

Short Term Effects of Elevated Serum Homocysteine in Patients with Acute Coronary Syndrome

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ABSTRACT

Background and objective: However Hyperhomocysteinemia is a hazard factor for cardiovascular disease; it isn't known whether it is related to hazards cardiac outcome in acute coronary syndrome. To determine the short term (28days) effects of either raised or normal homocysteine levels in the acute coronary syndrome patients.

Methodology: Present descriptive study was held at cardiology department of Liaquat University of Medical and health Science. Study duration was seven months from July 2017 to January 2018. Patients having acute coronary syndrome and either of gender were included. Blood sample was taken from each patient for Homocysteine level. Homocysteine level >15 µmol/L was defined as raised and its short term effects were noted among patients of acute coronary syndrome. Patients were followed during Hospital stay and through OPD for 28 days. Data was entered in the self-made proforma.

Results: Mean age of enrolled patients was 54.84±10.55 years. Males were commonest 72.5%. Homocysteine level >15mmol/l was in 57.50% patients. Short term effects as arrhythmias were 14.2% and re-infarction was in 4.2% patients, while mortality rate was 2.4%. These short term effects were significantly related to elevated Homocysteine level (>15 µmol/L) (p=0.058).

Conclusion: Raised homocysteine level was highly prevalent in acute coronary syndrome and it was markedly linked to short term effects including re-infarction, arrhythmias and mortality as compare to those having normal homocysteine level.

Keywords: Acute coronary syndrome, short term, homocysteine

INTRODUCTION

Acute coronary syndrome (ACS) remains to be a key coronary artery disorder (CAD),¹ with significant public concerns in morbidity, mortality, and expenditure.² It is marked by general malaise, epigastric discomfort, chest pain, anxiety and sweating. Different predisposing risk factors such as physical activity, diabetes, hypertension, alcohol consumption, high-risk diet, abnormal lipids, family history, obesity, age, psychosocial stress and smoking may trigger these symptoms.² Homocysteinemia remains to be independent risk predictor for Ischemic cardiac disease (IHD),³ in addition to the presence of hypercoagulability states and atherosclerotic vascular disease. Atherosclerotic disorder involving cerebrovascular, peripheral and coronary system is a key health challenge among adults, both in underdeveloped and developed countries.⁴ There is a clear correlation in between raised plasma homocysteinemia concentrations and high risk of atherosclerosis and, thus, coronary artery disease.⁵ Homocysteine promotes atherosclerosis via triggering oxidative endothelial disruption, modifying blood clotting, and vascular matrix degradation, thus fostering thrombus-embolic disorders.⁶ Among healthy people, a total plasma homocysteine of 5 to 15 mmol / L has been observed.⁷ Regulation of common risk indicators (e.g. lipids, smoking, etc.) has resulted in a reduction of CAD occurrence in developed nations. Although it is impossible to avoid the development of CAD among all subjects via active management of risk indicators within general population. Many case-control research has suggested reliably the homocysteine contribution as a risk indicator for CAD, and very few studies have as well shown a complete non-association between both of them.^{8,9} However, in a study of stated that significant association between CAD and elevated serum homocysteine, a fresh study executed at Aga Khan University Hospital(AKUH) laboratory revealed no correlation amid CAD and hyper homocysteinemia within Pakistani Acute myocardial infarction (AMI) cases.¹¹ In addition, the documented impact of elevated homocysteine over endothelium, observed most drastically in homocystinuria, can lead to a further severe IHD pattern after discharge, leading to quick re-infarction and mortality during follow-up time.¹² The intent of current research is thus to determine the short-term (28days) outcomes (arrhythmias re-infarction, and cardiac death) in the acute coronary syndrome patients having normal plasma homocysteine versus elevated plasma homocysteine.

MATERIALS AND METHODS

This descriptive study was carried out at the department of cardiology of Liaquat University of Medical and health Sciences. Approval was obtained form ethical review board committee. Study duration was seven months from July 2017 to January 2018. Total 120 patients were incorporated and this sample size was done by the proportion of 10% CAD risk within population with raised homocysteine¹³ with 5% error of margin and 95% of confidential interval. Patients with acute coronary syndrome, age of >20 years, and either of gender were included. Patients with intake history of folic acid, vitamin B12, including methotrexate, anticonvulsants and hyper/hypothyroidism were excluded. Comprehensive history of duration, severity and frequency of chest pain, presence of risk factors for MI, exercise tolerance and history of prior MI was taken. Complete clinical examination was done to assess the absence or presence of heart failure and/or presence of associated heart lesion. Following all ascetic procedures, a recording by 12-lead ECG was obtained and 3 ml venous blood sample was taken from each patient for homocysteine level. Homocysteine (5 to 15 µmol / L) was taken as normal and above 15 µmol / L was assumed to be elevated. Among patients with STEMI, UA, ACS, and NSTEMI, short-term (28-day) outcomes (arrhythmias, re-infarction, and cardiac death) were recorded. Every discharged patient was followed on the basis of phone calls and OPD. All the information was recorded via self-made proforma. Data analysis was done via SPSS version 21. Chi-square test was applied and p-value ≤0.05 was taken as significant.

