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Research Article

A COMPARATIVE STUDY OF SERUM HS-CRP LEVEL AMONG ISCHEMIC STROKE PATIENTS AND HEALTHY CONTROLS

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ABSTRACT

Objectives to study, the high sensitivity C-reactive protein (hsCRP) level in Indian patients with ischemic stroke and to compare it with that of age and sex matched controls. Also, to evaluate the hsCRP level as a prognostic marker in cases of acute ischemic stroke. A case control study of 100 patients presenting with a history of focal neurological deficit of acute onset in the form of hemiparesis, hemianaesthesia, or having evidence of presence of ischemic infarct in CT scan of brain was done. In all patients hsCRP levels were measured within 72 hours of presentation. Most of the patients (65%) were in the age group of 50 - 80 years. Left-sided hemiparesis with altered sensorium with facial palsy was the most common presenting symptom. hsCRP levels were found to be increased in stroke patients and on comparison with controls, the values were found to be significant ($p < 0.001$). Mean hsCRP level was 9.66 ±0.90 in non-survivors and 5.98 ± 1.79 in survivors of ischemic stroke. These values were found to be statistically significant ($p < 0.001$). From this study, we concluded that hsCRP level is increased in cases of ischemic stroke, suggesting an inflammatory response in acute stroke. Furthermore, the increased levels correlated with severe neurological deficit and worse outcome.

Keywords- Stroke, Hypertension, CRP (C-Reactive Protein).

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INTRODUCTION

Stroke is a common cause of death in India as well as a leading cause of long-term disability. Two-thirds of all strokes occur in people over age 65, with men more affected than women, although women are more likely to die from a stroke. The acute phase protein, i.e., high sensitivity C-reactive protein (hsCRP) in particular, has been the most extensively studied marker of inflammation [1]. Elevated plasma levels of CRP are not disease specific but are sensitive markers which are produced in response to tissue injury, infectious agents, and inflammation. It was the only inflammatory marker that independently predicted the risk of stroke [2, 3]. Our study was planned to study the serum concentration of hs-CRP in patient of acute ischemic stroke and to compare it with that of age and sex matched controls. Also, to evaluate the hsCRP level as a prognostic marker in cases of acute ischemic stroke.

MATERIAL AND METHODS

This case control study was conducted on 100 patients of acute ischemic stroke, admitted to the medicine department of SMS medical college and hospital, Jaipur. One hundred healthy, age and sex matched controls not having any evidence of stroke or CAD or previous history of TIAs were also studied for valid comparison. Patients presenting with history of focal neurological deficit of acute onset in the form of hemiparesis, hemianaesthesia or aphasia, or having evidence of the presence of ischemic infarct in CT scan of the brain were included in this study.

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The patients with infectious pathology, arthritis, cancer, history of recent MI or acute coronary syndrome were excluded from this study. A detailed history was taken regarding stroke, its onset, duration, time of presentation, focal neurological deficits. Clinical examination included vitals, i.e., pulse, blood pressure, and detailed examination of the neurological system. Laboratory investigations including complete blood count, ESR, serum electrolytes, fasting and postprandial sugar, lipid profile, glasgow coma scale(GCS) were measured employing standard methods. CT scan of the head and ECG were done within 72 hours of presentation, high-sensitivity CRP (hsCRP) levels were calculated by the immunoturbidimetry method.

SELECTION OF PATIENTS:

Inclusion Criteria

1:- All patients of clinical and CT scan brain confirmed first ischemic stroke admitted within 72hrs of symptom onset and

2:- Healthy age and sex matched volunteers who are relatives of the patient.

3:- Informed consent to participate in the study.

Exclusion Criteria

1. Acute infectious disease e.g. Tuberculosis.
2. All patients of stable or unstable angina, acute myocardial infarction, Immunological disorders.
3. Known or suspected neoplastic disorders e.g. multiple myeloma.
4. Recent [less than 3 months] major trauma, surgery, burns
5. Osteoarthrosis, costochondritis, rheumatoid arthritis, ankylosing spondylitis.
6. Unwillingness to participate in study.
7. Chronic liver disease

RESULTS

A total of 100 patients (73 males and 27 females) of stroke who fulfilled the inclusion criteria were analyzed. For valid comparison, 100 age and sex matched controls were taken. In the present study, 73% patients were males whereas 27% were females; mean age of the stroke patients was 61.02 ± 11.81yrs in cases and 60.77 ± 9.76 yrs in controls. The most prevalent risk factor was hypertension (55%), followed by dyslipidemia (42%), smoking (27%) and diabetes(21%).The most common presenting symptom was altered sensorium with left-sided weakness(38%). When mean hsCRP levels were compared between cases (7.30 ± 2.34) and controls (2.58 ± 0.88) as shown in Table1 these values were found to be statistically ($p < 0.001$) highly significant. On comparing the hsCRP levels and other factors like diabetes and BMI, significant positive correlation was found. It was also seen that patients with low GCS score had high levels of hsCRP in patients of strokes. Mean hsCRP level was 9.66 ± 0.90 in non-survivors and 5.98 ± 1.79 in survivors of ischemic stroke; these values were found to be statistically significant as shown in Table2.

