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CORRELATION OF C-REACTIVE PROTEIN IN ACUTE ISCHEMIC STROKE – AN ORIGINAL STUDY IN A TERTIARY CARE HOSPITAL

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ABSTRACT

AIM: Ischemic stroke is the 2nd leading cause of death in the world after Acute Myocardial Infarction according to WHO. This study was done to estimate the role of C-Reactive protein (CRP) as a marker of acute inflammation following ischemic stroke and to determine, its prognostic role in assessing the functional outcome of patient using modified Barthel index scoring.

METHOD: A prospective study, including 100 subjects was done in a tertiary care hospital in South India. Patients presenting with ischemic stroke are evaluated clinically and investigated with CT imaging and CRP levels and other blood parameters were determined. Modified Barthel index was assessed. A statistical analysis was done to know the relation between severity of stroke and CRP levels.

RESULTS: In this study there were 52 (out of 100) mild cases on day 1 according to Barthel Index. Their CRP values at admission was < 6 mg/l. There were 30 patients with moderate disability. 29 (96.7) of them had CRP value < 6mg/l and one patient > 6mg/l (3.3). Among these 30 patients, 29 patients showed improvement in their Barthel scores by day 5, at discharge and at 3months. 18 patients on day 1 in the study group were severely disabled and 13 (72.2) patients had CRP value >6mg/l on day one.

CONCLUSION: patients with low CRP levels had a good outcome at discharge and 3 month follow up. Elevated CRP is highly sensitive, nonspecific and an independent risk factor for prediction of ischemic stroke. Elevated CRP at admission is a good tool to assess the prognosis of patients following ischemic stroke in comparison to cholesterol levels

KEYWORDS : Ischemic Stroke, CRP levels, Barthel Index Scoring, Prognostic tool

INTRODUCTION:

Cerebro Vascular Accident (CVA) is the second most common cause of death in world as per WHO[1]. A Stroke is a rapidly developing clinical symptoms and/or signs of focal and at times global loss of brain function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin. About 80% of all strokes are ischemic in nature, while 10% are due to intracerebral hemorrhage, and the rest because of different causes[2]. The severity of the stroke may range from recovery in a few days, through persistent disability to death. Evidence shows that cerebral ischemia is involved with inflammatory processes [3]. Vascular inflammation is more related to high-sensitivity CRP (hsCRP) a marker for inflammatory process[4]. This study was done to estimate the role of C-Reactive protein as a marker of acute inflammation following ischemic stroke and also to determine, its prognostic role, to assess functional outcome of patient using modified Barthel index scoring.

METHODOLOGY:

Patients admitted with focal neurological deficits secondary to ischemic stroke between January 2015 and January 2016 to Government General Hospital, Vijayawada were included in the study. It is a prospective study with 100 cases aged greater than 14 years and of both sexes. Patients admitted with new onset of focal neurological deficit following ischemic stroke established by CT imaging taken within 48 hrs are only included. Patients with new onset of stroke with past history of essential hypertension, diabetes mellitus and dyslipidemias, previous heart disease are included. Those with history of alcohol consumption, smoking and oral contraceptive pills intake are included. Patients admitted with features of neurological deficit or coma secondary to intracerebral bleed, intracranial infections, subdural hematoma, intracranial tumor, meningitis are not considered into the study. Patient with transient ischemic attack were excluded. A detailed history of onset and course of the disease was taken along with history of risk factors, drug usage and other co-morbidities. A detailed General examination, Nervous system and other systems examination was done. All the patients were investigated for complete hemogram, urine analysis, Blood sugar, renal function tests, complete lipid profile and hsCRP. Cardiac status evaluation was done with ECG and 2D ECHO. Patient's functional status scored according to Modified Barthel Score at the time of admission, on 5th day and at the time of discharge. All the patients were followed up after 3 months by personal interview, telephonic conversation or postal correspondence and functional status are again scored as per Modified Barthel score. Patients are divided into 3 groups according to Modified Barthel index. Maximum score is 90, Barthel index < 41, severely disabled, 41 to 60, moderately disabled > 60, mildly disabled. The Barthel index is compared with initial CRP level and correlation is noted using appropriate statistical tests.

