



STUDY OF RELATIONSHIP BETWEEN C-REACTIVE PROTEIN AND ESSENTIAL HYPERTENSION IN URBAN POPULATION OF MALWA REGION

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ABSTRACT **Background:** Rising evidence associates inflammation to atherosclerosis. Even though a few study have recommended the role of inflammatory process in patients with essential hypertension and coronary artery disease cases. Elevated levels of C-reactive protein (CRP), an easily measured inflammatory marker, have been prospectively linked with a high risk of hypertension. However, the association of markers, other than CRP, with the possibility of developing hypertension remains mostly unproven. The activation of the renin-angiotensin system (RAS) is implicated in the pathogenesis of hypertension and the development of coronary artery disease. In addition to its effect on hypertension, angiotensin II also acts as a proinflammatory mediator. Antagonism of the RAS may enhance cardiovascular morbidity other than BP control, by decreasing vascular inflammation and remodeling. Its overall role in essential hypertension and coronary artery disease far from being understood. Present study is intended to examine whether CRP and systemic inflammation, are linked with essential hypertension or not.

Methods: One hundred cases of essential hypertension attending Medicine OPD in Aurobindo Medical College and Hospital, Indore were included in the study and their CRP levels and other regular investigations were done by appropriate standard methods.

Results: We found that about 48 % cases of essential hypertension were having elevated CRP levels.

Conclusions: CRP levels are strongly related with development of essential hypertension, which imply that essential hypertension due to atherosclerosis is a part of inflammatory process which we concluded in present study.

KEYWORDS : C-reactive protein (CRP), Coronary Artery Disease (CAD), Hypertension (HTN), Renin-angiotensin system (RAS)

INTRODUCTION

Inflammation has an important part in the pathogenesis of hypertension.^{1,2} Cross-sectional studies suggests raised plasma inflammatory markers in patients of hypertension.² Elevated levels of C-reactive protein (CRP), an, easily measured inflammatory marker have been prospectively linked with an higher risk of hypertension.³ Nevertheless, the association of other inflammatory markers, other than CRP, with the potential of developing hypertension is unexplored. Inflammation localized in vascular tissue is frequently identified as an significant contributor to the pathophysiology of hypertension,⁴ to the beginning and evolution of atherosclerosis and the progression to cardiovascular disease (CVD).⁵ Patients with cardiac diseases present with raised plasma levels of inflammatory markers. Out of them, C-reactive protein (CRP) has been established as an significant risk factor for the onset and progression of hypertension.⁶ Various data have shown that high-sensitivity CRP (hsCRP) is a strongly associated with acute coronary syndrome. In addition, hsCRP levels has been demonstrated to associate with systolic blood pressure (SBP), & pulse pressure.⁷ Thus CRP and Hypertension have added predictive value for Ischaemic heart diseases, as they became an independent marker of cardiovascular morbidity. The role of the renin-angiotensin system (RAS) is also demonstrated in the pathogenesis of hypertension and the progression to cardiac events.⁸ Apart from the effects on blood pressure, angiotensin II act as an proinflammatory mediator too.⁹ Antagonism of the Renin Angiotensin System can bring better cardiovascular results other than Blood Pressure control, by decreasing vascular inflammation. In this research article we will further explore the association of CRP as marker and /or mediator of inflammation in the hypertensive patients.

MATERIALS & METHODS

The study was conducted at Sri Aurobindo Institute of Medical Sciences from July 2018 to December 2018 .One hundred cases of essential hypertension (Newly diagnosed) attending Medicine OPD were included in study with criteria for exclusion were Diabetes, Renal Failure, additions such as smoking and alcoholism which are demonstrated as a risk factor for essential hypertension. Diagnosis of hypertension were done according to JNC-8 guidelines. Investigations like CBC, FBS/PPBS, lipid profile, urea, creatinine were also done. CRP levels were assessed in both OPD & IPD cases. CRP levels was done by diagnostic commercial reagent kit method for the in vitro detection of CRP in human serum by qualitative and semi-quantitative rapid latex slide test.

RESULT

Out of 100 patients, 72 were male and 28 were female. A patient age was ranging from 30 years to 82 years and mean age was 59 years. In current study elevated CRP levels were seen in 48% (48 patients) and normal CRP levels were observed in 52% (52 patients). In 48 patients CRP positive group 42 were male and 6 were female. At the same time CBC, FBS/PPBS, urea, creatinine and lipid profile was also done to rule out other co-morbid illness.

