Frequency of Hyperhomocysteinaemia in Ischemic Stroke Patients

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ABSTRACT

Objective: To determine the frequency of hyperhomocysteinaemia in ischemic stroke patients and its association with other risk factors.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at the department of general medicine Nishtar Hospital, Multan, from November 2020 to November 2021 for a period of one-year,

Materials and Methods: A total of 120 patients were enrolled from outpatients and emergency department of hospital. After clinical examination and 8 hours fasting venous blood sample was taken aseptically for ethylene diamine tetra acetate analysis. Main variables of study were age, gender, diabetes, hypertension and homocysteine level. SPSS version 23 was used for data analysis. Mean and SD was calculated for numerical data and frequency percentages for categorical data.

Results: Majority of the patients were (68.3%) between age group 40-60 years. Hypertension and diabetes mellitus was observed as (47.5%) and (31.7%), respectively. Among total 67.5% patients had hyperhomocysteinaemia, >15mmol/L. It was seen that the differences were not statistically significant.

Conclusion: Hyperhomocysteinaemia is a strong risk factor that is responsible for number of ischemic stroke incidents in Pakistani population. Preventive measures of hyperhomocysteinaemia will lessen the incidence of ischemic stroke.

Key Words: Ischemic stroke, Hyperhomocysteinaemia, Frequency

INTRODUCTION

A stroke eventuates when blood flow to a part of brain is disturbed, averting oxygen and nutrients supply to the brain tissues. Starved brain cells begin to die within minutes. It is a medical emergency which requires immediate treatment is vital. It is one of the major causes of deaths in the world.[1] About 15 million people suffer a stroke annually, from which five million die and another five million incapacitated because of it creating further problems.[2] Ischemic stroke is serious concern for health care system though it is not fatal, but is a major source of morbidity in stroke patients.[3]

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One of the most paralyzing neurological disorders which is very demanding financially and mentally. There are dozens of risk factors out which some are constant, like age, gender and positive family history, while others are manageable, like diabetes, hypertension, hyperlipidaemia and hyper-homocysteinaemia. According to available data 70% of stroke cases are caused by known risk factors.[4,5] Early diagnosis of manageable risk factors of stroke helps in preventing the incidents of this disease. One of such factors is homocysteine level in blood, it can be easily managed as it is simple and efficient with minimum economic burden and safe to do. Therefore it is of utmost importance to observe the rate of hyper-homocysteinaemia amid patients with ischemic stroke.[6]

Homocysteine is a Sulphur-containing amino acid derived from the metabolic demethylation of dietary methionine.5-12mmol/L is a normal amount of homocysteine in blood. More than normal range of homocysteine is responsible for oxidative damage to vascular endothelium with propagation of vascular smooth muscle and creates prothrombotic state as it affects thrombin, platelets and fibrin.[7] there is also a relation between high levels of homocysteine and atherosclerotic vascular disease.[8] Majority of studies also confirmed an association between higher homocysteine levels and stroke[9]. It is also observed that stroke patients with hyperhomocysteinaemia have a

higher chance of developing cerebral micro-angiopathy and multiple infarctions than others with normal homocysteine levels.[10]

It is evident from the above discussion that homocysteine levels have significant impact on human health. As most of the studies are on western population there is considerably few studies which have been done in Pakistani population; self-evidently eating habits, genetic profiles and life style of Pakistani populace is different therefore there is need of more local studies in this regard. The fore most drive of this study was to find out the rate of occurrence of hyperhomocysteinaemia in Pakistani patients suffering from ischemic stroke and its connection with other risk factors, as it is manageable factor, further studies may help in devising approaches in reducing stroke incidence and other complications related to it.

MATERIALS AND METHODS

The cross-sectional study was performed by means of convenience at the Nishtar Hospital, Multan, from Nov 2020 to Nov 2021. For this study ethical approval was taken from hospital ethical board. Patients suffering from Ischemic stroke were carefully chosen from the OPD and ED of the hospital. Informed consent from each patient was taken from each patient. The sample size was calculated using Open Epi, taking p-value as 0.5 with 95% CI.

Ischemic stroke was considered as neurological discrepancy lasting more than 24hours with diagnosed by a CT scan of brain or through indication of necrosis on CT scan of brain performed within 7 days of the episode.

All the patients with known previous history of ischemic strokes, ischemic heart disease, hypothyroidism, peripheral vascular disease, epilepsy as well as pregnant females and patients using medications which can alter homocysteine and also patients taking niacin, multivitamins, methotrexate, anticonvulsants, tamoxifen, bile acid sequestrants, nitrous oxide anesthesia were excluded.

