INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

Volume: 2: Issue-4: Oct - Dec -2011 IJABPT *ISSN 0976-4550*

PLASMA HOMOCYSTEINE AND TRADITIONAL RISK FACTORS IN YOUNG ACUTE MYOCARDIAL INFARCTION PATIENTS

Veerendra Kumar Arumalla[1] and K. Rajashekar Reddy[2]

[1]Department of Biochemistry, Shri Sathya Sai Medical College and Research Institute, Ammapettai, 603108, Kancheepuram(Dt) , Tamil Nadu. India.

[2]Department of General Medicine, Mediciti Institute of Medical Sciences, Ghanpur, 501401, Rangareddy(Dt) , Andhra Pradesh. India.

BACKGROUND: The present study was designed to find out association between the plasma homocysteine and traditional risk factors in young acute myocardial infarction patients.

MATERIALS AND METHODS: The study included 50 male patients of less than 40 years old, who were fulfilling the WHO criteria for acute myocardial Infarction presenting within 48 hours and 50 age sex matched controls. Plasma homocysteine levels were studied in addition to the traditional risk factors among the study and control groups.

RESULTS: The prevalence of hyper homocysteinemia was 66% in the study subjects. Plasma homocysteine levels were significantly increased in patients with smoking ($p=<0.001$), alcoholism($p=<0.003$),) dyslipidemia($p=<0.006$) and obesity($p=<0.024$). Elevation of homocysteine levels in patients with Diabetes mellitus, Hypertension and family history of CAD (coronary artery disease) was not significant.

CONCLUSION: In the present study significantly higher level of homocysteine was found in smokers, patients with alcoholism, dyslipidemia and obesity. However, there was no significant elevation was found in Diabetes mellitus, Hypertension and family history of CAD. Thus, plasma homocysteine should be evaluated in all young patients of myocardial infarction especially in the absence of traditional risk factors.
KEY WORDS: Acute myocardial infarction, young adults, homocysteine, traditional risk factors.

INTRODUCTION

Coronary artery disease (CAD) has become a major health problem all over the world. It is the most common cause of mortality in the entire world [1]. The prevalence of CAD is four-fold higher in urban India and two-fold higher in rural India than in the United States [2]. The incidence of CAD in the young has been reported to be 12%–16% in Indians [3, 4]. About 50% of the CAD-related deaths in India occur below the age of 50 years, and about 25% of acute myocardial infarction in India occurs under the age of 40 years [5, 6]. Although traditional risk factors such as hyperlipidemia, smoking, hypertension, and diabetes mellitus are thought to explain most CAD, 15% to 20% of those with CAD have no identifiable risk factors and therefore miss the opportunity for primary prevention [7].

For this reason, epidemiologists and biologists have tried to identify other risk factors that predict a portion of CAD events that might improve primary prevention efforts. Elevated plasma homocysteine level is a suggested and biologically plausible candidate.

This study was carried out to assess the homocysteine levels in CAD patients and to compare these with conventional risk factors such as hypertension, smoking, diabetes, obesity, family history and abnormal lipid profile. Present study was conducted in CAD patients less than 40 years of age in Indian population who had acute myocardial infarction.

MATERIALS AND METHODS

Present study involved 50 male patients aged 40 years or less admitted to Mediciti Institute of Medical Sciences Hospital, Ghanpur, R.R. District, Andhra Pradesh, with diagnosis of acute myocardial infarction. Informed consent was taken from all the subjects and the study was approved by the Institutional Ethical Committee. Previous history of diabetes, smoking, hypertension, positive family history, and hospitalization for ischemic heart disease, were noted in all the subjects.

Inclusion Criteria

1. Patients aged 40 years or less
2. Patients fulfilling WHO criteria for acute myocardial infarction which requires at least two of the three elements presenting within 48 hours a) History of ischemic chest discomfort b) Serial ECG changes c) Elevated cardiac enzymes

Exclusion Criteria

1. Patients aged more than 40 years.
2. Patients with BMI > 25 kg/m2 were considered as obese.
3. Patients on drugs such as methotrexate, anticonvulsants.
4. Patients with hyper/hypothyroidism

The following parameters were studied

Smoking: In terms of pack years, smoking index

Diabetes mellitus

1. Known diabetics on treatment
2. Newly detected Diabetes mellitus cases satisfying WHO criteria

Hypertension

1. Known hypertensives on treatment
2. Newly detected hypertension according to JNC VII criteria [8].

Family history of coronary artery disease (CAD)

Alcoholism: Amount, duration and the type of alcohol in the form of Rum, Whisky, Brandy, Vodka, Gin, Arrack, etc consumed was enquired, those subjects who consumed more than half bottles of these spirits daily (or intermittently with abstinence of 2-3 days), for more than 5 years were considered as alcoholics.

Obesity: Patients were classified as normal and obese based on body mass index. BMI = Weight (kg)/height (m^2). Patient with BMI > 25 kg/m2 were considered as obese.

Dyslipidemia

According to US National Cholesterol Education Program Expert Panel (NCEP-ATP III) guidelines, patients were considered to have dyslipidemia when a). Total cholesterol > 200 mg%, b). HDL < 40 mg %, c). LDL > 100 mg%d). Triglycerides > 150 mg%.

Fasting plasma homocysteine : Estimation was done by Fluorescence polaraization immunoassay (FPIA –ABBOTT –AXSYM- USA). Plasma homocysteine level >15 µmoles/L was considered as hyperhomocysteinemia [9].

Statistical analysis was performed using SPSS version 17.0 statistical package for windows. Un-paired t test for independent samples was used in comparing data between two groups. All p values were two tailed and values of <0.05 were considered to indicate statistical significance.

