e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(11); 1588-1592

Original Research Article

To Study the Prevalence of Plasma Homocysteine Levels in Cases of Stroke

Daulat Meena[1], Vishnukant Sharma[2], Vishvendra Singh Chauhan[3], Manish Kumar Singhal[4]

[1]Associate Professor, Department of Medicine, RVRS Medical College, Bhilwara, Rajasthan, India
[2]Assistant Professor, Department of Medicine, RVRS Medical College, Bhilwara, Rajasthan, India
[3]Assistant Professor, Department of Medicine, RVRS Medical College, Bhilwara, Rajasthan, India
[4]Associate Professor, Department of Medicine, RVRS Medical College, Bhilwara, Rajasthan, India

Received: 25-09-2023 / Revised: 23-10-2023 / Accepted: 26-11-2023
Corresponding Author: Dr. Manish Kumar Singhal
Conflict of interest: Nil

Abstract:

Background: Elevated homocysteine (Hct) levels pose a significant risk for ischemic stroke, albeit with ongoing debate. To address this, we conducted a systematic review and meta-analysis comparing Hct levels between ischemic stroke patients and controls.

Methodology: We enrolled 50 patients meeting inclusion criteria post-hospital admission for acute ischemic stroke, measuring homocysteine levels within 24 hours of primary admission.

Results: Our study revealed a mean patient age of 54.77 years, with 56.55% being male. All cases presented with hemiparesis, while 62% exhibited aphasia and altered sensorium. Statistical analysis demonstrated a significant difference in homocysteine levels between controls and cases, with a t value of 10.37 and a p value of <0.03.

Conclusion: Our findings suggest that ischemic stroke patients tend to exhibit higher Hct levels than controls. The potential modifiability of this risk factor requires further investigation through larger prospective cohorts.

Keywords: Stroke, Risk factor, Homocysteine.

Introduction

Stroke is one of the foremost causes of morbidity and mortality throughout the world, posing a major socioeconomic challenge in the occupational and neuro-rehabilitation programmes for "Stroke-Survivors". Despite recent advances, only two-thirds of all strokes can be attributed to known causal risk factors. Large clinical trials of LDL-cholesterol lowering therapy reported adverse events in up to 19% of patients despite these powerful interventions.[1-3]

Stroke is an etiologically heterogeneous disease, but atherosclerosis contributes to a large proportion of cases either directly via aortic, cervical, or intracranial large-artery atherosclerosis or indirectly by cardioembolism, e.g., as a result of cardiac arrhythmias caused by coronary heart disease (CHD) or emboli after myocardial infarction. Atherosclerosis is today perceived as a chronic inflammatory vascular condition and infectious diseases are believed to contribute to its pathophysiology. [3-6] The conventional stroke risk factors, including hypertension, diabetes mellitus, smoking, and cardiac diseases, do not fully account for the risk of stroke, and stroke victims, especially young subjects, often do not have any of these factors. Recently, there has been much interest in homocysteine, a sulfur containing amino acid as an important risk factor for vascular disease including stroke ; independent of the long recognized factors like hyperlipidemia, hypertension, diabetes mellitus and smoking ; although its association was described many decades ago. During the last decade, numerous studies observed a strong positive correlation between hyper-homocysteinemia and stroke; while others could not establish the same.[7-9]

The present study has been planned to explore an association between homocysteine levels in Indian patients with stroke (esp. acute ischemic stroke patients) so that some practical recommendations for screening and treatment of this modifiable risk factor can be provided.

Material and Methods

Patients who presented with an acute onset of focal neurological deficit were examined thoroughly and data were recorded in the standard Performa of clinical features. Diagnosis of stroke was confirmed by CT and MRI. All diagnosed cases of stroke more than 35 yrs. of age were included in

this study. All patients below 35 years of Age, not willing for study, suspected to have stroke on clinical grounds without correlation with Brain Imaging studies and plasma homocysteine levels may be increased due to psoriasis, systemic lupus erythematous, severe hepatic impairment, pernicious anemia, malignancies of breast, ovary, pancreas, drugs were excluded.

