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ORIGINAL RESEARCH

Assessment of homocysteine as a risk factor in acute vascular events

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Abstract

Background: Homocysteine (Hcy) is a four-carbon amino acid with a free thiol group, which is formed by demethylation of methionine, an essential amino acid derived from dietThe present study was conducted to assess homocysteine as a risk factor in patients with acute vascular events.

Materials & Methods: 80 patients underwent estimation of fasting plasma homocysteine estimation was done by fluorescence polarization immunoassay. Symptoms and risk factors such as hypertension, smoking, alcohol, diabetes, BMI and family history was recorded.

Results: Out of 80 patients, males were 50 and females were 30. Symptoms were breathlessness in 52, headache in 58, chest pain was seen in 35 and palpitations in 47. The difference was significant (P< 0.05). Risk factors were alcohol in 26, smoking in 22, dyslipidaemia in 68, family h/o of CAD in 42, hypertension in 38 and diabetes in 34. The difference was significant (P< 0.05). The mean plasma homocysteine level in hypertension was 24.2, in smokers was 32.5, in dyslipidaemia was 24.8, in diabetes was 22.9, in alcoholics was 25.6 and in family h/o of CAD patients was 29.4.

Conclusion: Authors found that plasma homocysteine is an independent risk factor for the development of acute vascular event. Assessment of plasma homocysteine may be useful in preventing CAD.

Key words: Arterial disease, Homocysteine, CAD

Introduction

Arterial disease usually due to atherosclerosis, is the most prevalent chronic disease in the developed world and is rapidly increasing in importance in the developing world. Only about two-thirds of all episodes of symptomatic atherothrombotic vascular disease in developed countries can be attributed to established genetic and environmental vascular risk factors.[1]An additional causal vascular risk factor may be raised plasma levels of homocysteine (hyperhomocysteinaemia).[2] Although 30 years have elapsed since hyperhomocysteinaemia (and homocystinuria) were first associated with an increased risk of atherothrombotic vascular disease, it is only recently that sufficient evidence has mounted to suggest that the association is independent and dose-related and it remains to be established whether it is causal and modifiable. WHO and World Bank data indicate that in India deaths attributed to coronary and cerebrovascular disease have increased markedly with the expanding population and will continue to increase.[3]

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Homocysteine (Hcy) is a four-carbon amino acid with a free thiol group, which is formed by demethylation of methionine, an essential amino acid derived from diet.[4] Normal total Hcy (tHcy) concentrations range from 5-15 µmol/L in the fasting state.[5] Hyperhomocysteinemia (HHcy) has been classified into moderate (plasma tHcy concentrations of 15-30 µmol/L), intermediate (plasma tHcy concentrations of 31-100 µmol/L), and severe. Both acquired and genetic factors can have an impact on plasma tHcy.6The present study was evaluatedhomocysteine as a risk factor in patientswith acute vascular events.

Materials & Methods

The present study consisted of 80 patients of both genders. All gave their written consent for the participation in the study. Inclusion criteria was ischemic heart disease,peripheral vascular disease, deep vein thrombosis and pulmonary thromboembolism

Data such as name, age, gender etc. was recorded. Parameters such ad cardiac enzymes-CKMB, blood urea, serum creatinine &coagulation profile were performed.Symptoms and risk factors such as hypertension, smoking, alcohol, diabetes, BMI and family history was recorded. Fasting plasma homocysteine estimation was done by Fluorescence polarization immunoassay. Plasma homocysteine level greater than 15µmoles/L was considered as hyperhomocysteinemia. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 80		
Gender	**Males**	**Females**
Number	50	30

Table I shows that out of 80 patients, males were 50 and females were 30.

Table II Assessment of parameters

Symptoms	Number	P value
Breathlessness	52	0.03
Headache	58	
Chest pain	35	
Palpitations	47	

Table II shows that symptomswerebreathlessnessin 52, headache in 58, chest pain was seen in 35 and palpitations in 47. The difference was significant (P< 0.05).

Table III Assessment of risk factors

Risk factors	Number	P value
Alcohol	26	0.91
Smoking	22	
Dyslipidaemia	68	
Family h/o of CAD	42	
Hypertension	38	
Diabetes	34	

Table III, graph I shows that risk factors were alcohol in 26, smoking in 22, dyslipidaemia in 68, family h/o of CADin 42, hypertensionin 38 and diabetesin 34. The difference was significant (P< 0.05).

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Graph I Assessment of risk factors

