

A Clinical Study of Serum (hs-CRP) Levels in Acute Ischemic Stroke in a Tertiary Care Hospital

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Abstract

Original Research Article

High levels of acute phase proteins like C-reactive protein are associated with inflammatory reaction or tissue damage. Aim: The present study was conducted in order to identify the levels of serum C reactive protein in patients with acute ischemic stroke. Methods: This prospective cross-sectional study was done in the department of general medicine, Prathima Institute of Medical Sciences, Nagunoor, Karimnagar. A total of n=54 patients were selected out of which n=34 were male and n=20 were female patients. A detailed history was obtained and complete clinical examination including neurological assessment was done. All the patients in the study were > 18 years of age. They were subjected to CT and MRI scan and ischemic stroke were confirmed. The biochemical investigation for serum hs-CRP was determined. Results: The mean hs-CRP levels in ischemic stroke patients were found to be 6.97 ± 3.25 mg/L. The comparison of the mean hs-CRP levels based on gender was done a value of hs-CRP less than 3.0 mg/L was considered as normal and the values of hs-CRP > 3.0 mg/L were considered increased. Out of 34 male patients in n=23 (67.65%), the values of hs-CRP were found to be increased similarly in n=12 (60%) females the values were also found to be increased. Conclusion: men are at a greater risk of stroke at an early age as compared to female counterparts. And the hs-CRP levels are positively correlated with stroke and modified Rankin Scale. Higher CRP clearly indicates greater severity of the stroke and poor prognosis.

Keywords: hs-CRP, Ischemic Stroke, Tertiary care hospital.

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INTRODUCTION

A stroke or cerebrovascular accident (CVA) is defined WHO as rapidly developing clinical signs of focal or global disturbance of cerebral function, lasting more than 24 hours or leading to death with no apparent cause other than vascular origin [1, 2]. It is still a leading cause of disability and death in the developed as well as developing countries across the world [3]. The various neurological manifestation of stroke includes hemiplegia, coma, paraplegia, monoplegia, cranial nerve palsy, and sensory impairment [4]. The WHO estimated that approximately 5.5 million people died due to stroke in 2002 and 20% of these deaths were in South Asia [5]. The CRP is an acute phase protein and is an important indicator of systemic inflammation and is a marker for the atherothrombotic disease. The recent use of hs-CRP levels with a standard international reference set by the WHO [6] has enhanced the usefulness of hs-CRP in monitoring and predicting the progress of cardiovascular events. An acute ischemic stroke usually triggers an inflammatory response which leads to increase levels of hs-CRP. High levels of hs-

CRP are generally associated with poor prognosis because they reflect underlying inflammation and tissue damage. Some studies have indicated the ischemic stroke is a sequel of recent infections [7, 8]. Studies have also indicated the IHD is more common in patients with increased hs-CRP and it is a reliable predictor of MI as compared to creatine kinase in MI patients [9-11]. Framingham studies have shown that high CRP levels are associated with increased risk of ischemic stroke [12-14]. With this background, we in the present study tried to evaluate the relation of hs-CRP in ischemic stroke patients.

MATERIAL AND METHODS

This prospective cross-sectional study was done in the department of general medicine, Prathima Institute of Medical Sciences, Nagunoor, Karimnagar. Institutional Ethical committee permission was obtained for the study and written consent was obtained for all the patients of the study. Inclusion Criteria was all the patients with ischemic stroke as determined by CT scan within 12 hours of the onset of symptoms. Exclusion

criteria were patients with hemorrhagic stroke, infections, with trauma, neoplasia, on medications with steroids and patients with hepatic or renal failure. The patients reported to the hospital with a history of sudden numbness or weakness of the face, arm or leg, sudden confusion, and trouble walking, loss of balance, disorientation, headache, inability to perform normal activities. A total of n=54 patients were selected out of which n=34 were male and n=20 were female patients. A detailed history was obtained and complete clinical examination including neurological assessment was done. All the patients in the study were >18 years of age. They were subjected to CT and MRI scan and ischemic stroke were confirmed. The biochemical investigation for serum hs-CRP was determined by withdrawing about 5ml of blood from the antecubital

vein under aseptic precautions in a vacutainer. The serum hs-CRP within 24 hours was sent for analysis values were recorded. The Modified Rankin Scale was used to measure the degree of disability due to stroke. All the available data was recorded in MS Excel and analyzed using SPSS version 17 on windows format.