RESULTS

Distribution of different risk factors among the study group was shown in table 1. Mean age of the patients was 37.5± 2.9 years. The hyperhomocysteinemia was found in 66% of the patients with acute myocardial infarction. Mean homocysteine levels in the study group was 19.69 ± 6.94 µmol/L. In the present study smoking was the predominant risk factor followed by alcoholism and dyslipidemia as shown in the table 1. Association of homocysteine with respect to the conventional risk factors was shown in table 2. There was significant elevation of homocysteine in patients with smoking followed by alcoholism, dyslipidemia and obesity. There was no significant elevation of homocysteine in patients having risk factors like Diabetes mellitus, Hypertension and family history of CAD.

Table 1: Comparison of risk factors among patients

Risk Factors	Number of Cases	(%)Percentage
Smoking	34	68
Diabetes Mellitus	7	14
Hypertension	8	16
Dyslipidemia	17	34
Obesity	1	2
Alcoholism	22	44
Family history of C A D	4	8

Table 2: Homocysteine levels with respect to conventional risk factors among the study subjects

Risk Factors	(%)Percentage	Homocysteine levels (mean ±SD)	p value
Smoking + *	68%	24.11 ± 5.6	<0.001
-	32%	18.79 ± 7.7	
Diabetes Mellitus +	14%	19.5 ± 7.45	0.938
-	86%	19.72 ± 6.94	
Hypertension +	16%	23.97 ± 7.38	0.056
-	84%	18.87 ± 6.63	
Dyslipidemia +	34%	23.34 ± 8.02	0.006
-	66%	17.81 ± 5.5	
Obesity +	2%	19.69 ± 6.94	0.024
-	98%	18.54 ± 6.5	
Alcoholism +	44%	19.11± 6.65	0.003
-	56%	26.13± 7.54	
Family history of C A D +	8%	22.3 ± 11.23	0.513
-	92%	19.46 ± 6.5	

*+ Presence of a risk factor, - Absence of a risk factor

DISSCUSSION AND CONCLUSION

In our study smoking was the most common risk factor with prevalence of 68% in patients, this is in accordance with other studies by Mishra[10], Puri[11], and Al. Khadra [12]. The association of homocysteine with traditional risk factors like smoking, dyslipidemia is in accordance with study by Puri et al [11].

Association of homocysteine with alcoholism was in accordance with Cravo ML et al [13]. Study done by Boushey et al. based on meta analysis of 27 studies indicated that an elevation in homocysteine levels >15 µmol/L was associated with an increased risk of CHD, peripheral arterial disease, stroke and venous thromboembolism[14]. It was calculated that 10% of all CAD risk in population was due to elevated homocysteine. Prolonged lowering of homocysteine by 3-4 µmol/L was associated with a 30-40% reduction in risk of CAD [15].

In the present study significantly higher level of homocysteine was found in smokers, patients with alcoholism, dyslipidemia and obesity. However, there was no significant association between hyperhomocysteinemia and other conventional risk factors like Diabetes mellitus, Hypertension and family history of CAD. Thus, plasma homocysteine should be evaluated in all young patients of myocardial infarction especially in the absence of traditional risk factors and it should be considered as an independent risk factor for development of future CAD. Further large scale randomized multicentered studies are yet to be done to understand the proper association between homocysteine and conventional risk factors in young individuals with myocardial infarction.

REFERENSES

1. WHO. The global burden of disease, update 2004; 11-12.
2. Goel PK, Bharti BB, Pandey CM, Singh U, Tewari S, Kapoor A, et al. A tertiary care hospital-based study of conventional risk factors including lipid profile in proven coronary artery disease. Ind Heart J 2003; 55: 234-240
3. Mammi MV, Pavithran K, Rahiman PA, Pisharody R, Sugathan K. Acute myocardial infarction in North Kerala- a 20-year hospital based study. Ind Heart J 1991; 43: 93-96.
4. Negus BH, Willard JE, Glamann DB, Landau C, Snyder RW2nd, Hillis LD, et al. Coronary anatomy and prognosis of young asymptomatic survivors of myocar-dial infarction. Am J Med 1994; 96: 354-358.
5. Murray CJL, Lopez AD. Global comparative assess-ments in the health sector. Geneva, Switzerland, WHO 1994
6. Enas EA, Senthilkumar A. Coronary artery disease in Asian Indians: an update and review [online]. Internet J Cardiol 2001
7. Smith SC Jr. Current and future directions of cardio-vascular risk prediction. Am J Cardiol. 2006; 97: 28A-32A
8. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7): May 2003, NIH publication No.03-5231.
9. Silvia Lonati, Cristina Novembrino, Silvia Ippolito et al, Clinical Chemistry and Laboratory Medicine. 2004:Volume 42, Issue 2, Pages 228–234.
10. Mishra SK, Rath PK, Mohanty NK, Mishra HN. Acute myocardial infarction inyoung patients. Indian Heart J 2003; 55(5): 359.
11. Puri A, Gilhotra HS, Singh S, Narain VS, et al. Smokers with premature coronary artery disease: Correlation with Novel Risk Factors. Indian Heart J 2003; 55(5): 414.
12. Al khadra AH. Clinical profile of young patients with acute myocardial infarction in Saudi Arabia. Int J. Cardiol 2003; 91(1): 9-13.
13. Craro ML, Gloria LM, Slehub J et al. Hyperhomocystenemia in chromic alocoholism : correlation with folate, vitamin B12 and vitamin B6 Am clin Nuir 63: 220-124.
14. Boushey CJ, Beresford SAA, Omenn GS et al. A quantitative assesment of plasma homocysteine as a risk factor for vascular disease. J Am med Assn 1995; 274: 1049-1057.
15. Tambe AB. Homocysteine and atherosclerotic vascular disease. Cardiology Today 2000; 4: 269-71.