Sixty-eight patients of ischemic stroke admitted to Department of Medicine, were enrolled in this study. Out of sixty-eight, eighteen patients had been excluded because of presence of factors interfering with serum homocysteine levels and presence of predisposing factors responsible for embolic stroke So the present study was conducted on 50 patients with 20 control patients. Serum or plasma sample was taken in a proper way for homocysteine assay.

Results

In our study mean age of patients was 54.77 years with 56.55% male patients. All the cases presented with hemiparesis.

62 % cases had aphasia and altered sensorium. Out of 50 patients 28% had headache while 38% patients had vomiting. Only 10% patients had seizure. (Figure 1).

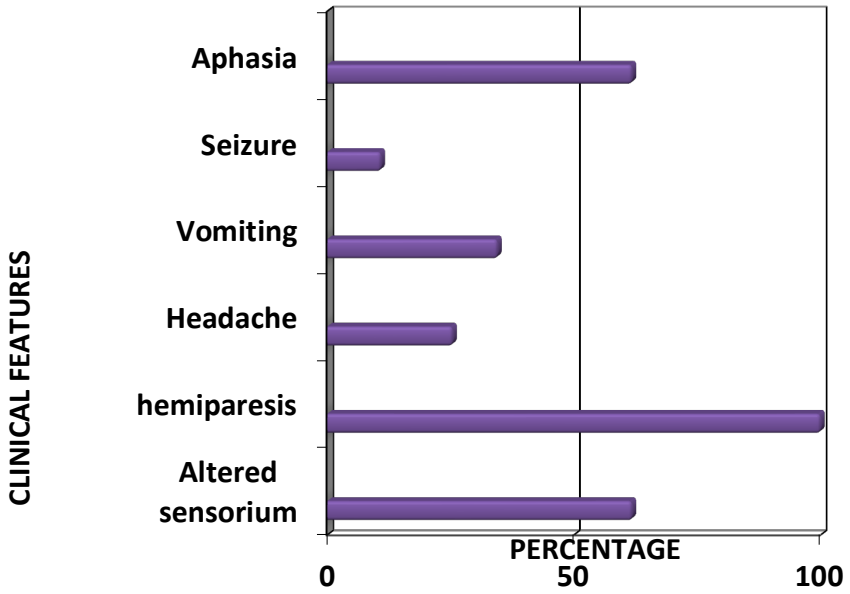

Figure 1: Clinical Features at the Time of Admission

Among total 50 cases , Hypertension was present in 48 cases(96%); Diabetes was present in 42 cases (84%). Smokers were 32 (64%). C A D and Alcoholism were the risk factors present in 23 (46%) and 18 (36%) cases respectively.(Figure 2)

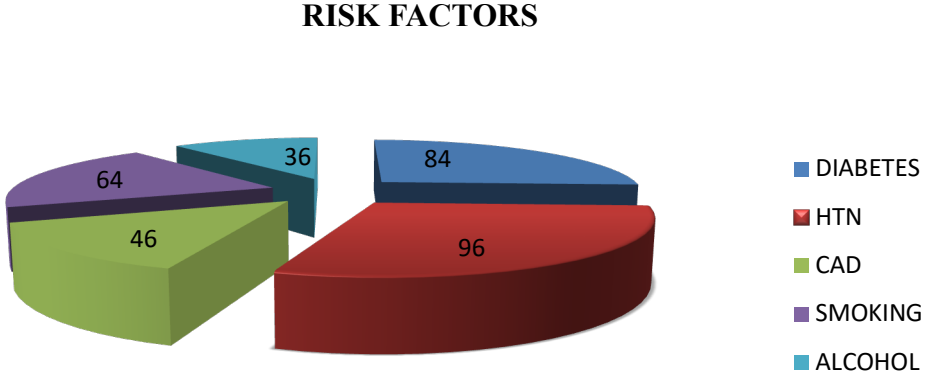

Figure 2: Risk Factors

Among Total 50 patients, 66% cases had high L D L.82%had low HDL. Hypercholesterolemia hypertriglyceridemia were present in 42% and 20% cases respectively. 30% cases had combined hypercholesterolemia and hypertriglyceridemia. (Figure3)

