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Original Article

C - reactive protein (CRP) is a differentiator between acute ischemic & hemorrhagic stroke

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Abstract:

Stroke is the third most common cause of death in developed country after cancer & ischemic heart disease. It is also one of the leading causes of death in developing countries like Bangladesh. Several studies have been done on stroke. But the difference between ischemic and hemorrhagic stroke on the basis of serum C-reactive protein (CRP) level has not been yet studied in Bangladesh. The aim of the study was to evaluate the differentiating role of CRP level between ischemic & hemorrhagic stroke patient in Bangladeshi population. A cross sectional prospective study was performed on 50-stroke patients in Bangabandhu Sheikh Mujib Medical University from January 2006 to December 2007. The study subjects were divided into ischemic & hemorrhagic groups on the basis of CT scan report. Serum CRP & Lipid profile was determined by standard method. Statistical analysis was performed by using SPSS software. Mann whitney- U test was done to see the level of significance. The study showed that mean serum CRP level was 9.69 mg/L that was higher than normal subjects & serum CRP level is 3.25 mg/L in ischemic & 13.05 mg/L in hemorrhagic stroke patient. The present study showed that serum CRP level is higher in hemorrhagic stroke than ischemic stroke. The study revealed that serum CRP level is a differentiator between ischemic and hemorrhagic stroke patients & helps the physician to take necessary management plan.

Key Words: C-reactive protein, Ischemic stroke, Hemorrhagic stroke

Introduction:

Stroke is a dreadful health hazard all over the world as well as our country and one of the leading causes of mortality and morbidity. Stroke is the term used to describe episodes of focal brain dysfunction due to focal ischemia or hemorrhage. It is most frequent clinical manifestation of diseases of cerebral blood vessels.

Cerebral blood flow normally 50ml /minute for each 100 gm of tissue[1]. A fall in cerebral blood flow to zero cause death of brain tissue within 4 to 10 min; values <16 to 18ml /100gm tissue per minute cause infarction within an hour and values <20ml /100gm tissue per minute cause ischemia without infarction unless prolonged for several hour or days[2].

Cerebrovascular disease is the 3rd leading cause of death in the United States. It is also the most prevalent neurologic disorder in terms of both morbidity & mortality. Cerebrovascular diseases cause 200000 deaths per year in the United States and are a major cause of disability. The incidence of cerebrovascular diseases increase with age and the number of stroke is projected to increase as the elderly population grows with a doubling in stroke death in the United States by 2030[2]. The annual incidence of acute cerebrovascular disease in the over 45 year age group in the U.K. is about 180-300 per 100000. Cerebrovascular diseases can cause death & disability by ischemia from occlusion of blood vessel (producing cerebral ischemia & infarction) or hemorrhage through their

rupture[3]. In India the prevalence rate of stroke was 250 - 350/ 100000 in last decade[4]. In Bangladesh adequate and complete data on the incidence and mortality of stroke is not available.

In one study in Dhaka Medical college Hospital, stroke is found to be the second commonest cause of emergency admission in the medicine ward and constituted about 10-12% of the total patient in this ward. Two studies in Chittagong Medical college Hospital and BIRDEM Hospital revealed 2.58% and 5.8% of the admitted patients diagnosed as stroke respectively [5].

The number of stroke patients is gradually increasing day by day. Stroke causes disable not only by the patient himself but also the patient becomes a burden to his family both economically and socially. Health care facility in our country is far behind of Western World specially CT scan or MRI is far behind in district level. Treatment modality depends upon its types and severity. Stroke is treated by medicine, physiotherapy and by other supportive treatment. Rehabilitation facilities are also limited in our country due to various regions. Types of rehabilitation necessary for a patient depend on severity of neurological disability. The association between Serum CRP level and types of stroke has been reported by many authors. We can use the CRP as a differentiating marker between ischemic & hemorrhagic stroke patient. If CRP can be a differentiating marker of stroke patient, then prior adequate protective measure can be taken to reduce the worse outcome of stroke. In this way serum CRP level may help in stratification of patient and thus help the physician to take necessary step to reduce the worse outcome of stroke. So the aim of the study is to evaluate the differentiating role of CRP level between ischemic & hemorrhagic stroke in Bangladeshi population.

