Hyperhomocystenemia as a Risk Factor for Ischemic Stroke

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ABSTRACT

OBJECTIVES: This study was carried out to evaluate homocysteine as a risk factor for ischemic stroke.

DESIGN: Descriptive study

SETTING: Isra University & Liaquat university of Medical and health sciences Jamshoro (LUMHS).

STUDY DESIGN: Twenty five diagnosed cases of ischemic stroke were selected from different wards of two hospitals. Twenty five healthy age matched persons were taken as controls having no risk factors for stroke. Serum homocysteine level was determined by enzyme immunoassay using commercially available kit.

RESULTS: Serum homocysteine level in patients with stroke was 14.0 ± 1.9 µmol/Lit and in healthy controls it was 9.0 ± 0.58 µmol/Lit. There was statically significant difference ($p < 0.05$) in the homocysteine level between the two groups yet the level was within normal range.

CONCLUSION: Serum homocysteine level is significantly increased in patients with ischemic stroke as compared to the normal healthy individuals having no ischemic stroke risk factors.

KEY WORDS: Homocysteine, Stroke, Risk factors.

INTRODUCTION

Stroke is one of the leading causes of death and disability worldwide. The best way to reduce its incidence is prevention by identifying various risk factors. The incidence of stroke in Pakistan is on rise (1, 2). In about sixty five percent cases, risk factors can be identified and one of these is raised level of homocysteine. (3) Homocysteine is produced by the metabolism of amino acid methionine. Kidney diseases, genetic factors, various drugs, and deficiency of vitamin-B group cause mild increase in blood homocysteine level. Homocysteine has many harmful actions on vascular system including increased oxidant stress, impaired endothelial function, stimulation of mitogenesis, and induction of thrombosis.(4) It may also cause a rise in blood pressure (5). Raised plasma homocysteine is significantly associated with ischemic stroke and treating hyperhomocystenemia may be an effective way of decreasing the risk of stroke (6). This study will determine that the raised plasma concentration of homocystenemia has relationship with stroke or otherwise.

MATERIALS AND METHODS

This study was conducted to compare the levels of serum homocysteine in ischemic stroke patients with that of age and sex matched controls. This study was conducted in the department of physiology, Faculty of Medicine & Allied Medical Sciences Isra University Hyderabad in collaboration with Isra University Hospital & Liaquat University Hospital Hyderabad, Sindh.

Fifty subjects, selected for the study and divided in two groups:

Group B (patients): This group comprised of 25 patients of ischemic stroke. The diagnosis was confirmed by clinical evaluation and findings of CT scan. These were selected from medical wards of Isra University Hospital and LUH Hyderabad.

Group A (controls): It comprised of 25 age and sex matched normal individuals with no risk factors for stroke and had no history of any cerebro-vascular disease. These were selected from the staff members of Isra University L.U.M.H and general population. These include subjects of all ages & both sexes.

Patients with renal failure or renal impairment, hemorrhagic strokes, thyroid and adrenal gland diseases, Ischemic heart disease, Persons on anticonvulsant therapy or on folic acid and cobalamine supplements, pregnant or lactating women, women taking oral contraceptives, purely vegetarians, diabetics, obese (BMI >25kg/m2), and smokers were excluded from this study.

Method of data collection

Personal information of every individual was recorded on a specifically designed proforma after obtaining the informed consent. A detailed history of the subjects was taken followed by a thorough clinical examination. Blood pressure was recorded and BMI calculated.

Laboratory data:

Laboratory investigation carried out included Serum

Homocysteine, Lipid profile including Serum cholesterol, LDL, HDL and total lipids. These were done for both patients and control subjects.

Collection of blood sample and Preparation of serum:

5 ml of blood was collected after venepuncture of peripheral vein. After centrifugation, serum was obtained. Serum homocysteine was measured by ELISA method on automated analyzer Elisa axsym system machine Axsym using specific kit. Other investigations were done by routine standard methods.

