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ROLE OF C- REACTIVE PROTEIN IN ESTIMATION OF EARLY DIAGNOSIS OF ISCHEMIC STROKE

General Medicine

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ABSTRACT

Background: The measurement of markers of inflammation or thrombosis has been proposed as a method to improve the prediction of risk in patients with vascular disease**.**

Aims and Objectives: The role of C-reactive protein (CRP) as a novel plasma marker of atherothrombotic disease is currently under investigation. We related plasma CRP levels to first ischemic stroke and its role as a diagnostic aid.

Methods: Eighty consecutive patients without thrombolysis with a first ischemic stroke patients were examined with the exclusion of risk factors. CT scan of brain was done after 24 hours of onset of symptoms to confirm the diagnosis. Plasma CRP level was determined before 72 hours of onset of symptoms in all CT confirmed ischemic stroke patients.CRP was randomly measured in 40 healthy individuals as a control group.

Results: The CRP concentration in ischemic strokes independent of infarction site, the value was more between 41-60 years of age group and almost equal in both gender. 64 of the 80 ischemic strokes studied had CRP value >6 mg/l and only 16 patients had <6 mg/l ($p<0.001$), chi square test value is ^{2}=27.88, which is statistically significant. Only 4 of the 40 control group had CRP >6 mg/l, which is insignificant.

Interpretation and Conclusion: The CRP level is significantly higher in ischemic strokes and by its elevation ischemic strokes can be diagnosed positively but sub-types of cerebral infarction cannot be differentiated at the time of early diagnosis.

KEYWORDS

C-reactive protein, Ischemic stroke.

INTRODUCTION:

Stroke remains a major cause of human mortality and morbidity. Cardiovascular and cerebrovascular diseases appear to be very frequently encountered now and responsible for great deal of morbidity. In spite of our increasing understanding of the pathophysiology and epidemiology of cardiovascular diseases and stroke and continuing advances in prevention and treatment, the burden of above said diseases is high.

Furthermore traditional atherogenic risk factors such as hypertension, smoking, hyperlipidemia, diabetes mellitus do not fully account for the clinical occurrence of CHD and stroke in different populations. At the turn of 20th century, Sir Williams Osler (1908) and Ophulus (1921) proposed that infection could be a casual factor in pathogenesis of atherosclerosis. Infact research of more than a century has implicated various microorganisms as potential link between inflammation and the pathogenesis of atherosclerosis. Indeed atherosclerosis is now accepted as an inflammatory disease, possible infections include chlamydia, H-pylori, Herpes and CMV. Researchers found a protein in their several years study in first attack of myocardial infarction or stroke and this is C-reactive protein[1].

Apparently measuring C-reactive protein might provide novel method to detect worrisome level of atherosclerosis in otherwise healthy persons. This new finding assumed importance to researchers as they raised the possibility that atherosclerosis may be at least partly and inflammatory process disease. Limited work have been published on CRP changes in stroke in India despite high incidence of CVA in India.

Objectives of the study :

In view of the different observations by various works about the source of inflammatory stimulus and significance of value of C-reactive protein in thrombotic stroke and relation between different risk factors, the present study was undertaken with the following aims and objectives.

- To observe CRP rise in ischemic stroke.
- To identify existence of inflammation in pathogenesis of stroke.
- To evaluate role of CRP as diagnostic aid in ischemic stroke.

MATERIALS AND METHODS:

The study was carried out in Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari.

Selection of Patients: The study was conducted on patients admitted with clinically first attack of stroke to medicine ward.

Period of Study: From February 2019 to January 2020.

Sample Size: 200 patients admitted with stroke (CT proved) were selected for the study, of this 150 patients had first time thrombotic stroke. Out of this 80 were selected after exclusion of patients having hypertension, diabetes, heart disease, infection, tuberculosis, hyperlipidemia, previous history of stroke, TIA and other factors known to alter CRP value as the study group. 40 age and sex matched control subjects were selected from general population.

Study Group: Of 200 stroke patients, 150 CT proved ischemic stroke patients after exclusion by exclusion criteria, 80 were selected as the study group.

Study Protocol:

Clinical history was taken from either the patient or his/ her relatives. While taking history importance was given regarding presence or absence of vomiting, headache and convulsions. Past history of hypertension, diabetes, CAD, RHD, TIA, collagen diseases, meningitis, intermittent claudication, tuberculosis, endocrine disorders and congenital disorders were taken. Personal history regarding dietary habits, smoking were noted. Detailed general examination with particular importance to height, weight, BMI, markers of atherosclerosis, blood pressure were noted. Detailed neurological examination was done. All other systems were examined in detail. Detailed investigations were done. CT scan after 24 hours after onset of symptoms and C-reactive protein estimation within 72 hours were taken.

RESULTS:

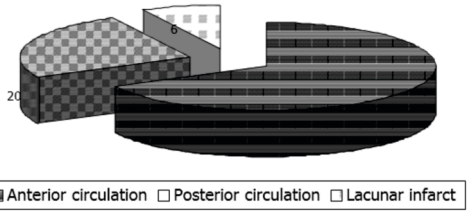
200 cases of first episode of stroke were studied during the period from February 2019 to January 2020. Of these 150 were ischemic stroke after CT evaluation. Of those 80 CT proved ischemic stroke patients without history of hypertension, diabetes, hyperlipidemia, vascular heart disease were studied and 40 age and sex control group were also studied as control group.

