTION

Chest pain is considered as one of the commonest cause for admitting the hospital casualty. Although, most often the acute onset chest pain is assumed to be acute coronary syndrome (ACS), of which only 15% to 25% of the patients have MI. The most important diagnostic challenge is to differentiate between the patients having chest pain due to the non-cardiovascular reason with that of the patinets with ACS or other life-threatening conditions.

It has been observed that only 15% to 25% of the patients with chest pain have MI, most of the remaining patients of acute chest pain are very often assumed to be of acute coronary syndrome (ACS) and the most important diagnostic challenge is to differentiate the patients having ACS with the patients and in many instances diagnosis of 2% ACS

patients overlooked leading to the negative consequences. A range of diseases are considered under the acute coronary syndrome from unstable angina to ST elevation myocardial infarction. All of these have similar pathophysiology in the form of thrombus overlying a plaque leading to the sudden low blood flow to the heart and approach to treat all these diseases are fundamentally similar but with the each one having certain unique feature depending on its type. In the recent years, the accuracy and efficiency of the evaluation of patients with acute chest pain is increased with advances in medical technologies mainly owing to better biomarkers of cardiac injury.

The cardiac markers such as Troponin I, Troponin T, Myoglobin and CK-MB released as a result of cardiac cell apoptosis plays a vital role in the detection of the acute coronary syndrome (ACS). A

280

International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556

variety of molecules have been used to diagnose and prognosticate ACS ranging from LDH and myoglobin to creatine phosphokinase and troponins. The measurements of troponins are considered as the most significant and specific method to assess the acute cardiac insult however the research is still going on for other enzymes and molecules which may help in assessing the severity of the myocardial infarction. The categorization of ACS from low to high risk is imperative in not only determining the adequacy of treatment but also to avoid financial burden and inconvenience to the patients.

The enzyme Gamma Glutamyl Transferase (GGT) is one of the latest molecule used for the diagnostic and more importantly in prognosticating myocardial infarction. It has gained significant importance in recent years as a marker of ACS, it has shown correlation with a host of risk factors responsible for macrovascular diseases, primarily coronary artery disease (CAD). It has also shown promises as a new tool for risk stratification of various types of acute myocardial infarction.

Aims & Objectives

1. To determine the frequency of raised serum Gamma Glutamyl Transferase levels in cases presenting with acute coronary syndromes.
2. To determine the possible association between raised serum GGT levels and different subsets of ACS.
3. To determine the association between raised serum GGT levels and in-hospital adverse cardiovascular outcomes.
4. To determine the association between raised GGT and risk factors for acute coronary syndrome.

MATERIALS AND METHODS

Study Setting: Patients admitted to Intensive coronary care unit in Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana

Study Population: Patients with Acute Coronary Syndrome

Sample Size: 150 Patients

Inclusion Criteria

All patients admitted with an episode of Acute Coronary Syndrome in the intensive coronary care unit of Mahatma Gandhi Memorial Hospital, Warangal.

Exclusion Criteria

- History of any alcohol intake
- History of Hepatobiliary disease
- Surgical conditions causing obstructive jaundice
- Alanine Transaminase (ALT)>40U/L
- Coarse liver echotexture on ultrasonography
- History of taking drugs such as barbiturates, phenytoin, anti-tubercular drugs

Study Design: Hospital based, Cross sectional, comparative study.

Study Period: November 2018 to January 2020.

RESULTS

Distribution of the Study Population According to Gender and Correlation with GGT

Out of 150 study population 92 patients were male and 58 were female. 40 out of 92 males had a positive value for GGT (43.5%). 34 out of 58 females were positive for GGT (58.6%). The p value was .07. There was no significant correlation between gender and GGT in this study.

Table 1: correlation between gender and GGT

Sex		GCT		Total	P value
		Positive	Negative		
Male	Count	40	52	92	.070
	% within sex	43.5%	56.5%	100%	
Female	Count	34	24	58	
	% within sex	58.6%	41.4%	100%	
Total	Count	74	76	150	
	% within sex	49.3%	50.7%	100%	
	% within GGT	100%	100%	100%	

Distribution of the study population according to diabetic status and correlation with GGT

Table 2: correlation between diabetes and GGT

			GCT		Total	P value
			Positive	Negative		
Diabetes	Yes	Count	40	30	70	.073
		% within Diabetes	57.1%	42.9%	100%	
	No	Count	34	46	80	
		% within Diabetes	42.5%	57.5%	100%	
Total		Count	74	76	150	
		% within Diabetes	49.3%	50.7%	100%	

Out of 150 study population 70 patients were diabetics and 80 non-diabetics. 40 patients out of the diabetic group were positive for GGT. P value was 0.07. There was no significant correlation between diabetic status and GGT levels in this study.