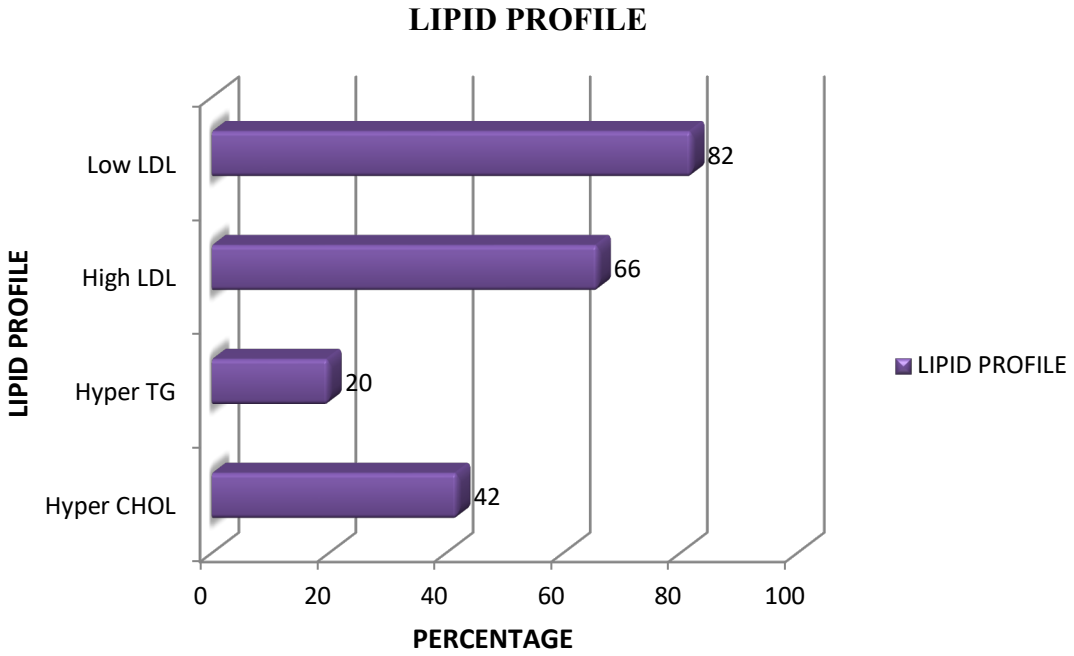

Figure 3: Lipid Profile

Among cases 56% cases had MCA Infarct. 18% cases had lacunar infarct. ACA infarct was present in 26% cases. (Figure 4)

