



EVALUATION OF SERUM HOMOCYSTEINE IN YOUNG PATIENTS OF ISCHEMIC STROKE

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ABSTRACT

INTRODUCTION: Stroke is the third most common cause of death. Hyperhomocysteinemia is as a possible risk factor for stroke, possibly because of accelerated atherosclerosis.

OBJECTIVE: To study serum homocysteine levels in young patients of ischemic stroke.

METHODS: This was a case control study, carried on 40 young patients (between age range 12 – 40 years) of ischemic stroke and 40 age/sex-matched controls during a period of 18 months. Serum homocysteine levels were determined using ELISA.

RESULTS: Statistical analysis was done by student “t” test. Mean age was 34.02 ± 4.73 years (cases) and 34.0 ± 4.77 years (controls). Mean serum homocysteine levels were significantly increased in cases ($20.56 \pm 10.51 \mu\text{mol/L}$) when compared to controls ($11.28 \pm 3.66 \mu\text{mol/L}$) ($p < 0.001$). It showed association between increased serum homocysteine ($>15 \mu\text{mol/L}$) and ischemic stroke.

CONCLUSIONS: Hyperhomocysteinemia is an independent risk factor for ischemic strokes in young adults.

KEYWORDS : stroke, young, homocysteine

INTRODUCTION

Stroke is one of the most frequent cause of death and disability worldwide.⁽¹⁾ It is the most common life-threatening neurologic disease, which is more often disabling than lethal.⁽²⁾ More than two-thirds of the global burden of stroke is borne by developing countries, where the average age of patients with stroke is 15 years younger than that in developed countries.⁽³⁾ Stroke incidence rises steeply with age; therefore, it is less common in younger people; but stroke in a young person can be devastating in terms of productive years lost and impact on a young person's life.⁽⁴⁾

Stroke is defined by the World Health Organization as “rapidly developed clinical signs of focal or global disturbance of cerebral function, lasting more than 24 hours or until death, with no apparent non-vascular cause”.⁽⁵⁾

Hypertension, diabetes, cigarette smoking, hyperlipoproteinemia(a), hyperhomocysteinemia, obesity, hypercholesterolemia, hypertriglyceridemia are some of the modifiable biochemical risk factors.⁽⁶⁾

Homocysteine (Hcy) is one of the non-protein sulphur containing amino acid that is formed as an intermediary product during the conversion of the essential amino acid methionine to cysteine.⁽⁷⁾ Approximately 80% of plasma homocysteine is protein bound. Free and protein bound homocysteine and its disulfides are globally referred to as total homocysteine (tHcy).⁽⁸⁾

Hyperhomocysteinemia causes ischemic stroke via various mechanisms. It promotes atherogenesis by damaging the vascular matrix, increasing oxidative injury to arterial endothelium, altered platelet activation, aggregation and enhancing proliferation of vascular smooth muscles.^{(9), (10), (11)}

As total homocysteine (tHcy) level is a modifiable risk factor for stroke, hence the aim of this study is to evaluate serum homocysteine levels in young patients of ischemic stroke.

MATERIALS AND METHODS

The present study entitled ‘Evaluation of serum homocysteine level in young patients of ischemic stroke’ is a case control study and has been carried out in tertiary care hospital during the period of October 2014 to October 2016. The study protocol was approved by the Ethical Committee of the Institute. Informed written consent was obtained from all the study subjects enrolled in the study.

INCLUSION CRITERIA

Cases (group A, n=40):

Newly diagnosed ischemic stroke patients, diagnosed by Computed Tomography scan, clinical signs and symptoms in the age group of 12 to 40 years.

Controls (Group B, n=40):

Age and sex matched healthy individuals without any major illness and not on any medications willing to give consent as controls.

EXCLUSION CRITERIA

- 1) Patients with meningitis, chronic inflammatory condition or intracranial neoplastic diseases, head injury, intracranial bleed.
- 2) Conditions mimicking stroke as metabolic problems like hyperglycaemia, hypoglycaemia, hepatic encephalopathy and CNS problems like hemiplegic migraine

Sample collection and analysis:

Under strict aseptic precautions, 5ml of venous blood were collected into plain vacutainer tubes and allowed to clot. Samples were centrifuged with the speed of 1000g for 10 minutes and serum separated were analysed in clinical biochemistry laboratory.