Distribution of the study population according to hypertensive status and correlation with GGT

Table 3: Correlation between hypertension and GGT

			GCT		Total	P value
			Positive	Negative		
SHT	Yes	Count	48	24	72	<.01
		% within SHT	66.7%	33.3%	100%	
	No	Count	26	52	78	
		% within SHT	33.3%	66.7%	100%	
Total		Count	74	76	150	
		% within SHT	49.3%	50.7%	100%	

Out of the 150 subjects 72 were hypertensives and 78 were normotensives. 48 out of 72 hypertensives were positive for GGT. P value is 0.00004. There is significant correlation between hypertension and GGT.

Distribution of the study population based on smoking status and correlation with GGT.

Table 4: Correlation between smoking and GGT

			GCT		Total	P value
			Positive	Negative		
Smoking	Yes	Count	34	26	60	.14
		% within smoking	56.7%	43.3%	100%	
	No	Count	40	50	90	
		% within smoking	44.4%	55.6%	100%	
Total		Count	74	76	150	
		% within smoking	49.3%	50.7%	100%	

60 subjects in the study population were chronic smokers. 34 of them turned out to be positive for GGT. The p value is 0.142. There is no significant correlation between smoking and rise in GGT.

Distribution of the study population based on type of acute coronary syndrome and correlation with GGT.

In our study of 150 patients 60 had ST Elevation in their ECGs, 48 subjects suffered from NSTEMI and 42 patients had Unstable Angina.

46 out of 60 patients with STEMI were positive for GGT. 28 out of 48 patients with NSTEMI were positive for GGT while none of the unstable angina subset had a positive GGT value. P value is 0.00001.

Therefore there is a highly significant correlation between type of ACS and GGT levels with STEMI and NSTEMI showing positive values compared to unstable angina.

Table 5: Correlation between type of ACS and GGT

			GCT		Total	P value
			Positive	Negative		
Type of ACS	STEMI	Count	46	14	60	.14
		%within type of ACS	76.7%	23.3%	100%	
	NSTEMI	Count	28	20	48	
		%within type of ACS	58.3%	41.7%	100%	
	UA	Count	00	42	42	
		%within type of ACS	0	100%	100%	
Total		Count	74	76	150	
		%within type of ACS	49.3%	50.7%	100%	

DISCUSSION

The present study was carried out at Mahatma Gandhi Memorial Hospital, Warangal. The study population included patients admitted to the Intensive Coronary Care Unit of the hospital with Acute Coronary Syndrome during the period from November 2018 to January 2020. All the cases were divided into three subsets; ST elevation MI, non ST elevation MI and unstable angina based on electrocardiographic and Troponin T measurements.

Baseline gamma glutamyl tranferase levels were measured by a standardized method for all the patients. All the subjects were observed for the first five days of their hospital stay for episodes of re-infarcts, ventricular arrhythmias requiring defibrillation, cardiogenic shock requiring inotropic support, pulmonary edema and death. Multiple parameters including traditional risk factors of coronary artery disease as well as its complications were compared to GGT to look for correlation.

282

International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556

In the present study majority of participants were males (61%) and females accounted for (39%) with a male: female ratio of approximately 3:2. Amongst which 43.5% of males and 54.1% females reported elevated GGT value. Which was statistically found to be insignificant. The age group of the participants in the present study ranged between 37 to 84 and the mean age was 60.3 with peak incidence in the fifth and sixth decades. In this study there was no statistical correlation between age and GGT.

The study conducted by Emiroglu MY et al,[1] showed a positive correlation in male sex with GGT values & ACS, however correlation between age & GGT is found to be insignificant, similar findings were reported by Jain Jyoti et al,[2] & Puukka et al,[3] which showed statistically significant association of raised GGT in male patients with ACS in comparision to female patients. However study conducted by Alexander M Strasak et al,[4] showed significant relation between GGT change and CVD mortality, with markedly stronger associations to be observable for younger individuals and in contrast to this Chakraborty et al,[5] showed significant correlation of raised GGT with increasing age. The findings of present study showed that there was no statistical correlation between age and GGT.

The findings of present study showed that 48 out of the 72 hypertensives in study were positive for GGT. It showed a positive correlation between hypertensive status and GGT with a p value of 0.004.

Whereas the study conducted by Emiroglu MY et al,[1] stated that there was no correlation between hypertensive status and GGT

The results of present study showed that 34 out of the 60 smokers in the study group were positive for GGT. Since the p value was 0.3, there was found to be no statistically significant correlation between smoking and GGT. This is in accordance with the study conducted by Emiroglu et al,[1] where there was no correlation between smoking and GGT.

