www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i7.86

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Significance of Troponin I and Microalbuminuria in Acute Myocardial Infarction

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Abstract
Background: *Cardiovascular disease (CVD) includes coronary artery disease (CAD), myocardial infarction, cerebrovascular disease, hypertension and peripheral artery disease .The mortality by acute myocardial infarction is approximately by 30%. In year 2009, approximately1 of every 25 patients die in the first year of acute MI and the survival is markedly reduced in elderly patients over the age of 75.Troponin I is contractile protein found solely myocardium. It is highly tissue specific and persists in circulation for days. Microalbuminuria is associated independently with cardiovascular morbidity and mortality. We aim to examine the relation of Troponin I and microalbuminuria in acute MI.*
Aim: *To estimate the level of Troponin I and Microalbuminuria along with their correlation in patients of acute myocardial infarction.*
Material and Method: *This hospital-based study was conducted on 50 diagnosed acute MI patients and 20 serves as age and gender matched controls. Blood sample was take in plain vial and Troponin I test was done on CTK Biotech cassette, CA(USA), whereas urine sample was taken in sterilized urine container and test for microalbuminuria was done by ELISA. Results were collected and analyses statically.*
Result: *Out of 50 patients Troponin I was positive in 47 and negative in 3. All the 20 controls were negative for Troponin I. The mean value of micro albuminuria in cases group and control group were 254.39±163.48 µgm/ml and 11.1± 3.94 µgm/ml respectively with p value of <0.001. On comparing both parameters with each other we find that out of 20 patients of control group, troponin I and microalbuminuria were in normal range of all cases. In study group, troponin I was positive in 47 cases and negative in 3 cases and microalbuminuria was raised (>25ug/ml) in 38 cases and within normal range (<25ug/ml) in 12 cases. This shows that serum Troponin I and micro albuminuria shows statically significant association.*
Conclusion: *It is concluded that when the role of cardiac troponin I is compared with microalbuminuria in the evaluation of acute myocardial infraction, both are equally recommended for the early prediction, diagnoses and prognosis of the AMI.*
Keywords: *Troponin I, Micro albuminuria, Myocardial Infarction.*

Introduction

The major causes of cardiovascular disease are tobacco use, physical inactivity and unhealthy diet. Mortality estimates due to CVD vary widely by state ranging from 10% in Meghalaya to 49% in Punjab, Goa (42%) Tamilnadu (36%) and Andhrapradesh (31%). Cardiovascular disease are the leading cause of mortality and is projected to remain so worldwide[1]. Incidence increases with age. Elderly people have higher rates of morbidity[2]. Indians are four time more prone to AMI as comparable to the people of other countries due to combination of the genetic and lifestyle factors that promote metabolic dysfunction. The risk of cardiovascular disease is predicted by various factor such as age, sex, smoking ,hypertension and dyslipidemia In most of the cases, the cardiovascular changes are detected only after a person exhibits the classical symptoms and the signs of acute myocardial infarction. This clearly indicates the need for a marker which can detect the risk of cardiovascular changes in the early stage, so that an affective prevention can be made possible[3]. Necrosis of myocardial cells causes release of certain enzymes in the blood commonly called markers. The common markers include creatine kinase (CK), lactate dehydrogenase (LDH), Aspartate transaminase, Myoglobin and Troponin. From these markers most widely used in detection of myocardial infraction are CPK –MB subtypes of creative kinase and cardiac Troponin T and I, as they are more specific of myocardial injury[4]. In 2002, it was reported that Cardiac Troponin I and T are preferred marker for assessing myocardial damage, elevated troponin in the setting of chest pain predict as high likelihood of myocardial information in near future[5].Micro albuminuria is considered to be a predictor of early renal damage. Microalbuminuria is associated independently with cardiovascular morbidity and mortality is diabetes and hypertension patients[6,7,8,9]. Troponin I is contractile protein found solely myocardium. It is highly tissue specific and persists in circulation for days. Normal levels of troponin T and troponin I in blood are 0.0-0.1ng/ml and 0.0-0.4ng/ml respectively[10]. Microalbuminuria is defined as small quantities of albumin in the urine ranging from 30-300 mg/day. It is highly prevalent in hypertensive, diabetic populations, Its prevalence varies from 10-40%[11].

Microalbumiuria has been shown to increase dramatically in the first days following AMI. Its level rises during AMI peaks at first day and has rapid decline throughout first week after AMI[112]. It was correlated that Troponin I with urinary protein excretion suggesting an interrelationship between inflammatory response and tubular dysfunction[13].

Material and Method

Fifty (50) diagnosed patients were reported to the department of medicine (indoor & outdoor) of Rajindera Hospital associated with Government medical college, Patiala from year 2007-2010 with diagnostic features of AMI constituted the study group. 20 normal healthy individuals of same age and sex constituted the control group. This study started after the approval of thesis committee. From selected patients, a written consent was taken. A detailed history of the each patient was taken and all the subjects (patients+controls) were subjected to routine investigations. In special investigations serum Troponin I was estimated by rapid qualitative test, a lateral flow chromatographic immunoassay was done on CTK. Biotech cassette, CA USA) in human serum. Microalbuminuria estimation was done by enzyme immunoassay (ELISA).The independent sample t test was used to compare the mean values. Pearson correlation was applied to correct between the parameters.