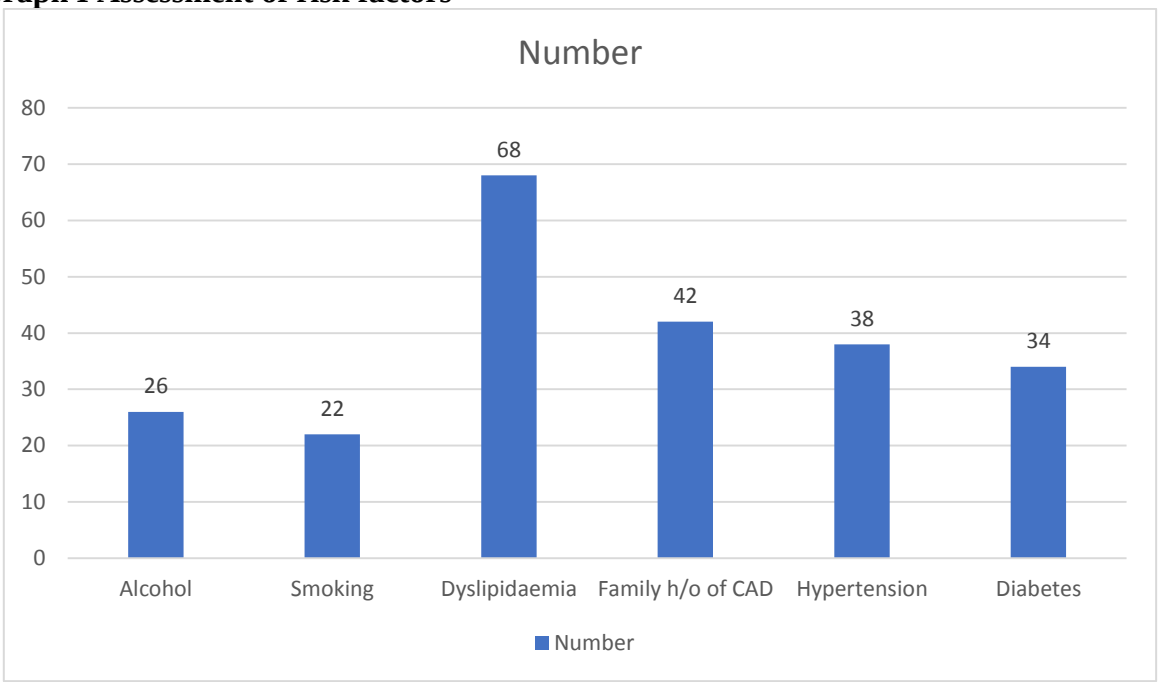

Table IV Assessment of plasma homocysteine level

Risk factors	Mean	SD
Hypertension	24.2	2.1
Smoking	32.5	4.3
Dyslipidaemia	24.8	1.9
Diabetes	22.9	3.7
Alcohol	25.6	4.2
Family h/o CAD	29.4	6.2

Table IV shows that mean plasma homocysteine level in hypertension was 24.2, in smokers was 32.5, in dyslipidaemia was 24.8, in diabetes was 22.9, in alcoholics was 25.6 and in family h/o of CAD patients was 29.4.

Discussion

Although atherosclerotic arterial disease can cause stable or slowly progressive clinical syndromes, such as stable angina and intermittent claudication, the main clinical burden consists of acute, usually ischemic, vascular events.[2] Acute arterial vascular events are the leading cause of premature death and disability in the developed world.[3]Major risk factors for CVDs are sedentary life style, cigarette smoking, alcohol, hypertension, high LDL cholesterol and diabetes mellitus.[7] Evidence from retrospective and prospective clinical studies indicates that elevated levels of homocysteine are associated with increased risk of CAD, Ischemic stroke and peripheral vascular disease.[8]The present study was conducted to assess homocysteine as a risk factor in patientswith acute vascular events.

We found that out of 80 patients, males were 50 and females were 30. Symptoms were breathlessness in 52, headache in 58, chest pain was seen in 35 and palpitations in 47. There has been an indication towards a significant correlation between hyperhomocysteinemia and cardiovascular disease and its complications such as heart attacks and strokes.[9] It is believed that hyperhomocysteinemia leads to endothelial cell damage, reduction in the flexibility of vessels, and alters the process of haemostasis. Hyperhomocysteinemia may lead to an enhancement of the adverse effects of risk factors like hypertension, smoking, lipid and lipoprotein metabolism, as well as promotion of the development of inflammation.[10] The

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prevalence of hyperhomocysteinemia may vary significantly between populations, and most likely depend on age, diet, and genetic background as well. Increasing age, male sex, smoking, coffee consumption, high blood pressure, unfavourable lipid profile, high creatinine and faulty diet are some of the factors associated with increased homocysteine levels.[11,12]Ashjazadeh et al[13] found that the mean fasting Hcy levels was significantly higher in the cases than in the controls. The mean Hcy levels was elevated significantly in those with cardioembolic strokes compared with the controls. The plasma Hcy level was associated with an adjusted odds ratio of 2.17 for Hcy above 15 μmol/L concentration for all types of stroke.
We found that risk factors were alcohol in 26, smoking in 22, dyslipidaemia in 68, family h/o of CAD in 42, hypertension in 38 and diabetes in 34. The mean plasma homocysteine level in hypertension was 24.2, in smokers was 32.5, in dyslipidaemia was 24.8, in diabetes was 22.9, in alcoholics was 25.6 and in family h/o of CAD patients was 29.4.Patil et al[14] found that most of the cases are between the age group of 60-69 years (55%). Youngest patient in this study is 20 years old. Males comprising 72%. Dyslipidemia (62%) was the most common risk factor followed by Smoking (53%). Hypertension (50%) and Diabetes mellitus (41%) are observed. Family h/o CAD (20%) was present and only (14%) patient was alcoholic. Overweight is present among 41% of patients. In this study significant number of patients (72%) have hyperhomocysteinemia. 47% of patients are moderate and 23% are intermediate. Only 2 patients have severe hyperhomocysteinemia. Mean plasma homocysteine level was 11±3μmol/L and is statistically significant. The mean plasma homocysteine was high among smokers when compared to non-smokers difference was highly significant. No much significant difference was noted in mean values of homocysteine among patients with other high- risk factors, such as alcohol consumption, diabetic, dyslipidaemia, BMI, family history of CAD. Hyperhomocysteinemia is seen in 38 out of 51 patients with cerebrovascular disease, 32 out of 42 patients with cardiovascular disease, one of 4 patients with peripheral arterial disease and one with deep vein thrombosis.
The limitation the study is small sample size.

Conclusion

Authors found that plasma homocysteine is an independent risk factor for the development of acute vascular event. Assessment of plasma homocysteine may be useful in preventing CAD.

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