In the present study out of 150 patients 60 had ST elevation in their ecgs, 48 subjects suffered from NSTEMI and 42 patients had unstable angina, 46 out of 60 patients with STEMI were positive for GGT. 28 out of 48 patients with NSTEMI were positive for GGT while none of the unstable angina subset had a positive GGT value. The mean GGT value for STEMI patients was 74.03 IU/L. The mean value for NSTEMI and unstable angina were respectively 54.88IU/L and 34.90IU/L. In comparing the correlation between types of ACS and level of GGT p value was significant <0.001. The mean value in unstable angina is within normal limits. Although the mean values in the other two subsets were elevated, the mean GGT in the STEMI subset was significantly higher than the NSTEMI subset. This reveals that GGT shows promise as a sensitive diagnostic marker of STEMI.

The study conducted by Emiroglu et al,[1] showed positive correlation between types of ACS and GGT. However there was no correlation in this study between STEMI subset and NSTEMI subset. Mean value of GGT in unstable angina subset was similar to that of control group.

In the study conducted by Dogan A et al,[5] mean GGT level was higher in ACS group than control group (32 vs. 16 U/l, P=0.001). GGT values of cases presenting with MI were higher in comparison to cases with stable angina according to the study performed by Demircan S et al,[6] (p<0.002) In the study conducted by Jain Jyoti et al,[2] subjects with NSTEMI had higher prevalence of raised GGT, compared to subjects with STEMI and UA, however this association was not statistically significant.[7]

CONCLUSION

The present study results showed that the Gamma glutamyl transferase levels are significantly elevated above normal in patients presenting with acute coronary syndrome. The GGT levels were independently correlated with STEMI and NSTEMI but had no correlation with unstable angina. There is a significant correlation between GGT levels and incidence of left ventricular systolic LV dysfunction The mean value of GGT was significantly elevated in patients who suffered from major adverse cardiovascular events. Patients with significantly elevated GGT values may, in future, be referred for early invasive revascularization procedures like PCI/CABG.

In conclusion, as concerns ischemic heart disease, GGT assay seems to have the features of a good prognostic marker and it helps to improve the ability to predict adverse events in CAD. Further its prognostic impact can be utilized in risk stratification and the need for urgent therapeutic intervention.

REFERENCES

1. Emiroglu MY, Esen OB, Bulut M, Karapinar H, Kaya Z, Akcakoyun M, et al. GGT levels in type II diabetic patients with acute coronary syndrome (does diabetes have any effect on GGT levels in acute coronary syndrome?). Acta Diabetol. 2013;50(1):21-5. doi: 10.1007/s00592-010-0208-2.
2. Jyoti J, Nitin V, Shashank B, Pradeep D. Gamma glutamyl transferase in acute coronary syndrome: A cross sectional study. J Cardiovasc Disease Res. 2017;8(3):96-100
3. Puukka K, Hietala J, Koivisto H, Anttila P, Bloigu R, Niemelä O. Additive effects of moderate drinking and obesity on serum gamma-glutamyl transferase activity. Am J Clin Nutr. 2006;83(6):1351-4; quiz 1448-9. doi: 10.1093/ajcn/83.6.1351.
4. Strasak AM, Kelleher CC, Klenk J, Brant LJ, Ruttmann E, Rapp K, et al. Longitudinal change in serum gamma-glutamyltransferase and cardiovascular disease mortality: a prospective population-based study in 76,113 Austrian adults. Arterioscler Thromb Vasc Biol. 2008;28(10):1857-65. doi: 10.1161/ATVBAHA.108.170597.
5. Chakraborty S, Majumder B, Das R, Mondal P, Chatterjee S. Assessment of γ-GT functions as novel risk factor in patients suffering from angina, myocardial infarction and congestive heart failure. J Indian Coll Cardiol. 2014;4(4):199-202.
6. Dogan A, Icli A, Aksoy F, Varol E, Erdogan D, Ozaydin M, Kocyigit S. Gamma-glutamyltransferase in acute coronary syndrome patients without ST elevation and its association

283

International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556

with stenotic lesion and cardiac events. Coron Artery Dis. 2012;23(1):39-44. doi: 10.1097/MCA.0b013e32834e4ed0.

7. Demircan S, Yazici M, Durna K, Kilicaslan F, Demir S, Pinar M, et al. The importance of gamma-glutamyltransferase activity in patients with coronary artery disease. Clin Cardiol. 2009;32(4):220-5. doi: 10.1002/clc.20345.

284

International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556