The observations of study were as follows :

1. **Type of stroke (CT Scan Evaluated) (n=200)**

Type of stroke	No. of cases	Percentage
Ischemic stroke	150	75.00
Hemorrhagic	50	25.00

2. **Age and sex distribution of ischemic stroke patients (n=150):** The maximum number of cases of cerebrovascular accident were found in age group >60 years, followed by 51-60 years in males. Maximum in age group of 51-60 years in females followed by 41-50 years. In the study 60% of the patients were males. Male to female ratio 1.5:1.22 patients had stroke with age <40 called young stroke.
3. **Localization of Lesions(CT Evaluated) (n=150)**: CT showed most cortical lesions in frontal lobe. Among sub-cortical lesions most were found in the basal ganglia, internal capsule and thalamus.
4. **Clinical picture of thrombotic stroke patients (n=80):** 70 patients presented with sudden onset of symptoms. While 10 patients had gradual onset. 10 patients presented in coma, while 30 were alert, 40 were confused or stupurous. History of claudication present in 10 patients and there were atheromatous markers in 43 patients.
5. **Clinical spectrum based on artery territory involved (n=80):** Anterior circulation strokes were more common than posterior circulation strokes. Strokes due to lacunar infarct were least.



6. **Body mass index of the study and control group:** Mean body mass index among the stroke patients is 21.24±1.03 Kg/m², the mean BMI among the control is 21.01±1.27 Kg/m². The difference in BMI were not statistically significant. Among the stroke patients majority have BMI between 20.1 and 22.0 Kg/m². Among the control, majority have BMI between 20.1 and 22.0 Kg/m². The BMI of the study and control group were matched as CRP value increases as BMI increased**.**
7. **Weight of study and control group:** The mean weight in the thrombotic stroke patients was 60.17±3.86 Kg and control group was 60.65±3.75 Kg, the difference in mean weight was not significant (p>0.05). The mean weight of both the study and control group were matched as CRP value increases with weight.
8. **Blood pressure of study and control group :** The mean systolic blood pressure of the study group is 124.2±4.06 mm Hg and the control group 125.0±5.99 mm Hg (p>0.05)and the mean diastolic blood pressure is 80.09±4.43 mm Hg in the study group and 80.22±6.09 mm Hg in the control group (p>0.05).The blood pressure of both the study and control groups were matched and the difference between the mean blood pressure were not statistically significant and will not influence the CRP value.
9. **Serum urea, serum creatinine, FBS of study and control group:** The mean serum urea value is 20.1±1.19 mg% in stroke patients and 19.8±0.38 mg% in control group (p>0.05). The mean serum creatinine value of the stroke patients was 0.75±0.15% and the control 0.74±0.12 mg% (p>0.05). the mean fasting blood sugar value of the stroke patients was 84.29±89.43 mg% and control group 83.33±8.25 mg% (p>0.05).
10. **Lipid profile of study and control group:** The mean cholesterol of thrombotic stroke patients is 162.97±25.75 mg%, control 159.7±23.8 mg% (p>0.05). The mean HDL cholesterol of study group is 47.97±6.02 mg% and the control group is 44.3±7.8 mg% (p>0.05). the mean LDL cholesterol value is 89.1±16.83 mg% in the study group and 84.8±27.8 mg% in the control group (p>0.05). The mean serum triglyceride values is 127.9±35.46 mg% in the study group and 153.1±67.25 mg% in the control group (p>0.05).
11. **Physical activity of study and control group:** Majority of the stroke patients and the control group were moderate in physical activity. Only 26 patients in the study group and 12 in the control group belonged to the sedentary work group. 12 of the stroke patients belonged to the heavy work group.
12. **Dietary habits of study and control group:** Majority of the stroke patients and control group consumed mixed Indian diet.
13. **C-reactive protein level in CT proved ischemic stroke patients :** The CRP value of CT evaluated ischemic stroke patients after admission before aspirin treatment. 64 of the 80 thrombotic stroke studied had CRP value > 6 mg/L. Only 16 patients had CRP value <6 mg/L (p<0.001). Chi-square test value is 27.88, which statistically significant. Only 4 patients in the control group had CRP value >6 mg/L.
14. **CRP Level in relation to Age (n=80):** CRP level is more between the age group 41-60 years and is less in young adults i.e., < 40 years.
15. **CRP level in relation to Sex (n=80)**

The above table shows increased CRP level in females i.e., 88 percent than males.

Sex	> 6 mg/ L	< 6 mg/L	Total	Percentage (%)
Males	42	13	55	76.36
Females	22	03	25	88.00

16. **CRP Level in relation to infarction site (n=80):** CRP level is more in subcortical than cortical infarct. Lacunar infarcts are also associated with more CRP level percent than cortical infarction.

CONCLUSIONS :

1. In this study mean C-Reactive protein levels were significantly higher in patients with ischemic stroke when compared to controls.
2. It is also observed that by elevated C-Reactive protein in ischemic stroke can be diagnosed positively but subtypes (cortical, subcortical, lacunar) of cerebral infarction cannot be differentiated at the time of early diagnosis.

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