RESULT

Total 120 subjects were recruited in the study. Mean age of patients was 54.84±10.55 years with age range of 35 to 80 years. Males remained in majority 72.55% contrasted to females 27.5%. Table.1

In the study population 55.0% of ACS patients were found to be suffering from STEMI, 44.2% with NSTEMI and only one patient presented with unstable angina. Table.2

Mostly patients were managed normally, while 14.2% cases revealed re-infarction, 4.2% cases exhibited arrhythmias and 3 subjects lost their lives. Mortality, arrhythmias and re-infarction were significantly correlated with raised Homocysteine level >15mmol/L (p=0.058). Out of 17 patients of re-infarction, 13 had Homocysteinemia and in 5 patients of arrhythmias four had Homocysteinemia. All the died patients had Homocysteine level >15mmol/l. Table.3.

Table.1. Age statistics of the patients n=120

Mean	54.84 years
Std. Deviation	10.55 years
Minimum	35.00 years
Maximum	80.00 years

Table.2. Coronary syndrome among patients n=120

Coronary syndrome	Frequency	Percent
NSTEMI	53	44.2%
STMI	66	55.0%
UA	01	0.8%
Total	120	100.0

Table.3. Short term effects as per Homocysteine level n=120

Short term effects	Homocysteine level		Total	p-value
	<15mmol/l	>15mmol/l		
Normal	46	49	95	0.058
Re-infarction	4	13	17	
Arrhythmias	1	4	5	
Death	0	3	3	

DISCUSSION

Homocysteine concentration is a major predictor of mortality among subjects with acute coronary syndrome (ACS), admitted to the hospital. In this short term (28days) effects of raised homocysteine were observed among patient of ACS, including NSTEMI, and UA, having normal plasma homocysteine with elevated concentration of plasma homocysteine. In present study STEMI cases were 55.0% and NSTEMI cases 44.2%, whereas only a single case was observed UA presentation. Lashari MN et al¹³ also found STEMI 48%, non STEMI 30% and UA 22%. In this study Males (72.55%) remained in majority contrasted to females (27.5%). Similarly Hoo FK et al¹⁴ found 71.7% males and 28.3% females. Lashari MN et al¹³ observed ACS more among males 61% in contrast to females 39%.

In this study homocysteine level >15mmol/l was in 57.50% patients, which was higher from findings of Sinha SK et al¹⁵ as 19.2%. This difference may due to age difference because mean age of this study was Mean age of patients of this study was 54.84 years 54.84±10.55 years and mean of above mentioned study was 26 ± 3.9 years. However Kumar A et al¹⁶ reported that

Incidence of raised homocysteine level was 83.3% among patients with myocardial infarction. In current study, most cases (79.2%) were managed normally, 14.2% patients revealed existence of re-infarction, 4.2% revealed arrhythmias and 3 patients lost their lives. Mortality, arrhythmias and re-infarction had a significantly association with elevated Homocysteine concentration >15mmol/l (p-value 0.058). In contrast, an earlier prospective research of Nygård et al,¹⁷ on association between the survival in cases with established CAD and concentration of homocysteine revealed a strong correlation amid mortality and homocysteine concentration. Al Obaidi MK et al¹⁸ also reported a positive correlated of greater risk of ischemic myocardial injury with raised homocysteine concentrations in ACS cases. Cantin J-P et al¹⁹ reported obstructing thrombus in nearly all AMI patients and in necropsy materials of sudden cardiac deaths. Thus, haemostatic factors have a crystal clear contribution in pathophysiology of disease. Boushey et al²⁰ also reported that risk for CAD further increases, in case of further hyperhomocysteinemia, if there is any other risk factor such as hypercholesterolemia or smoking. We also observed similar findings. Recent studies stated that plasma homocysteine concentration is associated with carotid intima-media thickness, the severity of CAD and arterial stiffness.²¹⁻²³ However inconsistently in a previous study of Stubbs PJ et al²⁴ reported that there is no link between cardiac death and level of homocysteine during 28 days. Although in a meta-analysis it is concluded that Elevated homocysteine concentration was correlated with all-cause mortality and a raised risk of MACE among ACS cases.²⁵ Though, the correlation of raised homocysteine concentration with cardiovascular mortality among ACS cases should be further confirmed by future studies.²³

CONCLUSION

Raised homocysteine level was highly prevalent in patients of acute coronary syndrome and it was markedly linked to short term effects including re-infarction, arrhythmias and mortality as compare to those having normal homocysteine level. Homocysteine level should be screened in starting of treatment to decrease hazards short term outcome.

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