Estimation of serum Homocysteine level

Homocysteine was estimated by enzyme linked immunoassay. The normal serum homocysteine levels in adults usually range between 4 to 15 $\mu\text{mol/L}$.

RESULTS AND OBSERVATIONS:

Statistical Analysis: Statistical analysis was done by “t” test. P value of <0.05 was considered significant.

Mean age was 34.02 ± 4.73 years (cases) and 34.0 ± 4.77 years (controls) [table no.1 and graph 1]. Mean serum homocysteine levels were significantly increased in cases ($20.56 \pm 10.51 \mu\text{mol/L}$) when compared to controls ($11.28 \pm 3.66 \mu\text{mol/L}$) ($p < 0.001$) [table no.2 and graph 2]. It showed association between increased serum homocysteine ($>15 \mu\text{mol/L}$) and ischemic stroke.

Table no.1

GROUPS	GROUP A	GROUP B	P value
Mean age (Years)	34.02 ± 4.73	34 ± 4.77	0.92

The mean age of distribution was 34.02 ± 4.73 years in group A, was 34 ± 4.77 years in group B which shows that mean age of distribution is nearly equal in the two groups.

Graph no.1 - Mean age wise distribution among study groups.

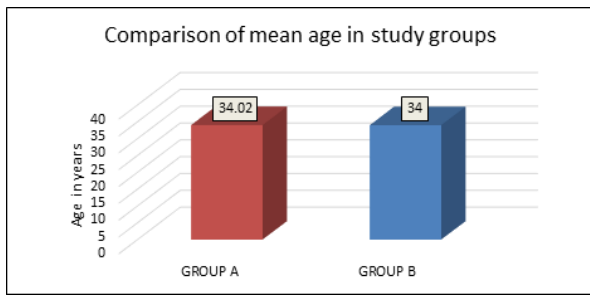


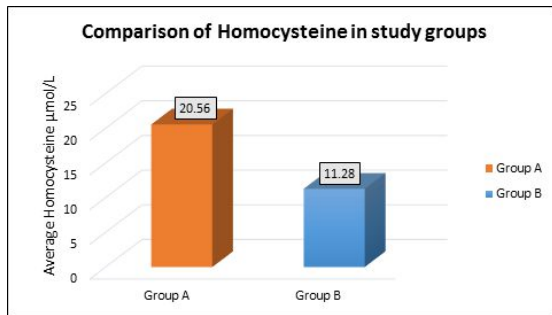
Table no. 2 - Comparison of serum Homocysteine levels among study groups

Parameter	Cases	Control	P value
	Mean ± SD (N = 40)	Mean ± SD (N = 40)	
Serum Homocysteine (µmol/L)	20.56 ± 10.51	11.28 ± 3.66	<0.001

Group A(Cases) Vs Group B(Control): P<0.001 (Highly significant)

There is significant increase in serum homocysteine in group A as compared to group B (P value <0.001). The relation of serum homocysteine between group A (cases) and group B (control) is statistically highly significant (P value <0.001).

Graph 2: Comparison of serum Homocysteine levels among study groups



DISCUSSION

Stroke is the third leading cause of mortality in the world. Therefore, stroke is a major health, social and community problem.⁽¹²⁾ More than two-thirds of the global burden of stroke is borne by developing countries.⁽³⁾

In young adults, ischemic stroke can have a significant impact on the affected individuals, their families, and general societies, as the patients are affected in the economically productive period of their lives. Young adults account for approximately 10%-30% of all stroke patients in India, as opposed to 3%-8.5% in Western countries.⁽¹³⁾

We found that, serum homocysteine is significantly increased in cases of ischemic stroke patients (Group A) (20.56 ± 10.51µmol/L) as compared to control (Group B) (11.28 ± 3.66µmol/L) (P<0.001) (table no.2 and graph no.2)

Similar findings were reported by N. Tan et al in 2002⁽⁹⁾, Dhamija R. et al in 2009⁽¹⁴⁾

Madhav V. et al in 2013⁽⁶⁾, Rahman A. et al in 2014⁽¹⁵⁾, Bhaskar V. et al⁽⁷⁾

CONCLUSION

Hence, from this study it is concluded that hyperhomocysteinemia is one of the independent risk factor which causes ischemic stroke in young patients.

Limitation of this study is having very small sample size; further large scale study is required to confirm our findings.

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