

Evaluation of Homocysteine Level- A Risk factor among patients with ischaemic Stroke admitted in emergency of tertiary care centre of Bihar

Santosh Kumar Nayan¹, Siddharth Singh^{2*}, Janardan³, Sumeet Kumar⁴

¹Assistant Professor, Dept. of Trauma and Emergency (General Medicine), IGIMS, Patna, Bihar, India

²Assistant Professor, Dept. of Trauma and Emergency (General Medicine), IGIMS, Patna, Bihar, India

³Assistant Professor, Dept. of Neuromedicine, IGIMS, Patna, Bihar, India

⁴Assistant Professor, Dept. of Surgery (Trauma and Emergency), IGIMS, Patna, Bihar, India

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Abstract

Background: Epidemiological investigations have shown that expanded complete homocysteine (tHcy) magnitude are related with an expanded risk of thromboembolic disease; nonetheless, controversy actually exists over which subtype of stroke is associated to hyperhomocysteinemia (HHcy). This investigation meant to examine whether raised tHcy is an autonomous risk factor for ischemic stroke and to contrast tHcy magnitude in patients and ischemic stroke subtypes. **Objectives:** To decide the recurrence of brought homocysteine level up in ischemic stroke. **Methods:** This forthcoming observational case control investigation was carried on 133 youthful ischemic stroke patients with 120 control match people over a time of 6 months, from March 2021 to August 2021 at Tertiary Care Centre, Patna. **Results:** The plasma fasting homocysteine magnitude was altogether higher in the cases than in the controls. The mean homocysteine magnitude was raised altogether in those with cardioembolic strokes contrasted and the controls. The plasma homocysteine level was related with a changed chances proportion of 2.15 for homocysteine over 16 $\mu\text{mol/L}$ fixation for a wide range of stroke. **Conclusion:** Expanded degree of Serum Homocysteine is altogether connected with risk of cerebrovascular mishap, which is free of the risk credited to conventional risk factors.

Keywords: Homocysteine, ischemic stroke, risk factors, vascular disease

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Introduction

Homocysteine is a prothrombotic factor that influences coagulation and fibrinolytic falls. It is a sulfhydryl amino corrosive that is promptly oxidized to homocysteine and homocysteine-cysteine blended disulphide in the plasma [1]. Mechanisms by which hyperhomocysteinemia builds risk of cerebrovascular mishaps are not satisfactory, yet a few potential components have been proposed. Hyperhomocysteinemia is related with untimely atherosclerosis [2]. It additionally causes endothelial injury through direct harmfulness and apoptosis which brings about endothelial brokenness causing debilitated endothelium-subordinate dilatation of veins joined with a proinflammatory and proatherosclerotic endothelial aggregate [3]. That is the reason behind the intrinsic mistakes of methionine digestion, related with exceptionally significant degrees of homocysteine, in causing atherosclerosis [4, 5, 6]. Be that as it may, atherosclerotic diseases like coronary vein disease and stroke, without hidden inherited problems, can likewise have somewhat expanded serum homocysteine magnitude [6, 7]. Some meta-investigations have shown free separated relationship of homocysteine magnitude with stroke and ischemic coronary illness.

Exploratory investigations both in vivo and in vitro show that homocysteine causes endothelial injury and cell separation [8]. Endothelial cell injury, platelet initiation, malicious impact on thrombomodulin articulation, protein C enactment, and an expanded oxidizability of low-thickness lipoprotein have been depicted as a couple of potential components by which homocysteine incites arteriosclerosis and apoplexy [9].

*Correspondence

Dr. Siddharth Singh

Assistant Professor, Dept. of Trauma and Emergency (General Medicine), IGIMS, Patna, Bihar, India.

Vitamin B12, vitamin B6, and folate are three fundamental cofactors in Hcy digestion. These have a dietary beginning. In emerging nations, insufficiencies in these vitamins are more predominant and can cause hyperhomocysteinemia and expanded risk of stroke [10]. Tan et al. concentrated on 109 youthful grown-up Asians (Chinese, Indians, and Malays) with ischemic stroke and tracked down a solid connection between expanded Hcy and ischemic stroke [10]. As per an investigation done by Han et al, it was seen that expanded homocysteine magnitude were both connected sure way with expanded possibilities of stroke just as the seriousness of the disease [11]. Hao et al. directed an investigation in 2,471 Chinese people and manifested that diminished plasma magnitude of folate, vitamin B12, and vitamin B6 just as male sexual orientation and living in metropolitan regions were altogether identified with hyperhomocysteinemia [12]. Besides, Biswas et al. directed an investigation in 120 Indian patients with intense ischemic stroke and manifested that there was a critical connection among HHcy and ischemic stroke [13]. They likewise found diminished serum groupings of vitamin B12 and folate in countless their patients.