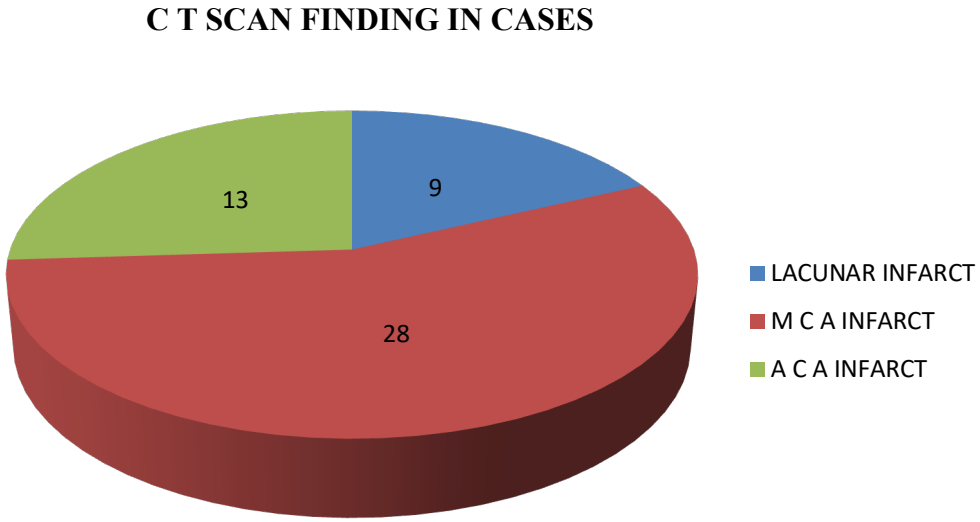

Figure 4: CT scan finding in Cases

Among controls 85% had normal homocysteine levels while only 15 %controls had mild hyperhomocystienemia. Among cases 44% had moderate hyperhomocystienemia and 38% had mild hyperhomocyetenemia.18% cases had normal homocysteine levels. None of cases and controls had severe hyperhomocystienemia (Figure 5). Mean homocysteine levels in our study were 29.65 + 11.02.

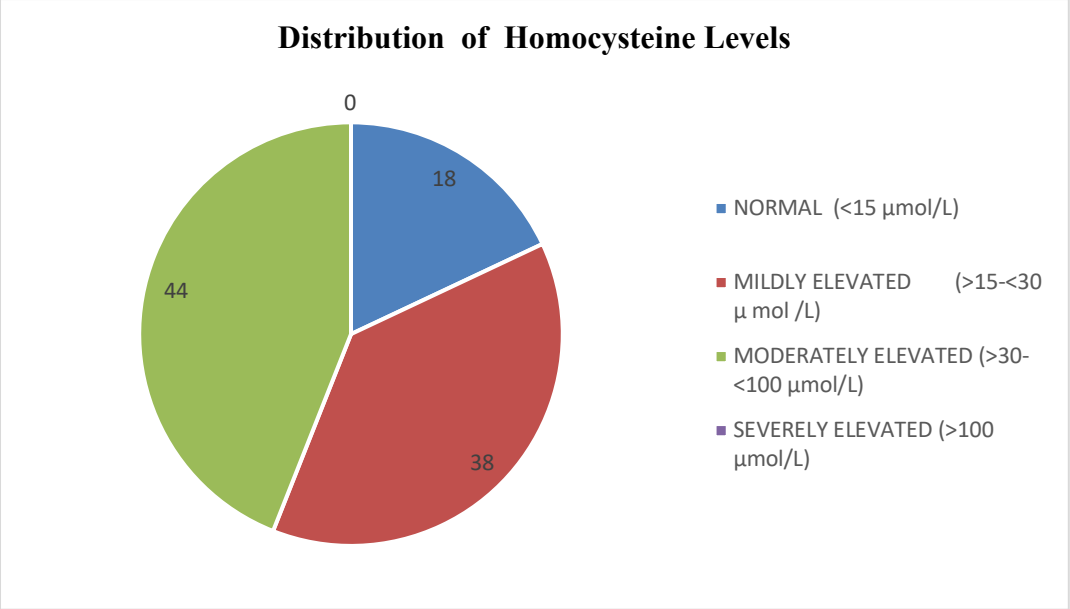

Figure 5: Distribution of Homocysteine Levels

Table 1: Mean Homocysteine Levels in Controls and Cases

	Total (n=70)	Mean Homocysteine + SD
Controls	20	11.87 + 3.19
Cases	50	29.65 + 11.02

On statistically analyzing the data of homocysteine levels in controls and cases t value was found to be 10.37 and p value was <0.03 which is statistically significant. (Table 1)

Discussion:

In our study high incidence of stroke in males may be ascribed to their genetic susceptibility and females as usual are protected by female hormones during their child bearing age. In postmenopausal state females are susceptible to stroke in a similar fashion as males.

