SERUM URIC ACID AS A RISK FACTOR IN HYPERTENSION

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Abstract: Hypertension is the commonest cardiovascular disorder causing complications like stroke, myocardial infarction etc. Hyperuricemia has long been known to be elevated in Hypertensive patients. However it is still not yet routinely assayed regularly as a risk assessment tool. This study is intended to re-explore the role of serum uric acid in Hypertension. 150 subjects were chosen. 50 were controls, 50 were new onset hypertensives and 50 were treated hypertensives. Uric acid was assayed in all subjects and results recorded. After proper statistical analysis of the data it is concluded that serum uric acid levels is significantly raised in new onset hypertensive subjects when compared with the controls (p value less than 0.001). Also, the levels of uric acid is low in treated subjects when compared with the new onset hypertensive subjects.

Keyword: uric acid, hypertension, inflammation, renin angiotensin system. Globally the burden of hypertension is increasing. In some industrialised countries, upto 25% of adults have diastolic BP over 90mmHg. Prevalence in developing countries seems to be similar to developed societies ranging from 10% to as much as 20% among adults. The distribution of Hypertension is influenced by a number of factors like age, gender, racial/ethnic composition of population, factors such as environmental exposures including dietary intake of sodium and potassium, body weight, alcohol consumption and physical activity. Like height and weight BP is a continuously distributed variable. No rigidly defined threshold levels of blood pressure distinguishes risk from safety. While those subjects who at an early age have the highest blood pressure in the cohort will be likely to have highest morbidity, it unfortunately does not prevent those with lower levels of pressure developing morbidity. Therefore what is needed at an early stage is a better predictor of vascular susceptibility. In this respect, Hyperuricemia has long been known to be associated with cardiovascular disease and is particularly common in hypertension. 25% to 50% subjects of hypertension have elevated serum uric acid when compared to normotensives.

CHEMISTRY OF URIC ACID: Uric acid is the major product of catabolism of the purine nucleosides adenosine and guanosine. In most mammals it is further degraded to allantoin by the hepatic enzyme uricase resulting in the range of 0.5 to 1.5 mg/dl. In contrast, serum uric acid level is high in hominoids (humans and apes). This increase is due to distinct mutations in the uricase gene that made it non-functional.
FUNCTION: Uric acid is not inert but may have beneficial and detrimental functions. It is beneficial in that it acts as an antioxidant and it is detrimental in that it causes endothelial dysfunction.

URIC ACID AND HYPERTENSION:
The independent role of uric acid as risk factor in hypertension has been undergoing debate for many years. Serum uric acid may reflect early renal vascular involvement. Interestingly, when hyperuricemia was induced in rats by the administration of an uricase inhibitor, they become hypertensive. Further studies showed that the hypertension in this model was mediated by two mechanisms. The first resulted from uric acid induced renal vasoconstriction mediated by endothelial dysfunction with reduced nitric oxide levels and second is by activation of Renin Angiotensin system.

RENAL ISCHEMIA:
There is strong evidence that renal vasoconstriction results in increased proximal uric acid reabsorption causing further increase in urate levels. Also, tissue ischemia increase uric acid generation from ATP breakdown and also reduces urate excretion caused by the effects of lactate on the organic anion exchanger.

ACTIVATION OF RENIN ANGIOTENSIN SYSTEM:
Hyperuricemia results in renal inflammation, apreglomerular arteriolopathy and tubulointerstitial inflammation and fibrosis. These renal changes result in activation of renin angiotensin system. This results in further renal vascular constriction and rightward shift in pressure natriuresis relationship. This present study is an attempt to reanalyse the association of uric acid with hypertension.

MATERIALS AND METHOD:
This study is a cross-sectional study. All study participants provided written, informed consent and study protocol was reviewed and approved by the institutional ethical committee board.

INCLUSION CRITERIA:
Those subjects who were healthy with average BP within normal limits (<120 systolic and 80 diastolic) were included as controls (group 1).

Patients with new onset hypertension were included as group 2.

Patients who were hypertensives on regular treatment were included as group 3.

EXCLUSION CRITERIA:
Hepatic diseases, renal diseases, Gout, drug therapy like probenecid.

METHOD:
Under strict aseptic precautions, 5ml of blood samples were collected by venepuncture. The samples were allowed to clot and serum was separated after centrifugation. Preliminary investigations like urea, creatinine, SGOT, SGPT were estimated and recorded. Serum uric acid was estimated using end point uricase method (ERBA Mannheim KIT) using semi auto analyser Microlab 300. Results recorded.

STATISTICS and CONCLUSION:
The distribution of cases and control is given in the following table:

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Particular</th>
<th>No. of respondents (n=150)</th>
<th>Percentage (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>50</td>
<td>33.3</td>
</tr>
<tr>
<td>2</td>
<td>Untreated</td>
<td>50</td>
<td>33.3</td>
</tr>
<tr>
<td>3</td>
<td>Treated</td>
<td>50</td>
<td>33.3</td>
</tr>
</tbody>
</table>
The basic statistics of variable of cases and controls is given in the following table:

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n</td>
<td>15</td>
<td>0</td>
<td>T = -0.135, p value 0.10 &lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>1.206</td>
<td>0.4645</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Unreated</td>
<td>0.6644</td>
<td>1.27770</td>
<td>Significant</td>
</tr>
<tr>
<td>2</td>
<td>n</td>
<td>0</td>
<td>2</td>
<td>T = 1.700, p value 0.000 &lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>3.540</td>
<td>875087</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Thus from the above statistical analysis we can conclude that Uric acid is significantly elevated in the new onset hypertensive subjects. It is in concordance with the previous studies 12,13,14

REFERENCES:

1. Park's Text Book of Preventive and Social Medicine 20th edition 2009 page 323
3. Robins Text Book of Pathological Basis of Diseases 7th edition page 528