RESULTS:

A total of 100 patients were studied of which 78% were males. The mean age of study group is 61.8 years with a range of 26 to 85 years and majority of the people belonged to 56-65 year age group. 55 patients had left sided weakness, 44 patients with right sided weakness and 15 patients had cerebellar signs. In this study 47 cases were diabetic, 47 hypertensive and 23 patients had underlying heart disease, 23 patients were smokers and 7 alcoholic. Of the total patients, 52 were mildly disabled, 30 moderately disabled and 18 severely disabled according to Barthel Index Scoring (Table -1). According to the Barthel score on day 1, 52 patients were mildly disabled, 30 patients moderately disabled, 18 severely disabled. On day 5, 80 patients were mildly disabled, 6 moderately disabled and 14 severely disabled. After day 5, during discharge 83 patients were mildly disabled, 4 moderately disabled and 10 severely disabled. 3 patients succumbed to the disease during this period (Table -2). During 3 months of follow up 84 patients were mildly disabled, 3 moderate disabled and 10 severely disabled. It was seen that 13 (72.2) out of 18 severe patients had CRP value > 6 mg/l. Patients with moderate disability 29 (96.7) had CRP values < 6 mg/l, 1 (3.3%) patient had CRP values > 6 mg/l. Patients with mild disease 52(100) all had CRP value <6mg/l. Also the p value < 0.05 was significant, suggesting the relation of CRP values with the severity of the disease (Table-3).

Table -1 – Barthel Index and Age

Age Groups	Severity			Total
In Years	Mild n (%)	Mod n (%)	Severe n (%)	
26-35	1 (50)	1 (50)	0	2
36-45	10 (100)	0	0	10
46-55	11 (64.7)	4 (23.5)	2 (11.8)	17
56-65	17 (54.8)	9 (29.0)	5 (16.1)	31
66-75	10 (33.3)	13 (43.3)	7 (23.3)	30
76-85	3 (30)	3 (30)	4 (40)	10
Total	52	30	18	100

Table 2 – Barthel Index on day 1,5 and on discharge				
Severity	Day 1 n (%)	Day 5 n (%)	On Discharge n (%)	3 months n (%)
Mild	52	80	83	84
Moderate	30	6	4	3
Severe	18	14	10	10
Death	0	0	3	3
Total	100	100	100	100

Table – 3 Barthel Index and CRP			
Severity	Number of Cases	C- Reactive Protein	
	n	<6 n (%)	>6 n (%)
Mild	52	52(100)	-
Moderate	30	29(96.7)	1(3.3)
Severe	18	5(27.8)	13(72.2)
Total	100	86	14

X2 = 61.9; p<0.05, Significant

Discussion: Stroke is the second most common cause of death in the world. In this study there were 52 (100) mild cases on day 1 according to Barthel Index. Their CRP values at admission was < 6 mg/l. These patients have shown improvement in Barthel scores on day 5, at discharge and at 3 months. There were 30 patients on day 1 with moderate disability. 29 (96.7) patients had CRP value < 6mg/l and one patient > 6mg/l (3.3). Among these 30 patients 29 patients showed improvement in their Barthel scores by day 5, at discharge and at 3months. 18 patients on day 1 in the study group were severely disabled and 13 (72.2) patients had CRP value >6mg/l on day one. P values in this study of CRP is < 0.05. Other studies have shown varying prevalence. Rajput et al. had found that among stroke patients from Pakistan, 132 (88%) had elevated CRP (CRP > 10 mg/L)[5]. Muir et al. had detected elevated CRP (> 10 mg/L) levels in 96 out of the228 (42.1%) patients admitted with acute ischemic stroke in the UK[6]. In Framingham study by Rost N.S. et al. they showed that independent of age, Men in the highest CRP quartile had 2 times risk of ischemic stroke / TIA (p = 0.27) and women had almost 3 times the a risk (p = 0.003). Rajinder K Dhamija et al in there study showed that the difference in CRP levels in cases and control subjects was highly significant (4.78± 0.72 mg/dl vs 0.76 ±0.70, p<0.001). 96.5% of patients with raised CRP had abnormal lipid levels also .Raised CRP levels in stroke patients were significantly associated with large territory infarcts, severe disability and poor functional outcome(p<0.05)[7].

Conclusion: Rise in CRP in ischemic stroke reflects the role of inflammation in CVA. In this study, patients with CRP < 6 mg/l suffered mild disease. They also showed good prognosis and their Barthel scores improved with follow up. Patients with CRP levels > 6 mg/l suffered severe disease and did not show significant improvement in their Barthel score. The association of CRP values at admission and its correlation with Barthel scores helps to assess the functional outcome of patient following ischemic stroke. The rise in CRP following ischemic stroke suggest its role in inflammation. CRP is a better tool than cholesterol levels as a prognostic marker. Elevated CRP is highly sensitive, non-specific and an independent risk factor for prediction of ischemic stroke. Elevated CRP at admission is a good tool to assess the prognosis of patients following ischemic stroke in comparison to cholesterol levels.

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