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ORIGINAL RESEARCH ARTICLE

Clinical and Imaging Profile of CVA Patients with Special Reference to Serum Homocysteine Level

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ABSTRACT

Objective: Several studies have reported on the high prevalence of hyperhomocysteinemia in Indian population and its implications in stroke and other cardiovascular events. The present study is undertaken to estimate the serum homocysteine level in cerebrovascular accident cases with the aim to search for the association of serum homocysteine level and cerebrovascular accident among local population of Rewa, Madhyapradesh.

Methodology: 101 Patients presenting with cerebrovascular accidents consisting of both hemorrhage and infarction admitted in Medicine Ward at SGMH. Rewa or seen in MOPD over a period of one and a half year were enrolled in the study. A detailed medical history was obtained. All patients were subjected to routine investigations including neurological examination, blood examination, liver function, renal function, urine examination, chest X – ray & ECG, Serum homocysteine concentration was measured using HOMO–ENZYMATIC PHOTOMETRIC TEST.

Summary and Conclusion: CVA seems to have a male preponderance over female having a ration of 55:45. The mean serum homocysteine level was also higher in males than in females showing mean of 30.44 and 28.14 respectively. The mean serum homocysteine level in Indian population was higher when compared to western studies. The highest serum homocysteine level was observed in the age group 70 years and more. This implies that the level of serum homocysteine increased as age advanced. Diabetics and IHD patients had higher mean serum homocysteine level. From this study, it was observed that serum homocysteine level was significantly raised in patients with stroke. It is very common and important cerebrovascular risk factor in our country, even commoner than diabetes, hypertension and smoking. Now a day, Hyperhomocysteinemia is considered an independent risk factor for incidence of stroke, even though there is lack of convincing explanation till date. This study though of small size suggests that hyperhomocysteinemia occurs in patients of CVA.

Key words: Hyperhomocysteinemia, Homo–Enzymatic Photometric Test, CVA.

INTRODUCTION

Stroke is the third major cause of death worldwide. The worldwide incidence has been quoted as 2/1000 population / annum, involving about 4/1000 people aged 45-84 yr. In India, The incidence of C.V.A. was found to be 13/100,000 population / year in a study conducted at Vellore in 1969 – 71 and 33/100, 000 / year in study conducted at Rohtak [1] A WHO study in 1990 quoted incidence of mortality due to stroke in India to be 73/100,000/year.

MATERIALS AND METHODS

The diagnosis of cerebrovascular accident was made on the basis of history and clinical examination i.e. acute onset of neurological deficit.

All the patients were subjected to a detailed history taking and clinical evaluation to obtain the following information.

1. Age and Sex.
2. Detailed questions were asked about the addiction habits in the form of tobacco chewing, smoking and alcohol consumption with their duration and amount of consumption.
3. A detailed drug history was taken.

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4. A Complete past and family history was taken regarding.
    a. Hypertension
    b. Diabetes mellitus
    c. Cardiac Diseases
    d. Cerebrovascular accident.
5. All the peripheral vassels of the patients were examined for the evidence of atherosclerosis: Weak pulses or Peripheral bruits (Carotid, Femoral and abdominal bruit).
6. Blood Pressure was taken in both arms and right lower limb.
7. For evidence of hyperlipidemia patients were examined for the presence of xanthoma, corneal arcus, xanthelesma.
8. A thorough clinical examination (general and systemic) was done with special attention to central nervous system.
9. Fundus was examined for evidence of hypertension and diabetic retinopathy.
10. Glasgow coma scale with other parameter was used for day to day clinical evaluation.
11. Routine investigations like Haemoglobin, TLC. DLC, urine for routine and microscopic, blood sugar was done in each patient. One twelve lead ECG was recorded.

Inclusion Criteria:

1. Patients admitted in medical ward with acute onset of neurological deficit.
2. Patients of either sex of any occupation.
3. Patients seen in MOPD with past history suggestive of CVA or TIA were included in the study.

Exclusion Criteria:

1. Patients with history of head injury.
2. Patients with evidence of tumor or infection of brain and meninges.
3. Patients with neurological deficit solely due to post ictal state.
4. Patients who were cases of hypothyroidism or renal disease.
5. Patients whose peripheral smear was suggestive of macrocytic picture were excluded from the study.

Observations

In this study mean serum homocysteine level in the study group was found to be 30.32umol/L. The highest mean serum homocysteine level was seen in age group of >70 years.

Table 1: Distribution According to Serum Homocysteine Level with Related to age

S. No		Age					Total (n=101)
		<40 (n=15)	41- 50 (n=11)	51- 60 (n=29)	61- 70 (n=27)	>70	
1	Normal (<15umol/L)	1	4	7	4	5	21
2	Mildly Elevated (6 – 30 umol/L)	9	2	17	16	10	54
3	Moderately Elevated (30 – 100 umol/L)	5	4	3	8	4	24
4	Severely Elevated (> 100 umol/L)	0	0	1	1	0	2
	Total	**15**	**10**	**28**	**29**	**19**	**101**

Comparison of mean serum homocysteine level when done on the basis of domicile showed no statistical difference (31.7umol/L versus/L 26.8umol/L), similarly men were found to have higher mean serum homocysteine level then women but difference was statistically insignificant.

