Original Article

C-Reactive Protein (CRP) and other Risk Factors in Acute Ischemic Stroke Patients

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ABSTRACT

INTRODUCTION: Stroke is a common cause of mortality and morbidity in developing countries; stroke is second leading cause of death after cardiac disease worldwide. Apart from established major risk factors for Ischemic Stroke (IS) i.e.; Hypertension, Diabetes Mellitus, Smoking & Hyperlipidemia, a burning but still debatable issue is raised serum C - reactive protein (CRP), that is also thought to be the major risk factor for acute IS due to participation in formation of Atherosclerosis in the cerebral vessels in genetically prone patients.

OBJECTIVE OF STUDY: To find out significance of serum levels of CRP among CT scan proved acute ischemic stroke patients.

STUDY DESIGN & PLACE: This is a prospective observational study was conducted at Department of Medicine, Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad from July 2009 to June 2010.

DATA COLLECTION: Patients meeting the inclusion criteria were enrolled in this study after obtaining informed consent, and were evaluated thoroughly for c reactive protein and other risk factors. All the selected cases were investigated for; Complete blood count, Urine detail report, CT scan brain plain, Serum C-Reactive Protein (CRP) Level, Fasting & Random Blood Sugar, Fasting Lipid Profile ECG & X-Ray chest PA View. The data was collected on a predesigned proforma designed for this study.

RESULTS: Out of 150 selected adult cases of CT scan proved Ischemic Stroke, male were 120 (80 %) & female were 30 (20 %). Male to female ratio was 4:1. Their ages were between 20-80 years.

Among these patients high level of CRP (> 10mg / L) was found in 132 (88 %). Out of these Male were 110 (73.3 %) & that of Female were 22 (14.7%) respectively. Frequency of other major risk factors in male & female IS patients was also observed.

CONCLUSION: A close relationship between high level of CRP and acute IS was found, because in acute IS patients high levels of CRP was observed but again it needs further studies high sample size to establish the c reactive protein as a independent risk factor for acute ischemic stroke.

KEY WORDS: Acute ischemic stroke, Serum C-reactive protein level, CT scan brain, MRI brain.

INTRODUCTION

Stroke is a common cause of mortality and morbidity in developing countries; stroke is second leading cause of death after cardiac disease worldwide.[1]

Apart from established major risk factors for Ischemic Stroke (IS) i.e.; Hypertension, Diabetes Mellitus, Smoking & Hyperlipidemia, a burning but still debatable issue is raised serum C - reactive protein (CRP), that is also thought to be the major risk factor for acute IS due to participation in formation of Atherosclerosis in the cerebral vessels in genetically prone patients . CRP is an acute phase reactant synthesized by liver within 06 hours of an inflammatory stimulus e.g.; acute ischemic stroke, ischemic heart disease, auto immune disorders etc and half life is 19-hours[1]. It is also suggested that C reactive protein is a marker of inflammatory process and have importance value in coronary artery disease and also important prognostic factor ischemic stroke patients.[8]

Atherosclerosis of cerebral & other blood vessels is a disorder of Inflammation, Lipid accumulation, Cellular adhesion, Monocyte & Macrophage attachment, Innate immunity & Transmigration of immune cells across the endothelium .

Later on the rupture of mature plaque, leading to thromboembolic phenomenon & its complications like; ischemic heart disease, peripheral ischemic disease and ischemic Stroke etc.

PATIENTS & METHODS

This is a prospective observational study, designed to find out serum level of CRP among CT scan proved IS

patients at Department of Medicine, Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad from July 2009 to June 2010.

Patients with history of stroke in patient with age of 20 and above of either sex with proved ischemia with neuroimaging (CT scan brain & MRI brain) were included in this study after obtaining informed consent.

All the patients below 20 years of age, having intra cerebral bleeding, subarachnoid hemorrhage, space occupying lesions on CT scan brain, ischemic heart disease (recent history of MI), and autoimmune disease were specially excluded from study to control the confounding variables.