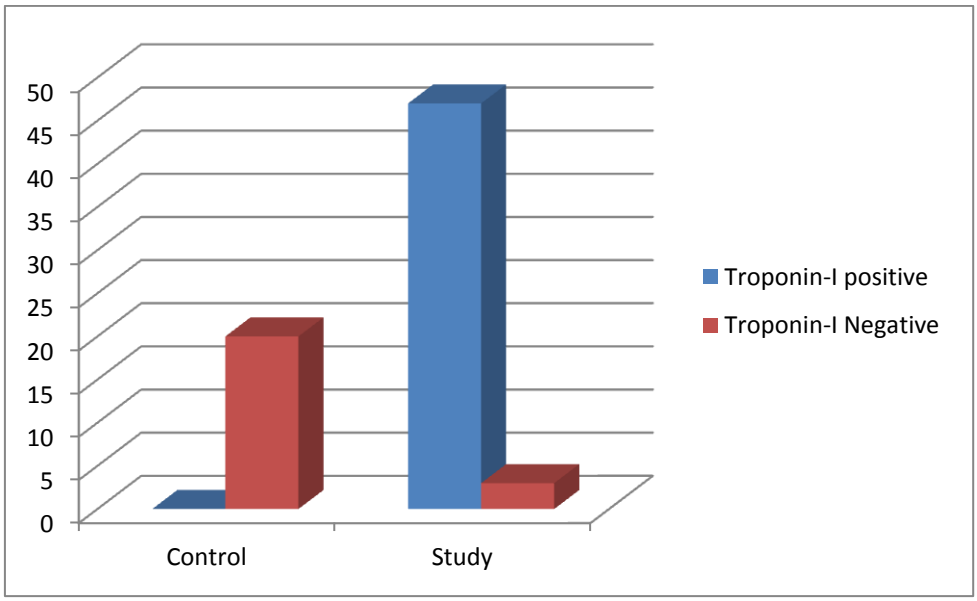
Result

Out of 50 patients Troponin I was positive in 47 and negative in 3. All the 20 controls were negative for Troponin I. The mean value of micro albuminuria in cases group and control group were 254.39±163.48 µgm/ml and 11.1± 3.94 µgm/ml respectively with p value of <0.001. On

comparing both parameters with each other we find that out of 20 patients of control group, troponin I and microalbuminuria were in normal range of all cases. In study group, troponin I was positive in 47 cases and negative in 3 cases and microalbuminuria was raised (>25ug/ml) in 38 cases and within normal range (<25ug/ml) in 12 cases. This shows that serum Troponin I and micro albuminuria shows statically significant association.

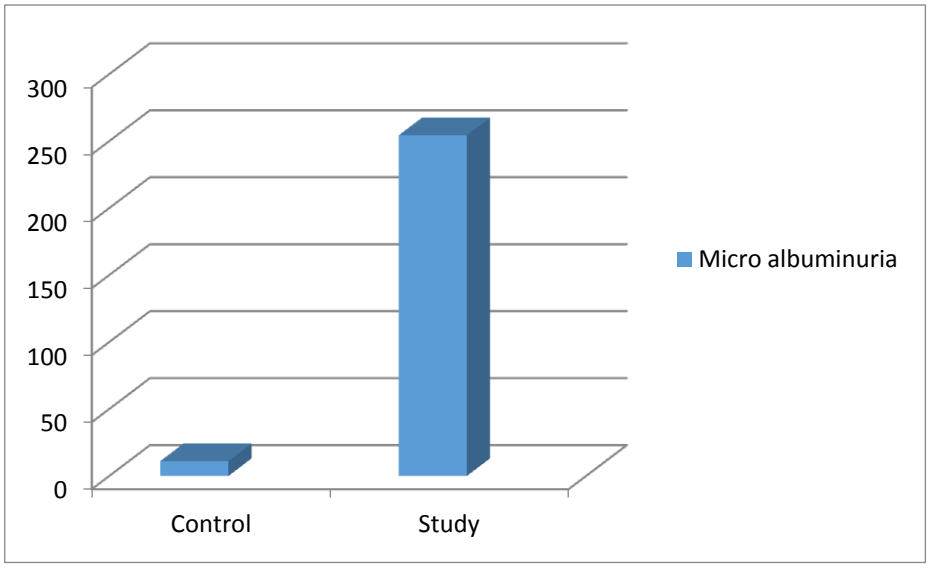
Comparison of Serum Qualitative Troponin-I Between Study and Control Group

