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ESTIMATION OF SERUM FERRITIN AS A PROGNOSTIC MARKER IN ACUTE HEMORRHAGIC STROKE AN OBSERVATIONAL STUDY.

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ABSTRACT **INTRODUCTION :** Stroke is a medical condition in which there is cell death due to poor blood flow to the brain. Signs and symptoms often appear soon after the stroke has occurred. High blood pressure is most common cause of stroke in many individuals . Others include high blood cholesterol, tobacco smoking, obesity. CVA is the third leading cause of death after heart diseases and cancer and is now emerging as the most common preventable life-threatening neurological problem, worldwide. Search has been on to find out the factors which can help in formulating the prognosis of individual stroke cases. One of the prognostic indicators, which has gained great clinical interest in recent times, is the level of serum ferritin. Initially, considered only as a stress response to stroke, serum ferritin is now under research as a prognostic marker of stroke **MATERIALS AND METHODS**: This study was conducted in the department of general Medicine Government General Hospital, Nellore from may 2022 to june 2022. This was a hospital based observational study. A group of 50 subjects participated in this study. Primary supratentorial hemorrhage diagnosed clinically and by computed tomography of brain. **REUSLTS:** In this study most of the patients are in their fifties and sixties, males are commonly affected four times higher than females . Hypertension is the most commonly associated risk factor (98%) in this study population. The most common location of hypertensive ICH is lateral gangliocapsular region, Headache is the most common symptom present in most of the population . The serum ferritin levels are significantly elevated among the bad prognostic group with Modified Rankin Score of more than 2. **DISCUSSION:** High serum ferritin levels are independently associated with poor outcome in patients with ICH which suggest neurotoxic effect of increased body iron stores. It is likely that the inflammatory response is triggered by stroke process and mediated by IL-1 (fever) and IL-6 / TNF with rise in acute phase reactants such as CRP etc that may enhance neurotoxicity. The most common location of hypertensive ICH is lateral gangliocapsular region. In a clinico pathological series by Cole and Yates, it has been found that the microaneurysms caused by hypertension were commonly located in this region. Manu Mehriditta found no significant correlation between the serum ferritin levels and the volume of ICH. Due to hemolysis and extensive day today variability (30 – 50 %),serum iron and transferrin saturation exhibit a significant analytic variability. **CONCLUSION:** The most common risk factor connected with ICH is hypertension. The volume of ICH and admitting GCS have no effect on serum ferritin levels. There is an increase in baseline serum ferritin which can be used as an independent prognostic marker and is associated with clinical deterioration.

KEYWORDS : STROKE, SERUM FERRITIN , OUTCOME, PROGNOSIS

INTRODUCTION

The term stroke or apoplexy refers to acute neurological injury,especially the type caused by cerebrovascular disease. Prevalence is around 55.6 per 100,000 all ages (1);0.63 Million deaths (2) ;1.44164;million cases of new acute strokes every year (3);6,398,000 DALYs (4).12% of strokes occur in the population aged <40 years (5).28-30 day case fatality ranges from 18-41% (6).In addition to the functions specific to the lost brain tissue, other essential mental faculties such as humor, mood, initiative, and speed of thought are severely affected. Sadly these attributes are ignored in the management of stroke patients.

A milestone in the discovery of stroke was the work of Morgagni. He categorised apoplexy into sanguineous apoplexy and serous apoplexy (7). Portal (1742-1832) rightly emphasized that it was impossible to distinguish between the two during life (8). Stroke is one of the leading causes of death and disability in India with an incidence rate of 119-145/100,000 population.

Due to high content of unsaturated fatty acids and relative deficiency of antioxidant mechanisms,brain is especially vulnerable to free radical injury. About 2/3rd of body iron is in the form of hemoglobin. To participate in free radical formation, iron must be liberated from the protein. (9). Ferritin is the key storage protein in the brain. Under steady state concentrations, serum ferritin levels is also an indirect marker of the total amount of iron stored in the body. Hence,serum ferritin level is used as a diagnostic test to estimate iron stores (10).

MATERIALS AND METHODS

This study was conducted in the department of general Medicine Government General Hospital Nellore from may 2022 to june 2022. This was a hospital based observational study. A group of 50 subjects participated in this study.

Inclusion criteria for study patients were having first episode of Primary supratentorial hemorrhage , diagnosed clinically and by computed tomography of brain were included. Exclusion criteria for study patients are Ischemic stroke, Anemia,Severe alcohol consumption,Chronic liver disease,Chronic kidney disease,Hematological cancer,Secondary intracerebral hemorrhage.

Statistical Analysis:

The variables were analysed using SPSS software version 15. Students t' test and chi square tests were employed to find out significance of difference between means in study patients. Variables are analysed using one way ANOVA between different prognostic groups. Spearman's correlation test was used to correlation the relation between serum ferritin and GCS and volume of hematoma.