On the analysis of risk factors hypertension came out to be the most common risk factor in stroke patients. Hypertension was present in 96% of patients. High incident of hypertension in our stroke patients may be attributed to the fact that we have taken blood pressure of the patients at the time of the admission only. It is a well-known fact even in normotensive subject B.P. may be found high at the time of stroke due to stress and other neuro hormonal mechanisms.

The number of diabetics were 42 (84%) while 8 (16%) were non-diabetics.

The incidence of smoking among cases was 64%. Smoking is a well-established risk factor for stroke. Piyathilake CJ et al 2004 concluded that there was dose response relationship between the number of cigarette smoked and risk of ischaemic stroke for men.[10] A similar positive association was observed between smoking and risks of lacunar infarction and large artery occlusive infarction. The objective of the present study was to evaluate the prevalence of serum homocysteine levels in acute ischemic stroke patients.

Among 50 cases 38% had mild hyperhomocystienemia while 44% had moderate hyperhomocystienemia. Only 18% had normal homocysteine levels. Perry IJ et al. 1995 suggested that the association with serum total homocysteine concentration in stroke victims was a strong, independent and graded increase in the relative risk for stroke.[11] Coull et al. 1991 reported that increased homocysteine levels were an independent risk factor for stroke. [12] Brattstrom et al. 1992 subsequently studied the relationship between plasma homocysteine and different stroke types in 147 survivors of strokes.[13]

They found that 40% of stroke patients had hyperhomocystienemia versus 6% of control subjects; this finding was independent of stroke type, being as true for hemorrhagic and lacunar stroke as for carotid stroke patients. Much of the variation in plasma homocysteine levels was accounted for by serum cobalamin, folate and creatinine levels.

A. P. S. NARANG et al 2008 was undertaken to compare the homocysteine levels in patients of ischemic stroke with controls. The mean homocysteine levels in patients with ischemic stroke were 16.80±6.71µmol/L while in controls it was 12.30±4.68 µmol/L, the difference being

statistically significant (P<0.01). An association between elevated homocysteine and stroke has been postulated which may be due to acute vascular events themselves.[14] David Tanne et al 2003 suggested that an increase of 1 natural log unit in homocysteine concentration was associated with a >3-fold increase in relative odds of incident ischemic stroke (3.3; 95% CI, 1.2 to 10.2). Homocysteine concentrations at the highest quartile (>17.4 μmol/L) were associated with significantly higher odds of ischemic stroke compared with the lowest quartile in matched-pair analysis (3.1; 95% CI, 1.1 to 9.8) and after multivariable adjustments (4.6; 95% CI, 1.3 to 18.9).[15] John W. Eikelboom et al 2003 suggested that increasing homocysteine was a strong and independent risk factor for ischemic stroke (adjusted OR 2.7, 95% CI 1.4 to 5.1 for a 5-mmol/L increase in fasting plasma homocysteine from 10 to 15 mmol/L). [16]

In our study the mean homocysteine levels was 29.65 + 11.02 and 82% of ischemic stroke patient had mild to moderate increased homocysteine level. We herewith conclude from the present study that homocysteine is one of the risk factors for cerebrovascular disease in approximately 82% cases. Whether homocysteine is the cause or effect of cerebrovascular disease has to be worked out. A larger sample size is needed to elucidate this enigma.