4ml venous blood sample was taken in ethylene di-ammine tetra acetate EDTA vial from all patients after eight hours of fasting and sent to laboratory for analysis. Collected data was entered on predesigned performa. Data analysis was done by using SPSS version 23. Categorical data like gender, diabetes, and hypertension was presented as frequency and percentages(%). Numerical data like age and homocysteine values was presented as mean ± standard deviation. Test of significance student t-test (for numerical) and chi square test (for categorical) was applied to see association among study variables. P value below or equal to 0.05 was taken as significant.

RESULTS

One hundred and twenty patients were included in this study in which male (59.2%) and female (49%). The mean age of the patients was 55.65±9.75 years.

Majority of the patients were (68.3%) between age group 40-60 years. Hypertension and diabetes mellitus was observed as (47.5%) and (31.7%), respectively (Table. I).

Overall, (67.5%) patients had hyperhomocysteinaemia, >15mmol/L. (Table. II). The mean homocysteine levels of the patients against the independent variable were shown in table. III. It was seen that the differences were not statistically significant. (Table. 3).

Table No.1: Demographic and baseline among the patients

Variable	N (%)
Gender	
Male	71 (59.2)
Female	49 (40.8)
Age distribution (years)	
40-60	80 (68.3)
61-75	38 (31.7)
Hypertension	57 (47.5)
Diabetes mellitus	38 (31.7)

Table No.2: Presence of hyper-homocysteinaemia among the patients

Homocysteine level	N (%)
≤15mmol/L	39 (32.5)
>15mmol/L	81 (67.5)

TableNo.3: Mean homocysteine levels of stroke patients against the variables

Variable	Category	N (%)	Homocysteine Mean±S.D	P-value
Gender	Male	71 (59.2)	16.25±1.49	0.254
	Female	49 (40.8)	15.95±1.18	
Age (years)	40-60	82 (68.3)	16.05±1.45	0.328
	61-75	38 (31.7)	16.31±1.21	
Hypertension	Yes	57 (47.5)	16.03±1.21	0.462
	No	63 (52.5)	16.22±1.52	
Diabetes mellitus	Yes	38 (31.7)	16.07±1.45	0.771
	No	82 (68.3)	16.15±1.35	

DISCUSSION

Hyperhomocysteinemia was observed to have a significant association with ischemic stroke in the study. Hyperhomocysteinemia was observed in 67.5% of our ischemic stroke patients (Table 2). Similar results observed by Niazi F et al. and Pezeshgi, P et al.[11,12] where they found Hyperhomocysteinemia in 50% and 64% of the patients. Some studies, however, have been unable to find a relationship between hyper-homocysteinaemia and stroke.[13] Males showed greater

homocysteine levels than females in our research. Which is consistent with results by Malati Murmu KM et al. and Hao L et al.[14,15]

There was no significant link between homocysteine levels and age in our investigation. Similar results were observed by Huang S et al. and Narang AP et al.[16,17] Homocysteine levels have also been reported to rise with age in a few studies.[15] This conclusion may be explained in terms of nutritional status and vitamin consumption, which is expected to decline as people become older.

Homocysteine levels were not different in hypertensive ischaemic stroke in our research. The evidence on the link between homocysteine and hypertension has been mixed. Sharabi Yet al.[18]found no link between hypertension and homocysteine levels whereas, Narang AP et al.[16] found a link between hypertension and homocysteine levels. Hyperhomocysteinemia is thought to cause an elastolytic process in the artery wall by increasing serine elastase production and release. The lack of elastin can cause the artery wall to harden, leading to hypertension. Although other concurrent variables may also present, this might be one of the ways Hyperhomocysteinemia contributes as a risk factor for stroke.[19]

Similarly, homocysteine levels were not different in diabetic stroke patients. Similarly Narang AP et al. observed ischemic stroke are independent of diabetes mellitus.[16] Other research has shown mixed outcomes when it comes to the link between homocysteine levels and diabetes mellitus.[20] Further research on the relationship between homocysteine levels and diabetic stroke patients is needed.

This research provided a lot of good points. One of them was that the exclusion criteria included all conceivable confounders of homocysteine levels, and patients were rigorously eliminated from the trial if they had any confounders of homocysteine levels. Second, it measured homocysteine levels in fasting blood samples, as non-fasting blood samples in earlier investigations had shown elevated homocysteine levels.[18] Our study's sample size, on the other hand, was rather modest. As a result, more research should be conducted in various sections of the country. Hyperhomocysteinemia is a preventable risk factor linked to a high proportion of ischemic stroke patients in Pakistan's population. Hyperhomocysteinemia prevention would lower the incidence of stroke and, as a result, the prevalence of ischemic stroke in Pakistan.

CONCLUSION

Hyperhomocysteinaemia is a strong risk factor that is responsible for number of ischemic stroke incidents in Pakistani population. Preventive measures of hyperhomocysteinaemia will lessen the incidence of ischemic stroke.

Author's Contribution:

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