

STUDY OF SERUM HOMOCYSTEINE LEVELS IN CEREBROVASCULAR ACCIDENT

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ABSTRACT

Background: Stroke is the second most common cause of death and major cause of disability worldwide. Plasma homocysteine concentration is one of the emerging modifiable risk factor for stroke. The objective of this study was to evaluate the fasting homocysteine level in different type of stroke (Ischemia & Hemorrhage). **Material & Methods:** The present study is case control study in which 90 patients with diagnosis of stroke (intracerebral infarct & hemorrhage) were enrolled and fasting serum homocysteine were measured in all and its comparison was done with matched healthy controls. **Result:** In study group the mean serum homocysteine level is 31.47 ± 39.89 $\mu\text{mol/L}$ and in control group 16.62 ± 22.08 $\mu\text{mol/L}$, it indicates that serum homocysteine level is highly significantly raised (P value < 0.0001) in cases of stroke compared with control patients. However there is no significant difference in homocysteine level between intracerebral infarct and intracerebral hemorrhage (P= 0.5817). There is significant relationship of raised serum homocysteine level with hypertension & smoking. **Conclusion:** The present study revealed that hyperhomocysteinemia appears to be an important risk factor for cerebrovascular accidents. It is therefore important to use serum homocysteine level as an important tool to investigate all cases of cerebrovascular accidents and also in those who are at risk of developing stroke.

Keywords: Cerebrovascular accident; Hemorrhage; Serum homocysteinemia.

INTRODUCTION

Cerebrovascular accident is an important cause of premature mortality and disability in developing countries like India [1]. In the USA stroke is the third most common cause of mortality and morbidity after cardiovascular disease and cancer[2]. Intracranial atherosclerosis of large vessels is most common cause of cerebrovascular accident in India [3].

Stroke has occurred if the neurologic manifestations last for >24 hours or brain infarction is demonstrated on imaging study [4]. Extensive experimental evidence, both *in vitro* and *in vivo*, indicates that homocysteine causes endothelial dysfunction. Homocysteine changes vascular tone by regulating endothelium-dependent vasodilator and constrictor substances, including decreasing nitric oxide bioavailability, increasing contractile prostanoids as well as interfering myoendothelial communication [5].

For healthy middle aged adult individuals, hyperhomo-

cysteinemia is an independent risk factor for endothelial dysfunction [6]. Elevated homocysteine level is common and this is the major prothrombotic factor associated with stroke.

Aims and objectives: To study serum homocysteine levels in cerebrovascular accident as a risk factor for stroke.

MATERIAL AND METHODS

Study design: The present case control analytical study

Ethics approval: Study was approved by the Institutional ethics committee and informed consent was taken from the participants or from the blood relatives.

Study location: BLDE University's Shri B.M.Patil Medical College and Research Centre, Vijayapur.

Study period: January 2016 to June 2017.

Sample size: Total hundred and eighty were recruited for this study

Inclusion criteria: 90 patients of stroke diagnosed by clinical examination and confirmed by CT scan and MRI brain, admitted in our hospital were included as study group and for control group age & sex matched healthy control were included in this study.

Exclusion criteria: Patients with the following concom-



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itant illnesses like - previous history of ischemic or valvular heart disease, past history of stroke, peripheral vascular disease, hypothyroidism, epilepsy, renal impairment, drugs that affect homocysteine, Vit B12, Folate metabolism i.e. fibrates, statins and niacin, methotrexate and sulfasalazine, anticonvulsant drugs, and levodopa, oral contraceptives, pregnancy, anticoagulant therapy and anticoagulant therapy were known to elevate serum homocysteine were excluded from the study.

Grouping: Grouped as Control and Study group

Sample collection: 3ml fasting blood sample of 90 cases and 90 control patients collected on admission.

Methodology: Estimation of serum homocysteine level by Chemiluminescent Immunofluorescent Assay by Instrument Minividas. The AMS enzymatic test for the quantitative homocysteine determination based on a series of enzymatic reaction causing a decrease in absorbance value due to NADH oxidation to NAD⁺. Homocysteine concentration in sample is directly proportional to the quantity of NADH converted to NAD⁺.

Statistical analysis: Data is presented diagrammatically and as mean ± SD. Groups are compared using 't' test, chi square test and regression analysis done.

RESULTS

According to this study only 1.1 % of patients is of 30-39 years age group and 27.8 % of patients is of 70-79 years age group. In this study 66.7 % patients are male and 33.3% patients are female.

In study group the mean serum homocysteine level is 31.47±39.89 µmol/L and in control group 16.62±22.08

µmol/L, it indicates that serum homocysteine level is highly significantly raised in cases of stroke compared with control patients.

The above results indicates that association between serum homocysteine level with age, sex and diagnosis were insignificant, but there is a significant correlation between serum homocysteine level and Diabetes Mellitus, hypertension,

DISCUSSION

In this case control study we found a strong co-relation of hyperhomocysteinemia with ischemic stroke in both younger and older age group. The result of the present study are consistent with many case control and prospective studies, although few prospective studies failed to establish correlation [7].

There is no definite threshold level for homocysteine that correlates with the sudden increase in the risk of vascular events. Although the normal range for homocysteine level has been proposed to lie between 5 and 15µmol/L, increased risk of vascular disease within this range is documented by Modiet al [7].

Many studies have showed that increased homocysteine represents an independent risk factor for coronary, cerebrovascular and peripheral arterial diseases[8],[9],[10]. Various risk factors for cerebrovascular accidents like age, sex, food habit, hypertension, diabetes mellitus and lifestyle were studied and analyzed in relation to serum homocysteine levels.

Hyperhomocysteinemia is one of the newly recognized factor that increases the risk of vascular disease [11]. Mechanisms by which hyperhomocysteinemia increases risk of cerebrovascular accidents are not clear, but

Table1. Comparison of serum homocysteine level and its association with study group

Parameter		No. Of Patients	Homocysteine level Mean ±SD (µmol/L)	Mann Whitney U test
Group	Control	90	16.62±22.08	P<0.0001*
	Study	90	31.47±39.89	
Association between the Serum homocysteine level in study group with				
Age	<60	32	27.48±35.14	P=0.4281NS
	≥60	58	33.65±42.43	
Gender	Male	60	29.18±37.47	P=0.4739NS
	Female	30	36.02±44.67	
DiabetesMellitus	Yes	19	19.97±33.47	P=0.0078*
	No	71	34.53±41.11	
Hypertension	Yes	22	62.21±52.9	P=0.0001*
	NO	68	21.51±28.75	
Smoking	Yes	27	72.06±53.9	P=0.0001*
	No	63	14.06±06.13	
Diagnosis	Infarct	77	31.38±39.77	P=0.5817NS
	Hemorrhage	13	31.92±42.26	

several possible mechanisms have been proposed [11]. Hyperhomocysteinemia is associated with premature atherosclerosis.

Experimental studies both in vivo and in vitro shows that homocysteine causes endothelial injury and cell detachment. Hence these data suggest that homocysteine might contribute to cerebrovascular disease in patients as an additive risk factor [12]. Measurement of homocysteine may become the integral part of workup of stroke patients in future.

CONCLUSION

In conclusion the present study revealed that hyperhomocysteinemia appears to be an important risk factor for cerebrovascular accidents. It is therefore important to use serum homocysteine level as an important tool to investigate all cases of cerebrovascular accidents and also in those who are at risk of developing stroke.

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