Table 2: Distribution According to Domicile, Sex and Mean Serum Homocysteine level (n = 101)

Residence	Male	%	Female	%	Total	%	Mean S. Homocysteine level
Rural	39	69.67	33	73.33	72	71.29	31.73
Urban	17	30.36	12	26.67	29	28.71	26.82
Total	**56**	**100.0**	**45**	**100.0**	**101**	**100.0**	**30.32**

Diabetics were found to have mean serum homocysteine level much higher than non – diabetic population, the difference was statistically significant. In hypertensive cases, they were found to have higher mean serum homocysteine level when comparison was made to non – hypertensive cases but difference was statistically insignificant.

Table 3: Showing Past History of Various Diseases (n – 101)

S. No	Past History	No. of Cases		(%)	Total	Mean S. Hey level (n=50)
		Male	Female			
1	Hypertension	16	11	26.73	27	30.55
2	Diabetes mellitus	9	3	11.89	12	58.22
3	IHD	2	-	1.98	2	145.06
4	CVA/TIA	6	4	9.90	10	24.19
Total		**33**	**18**	**50.49**	**51**	**40.30**
No significant past history		23	27	49.50	50	20.13

Patients who were found to have haemorrhagic stroke had higher mean serum homocysteine level than ischemic stroke (58.9 umol/L versus 48.6 umol/L) and the difference was statistically significant.

Table 4: Showing Etiology in CVA on basis of Imaging (n=25)

Etiology	Male	Female	Total	Mean S. Homocysteine level
Ischemic	9	7	16	**48.60**
1. Thromobotic	8	5	13	
2. TIA	1	2	3	

Hemorrhagic	5	4	9	**58.92**
1. ICH	5	3	8	
2. SAH	0	1	1	
Total	**14**	**11**	**25**	

Mean serum homocysteine level in patients who died during course of hospitalization was again much higher when compared to those who survived the catastrophe of stroke (63.57 umol/L versus 30.32 umol/L); the difference was found to be statistically significant.

DISCUSSION

In our study group, hyperhomocysteinemia (>15umol/L) was found in 80 patients (79.6%). Mean serum homocysteine level was calculated as 30.32 umol/L. It was seen that highest mean serum homocysteine level was seen in age group of >70 years. When comparison was made on the basis of gender, males were found to have higher mean serum homocysteine level than females (30.44 umol/L versus 28.14 umol/L).

The Ruby Hall study**,** conducted in Pune (2002) showed raised homocysteine was the commonest risk factor for stroke in studies population. The mean homocysteine in vegetarians with stroke was 37.7+11.91. umol/L and the mean homocysteine level in all non vegetarians from rare to more than once a week were 25.5 + 13.6 umols/L in this population which was comparable to our study group [2].

In a study conducted by Zongete *et al* in RIMS, Imphal, Manipur in time period of 1997 to 2002 it was seen that, Cerebrovascular accident seems to have a male preponderance over female having a ration 64:29. The mean homocysteine level is also higher in males than in female showing 15.67±6.70 umols/L 14.62±5.70 umols/L respectively. The maximum numbers of cases are in the age group 65-74 years with levels of 16.22±6.00 umols/L. The highest homocysteine level was observed in the age group 74 years and above. This implies that the level of homocysteine increases as age advances [3]. Even in our study group we have seen that mean homocysteine level is higher in males (30.44 umol/L) than females (28.14 umol/L) and highest mean homocysteine level in >70 years age group. Similarly Tan *et al*, 2002 found that mean fasting homocysteine levels were significantly higher in cases (13.7 umols/L,) than controls (10.8 umols/L) [4].

All these studies indicate that hyperhomocysteinemia was associated with stroke, age, male, gender, diet and geographical distribution. Our results were more comparable to Indian study as was expected due to differences in diet.

During our study, 27 patients were found to have past history of hypertension alongwith 12 patients were having diabetes and 2 persons had past history of IHD. Highest mean serum homocysteine level was found in diabetic and IHD group, which was statistically significant. In hypertensive group, there was increased mean serum homocysteine level than non – hypertensive group but difference was statistically insignificant. In study conducted by Narang *et al* in 2009 showed that the mean homocysteine levels in patients with ischemic stroke were 16.80+/-6.71 umols/L while in controls it was 12.30+/-4.68 umols/L the difference being statistically significant (P<0.01). The increased homocysteine levels in patients with ischemic stroke are independent of diabetes mellitus, age and sex. The homocysteine levels were higher in hypertensive subjects than – hypertensive (P<0.05). In our study group, we had found that hypertensive subjects had higher mean serum homocysteine level that non – hypertensive group but difference was not significant, which might due to underreporting of known case of hypertension in our study group as most cases belonged to rural and less educated community [5].

Parnetti, 2004 found that homocysteine was elevated in all stroke subtypes: 13.0+/-2.5 umols/L in patients with cardioembolic disease, 13.9+/-5.4 umols/L in those with small vessel diseases, 15.5+/-6.8 umols/L in cases of undetermined stroke, and 17.8+/-13.5 umols/L in patients with large vessel disease. Mean homocysteine was 8.10 umols/L (SD=2.5) in controls.

In present study, Mean serum homocysteine level when calculated in patients who died during course of hospitalization was found to be much higher (63.5 umols/L) when compared to mean serum homocysteine level of study group [6].

In our study hyperhomocysteinemia has been found to commoner risk factor than hypertension, diabetes mellitus, smoking, alcoholism. Furthermore, its effect is synergistic rather than additive when associated with other risk factor.

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