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Original Article

Assessment of C Reactive Proteins Levels in Hypertensive Patients of Tertiary Care Teaching Hospital in Central India

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ABSTRACT

Background: *The present study was conducted for assessing C reactive proteins levels in hypertensive patients*

Materials & Methods: *The study included 100 hypertension cases and 100 controls who met the inclusion requirements. Data were collected through interview and review of medical records. Newly diagnosed 100 treatment naive cases of Essential Hypertension attending medical OPD and admitted in medical wards was included in the study. Patients diagnosed as hypertensive by physician were enrolled in the study. For each case one control was selected. History of co-morbid illness, prolonged co-morbidity, and history of hypertension was evaluated. All subjects had 5 mL of blood drawn into serum tubes after an overnight fast. After letting the blood clot for 15 minutes at 3000 RPM, the serum was centrifuged out. C-reactive protein levels in the blood were checked right away. CRP levels were evaluated using Immunoturbidimetry. The data was analysed by using descriptive and inferential statistics.*

Results: *The mean CRP in Cases was more (5.38 ± 1.62) as compared to Controls (1.13 ± 0.48) found statistically significant. (By Un-paired T test; p>0.05). The above table shows association of type (NYHA) of hypertension and CRP among cases. The mean CRP in Stage II was more (6.13 ± 1.28) as compared to Stage I (5.19 ± 1.78) shows statistically significant.*

Conclusion: *This study confirmed the function of CRP and established its significance as a marker for early detection and prevention of myocardial infarction in hypertensive patients.*

Keywords: *C Reactive proteins, Hypertension.*

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INTRODUCTION

Hypertension is the leading cause of death and disability globally. The cardiovascular prognosis of patients with arterial hypertension varies depending on the degree and timing of identification of typical end organ damage and subsequent illnesses. “Haemorrhagic and vascular stroke, retinopathy, coronary heart disease/myocardial infarction, heart failure, proteinuria, renal failure, and atherosclerotic change, including the appearance of stenoses and aneurysms in the vascular system, are common manifestations of end organ damage from hypertension”.[1,2] According to epidemiological study, “hypertension is one of the main risk factors for cardiovascular disease”. Peripheral artery disease, ischemic heart disease, and stroke are a few of the cardiovascular conditions that have been related to hypertension. Continuous, constant, and independent of other risk factors, high blood pressure is linked to an increased risk of cardiovascular events. The cardiovascular system's vascular events are predominantly brought on by atherosclerosis. A complicated network of elements contributes to atherosclerosis.[3,4]

Dyslipidemia, hypercoagulability, oxidative stress, inflammation, and endothelial dysfunction are just some of the proposed causes. Atherogenesis relies on inflammation at every stage, from plaque formation to rupture.[4] C-reactive protein is a homopentameric acute-phase inflammatory protein, a highly conserved plasma protein that was initially discovered in 1930 by Tillet and Francis while investigating the sera of patients suffering from the acute stage of Pneumococcus infection and was named for its reaction with the capsular (C)-polysaccharide of Pneumococcus. In the presence of calcium, CRP binds to polysaccharides such as phosphocholine (PCh) on microorganisms and triggers the classical complement pathway of innate immunity by activating C1q. C-reactive protein exhibits elevated expression during inflammatory conditions such as

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rheumatoid arthritis, some cardiovascular diseases, and infection.[5]

It is well established that there is a relationship between the presence and severity of arterial lesions and hs-CRP, and it is known that nearly half of infarctions may happen in patients who do not present with dyslipidemia.[6] Hence; the present study was conducted for assessing C reactive proteins levels in hypertensive patients.

METHODS

The present study was conducted in the department of biochemistry and medicine of a tertiary care centre with the aim of assessing C reactive proteins levels in hypertensive patients. The study included 100 hypertension cases and 100 controls who met the inclusion requirements.

