



## Evaluation of Inflammatory Markers in Essential Hypertension

### KEYWORDS

CRP, Uric acid, Hypertension

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**ABSTRACT** *Aim:* The aim of our study was to evaluate serum uric acid and serum CRP levels in hypertensive patients and to compare it with normotensive subjects.

*Study design:* A hospital based cross sectional study was conducted on patients attending the Out Patient Department of Medicine of SGRRIM&HS, Dehradun. A total number of 105 subjects (70 cases + 35 controls) in the age group (30 – 70 yrs) attending the Out Patient Department of Medicine of SGRRIM&HS, Dehradun and 35 healthy volunteers among the persons catering in various units of SGRRIM&HS, Dehradun were selected randomly for the study from Jan 2015 to Dec 2015. Both males and females with essential hypertension were included in the study. Serum uric acid and serum CRP was estimated in all cases and control subjects. Patients above 70 yrs and below 30 yrs, smokers, alcoholics, diabetics, patients suffering from cardiovascular disease and renal disorders were excluded from the study.

*Methodology:* Biochemical and statistical analysis was done on all the 105 selected subjects. Serum Uric acid was estimated by enzymatic method (Uricase/Peroxidase) and serum CRP was estimated by noncompetitive Immunoassay method. Statistical analysis of each parameter was done and values were expressed in Mean  $\pm$  SD.

*Result:* The mean Systolic BP of the hypertensive patients were  $(149.5 \pm 11.23)$  and the Mean Diastolic BP were  $(93.15 \pm 10.98)$  mm of Hg, found much higher when compared with control cases. The mean serum CRP levels were  $12.44 \pm 9.41$  mg/dl and mean serum Uric acid levels were  $5.71 \pm 1.42$  mg/dl, both these values were much higher when compared with their control cases.

### Introduction:

CRP is an active phase reactant produced by hepatocytes in response to a wide range of stimuli<sup>(1)</sup>. It rises dramatically in response to infection, inflammation and injury. It is used widely as part of diagnostic work up, to monitor disease status and to monitor treatment results. The conc. of Serum CRP varies from 3mg/dl – 10mg/dl in healthy individuals<sup>(2)</sup>. Numerous epidemiological studies have demonstrated that increased serum CRP concentrations are positively associated with future risk of Metabolic Syndrome, Diabetes Mellitus and Hypertension<sup>(3-4)</sup>.

Uric acid is an end product of the metabolism of purine nucleotides that are the principal constituents of cellular energy stores such as ATP, and components of DNA and RNA. So uric acid levels are both higher and more fluctuating in humans than in other mammals<sup>(5)</sup>. It has been suggested that higher uric acid levels in subjects with cardiovascular disease might be a compensatory response to counteract excessive oxidative stress<sup>(6)</sup>. A number of studies demonstrated that high UA is an independent risk factor for hypertension, diabetes, cardiovascular disease and mortality<sup>(6)</sup>. Hypertension is usually defined by the presence of chronic elevation of systemic arterial pressure above a certain threshold value. Evidences indicate that cardiovascular risk associated with elevation of BP above 115 – 75 mm Hg increases in a log – linear fashion<sup>(7-8)</sup>.

Hypertension is a progressive cardiovascular syndrome arising from complex and interrelated etiologies<sup>(9)</sup>. 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.

### Materials and Methods:

A hospital based cross sectional study was conducted on patients attending the Out Patient Department of Medicine of SGRRIM&HS. A total number of 105 subjects (70 cases + 35 controls) in the age group (30 – 70 yrs) attending the Out Patient Department of Medicine of SGRRIM&HS, Dehradun and 35 healthy volunteers among the persons catering in various units of SGRRIM&HS, Dehradun were selected randomly for the study from Jan 2015 to Dec 2015. Both males and females with essential hypertension were included in the study. Serum uric acid was estimated by fully automated dry chemistry analyzer by uricase/ peroxidase method<sup>(10)</sup> and Serum CRP was measured by Noncompetitive Immunoassay<sup>(11)</sup> in all subjects.

### Result:

The mean Systolic BP was  $(149.5 \pm 11.23)$  mm of Hg and the Mean Diastolic BP was  $(93.15 \pm 10.98)$  mm of Hg, found much higher when compared with control cases  $(120.53 \pm 3.24)$  mm of Hg and  $(75.21 \pm 4.56)$  mm of Hg respectively. The mean serum CRP levels were  $12.44 \pm 9.41$  mg/dl and mean serum Uric acid levels were  $5.71 \pm 1.42$  mg/dl, both these values were much higher when compared with their normal controls  $(4.65 \pm 0.62)$  mg/dl and  $(2.63 \pm 1.57)$  mg/dl respectively. These observations are tabulated in Table (i) and depicted graphically in Fig. (i)

**Table (i)**

Parameter (n)	Case (70) (Mean $\pm$ SD)	Control (35) (Mean $\pm$ SD)
Systolic BP	149.5 $\pm$ 11.23	120.53 $\pm$ 3.24
Diastolic BP	93.15 $\pm$ 10.98	75.21 $\pm$ 4.56
Sr. CRP	12.44 $\pm$ 9.41	4.65 $\pm$ 0.62
Sr. Uric Acid	5.71 $\pm$ 1.42	2.63 $\pm$ 1.57

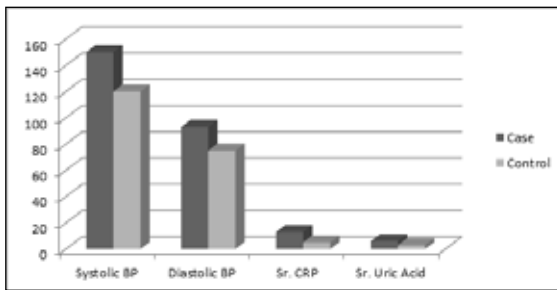


Fig. (i)

#### Discussion:

This study shows a positive correlation of both Serum Uric acid and Serum CRP levels in essential hypertension. It also indicates that Serum Uric acid in individuals with uncomplicated and untreated essential hypertension is associated with endothelial dysfunction independent of traditional and emerging risk factors, insulin sensitivity and CRP. Endothelial dysfunction, commonly observed in Cardiovascular and renal diseases is attributed to oxidative stress, dyslipidaemia, genetic factors etc<sup>(12)</sup>.

Our data is showing an independent link between Sr. uric acid and Sr. CRP suggests that chronic exposure to mild hyperuricaemia may be a factor that contributes to micro-inflammation and raised Sr. CRP in individuals with Essential Hypertension.

In a study by Zoccali C et al, it was found that Sr. CRP is a strong correlate of endothelial function than Creatinine<sup>(13)</sup>. Many studies use uric acid as a marker or even to define a therapeutic end point, but an elevated uric acid is a simple index of elevated cell turnover and oxidative stress.

#### Limitations:

Sr. Uric acid levels and Sr. CRP levels are nonspecific markers. No one usually would like to compare uric acid versus CRP as a marker of inflammation. Uric acid levels depend on kidney function, besides dietary influence cannot be ignored.

#### Conclusion:

Uric acid and CRP are useful biomarkers of vascular function. They can indicate the quantum of inflammatory, metabolic and cell turnover of any progressive vascular disease. With serial measurements it definitely helps in monitoring cardiovascular diseases. Now days uric acid is used as prognostic marker for cardiac failure also.

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