

Relationship between Homocysteine and Vitamin B₉ Level in Male CHD Patients and Compare with Normal Healthy Male Subjects

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Abstract- Present study conducted on coronary heart disease patients. plasma homocysteine concentrations and relationships to vitamin B₉ that serve as coenzymes in homocysteine metabolism. Results showed that homocysteine exhibited strong inverse association with plasma folate. plasma homocysteine level varied from 6.8 to 18.7 μmol/L with mean as 12.92 ± 3.61 μmol/L in normal control male subject. The mean plasma homocysteine level was increased to 18.89 ± 2.24 μmol/L with a range of 14.0 to 21.51 μmol/L in normal control males subjects aged between 46-70 year, increase in the homocysteine level was statistically significant as compared to that of normal subjects above stated as evident by P-value (P < 0.001). The mean plasma Homocysteine level was found to be 23.48 ± 1.62 μmol/L with a range of 20.64 to 25.54 μmol/L in CHD male subjects aged between (25 to 45 years). The increase Plasma homocysteine concentration in CHD patients was statistically significant as compared to normal control more subjects with age difference as evident by P-Value (P < 0.001). The increase was statistically highly significant as compared to control group. while it ranged from 6.80 to 21.51 μmol/L as evident by P-value (P < 0.001). CHD. The mean serum folic acid (vit. B₉) level was found to be 6.98 ± 1.54 ng/ml with a range of 4.82 to 9.12 ng/ml in normal control male subjects aged between 25 to 45 years. Plasma homocysteine and vitamin B₉ was estimated by high performance liquid chromatography. Estimation of homocysteine and serum vitamin B₉ is reliable, economic and sensitive and it can be used in proper management of chronic complications of coronary heart disease. HPLC grade kits.

Index Terms- Coronary heart disease, homocysteine vitamin B₉, HPLC.

I. INTRODUCTION

The main forms of CVD are coronary heart disease (CHD) and stroke. About half of all deaths from CVD are from CHD and about a quarter are from stroke^[1] Coronary artery disease has become a major health problem and is the most common cause of mortality and morbidity in the entire world^[2]. Cardiovascular disease is the leading cause of death and disability in the developed nations and is increasing rapidly in the developing world^[3]. Hyperhomocysteinemia is defined as total Homocysteine concentration elevated above 15 micro mol/L. Hyperhomocysteinemia has been strongly associated with the

pathogenesis of coronary vascular disease, and correspondingly has been identified as a contributing factor in four main disease mechanisms including thrombosis, vascular oxidative stress, apoptosis and cellular proliferation.^[4-6] Impaired enzyme function as a result of Genetic mutation or deficiency of the B vitamins folic acid, vitamin B₁₂, and B₆ can lead to hyperhomocysteinemia. Oxidized forms of Homocysteine account for 98-99% of total plasma Homocysteine although there is un certainty as to whether increased Homocysteine is casual or merely a proxy for cardiovascular disease, several lines of evidence suggest that it may play a role in atherothrombotic disease. Homocysteine appears to alter the anticoagulant properties of endothelial cells to a procoagulant phenotype. Mildly increased Homocysteine causes dysfunction of the vascular endothelium. folic acid effectively lowers Homocysteine concentration in the plasma. Intervention studies are urgently needed to determine if lowering Homocysteine is effective in decreasing the morbidity and mortality of cardiovascular disease.^[7]

II. MATERIAL & METHODS

The present study was conducted on 50 patients of coronary heart disease of HRMC, S.P. Medical college, Bikaner and 50 persons are healthy subjects between the age group 25-70 years of both sexes.

Determination of plasma homocysteine- For the determination of homocysteine, the sample is reduced and derivatized in one step. The albumin bound and the oxidized homocysteine is reduced. During a precipitation step high molecular substances are removed and analysed by high performance liquid chromatography with uv detector.

Determination of Serum vitamin B₉- Detection was performed with a photodiode array detector monitoring the eluent 280 nm for folic acid. Identification of resolved peaks in real samples was executed by comparing their spectra with those derived from aqueous standard solutions. For the determination of vitamin B₉, the sample is reduced and derivatized in one step. HPLC injection the values of different parameter in different subjects were obtained with the help of uv detector.

III. RESULTS

The plasma homocysteine level was found to be $30.42 \pm 10.10 \mu\text{mol/L}$ with a range of $16.04\text{-}46.66 \mu\text{mol/L}$ in CHD. The increase was statistically highly significant as compared to control group with $14.95 \pm 14.95 \mu\text{mol/L}$; while it ranged from 6.80 to $21.51 \mu\text{mol/L}$ as evident by P-value ($P < 0.0001$). The serum folic acid (vit. B₉) level was found to be 3.64 ± 1.23

ng/ml) with a range of 1.25 to 6.72 ng/ml in CHD subjects. The decrease level of folic acid (vit. B₉) was statistically highly significant as compared to control subjects with 4.90 ± 1.94 ng/ml; while it ranged from $1.86\text{-}9.12$ ng/ml as evident by P-Value ($P < 0.0002$). The results of present study of folic acid (vit. B₉) was similar to results obtained by previous studies.

Plasma homocysteine level by age and sex group in patients of CHD and Control

AGE GROUP (years)	Group	Sex	Plasma Homocysteine level (μmol/L)					
			Mean	SD	SE	Df	t vale	p value
25-45	Patients (25)	Male (15)	23.48	1.62	0.42	98	18.87	0.0001 HS***
		Female (10)	20.21	3.25	1.03	98	18.85	0.0001 HS***
	Control (25)	Male (15)	12.92	3.61	0.93			
		Female (10)	10.44	1.69	0.53			

* Significant

***Highly Significant

Df = Degree of Freedom

Serum Vitamin B₉ (Folic acid) level by age and sex group in patients of CHD and Control

AGE GROUP (years)	Group	Sex	Vitamin B ₉ (Folic acid) level (ng/ml) in Serum					
			Mean	SD	SE	Df	t vale	p value
25-45	Patients (25)	Male (15)	4.03	1.35	0.35	98	0.18	0.0001 HS***
		Female (10)	2.49	0.78	0.25	98	7.86	0.0001 HS***
	Control (25)	Male (15)	6.98	1.54	0.40			
		Female (10)	4.36	1.49	0.47			

* Significant

***Highly Significant

Df = Degree of Freedom

IV. DISCUSSION & CONCLUSION

A statistically significant increased concentration of plasma homocysteine was recorded in CHD (male) patients age between 25-45 years as well as in the whole group as compared to that of normal control male subjects with same age difference. It might be possible that elevated plasma total homocysteine levels have been positively associated with ischemic stroke risk. The serum vitamin B₉ (Folic acid) concentration was found to be decreased significantly in CHD (Male) patients aged between 25-45 years as well as in the whole group as compared to the normal control male subjects with same age difference. It might be possible that high dose of folic acid will improve endothelial function, reduce coronary artery plaque size and reduce coronary artery

retention. Homocystinuria means elevated tHcy concentration observed in these patients and significantly reduce cardiovascular events and present the formation of Atherosclerosis. Low dose folic acid reduce plasma tHcy, but a high dose may be required to produce the beneficial effects on vascular function report by stuart et al (2003)^[10]. The result of present series of study resembled with findings of yaps et al (2001)^[8] and stores et al (2012)^[9].

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