Inclusion Criteria for Cases:

- Patients who gave consent
- Patients with hypertension
- Patients above the age of 30 years
- Both Male and Female

Exclusion Criteria for Cases:

- Patient unwilling to participate
- Patient with serious illness

Inclusion Criteria for Controls:

- Patients who gave consent
- Patients above the age of 30 years
- Both male and female

Exclusion Criteria for Controls:

- Patient unwilling to participate

Data were collected through interview and review of medical records. Newly diagnosed 100 treatment naive cases of Essential Hypertension attending medical OPD and admitted in medical wards was included in the study. Every case subjected to at least two blood pressure readings in standing and supine position before inclusion in the study. Every day, searches for admissions of hypertension cases in hospital wards and intensive care units were made. Patients diagnosed as hypertensive by physician were enrolled in the study. For each case one control was selected. History of co-morbid illness, prolonged co-morbidity, and history of hypertension was evaluated. All subjects had 5 mL of blood drawn into serum tubes after an overnight fast. After letting the blood clot for 15 minutes at 3000 RPM, the serum was centrifuged out. C-reactive protein levels in the blood were checked right away. CRP levels were evaluated using Immunoturbidimetry. The data was analysed by using descriptive and inferential statistics.

Graph 1: Distribution of subjects of study group on the basis of type of hypertension

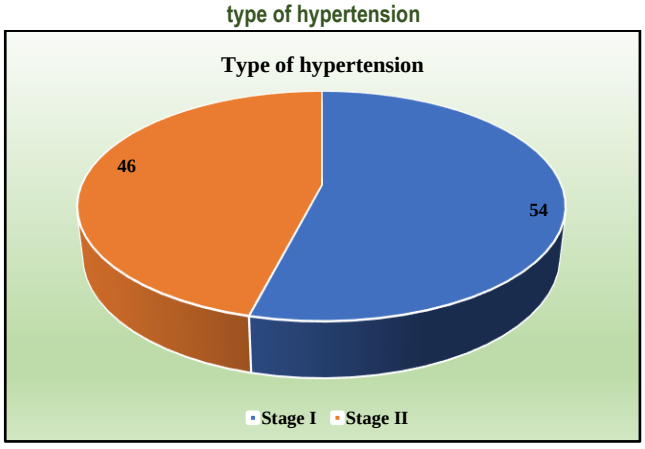

Table 1: Mean blood pressure among two groups:

Blood Pressure	Cases	Controls	P value
SBP (mm of Hg)	152.72 ± 8.92	134.54 ± 4.21	<0.0001 (S)
DBP (mm of Hg)	89.92 ± 4.38	81.32 ± 2.58	<0.0001 (S)

Table 2: Mean C-reactive protein (CRP) among two groups:

CRP	Cases	Controls	P value
Mean	5.38 ± 1.62	1.13 ± 0.48	<0.0001 (S)

Table 3: Association of type (NYHA) of hypertension and CRP among cases:

Type of hypertension	CRP levels (Mean ±SD)	P value
Stage I	5.19 ± 1.78	<0.0001 (S)
Stage II	6.13 ± 1.28	

RESULTS

Majority of the patients of study group and control group belonged to the age group of 51 to 60 years. Both the groups were comparable in terms of age-wise and gender-wise distribution of patients. There were 26% and 11% patients with family history of hypertension among Cases and Controls respectively. When two groups were statistically examined with regard to a family history of hypertension, no difference was discovered. It was observed that majority of Cases were with Stage I hypertension (54%) followed by Stage II hypertension (46%). The mean systolic blood pressure in Cases was more 152.72 ± 8.92 (mm of Hg) as compared to Controls (134.54 ±4.21 mm of Hg) shows statistically significant. The mean diastolic blood pressure in Cases was more 89.92 ± 4.38 (mm of Hg) as compared to Controls (81.32 ±2.58 mm of Hg) found statistically significant. The mean CRP in Cases was more (5.38 ± 1.62) as compared to Controls (1.13 ± 0.48) found statistically significant. (By Un-paired T test; p>0.05). The above table shows association of type (NYHA) of hypertension and CRP among cases. The mean CRP in Stage II was more (6.13 ± 1.28) as compared to Stage I (5.19 ± 1.78) shows statistically significant.