RESULTS

In this study most of the patients are in their fifties and sixties, but can extend from 30- 80years. Males are more commonly affected 4 times higher than females (4:1). 78% men and 22% women. Hypertension is the most commonly associated risk factor (98%) in this study population followed by smoking, alcoholism and diabetes mellitus which is in concordance with other studies.

The most common location of hypertensive ICH is lateral gangliocapsular region. In our study, the most common location of ICH is gangliocapsular region followed by lobar and thalamus. Older patients are having little higher incidence of lobar haemorrhage located in temporoparietal region.

Headache is the second most common symptom after focal neurological deficit. It is present in 50% of the study population.

The overall mortality is 30 % in this study population. Males had higher mortality (34.28%) than that of females (20%). This is also higher than the reported mortality rate of 10 – 20 % among developed countries. In part it can be explained by lack of long term care facilities in most part of India and associated complications of immobilization.

The serum ferritin levels are significantly elevated among the bad prognostic group with Modified Rankin Score of more than 2. The mean serum ferritin value is 111 ng/ml (SD 32.018). The mean ferritin values are 265.11 ng/ml (SD 84.04) and 363.40 ng /ml in patients with MRS 3 to 5 and 6 respectively. The difference is statistically significant ($p < 0.05$). Hence the serum ferritin level at the baseline can be used as a prognostic marker in ICH.

In our current study the mean volume of ICH are 24 ml (SD 8.3) , 59.48 ml (SD 25.97) and 78.66 ml (SD 23.29) among the patients with MRS < 2 , 3-5 and 6 respectively. This observation is statistically significant (

P < 0.05).

Patients with poor prognosis had larger hematoma volume on initial CT scan. Intraventricular hemorrhage (IVH) was noted in 53.33% of the mortality group with midline shift in 6.6%.The most common location in this study in mortality group is gangliocapsular followed by lobar and thalamus in order. This is in concordance with other studies.

DISCUSSION

This study was conducted on 50 patients with acute intracerebral hemorrhage to find out the serum ferritin levels and correlation between different prognostic groups.

It is likely that the inflammatory response is triggered by stroke process and mediated by IL-1 (fever) and IL-6 / TNF with rise in acute phase reactants such as CRP etc that may enhance neurotoxicity. However the initial rise in serum ferritin levels at the onset of stroke is not associated with inflammatory response and correlate with the body iron stores.

In the study by Natalia Perez et al, it has been proved that the serum ferritin levels are not correlated with other markers of inflammatory response (11). It is again confirmed by Armengolu et al (12). In addition study by Natalia Perez et al, concluded that older age,higher stroke severity, large volume of hematoma with intraventricular extension and mass effect are associated with poor outcome which correlates with this study.

High serum ferritin levels are independently associated with poor outcome in patients with ICH which suggest neurotoxic effect of increased body iron stores. Base line serum ferritin levels correlated with initial ICH and edema volume and to a lesser extent with ICH growth. Azra Zafar et al conducted a study among which 62 men and 38 women were studied.

Manish Narayan studies a total of 27 patients among them 14 were men 9 were women.The most common location of hypertensive ICH is lateral gangliocapsular region. In a clinico pathological series by Cole and Yates, it has been found that the microaneurysms caused by hypertension were commonly located in this region (13).

Headache is the second most common symptom after focal neurological deficit. It is in contrast to other series in which headache is present in only in 40 %. In a study by Hafiz AM et al, the most common symptom was focal neurological deficit followed by vomiting (78%), impaired consciousness (72%), motor and sensory aphasia followed by headache and dysarthria, which didn't correlate with other studies.

Manu Mehriditta found no significant correlation between the serum ferritin levels and the volume of ICH (14). Serum ferritin levels measured at the onset of symptoms,if elevated,there is increased risk of progression to stroke by 33% , regardless of other predictors of neurological outcome (15 ,16) . serum ferritin indicates tissue iron stores and therefore, a reliable marker of availability of iron in the area of acute stroke in patients without infectious or inflammatory disease.

Due to hemolysis and extensive day today variability (30 – 50 %),serum iron and transferrin saturation exhibit a significant analytic variability (17,18).Perihematomal edema volume has been associated with significant mortality and morbidity .In a study conducted by Savman et al. in 20 preterm infants with intraventricular hemorrhage and 10 preterm control infants, found out non protein bound iron (NPBI) in 75% of the patients with IVH and 0% in control infants(11).

CONCLUSIONS

In our study of 50 patients with primary supratentorial intracerebral hemorrhage . The most common risk factor connected with ICH is hypertension,the volume of ICH and admitting GCS have no effect on serum ferritin levels,increased baseline serum ferritin can be used as an independent prognostic marker and is associated with clinical deterioration,gangliocapsular region is the most common site of bleed,the absence of diabetes, younger age and absence of IVH and midline shift are associated with good prognosis.low GCS and higher volume of hematoma is associated with poor prognosis.

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