Group	No. of cases	Troponin-I positive	Troponin-I Negative	Significance
Control	20	-	20 (100%)	X2=57.2
Study	50	47(94%)	3 (6%)	p>0.01, HS



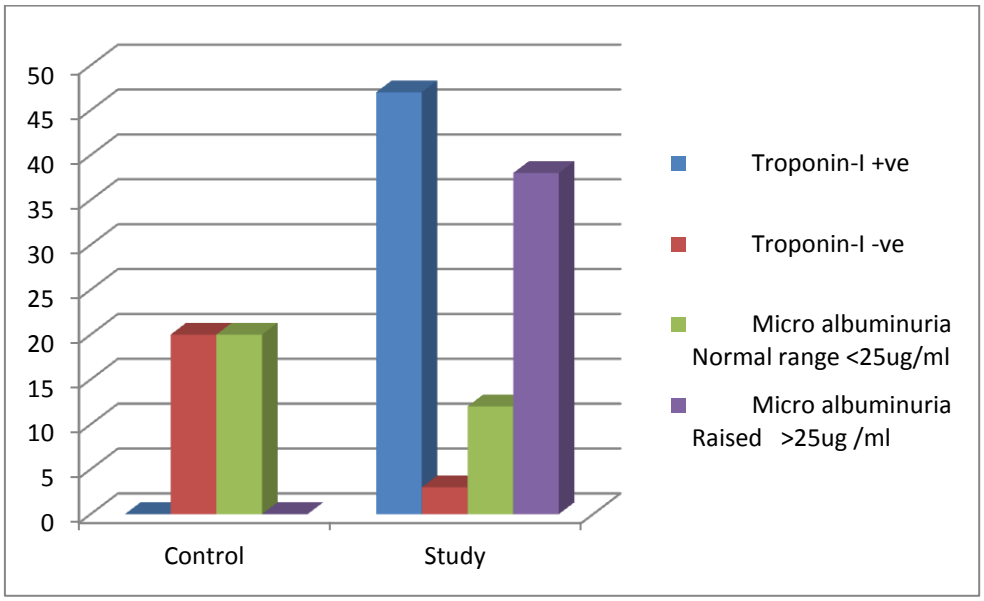
Comparsion of Microalbuminuria Between Study and Control Group

Group	Range (µgm/ml)	Mean±SD (µgm/ml)
Group I (Control)	5-18	11.1_+3.94
Group II (Study)	12.6-425	254.39+_163.48
't' value		6.63
'p' value		0.0001
Significance		HS



Comparision of Troponin I and Microalbuminuria in Study and Control Group

Group	Total cases	Troponin-I		Microalbuminuria	
		+ve	-ve	Normal range <25ug/ml	Raised > 25ug /ml
Control	20	0	20	20	0
Study	50	47	3	12	38



Discussion

Acute myocardial infarction is defined as death or necrosis of myocardial cell[14]. Necrosis of myocardial cells causes release of certain enzymes in the blood, commonly called markers. The common markers include creatinekinase (CK), lactate dehydrogenase (LDH), aspartate transaminase (AST), myoglobin and troponin[15]. One of the study also shows that novel, more sensitive and more precise cardiac troponin assays improve the early diagnosis of AMI[16.] Another study also shows that cardiac troponin is the cornerstone for ruling-out AMI in patients presenting with a suspected acute coronary syndrome (ACS), elevated cardiac troponin is frequently observed in those without clinical signs indicative of AMI, often reflecting myocardial injury of 'unknown origin'. Cardiac troponin is commonly elevated in acute non-ACS conditions, as well as in chronic diseases[17]. One another study also describes the role of troponin in the evaluation of patients with suspected myocardial infarction[18]. Different theories have been postulate to explain the increase in albumin excretion rate during acute myocardialinfarction, microalbuminuria is a early response following acute myocardial infraction[19]. One of the study shows that Microalbuminuria is a significant predictor of in-hospital morbidity and mortality in non-diabetic patients with acute myocardial infarction[20].In yet another study it was found thatmicro albuminuria measured during the first week after AMI is independently associated with increased long-term risk for in-hospital and six-month mortality. On the basis of these results, we suggest that this measurement should be included in the routine clinical work up of patients with AMI[21]. Another study shows that microalbuminuria may be useful in identifying persons at increased risk of CHD and subsequent death in the general population[22]. So keeping in mind of results of all these studies, present study was conducted with an aim to evaluate cardiac Troponin Iand microalbuminuria for the early diagnosis of the acute myocardial infarction. Considering all our finding, Troponin I vs microalbumiuria within 24 hrs and 3rd day respectively, it is evident that out of 50patients,

94% patients were found positive for troponin I and 76% Patients had that both troponin I and microalbumiuria. These observations suggest that both troponin I and microalbumiuria are better markers of markers of MI.

Conclusion

So, it is concluded that when the role of cardiac troponin I is compared with microalbumiuria in the evaluation of acute myocardial infarction, both are equally recommended for the early prediction, diagnoses and prognosis of the AMI.

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