Assessment of Uric Acid Levels in Primary Hypothyroid Patients of RIMS, Ranchi Jharkhand

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Abstract: Introduction: Thyroid gland disorders are one of the commonest endocrinological disorders. Thyroid hormones influences uric acid levels. Objectives: To assess serum uric acid levels in hypothyroid patients and compare it with euthyroid individuals. Material and Methods: 50 patient samples and 50 control samples were taken. Serum was separated and serum uric acid levels were estimated by fully Automated Analyzer AU480. Thyroid estimation was done on ABOTT ARCHITCT i1000SR IMMUNOASSAY machine. Data was analyzed using SPSS 20 software. Results: Cases have significantly higher values for serum uric acid and levels than controls and have significant positive correlation with TSH. Conclusions: Hypothyroidism is associated with increased serum uric acid.

Keywords: Primary hypothyroidism, TSH, Renal function, Uric acid

1. Introduction

Thyroid gland disorders are amongst the most abundant endocrinological disorders second only to diabetes. Primary hypothyroidism is a frequent syndrome, whose prevalence is 0.5–2.0% among women and around 0.2% among men. According to several authors, recently the number of patients with autoimmune diseases with hypothyroidism have increased by 2.1%.(1) Hypothyroidism is state of thyroid hormone deficiency or their impaired functions with compensatory thyroid enlargement.(2) Impaired production of thyroid hormones primarily due to thyroid abnormality or iodine deficiency; sometimes may be secondary to pituitary or hypothalamic disorders. Hyothyroidism is associated with weight gain, cold intolerance, constipation. These thyroid hormones have important biological effects such as regulation of body hemodynamic, thermoregulation, and various metabolisms. It influences almost all metabolisms in the body including carbohydrate, proteins, lipids, and maintenance of water and electrolyte homeostasis, which are well-established.(3,4) Hypothyroidism may also associated with kidney derangement resulting in uric acid levels. Hyperuricemia can result from increased production or decreased excretion of uric acid or from a combination of two processes.(5,6)

Uric acid is the end product of purine metabolism in humans. Uric acid is an anti-aging and antioxidant agent. The daily synthesis of uric acid by body is approximately 400 mg and food intakes provide another 300 mg. Approximately 70% of the uric acid is excreted by the kidneys and the rest by the gut. Hyperuricemia is defined by serum uric acid concentrations greater than 7.0 mg/dl in men or greater than 6.0 mg/dl in women.(7) Excess serum accumulation can lead to diseases and mainly involved in gout. So this study was designed for estimation and observation of changes in serum uric acid level in hypothyroid patients.

2. Material and Method

This study was performed in the Department of Biochemistry, RIMS RANCHI from period of Jan 16 to Dec 16. 50 patient samples and 50 control samples were taken.

The study subjects was divided into two groups of which include:

Group 1: Comprising of 50 newly diagnosed and untreated cases of hypothyroidism. The diagnosis was based on decreased serum T3 and T4 levels associated with increased TSH levels. All patients suffering from hypothyroidism was diagnosed and confirmed by the physician based on freeT3 (Normal: 2.4–4.2 pg/ml), freeT4 (Normal: 0.7–1.4 ng/dl) and TSH (Normal: 0.34–4.25 μU/ml) levels of the patients.(8)

Group 2: Comprising of 50 healthy controls in the similar age group having normal thyroid profile.

Inclusion Criteria: Newily diagnosed and untreated cases of hypothyroidism was included in the study.

Exclusion Criteria: a) Pregnancy b) Paediatric age group (< 18 yrs). c) Elderly age group (> 60 yrs). d) Renal disorders. e) Hepatic disorders. f) Bone disorders. g) Diabetes, hypertension or any other systemic illness that may affect the renal function. h) Patients on drugs for treatment of thyroid disorders or any other medications that might affect renal function.

Thyroid Assay Include: Thyroid assay test was done by chemiluminescent microparticle immunoassay method on ABOTT ARCHITCT i1000SR IMMUNOASSAY machine.
Uric Acid Assays: Uric acid was estimated by Uricase method on BECKMAN COULTER AU480 machine.

3. Statistical Analysis and Results

Table 1: Age distribution of study subjects:

<table>
<thead>
<tr>
<th>No of study subject</th>
<th>Control</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Mean±SD</td>
<td>32.30±11.94</td>
<td>36.73±12.56</td>
</tr>
</tbody>
</table>

Table 1 suggest that cases were slightly older than controls.

Table 2: Sex distribution of study subjects:

<table>
<thead>
<tr>
<th>Group</th>
<th>Control</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>83.3%</td>
<td>80%</td>
</tr>
<tr>
<td>Male</td>
<td>16.7%</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2 suggest most of the cases and control were females.

Table 3: Comparison of levels of TSH and Uric acid between cases and controls:

<table>
<thead>
<tr>
<th>Group</th>
<th>TSH (μIU/ml)</th>
<th>Uric acid (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothyroid (Mean±SD)</td>
<td>83.10±15.49</td>
<td>7.82±1.42</td>
</tr>
<tr>
<td>Healthy controls (Mean±SD)</td>
<td>7.82±1.42</td>
<td>15.49 ± 2.88</td>
</tr>
</tbody>
</table>

The pathophysiology of renal function in hypothyroidism is multifactorial and many theories had been proposed. In hypothyroid state, cardiac output is decreased and circulating volume is diminished, resulting in a decreased renal blood flow or pre-renal insufficiency. In addition, the increase in systemic and renal vasoconstriction, probably from direct effect of thyroxine, may further lead to decrease renal blood flow. It may result in less excretion of uric acid.

5. Conclusion

Our studies show there was increased level of uric acid in hypothyroid patient compared to normal individuals. The present study indicates the profound influence of thyroid hormone on renal function. Therefore, patients presenting with these biochemical abnormalities are recommended to be investigated for hypothyroidism and vice versa.

References