Identification of modifiable risk factors like homocysteinemia could bring about the better anticipation of stroke and can save youthful patients from getting crippled in light of stroke [14]. The vast majority of the information on this is from the western populace and not many investigations have been done in the Asian populace [15]. The hereditary qualities, way of life, and the dietary propensities for the Indian populace are not the same as the remainder of the world so the target of this investigation was to discover the recurrence of hyperhomocysteinemia in Indian patients with youthful ischemic stroke and to know whether it has a relationship with early bleakness and mortality. On this foundation, our investigation targets contrasting the event of homocysteine magnitude in patients with cerebral ischemic stroke group, is to decide the job of homocysteine as a marker for ischemic stroke.

Methodology**Patients**

An imminent case-control investigation was wanted to investigate homocysteine magnitude in patients of ischemic stroke and contrast it and age-and sex-matched controls. It was a case-control investigation did among the patients with ischemic stroke conceded into Tertiary Care Center, Patna between the times of March 2021 to August 2021. All out of 133 patients were included in this investigation that satisfied both the inclusion and exclusion criteria. The patients of ischemic stroke with numerous set up risk factors like diabetes, hypertension, and smoking in blend were avoided in the current investigation. The controls were chosen from among age-and sex-matched sound volunteers, patients with irrelevant protests and their family members after informed assent.

Sample collection

Ischemic stroke patients, analyzed as indicated in the operational definition meeting the inclusion measures, conceded through the emergency office, were taken a crack at the investigation. Preceding enrolment, the advantages and disadvantages of the investigation were clarified, and informed consent was gotten. Non-fasting blood was gathered and shipped off the institutional research centre for the homocysteine level examination. Patients socioeconomics like age, sex, smoking status, and comorbidities were asked by the specialist and entered in the survey. Vitamin B12 level was not checked. Fasting blood tests were gotten from every one of the patients inside 5 days of ischemic stroke and were quickly chilled on ice. Serum tests were gathered inside 30 minutes and were from that point put away at - 80°C.

Results**Table 1 Clinical characteristics of patients**

Mean age, yr (±SD)	67.9 (13.3)	68.7 (8.4)	0.607
Gender, n (%)			
Male	74 (43.3)	35 (40.7)	0.789
Female	97 (56.7)	51 (59.3)	
Diabetes mellitus, n (%)			
No	125 (73.1)	62 (72.1)	0.883
Yes	46 (26.9)	24 (27.9)	
Hypertension, n (%)			
No	67 (39.2)	61 (70.9)	<0.001
Yes	104 (60.8)	25 (29.1)	
Hyperlipidemia, n (%)			
No	124 (72.5)	48 (55.8)	0.011
Yes	47 (27.5)	38 (54.2)	
Smoking, n (%)			
No	150 (87.7)	74 (86.0)	0.697
Yes	21 (22.3)	12 (14.0)	
Homocysteine (µmol/L)			
Median	13.6	11.7	0.013
(Range)	(3.8-54.1)	(7.0-31.9)	
Mean	16.2	13.5	
(95% CI)	(14.8-17.5)	(12.4-14.6)	
Vitamin B12 (pmol/L)			
Median	242.9	328.7	0.083
(Range)	(62.0-1400)	(63.0-1100)	
Mean	327.3	386.1	
(95% CI)	(286.0-368.5)	(333.4-438.8)	
Folate (nmol/L)			
Median	6.00	6.35	0.908
(Range)	(2.7-18.0)	(2.90-15.30)	
Mean	6.52	6.56	
(95% CI)	(6.12-6.92)	(6.06-7.05)	

Inclusion criteria

- ✓ Very first episodes of ischemic stroke
- ✓ Cases introducing inside about fourteen days of the occasion
- ✓ Age group between 16 years to 44 years
- ✓ Able to give informed consent.

Exclusion criteria

- ✓ Non-hemorrhagic stroke
- ✓ Renal, hepatic, thyroid dysfunction
- ✓ Collagen vascular illnesses
- ✓ Persistent diseases like HIV, Syphilis, TB, RHD, and cancer
- ✓ Patient on steroids
- ✓ Pregnancy state and post pregnancy period.

Statistical Analysis

Every one of the investigations were finished utilizing SPSS (adaptation 13) programming (SPSS, Inc.). Student's t test was utilized for the quantitative factors. Chisquare test was utilized to break down the subjective discoveries. Chances proportions (OR) and 95% certainty stretches were determined and a P esteem more modest than 0.05 was viewed as measurably critical. Age, sex, DM, and smoking were matched in the two cases and controls (table 1). HTN and HLP were constrained by defining two magnitudes. Paired strategic relapse investigation was utilized to work out Hcy in the stroke subgroups and controls. Moreover, the investigation of difference (ANOVA) was utilized to analyze the mean upsides of B12, folate, and Hcy.