RESULTS

The modified Rankin Scale [mRS] is most widely used for the measurement of the degree of disability and dependence on the daily activities in people affected with stroke and other neurological disabilities. The mRS was utilized in the study the score 0 indicates no disability and score 6 is the death of the patient.

Table-1: The Modified Rankin Scale (mRS) [15]

Score	Description
0	No symptoms.
1	No significant disability. Able to carry out all usual activities, despite some symptoms
2	Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.
3	Moderate disability. Requires some help, but able to walk unassisted.
4	Moderately severe disability. Unable to attend to own bodily needs without assistance and unable to walk unassisted.
5	Severe disability. Requires constant nursing care and attention, bedridden, incontinent
6	Dead

In the study the observed clinical symptoms in the patients with ischemic stroke included sudden numbness or weakness of face 21 (38.89%) weakness of arm 12 (22.22%) loss of balance and inability to walk 6(11.11%) seizures 5(9.26%) trouble speaking 10

(18.51%) disorientation 11 (20.37%) difficulty to follow instructions of the examiner 12(22.22%) headache 6 (11.11%). The gender wise distribution of the patients according to the modified Rankin Scale is given in table 2.

Table-2: Gender wise distribution of cases based on the Modified Rankin scale

Score	Male	Female	Total (percentage)
0	4 (11.76%)	3 (15%)	7 (12.96%)
1	11 (35.35%)	8 (40%)	19 (35.18%)
2	6 (17.65%)	4 (20%)	10 (18.52%)
3	3 (8.82%)	2 (10%)	5 (9.26%)
4	5 (14.71%)	1 (5%)	6 (11.11%)
5	4 (11.76%)	2 (10%)	6 (11.11%)
6	1 (2.94%)	0	1 (1.85%)
Total	34 (100%)	20 (100%)	54 (100%)

The mean hs-CRP levels in ischemic stroke patients were found to be 6.97 ± 3.25 mg/L. The comparison of the mean hs-CRP levels based on gender was done a value of hs-CRP less than 3.0 mg/L was considered as normal and the values of hs-CRP > 3.0 mg/L were considered increased. Out of 34 male

patients in n=23 (67.65%), the values of hs-CRP were found to be increased similarly in n=12 (60%) females the values were also found to be increased. A statistical analysis of the relation of hs-CRP in the patients revealed the p values were <0.05 which is considered as significant shown in table 3.

Table -3: The comparison of CRP levels based on gender

hs-CRP Levels	Male	Female	Total (Percentage)	P Values
> 3.0 mg/L (Increased)	23 (67.65%)	12 (60%)	35 (64.81%)	<0.05*
< 3.0 mg/L (Normal)	11 (32.35%)	8 (40%)	19 (35.18%)	
Total	34	20	54 (100%)	

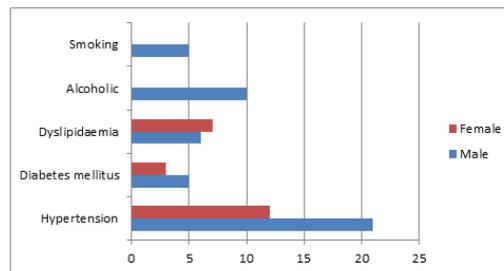
The comparison of hs-CRP levels in the patients based on the modified Rankin scales (mRS) revealed patients with lower modified Rankin Scale (mRS) has less hs-CRP levels and the correlation between the hs-CRP and modified Rankin Scale (mRS) revealed hs-CRP is positively correlated with mRS scores. Hence greater hs-CRP levels indicate greater severity of ischemic stroke.