DISCUSSION

The CRP is a marker of systemic inflammation which is linked with an high risk of acute coronary events stroke¹⁰ and essential hypertension. Various studies done in past also suggests the strong relationship of C-reactive protein levels with various cardiac illness. For example, c-reactive protein levels were elevated in group who had a sedentary lifestyle,¹¹ & had poorer cardio respiratory health, and were overweight. C-reactive protein levels also demonstrated strong relation with the spectrum of metabolic syndrome, with the existence of subclinical atherosclerosis, and its evolution to atherosclerosis.¹² Inflammation has also been shown in progression of hypertension and previous data recommends elevated CRP levels amongst those persons who were hypertensive. In current study similar observation were made that 48 % case had raised levels of CRP. Interestingly occurrence of raised levels of CRP was very high in male as compare to female (in CRP positive group 87.5% were male & 12.5% were female). Elevated levels of CRP might raises blood pressure by decreasing nitric oxide in endothelial cells.¹³ CRP may also act as a proatherosclerotic agent by up titrating angiotensin type 1 receptor expression. Inflammation has been demonstrated to associate with endothelial dysfunction and links with the renin-angiotensin system. Therefore it has been speculated that essential hypertension could play a part in inflammatory disorder. Nevertheless clinical studies relating inflammation with essential hypertension are limited. Some researchers has also suggested regular checkup of CRP levels alongside with cholesterol levels as a screening measure for essential hypertension and coronary heart diseases.¹⁵ However, if CRP screening is done, then two separate measurements need to be checked (2 weeks apart) with the average of the measurements used to assess the risk. Any treatment to decrease CRP levels emphasizes on reducing the cardiovascular morbidity & mortality . Cholesterol lowering drugs have also been associated with decreasing CRP levels in patients having high cholesterol. CRP levels may decrease even without altering the cholesterol levels. Previous studies have showed that the people with elevated LDL cholesterol levels, those with low CRP have improved outcomes in comparison to

those with elevated levels. In view of coronary artery disease, low C-reactive protein could be related with lesser overall risk and a better prognosis. By reducing vascular inflammation and remodeling, the anti-hypertensive drugs that apply their action via RAS inhibition have enhanced cardiovascular outcomes beyond BP control.

Control of hypertension plays a vital role in reducing cardiovascular morbidity and mortality burden. In fact, hypertension contributes to augment the latter in association with other cardiovascular risk factors (such as obesity, alcohol and sedentary lifestyle). JNC-VIII and WHO-ISH and other national and international guidelines have recommended various non-pharmacological and pharmacological modalities to decrease Blood Pressure in hypertensive patients.¹⁶

The present study had various limitations. First, sample collections were insufficient and needs more number of cases for further study, second; only qualitative estimation of CRP was done. Conventionally, CRP levels have been measured with in the 3-5mg/l range in assessing for inflammation. High sensitivity CRP (HSCRP) tests able to measure down to 0.3mg/l which is necessary in risk assessment for vascular disease are available. Third, no base line and post treatment status of CRP levels were carried out. However, single CRP measurements have been shown to provide significant risk forecast data. Fourth, not linked with the severity of hypertension. However, our research showed that CRP is an significant indicator in hypertensive disease diagnosis, prognosis and medical management.

CONCLUSION

Hypertension can be regarded a low-grade inflammation disease that adds to cardiovascular morbidity & mortality. In patients with hypertension, non-pharmacological and pharmacological strategies to regulate high BP may reduce vascular inflammation separately, leading to decreased cardiac occurrences in randomized clinical trials. Along with other antihypertensive agents, ARBs showed perhaps more powerful anti-inflammatory characteristics apparently unrelated to the BP-reducing impact of this class of drugs, but more likely the direct antagonism of angiotensin II-induced pro-inflammatory effects. Thus, decreasing BP is the primary goal in order to decrease cardiovascular events in hypertensive patients, reduction of low-grade inflammation in hypertension may be an interesting and important target in order to reduce the cardiovascular morbidity and mortality associated with hypertension. Thus, the drug that contains both anti-hypertensive and anti-inflammatory characteristics may be a novel anti-hypertensive drug in the coming future to avoid cardiovascular morbidity and hypertension-related mortality. Non-pharmacological (weight control, physical activity and DASH diet) to control BP can be planned to decrease vascular inflammation in cases with hypertension, in order to accomplish a decline of cardiovascular events and better outcomes. In the current research, approximately 48% of individuals had increased CRP in hypertension subjects and, compared to females, males had a significantly greater incidence of elevated CRP. As a consequence of this research, we found that the mechanisms of this effect is poorly understood and require further evaluation.

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