Materials and Methods:

This study was carried out in the Department of Biochemistry, Bangabandhu Sheikh Mujib Medical University, Dhaka from January 2006 to December 2007. A cross sectional prospective study was conducted on 50-stroke patients (confirmed by CT scan or MRI). Serum CRP & Lipid profile was determined by standard Methods. The subjects were divided in two groups (ischemic & hemorrhagic). Statistical analysis was performed by using SPSS software. Mann whitney- U test was done to see the level of significance.

Results:

Out of 50 patients in this study, 27 were male and 23 were female. The mean (±SD) age of study subject was 62.90 ± 11.21 years (40- 82 years) (Table-I). The mean (±SD) of serum CRP concentration was 9.69 ± 10.95 mg/L and median concentration was 3.4mg/L. This is shown in table- II. This results correlate with other study[14].

Table – I: Age & Sex distribution of the study subject.

Parameter	Mean ± SD	Range	Sex	
			male	female
Age (years)	62.90±11.21	40- 82	27	23

Results are expressed in Mean± SD.

Table – II: Serum CRP level of study subjects.

Parameter	Mean ± SD	Median (Range)
CRP (mg /L)	9.69±10.95	3.4 (3-50)

Results are expressed in Mean± SD & Median (range).

Table III: Comparison of CRP level between ischemic & hemorrhagic stroke in study subject.

Group	CRP (mg/L) Median (Range)	Mann Whitney U value	P value
Ischemic stroke	3.25 (3-50)	116	<0.05
Hemorrhagic stroke	13.05 (3.2-32.8)		

Results are expressed in median (Range). Significance of difference between groups was calculated by non parametric Mann Whitney- U test. Between two groups, hemorrhagic stroke group showed a very high level of serum CRP level than Ischemic group which was statically significant (p<.05).

Table- IV: Lipid profile of study subject.

Parameter	Mean ±SD
Triglyceride (mg/dl)	190.66 ± 43.90
Total cholesterol (mg/dl)	223.54 ± 40.36
HDL (mg/dl)	32.86 ± 5.46
LDL (mg/dl)	153.91 ± 39.05

Results are expressed in (Mean± SD)

Table- V: Comparison of lipid profile between ischemic & hemorrhagic stroke.

Parameter	Ischemic stroke n=40	Hemorrhagic stroke n=10	t-value	p value
T. cholesterol mg/dl	216.68±39.119	251. ±34.56	-2.534	<0.01
HDL mg/dl	32.207±5.7	35.51±6.80	-1.745	>0.05
LDL mg/dl	147.33±38.43	180.24±30.66	-2.509	<0.05
TG mg/dl	191.75±47.33	186.30±27.53	-.348	>0.05

Results are expressed in (Mean± SD).Unpaired t-test was done as the level of significance. Unpaired t test shows significant difference of total cholesterol & LDL (p value <0.01 & <0.05 respectively) But there is no difference in HDL & TAG (p value >0.05).

Discussion:

A close association has been reported between raised serum CRP level and post stroke outcome by many authors [6-10]. Despite improved treatment of stroke during the past decade, there remains a substantial risk of death or new vascular events during the first year after the acute episode. The identification of new risk markers could improve risk stratification and selection of individuals who might benefit from intensified therapy and the understanding of path physiological mechanisms[11]. The aim of the study was to evaluate the differentiating role of CRP level between ischemic & hemorrhagic stroke in Bangladeshi population. In this study we measured serum CRP level within 72 hours of onset of stroke of 50 diagnosed patients. Raised serum CRP level was observed in all stroke patient of the study subject. The mean CRP concentration of study subject is 9.69 ± 10.95 mg/L (median CRP 3.4 mg/L) which is much higher than reference range. Similar findings are found by other authors[11]. Association between CRP level and both type of stroke patient was calculated by non parametric Mann whitney- U test and found highly significant (p <.05) which indicate that increased the serum CRP level is associated with hemorrhagic stroke. We also correlate serum CRP level with the component of lipid profile and found significant positive correlation between CRP with total cholesterol, LDL and TG. But no significant correlation found between CRP & HDL. Therefore, the study revealed that serum CRP level is increased in stroke. It is also revealed that CRP level is more increased in hemorrhagic stroke than ischemic stroke patient. Similar finding was found by other authous[12].

Conclusion: From above discussion it may be concluded that CRP as a differentiating marker between ischemic & hemorrhagic stroke patient for neurological evaluation and thus help the physician to take necessary step to reduce the worse outcome of stroke.

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