Table -4: Comparison of modified Rankin Scale according to hs-CRP levels

Score	hs-CRP > 3.0 mg/L (Increased)	hs-CRP < 3.0 mg/L (Normal)	Total (%)
0	12(34.28%)	6 (31.58%)	7 (12.96%)
1	15(42.86%)	4 (21.05%)	19 (35.18%)
2	6 (17.14%)	3 (15.79%)	10 (18.52%)
3	4(11.42%)	1 (5.26%)	5 (9.26%)
4	5 (42.86%)	1 (5.26%)	6 (11.11%)
5	5 (42.86%)	0 (00)	5 (9.26%)
6	0 (00)	0 (00)	1 (1.85%)
Total	35 (100%)	19(100%)	54 (100%)

In this study hypertension was the leading risk factor associated with ischemic stroke found in n=21 out of total n=34 male and in n=8 female patients out of total of n=20 patients. The other two important causes

in male were alcoholism n=10 and smoking n=5 patients. In females, the next common cause was dyslipidemia found in n=7 female patients followed by diabetes mellitus in n=5 females shown in graph 1.

**Fig-1: showing the risk factors for ischemic stroke in the study**

DISCUSSION

In the present study we found there were n=34 male patients and n=20 female patients during the period of study. Other similar studies in this field have shown similar male preponderance for ischemic stroke [16]. The mean age of male in the study was 55.6 years and in the female patients, the mean age was 58.5 years. Greater numbers of male patients were from the age group 51-55 years and female it was 55-60 years. In our study n=33 patients were hypertensive, dyslipidemia was seen in n=13 patients, alcoholism n=10 and smoking n=5 patients n=15 patients had more than one risk factor. Some studies in relation to ischemic stroke have shown that recent infections are an important risk factor for ischemic stroke [17, 18]. It has been highlighted that inflammatory processes are involved in the cerebral ischemia. The CRP is an acute phase reactant and its use of hs-CRP as a peripheral marker of inflammation is increasing. It is also used as a marker of generalized atherosclerosis [19, 20]. The previously available information on plasma CRP levels and ischemic stroke have pointed out that this marker is an independent predictor of future risk of strokes [21, 22]. It has been shown that men with the highest value of CRP has twice the risk of ischemic stroke [21]. Studies have indicated the increase of fibrinogen levels are also correlated with the rise in fibrinogen levels [23, 24]. CRP is a protein and its synthesis is regulated at the level of transcription by IL-6 [25, 26]. Raised CRP levels indicate the greater size of infarcts. In this study also we found larger size infarcts with greater CRP levels and having a poor prognosis. Apart from reflecting the amount of tissue damage CRP also indicate a state of increased risk due to enhanced inflammatory or cytokine excess. Experimental studies

have shown that CRP contributes to secondary brain damage after focal cerebral ischemia by complement-mediated exacerbation of tissue injury [27, 28]. Treatment of rats with human CRP after middle cerebral artery occlusion has resulted in larger infarcts [27]. In this study, we found that hs-CRP levels and the modified Rankin scale were positively correlated. Interestingly patients with greater risk factors had hs-CRP levels > 3mg/L. Hence persons with vascular risk factor along with elevated hs-CRP have increased risk of stroke when compared to risk factors alone [29]. Therefore, determination of risk factors, along with hs-CRP may indicate the prognosis of stroke.

CONCLUSION

Within the limitations of the present study, it can be concluded that men are at a greater risk of stroke at an early age as compared to their female counterparts. And the hs-CRP levels are positively correlated with stroke and modified Rankin scale. Higher CRP clearly indicates greater severity of the stroke and poor prognosis.

Conflict of interest: None

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Ethical Permission: Obtained

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