Entitled patients after admission were examined thoroughly for major & possible risk factors and details were entered in pre designed proforma for this study. The study protocol was approved by the ethical review committee (ERC) of our institute. All the selected cases were investigated for; Complete blood count, Urine detail report, CT scan brain plain, Serum C-Reactive Protein (CRP) Level, Fasting & Random Blood Sugar, Fasting Lipid Profile ECG & X-Ray chest P View. Statistical analysis was performed on SPSS version 10.0 and serum level of CRP in IS patients and frequencies of risk factors were calculated.

RESULTS

Out of 150 selected adult cases of CT scan proved Ischemic Stroke, male were 120 (80 %) & female were 30 (20 %). Male to female ratio was 4:1 (**Table: I**).

Among 150 Acute Ischemic Stroke (IS) patients high level of CRP (> 10mg / L) was found in 132 (88 %). Out of these Male were 110 (73.3 %) & that of Female were 22 (14.7%) respectively (**Table: II**).

Frequencies of other major risk factors in male & female patients are tabulated in **Table: III**.

TABLE I: BREAK UP OF SEX RATIO IN ISCHEMIC STROKE PATIENTS (n=150)

Male	Female	M:F Sex Ratio
120 (80 %)	30 (20 %)	4:1

TABLE II: SEX BREAK UP OF HIGH SERUM CRP LEVEL IN IS PATIENTS (n=150)

Male	Female	Total
110 (73.3 %)	22 (14.7 %)	132 (88 %)

TABLE III: FREQUENCY OF OTHER MAJOR RISK FACTORS IN IS PATIENTS (n=150)

Risk factors	Male	Female	Total
Hypertension	60	18	78 (52 %)
Diabetes Mellitus	22	15	37 (24.7 %)
Smoking	16	01	17 (11.3 %)
Dyslipidemia	14	04	18 (12 %)

DISCUSSION

Stroke can occur at any age in either sex but more common in males and in older age group. Many modifiable risk factors are responsible for this leading cause of death and disability; many risk factors for stroke were evaluated in detail. In our study we have evaluated C reactive protein along with other risk factors like diabetes mellitus, hypertension, smoking and dyslipidemias.

Out of established major risk factors for Ischemic Stroke (IS) like; Hypertension, Diabetes Mellitus, Smoking & Hyperlipidemia, a burning but still debatable issue is raised serum C-reactive protein (CRP), that is also thought to be the major risk factor for acute IS due to its participation in formation of Atherosclerosis in the cerebral vessels in genetically prone patients.

CRP is an acute phase reactant synthesized by liver within 06 hours of an inflammatory stimulus e.g.; acute ischemic stroke, ischemic heart disease, auto immune disorders etc.

Atherosclerosis of cerebral & other blood vessels is a disorder of Inflammation, Lipid accumulation, Cellular adhesion, Monocyte & Macrophage attachment, innate immunity & Transmigration of immune cells across the endothelium.

Worldwide many studies regarding to increase level of CRP in acute IS have been done & their study results are being mutually discussed below. Muir et al, in their study among 228 Ischemic stroke patients in Acute Stroke Unit, University Department of Medicine and Therapeutics, University of Glasgow, Scotland, during 959 days follow up have found that higher the concentration of CRP (>10.1 mg/ L) causes decrease survival in IS patients, in our study we have also found increased level of C reactive protein of >10mg/l which is similar to above mentioned study.

Zacho et al, in their dual (cohort & cross-sectional) comparative studies in general population found high frequency of IHD (32%) & IS (25%) among high levels of CRP patients. While in our study we found 88% IS patients with high level of CRP.

Wakugawa et al, in their study among 2692 population finally conclude that elevated serum CRP levels are an independent risk factor for future acute ischemic stroke in Japanese men and the coexistence of a high level of CRP along with another risk factor extremely increases the risk of acute IS.

CONCLUSION

In this study a close relationship between high level of CRP and acute ischemic stroke was observed due to high levels of CRP in patients with acute ischemic stroke. It is recommended that more local studies are required with higher sample size regarding the signifi-

cance of CRP as an independent risk factor for acute ischemic stroke.

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