References:

1. Ross R. Atherosclerosis: an inflammatory disease. N Engl J Med. 1999; 340: 115-126.
2. Graham IM, Daly LE, Refsum HM, Robinson K, Brattstrom LE, Ueland PM, Palma-Reis RJ, Boers GH, Sheahan RG, Israelsson B, Uiterwaal CS, Meleady R, McMaster D, Verhoef P, Witteman J, Rubba P, Bellet H, Wautrecht JC, de Valk HW, Sales LA, Parrot-Rouland FM, Tan KS, Higgins I, Garcon D, Andria G. Plasma homocysteine as a risk factor for vascular disease. The European Concerted Action Project. JAMA. 1997; 277:1775–1781.
3. Yoo JH, Chung CS, Kang SS. Relation of plasma homocyst(e)ine to cerebral infarction and cerebral atherosclerosis. Stroke. 1998; 29: 2478–2483.
4. Perry IJ, Refsum H, Morris RW, Ebrahim SB, Ueland PM, Shaper AG. Prospective study of serum total homocysteine concentration and risk of stroke in middle-aged British men. Lancet. 1995; 346:1395–1398.
5. Giles WH, Croft JB, Greenlund KJ, Ford ES, Kittner SJ. Total homocyst(e)ine concentration and the likelihood of nonfatal stroke: results from the third National Health and Nutrition Examination Survey, 1988–1994. Stroke. 1998; 29:2473–2477.
6. Alfthan G, Pekkanen J, Jauhiainen M, Pitkaniemi J, Karvonen M, Tuomilehto J, Salonen JT, Ehnholm C. Relation of serum homocysteine and lipoprotein(a) concentrations to atherosclerotic disease in a prospective Finnish population based study. Atherosclerosis. 1994; 106:9 –19.
7. Verhoef P, Hennekens CH, Malinow MR, Kok FJ, Willett WC, Stampfer MJ. A prospective study of plasma homocyst(e)ine and risk of ischemic stroke. Stroke. 1994; 25:1924 – 1930).
8. Selhub J, Jacques PF, Wilson PW, Rush D, Rosenberg IH. Vitamin status and intake as primary determinants of homocysteinemia in an elderly population. JAMA. 1993; 270:2693–2698.
9. Mudd SH, Skovby F, Levy HL, Pettigrew KD, Wilcken B, Pyeritz RE, Andria G, Boers GH, Bromberg IL, Cerone R. The natural history of homocystinuria due to cystathionine beta-synthase deficiency. Am J Hum Genet. 1985; 37:1–31.
10. Piyathilake CJ, Macaluso M, Hine RJ, Richards EW, Krumidieck CL. Local and systemic effects of cigarette smoking on folate and vitamin B-12. AM J Clin Nutr 1994; 60:559-66.
11. Perry IJ, Refsum H, Morris RW, Ebrahim SB, Ueland PM, Shaper AG. Prospective study of serum total homocysteine concentration and risk of stroke in middle-aged British men. Lancet. 1995; 346:1395–1398.
12. Coull BM, Malinow MR, Beamer N, Sexton G, Nordt F, de Garmo P. Elevated plasma homocyst(e)ine concentration as a possible independent risk factor for stroke. Stroke 1991; 21:572-76.
13. Brattstrom LE. Vitamins as homocysteine lowering agents. J Nutr 1996;126:S1276-80
14. P. S. Narang, Indu Verma, Satinder Kaur, Anisha Narang, S. Gupta And G. Avasthi. Homocysteine – Risk Factor for Ischemic Stroke? Indian J Physiol Pharma col 2009; 53(1): 34–38.
15. David Tanne, Moti Haim, Uri Goldbourt, Valentina Boyko, Ram Doolman, Yehuda Adler, Daniel Brunner, Solomon Behar and Ben-Ami Sela. Prospective Study of Serum Homocysteine and Risk of Ischemic Stroke among Patients with Pre-existing Coronary Heart Disease. Stroke 2003; 34; 632-636.
16. John W. Eikelboom, Graeme J. Hankey, Sonia S. Anand, Elizabeth Lofthouse, Nicole Staples and Ross I. Baker. Association Between High Homocyst(e)ine and Ischemic Stroke due to Large and Small-Artery Disease but Not Other Etiologic Subtypes of Ischemic Stroke. Stroke 2000; 31; 1069-1075.