Table 1. Showing clinical and biochemical parameters in study groups

Variables	Cases	Controls
Mean age(yr)	61.02 ± 11.81	60.77 ± 9.76
Sex (M/F)	**73/27**	74/26
Mean hs-CRP (mg/dl)	7.30 ± 2.34	2.58 ± 0.88

Table 2. Showing clinical and biochemical parameters in the ischemic strokes groups

Variables	Survivors(n=64)	non survivors (n=36)
Mean age(yr)	58.0 ± 11.83	66.38 ± 11.80
Sex (M/F)	47/17	26/10
Diabetes %	10.9%	38.8%
Hypertension %	43.7%	58.3%
Dyslipidemia %	34.3%	58.2
Smoker %	27.2%	61.7
GCS	8.25± 1.74	6.36± 1.75
Mean hs-CRP (mg/dl)	5.98 ± 1.79	9.66 ± 0.90

DISCUSSION

Stroke is a leading cause of mortality in the India and also a major cause of disability. Recently, it was shown that elevated CRP levels independently predict the risk of future stroke and transient ischemic attack in the elderly [4]. To analyse the role of hsCRP in stroke, the present study was undertaken. It was conducted on 100 stroke patients. A control group having 100 persons, had been taken randomly from healthy subjects who were similarly evaluated as the stroke cases.

The mean age for cases was 61.02 ± 11.81 years and that of controls was 60.77±9.76 years. The mean age in our study was lower as compared to some western studies like O'Malley et al [5] (79.5 ± 6.5 years) and Pikija et al [6] (76 years) but it is higher as compared to an Indian study by in Parvaiz et al [7]. (58 years). This disparity in age may be

due to higher life expectancy in the west as compared to developing world.

Hypertension was the most prevalent risk factor in this study i.e 55% among cases compared to 7% in controls. Dyslipidemia was second commonest i.e 42% among cases & 13% in controls. Both hypertension and dyslipidemia were observed to be significantly associated with occurrence of the stroke (p value being <0.001 &<0.05) respectively. Smoking and diabetes were also observed more in stroke group and was statistically significant (p value 0.001 & 0.01 respectively). Similar to our study in previous studies as well hypertension was observed as the most common risk factor (82.7% in Pikija et al and 84.7% in A. Muscari et al) [8,9]. Smoking was second or third commonest in other studies (14% in O' Malley et al, 14.6% in Muscari et al and 4.9% in Pikija et al studies) [10]. Diabetes mellitus had a representation of 35% which was higher as compared to other studies (8.6% in O'Malley et al, 21.2% in Muscari et al and 18.5% in Pikija et al studies). Kannel reported that diabetes doubles the risk of stroke [11]. Benson and Sacco observed that hypertension confers a relative risk of 3 to 5 times [12].

As regard to GCS in this study, we found that patient with GCS less than 6 increases the relative risk of mortality and morbidity by 1.6 fold than those with GCS more than 6. This agreed with the result of Teasdale et al and Burtin et al [13, 14]. The results of our study were in accordance with Yue Huang et alwho reported that higher levels of hsCRP is a strong risk Factor for Death after Acute Ischemic stroke [15]. hs-CRP in our study showed significant negative correlation with GCS which was also reported by Hashimoto et al [16].

High sensitive C-reactive protein (hsCRP) is a sensitive marker of inflammation and tissue injury in the arterial wall.CRP is a glycoprotein produced by the liver and plays a vital role in the development of atherosclerotic disease in cardiac and cerebral circulation. As a marker of infection and inflammation, high hsCRP has been associated with acute stroke. When the hsCRP levels were measured within 72 hours of admission, it was found to be high in cases (7.30 ± 2.34) as compared to control (2.58 ± 0.88). Similar observations have been reported by various other workers also like Di Napoli et al [17].

In the present study, we compared the level of hs-CRP with survival during hospital stay in acute ischemic stroke. Value of hs-CRP was 9.66 ± .90 mg/L in non-survival as compared to 5.98 ± 1.79mg/L in survival case group which was statistically significant (p value <0.001). Arenillas et al, in their study showed that a high-sensitivity CRP level above the receiver operating characteristic curve cut-off value of 1.41 mg/dl emerged as an independent predictor of new end-point events (p<0.0001) [18].

CONCLUSION

From this study, we concluded that hsCRP level is increased in cases of acute ischemic stroke, suggesting an inflammatory response in acute stroke. Furthermore, the increased levels correlated with, severe neurological deficit, and worse outcome. Therefore hs-CRP can be used for risk stratification after stroke.

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