One hundred thirty three continuous patients and 86 age and sex-matched controls from a similar geographic region were chosen. Table 1 shows the pattern segment esteems, ordinary vascular danger factors, fasting serum Hcy, vitamin B12, and folate magnitude in the cases and controls. Table 2 represents fasting serum Hcy, vitamin B12, and folate magnitude in the stroke subtypes and controls. In this investigation, our discoveries manifested that mean degrees of fasting serum Hcy were altogether higher in the cases than in the controls. The mean Hcy level was altogether higher in the cardioembolic group than in the controls after change for HTN and HLP. No other stroke subtypes manifested essentially unique Hcy magnitude after changing contrasted and the controls. The danger factors seen were hypertension in 28 (37%) patients, diabetes 08 (10.10%), other danger factors in 21 (17.10%) patients, and no danger factors were found in 16 (20.0%) patients.

Homocysteine magnitude among males (24.34 ± 13.52) and females (16.4 ± 12.27) manifested a measurably huge distinction. The < 18 years age group manifested 16.3 ± 7.08 magnitude, the 17-26 years age group manifested 23.58 ± 14.56 , the 27-36 years age group manifested 20.7 ± 14.25 , and patients old enough group 37-46 manifested 25.87 ± 13.70 . These contrasts between the homocysteine magnitude of different age groups manifested no measurable importance. There was additionally no measurable importance seen between homocysteine magnitude and the TOAST arrangement with huge course atherosclerosis, little vessel sickness, cardio embolism, stroke not really settled aetiology, and stroke of dubious aetiology. While hazard factors with respect to hypertension and diabetes manifested mean homocysteine magnitude of 28.01 ± 14.88 and 17.6 ± 13.10 individually. This distinction was additionally measurably irrelevant.

Discussion

This investigation manifested that there is no huge correlation between serum homocysteine magnitude and the period of patients with ischemic stroke according to Pearson's correlation test, with a mean homocysteine level of 28.01 and a standard deviation of 1.47 however diabetes mellitus and hypertension are essentially connected with expanded homocysteine magnitude. Hyperhomocysteinemia has a multifactorial beginning fusing hereditary, nourishing, pharmacological, and obsessive elements [16, 17]. Thinking about the distinctions in dietary, hereditary, and ethnic factors, the information distributed from the West may not be material to our populace [18]. Since our perceptions depend on a little group of patients and control populace, it is hard to propose an unmistakable remove an incentive for homocysteine magnitude to be taken as critical and would require a bigger populace investigation [19, 20]. No critical contrast in the mean homocysteine magnitude were found in patients with huge vessel infection contrasted with little vessel sickness. Our discoveries on the association between HHcy and cardioembolic subgroup might be clarified by higher commonness of cardiovascular sickness in our nation or the way that our middle is a reference place and most straightforward patients that have less vascular danger factors are not alluded to this middle [18]. These discoveries might uphold the speculation that HHcy has various systems of pathogenicity, which might show the impact of other undiscovered hereditary and ecological variables going about as confounders [20].

Comparative perceptions were made by Lindgren et al. who couldn't find any free correlation between plasma homocysteine focus and the infarct subtype, or to the level of carotid supply route stenosis [21]. Nonetheless, in another investigation by Eikelboom et al. the affiliation was far higher in the patients with huge vein infection when contrasted with those with little corridor illness [22]. They recommended that the injurious impact of hyperhomocysteinemia is intervened fundamentally through a proatherogenic impact and more outlandish due to prothrombotic impact, which may be contributory in the huge vessel illness. As opposed to the above perceptions, Evers et al. found that raised homocysteine magnitude were related with cerebral microangiopathy and not with cardioembolic or macroangiopathy-related ischemic stroke [23]. There is proof that

hyperhomocysteinemia is both atherogenic and prothrombotic, working through an assortment of potential systems including direct endothelial injury, mitogenic impact on smooth muscle cells, hindered endogenous fibrinolysis, endothelial nitrous oxide reaction, and change in arachnoidid corrosive digestion [24, 25]. Homocysteine magnitude were essentially higher in patients with hypertension and stroke of either age group when contrasted with normotensives in the current investigation. Solid relationship among hypertension and tHcy level in stroke patients had additionally been seen by different creators [26]. It is recommended that hyperhomocysteinemia incites an elastolytic interaction in the blood vessel divider, by prompting union and emission of serine elastase. The deficiency of elastin might prompt the solidifying of the blood vessel divider bringing about hypertension. This may be one of the variables, by which hyperhomocysteinemia contributes as a danger factor for stroke, albeit other accompanying elements may likewise exist.

Conclusion

Expanded homocysteine level is a significant danger factor for the advancement of ischemic stroke in all populaces particularly in more youthful age group. Hypertension and smoking as such are significant contributory variables for hyperhomocysteinemia. This investigation manifested that a raised Hcy level was an autonomous danger factor for ischemic stroke in patients who live in the Iranian region of Fars. Likewise, there was a critical connection between expanded Hcy magnitude and the danger of cardioembolic strokes. A bigger ordinary Indian populace should be screened to set up an unmistakable 'significant' level of homocysteine.

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