DISCUSSION

Hypertension is a progressive CV syndrome arising from complex and interrelated etiologies. Early markers of the syndrome are often present before BP elevation is sustained; therefore, hypertension cannot be classified solely by discrete BP thresholds. Progression is strongly associated with functional and structural cardiac and vascular abnormalities that damage the heart, kidneys, brain, vasculature, and other organs and lead to premature morbidity and death. Reduction of BP when target organ damage is demonstrable or the functional precursor of target organ damage is present and still reversible generally reduces the risk for CV events.[7]

In the mid 1990s, immunoassays for C-reactive protein (CRP), with greater sensitivity than those previously in routine use, revealed that increased CRP values, even within the range previously considered normal, strongly predict future coronary events. These findings triggered widespread interest, especially, remarkably, in the US, where the clinical use of CRP measurement had been largely ignored for about 30 years. CRP production is part of the nonspecific acute-phase response to most forms of inflammation, infection, and tissue damage and was therefore considered not to provide clinically useful information.[8]

Binding of CRP to lipids, especially lecithin (phosphatidyl choline), and to plasma lipoproteins has been known for over

60 years, but the first suggestion of a possible relationship to atherosclerosis came when we demonstrated that aggregated, but not native, nonaggregated, CRP selectively bound only LDL and some VLDL from whole serum. However, native CRP does bind to oxidized LDL and to partly degraded LDL, as found in atheromatous plaques, and then activates complement.[8] Hence; the present study was conducted for assessing C reactive proteins levels in hypertensive patients.

In the present study, the mean systolic blood pressure in Cases was more 152.72 ± 8.92 (mm of Hg) as compared to Controls (134.54 ±4.21 mm of Hg) with statistically significant difference. (By Un-paired T test; p>0.05) The mean diastolic blood pressure in Cases was more 89.92 ± 4.38 (mm of Hg) as compared to Controls (81.32 ±2.58 mm of Hg) with statistically significant difference. (By Un-paired T test; p>0.05). Hamed Mehri et al in "a study to investigate the serum levels of MBL in patients with CAD observed there was a significant increased blood pressure among case group compared to the control group".[8]

In the present study, the mean CRP in Cases was more (5.38 ± 1.62) as compared to Controls (1.13 ± 0.48) with statistically significant difference. (By Un-paired T test; p>0.05) Tymen T. Keller et al in "a study observed CRP were significantly more among cases compared to controls with statistically significant difference".[9] "The CRP levels of hypertensive patients with acute myocardial infarction were found to be higher than those of the general population by Sanchis et al. As an acute phase reactant that rises in response to inflammation and tissue injury, C-reactive protein is a non-specific indicator of myocardial infarction".[10]

In a previous study conducted by Tofano, Ricardo Jose et al, authors evaluated the association among high sensitivity CRP levels, and the biochemical, and anthropometric profile in hypertensive and non-hypertensive patients who underwent arteriography. Their r results showed that 78.95% of the patients who underwent arteriography were suffering from HBP. Hypertensive individuals had significantly higher glycaemia (124.14±45.33 mg/dL) or DM, higher values of triglycerides (195.27±74.52 mg/dL), waist circumference (98.52±12.52 cm), body mass index (29.99±1.41 kg/m2) and hs-CRP (0.53±0.44 mg/dL). Most of the hypertensive patients (93.33%) presented with MS and were related to the presence of more severe lesions in the arteries and had passed through more invasive procedures like angioplasty and surgery.[11] In another study conducted by Sesso et al, authors examined whether C-reactive protein levels, a marker of systemic inflammation, are associated with incident hypertension. During follow-up, 5365 women developed incident hypertension. In crude models, the relative risks (RRs) and 95% confidence intervals (CIs) of developing hypertension from the lowest (referent) to the highest levels of baseline C-reactive protein were 1.00, 1.25, 1.51, 1.90, and 2.50. C-reactive protein was significantly associated with an increased risk of developing hypertension in all prespecified subgroups evaluated, including those with very low levels of baseline BP, as well as those with no traditional coronary risk factors. Similar results were found when treating C-reactive protein as a continuous variable and controlling for baseline BP. C-reactive protein levels are associated with future development of hypertension, which suggested that hypertension is in part an inflammatory disorder.[12]

CONCLUSION

This study confirmed the function of CRP and established its significance as a marker for early detection and prevention of myocardial infarction in hypertensive patients.

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