Statistical analysis:

Data was evaluated in statistical program SPSS (Statistical Packages for Social Sciences) version16.0. The numerical variables such as total lipid (mg/dl), cholesterol (mg/dl), HDL (mg/dl) and LDL(mg/dl), blood pressure (mmHg) were presented as Mean + Standard Deviation and student t test was applied to compare the means between the groups A and B. All the data were calculated on 95% confidence interval. P value $p < 0.05$ was considered as statistically significant level.

RESULTS

This study was carried out on 50 subjects who were classified in 2 equal groups as follows: Group A: Healthy controls and Group B: Diagnosed cases of ischemic stroke. There were 37 male and 18 female subjects with age range of 36-72 years. Sixty eight percent subjects were in the age range of 41-60 years. The comparison of lipid profile level in patients and control group is shown in **Table I**. It shows total lipid, serum cholesterol HDL & LDL. Values of all 4 parameters were within normal range in both groups. There was no significant difference between any parameter of lipid profile between the two groups. The mean blood pressure values in patients and control group is shown **Table II**. Not only the mean blood pressure but both systolic and diastolic were within normal range in group A subjects. Mean blood pressure in subjects of group B was 166/ 100 mmHg and was significantly higher than the subjects of group A. (p< 0.004)

The mean serum homocysteine level in patients and control group was compare and result shown in **Table III**. Mean serum Homocysteine level of group A was 9.4 + 0.58 m mol/l and that of group B was 14.0 + 1.9 m mol/l. Mean serum homocysteine level of group B was significantly higher (p< 0.004) as compared to Group A.

TABLE I: COMPARISON OF LIPID PROFILE LEVEL IN PATIENTS AND CONTROL GROUP

Groups	No of Subjects	Total lipid mg/dl	Cholesterol mg/dl	HDL mg /dl	LDL mg /dl
Control A	25	4.95+14.5	172+ 3.7	34.6+0.5	111+ 3.6
Patients B	25	5.36+20.8	184+ 5.2	35.6+ 0.7	118+ 3.6

(All the values are expressed mean + SD)

TABLE II: COMPARISON OF MEAN BLOOD PRESSURE IN PATIENTS AND CONTROL GROUP

Subjects	No of Subjects	Mean blood pressure mmHg
Control A	25	114/76 mmHg
Patients B	25	166/100 mmHg *

(All the values are expressed mean + SD)
*P< 0.004 student t test

TABLE III: COMPARISON OF SERUM HOMOCYSTEINE LEVEL IN PATIENTS AND CONTROL GROUP

Subjects	No of Subjects	Serum Homocysteine level μmol/Lit.
Control A	25	9.0 + 0.58
Patients B	25	14.0 + 1.9 *

(All the values are expressed mean + SD)
*P< 0.004 as compared to Group A

DISCUSSION

Homocysteine is newly identified risk factor for stroke and a lot of work has been done in the last decade in this respect. (3-12). Present study is the continuation of this work.

Hyperlipidemia has been considered as a risk factor for atherosclerosis. So analysis of lipid profile was part of this study. We found no significant different in any parameter of lipid profile among both groups. Similar result has been reported by Somay G et al (2005). Amarenco and Labreuche (2009) found that despite inconsistent or weak association between cholesterol and stroke, lowering of cholesterol concentrations with statins reduces the risk of stroke in high-risk populations and in patients with non-cardioembolic stroke or transient ischemic attack.

Hypertension is another crucial risk factor for stroke.

In the present study blood pressure was significantly increased in the stroke patients as compared to healthy controls as has been reported previously (6, 14).

Hyperhomocystenemia is now considered as a crucial but reversible risk factor for stroke. Our study was aimed to determine the level of homocysteine in ischemic stroke patients and to evaluate whether it is an independent risk factor or not. We estimated the fasting homocysteine levels in all both groups and found that homocysteine level was significantly increased in stroke patients as compared to normal healthy controls. Our findings are in agreement with most of the previous studies; (15-17). Zong W et (2010) all found that elevated homocysteine concentration can predict the risk of stroke recurrence and mortality in stroke patients.

It is concluded that raised homocysteine in blood is an important risk factor for ischemic stroke. It is therefore recommended that homocysteine estimation should be included as a routine laboratory test for persons with cerebrovascular risk factors and public should be made aware of it.

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