Original Research Article

Prevalence of hyperuricemia in hypothyroidism in a tertiary care hospital Pune

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Abstract

Background: Hypothyroidism is associated with many biochemical abnormalities including increased uric acid levels. We designed this study in our population for evaluation of serum uric acid levels in hypothyroid patients. Thyroid gland produces two hormones, Thyroxine (T4) and Triiodothyronine (T3). These hormones play a critical role in cell differentiation during development and help to maintain thermogenic and metabolic homeostasis in the adult. Hypothyroidism is a clinical condition in which thyroid hormones production is below normal. It affects approximately 2% of the population. **Materials and Methods:** This study was conducted over a period of six months among subjects having hypothyroidism at Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pune. Ethics committee approval obtained prior to the study. Both female and male subjects were included in the study and all of them in the age group of 20-60 years. Patients (N = 50) who were diagnosed clinically and biochemically as hypothyroid for the first time who were attending OPD or admitted were enrolled for the study. 25 normal healthy individuals working in this Medical College were included as control group. **Results:** Mean serum uric acid levels were found significantly higher in hypothyroid patients compared to controls. These findings suggest that hyperuricemia are associated with hypothyroidism. (p value = 0.0001). **Conclusion:** It is important to evaluate serum uric acid levels routinely in hypothyroidism patients, to correct the possible altered purine nucleotide metabolism and to prevent the onset of gout. It may also help to observe set in myopathic changes in advanced hypothyroidism.

Key Words: Uric acid, Hypothyroidism, Triiodothyronine and Tetraidothyroxine

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INTRODUCTION

Hypothyroidism is a clinical syndrome resulting from a deficiency of thyroid hormones, which in turn results in a generalized slowing down of metabolic processes. It is a common metabolic disorder in general population. The prevalence of primary hypothyroidism is 1:100, but it may be 5:100 if patients with subclinical hypothyroidism (normal T4, raised TSH) are included.[1] The thyroid gland synthesis of two hormones, Thyroxine (T4) and Triiodothyronine (T3).[1-2] Uric acid is the end product of purine metabolism in humans due to loss of uricase activities.[3,4] The evolutionary advantages of uric acid are anti- oxidantinc life expect and BP control in times of low salt ingestion, intelligence along with Neurodegenerative protective effects. Uric Acid pathologically associated with vascular damage and inflammation.[5,6] Recent studies show that hyperuricemia is associated with CVD and premature death from MI and stroke[7]. Lowering uric acid levels associated with reduced risk. In hypothyroidism, because of low metabolic profile ADP level will be more as against ATP. Hence adenine is oxidized through xanthine oxidase system and liberates more uric acid.[8,9] Uric acid is the final breakdown product of purine degradation in humans. Uric acid production varies with the purine content of the diet, rates of purine biosynthesis, degradation, and salvage.[10.11] The present study was undertaken to evaluate serum uric acid levels in subjects along with hypothyroidism.

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MATERIAL AND METHODS

This cross sectional study was done in the department of Biochemistry, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pune during the period of January 2017 to July 2017 to evaluate the serum uric acid levels of hypothyroid patients and to find out relationship of hyperuricemia with severity of hypothyroidism and the values were compared with that of age and sex matched healthy euthyroid subjects. Clinically and biochemically newly diagnosed 50 hypothyroid patients of both sexes, age 20 to 60 years, with no history of thyroxine in the last 3 (three) months and not taking hypolipidemic drugs were included in the study. Patients with chronic renal failure, diabetes mellitus, liver diseases, chronic diseases, pregnancy and age less than 20 and more than 60 years were excluded. Hypothyroidism was diagnosed by clinical history, physical examinations and relevant laboratory investigations. Patients with low T4 and high TSH levels were defined as hypothyroids. Subclinical hypothyroid patients (high TSH and normal T4) were excluded from the study. Total 50 subjects were included in the study and out of them 25 overt hypothyroid patients were grouped as cases (Group I) and age and sex matched 25 euthyroid subjects were grouped as normal controls (Group II). Specimen was collected taking aseptic measures, allowed to clot; serum was separated and analyzed for uric acid levels. Serum TSH and T4 were estimated by microparticle enzyme immunoassay (MEIA) method. Serum uric acid level was assayed by using uric acid reagent by enzymatic endpoint method as stated by micro-flow cell photometer.

RESULT

Table I shows the comparison of the serum uric acid levels between the cases and the controls. Mean serum uric acid levels in cases were 7.30 ± 2.68mg/dL respectively compared to 5.43 ± 1.74 mg/dL in controls. Mean uric acid levels were significantly increased in cases as compared to controls.

Table I: Serum uric acid levels of study subjects

Parameters	Cases (n=25)	Controls (n=25)	'p' values
Serum uric acid (mg/dL)	7.30 ± 2.68	5.43 ± 1.74	< 0.001

DISCUSSION

The purpose of the present study was therefore to determine the relationship between renal function and thyroid status. Thurman JM *et al* [12] shows longstanding hypothyroidism can cause significant reversible changes in renal function such as a decrease in sodium resorption in the proximal tubules, impairment in the concentrating and diluting capacities of the distal tubules, a decrease in urinary urate excretion, and a decrease in renal blood flow and glomerular filtration rate (GFR).[13] In the present study mean serum uric acid level in hypothyroid subjects was significantly higher than in control subjects. This finding is consistent with the studies done by other investigators. They have also found serum uric acid level significantly elevated in hypothyroid patients.[6,9,10] In a study on 12 (twelve) induced hypothyroid rabbits, mean serum uric acid level was found higher in hypothyroid condition than in euthyroid condition.[11] Therefore, patients presenting with these biochemical abnormalities are recommended to be investigated to explore hypothyroidism. Data available are insufficient for proof. Challenge – adjusting for multiple co morbidities. Do reveal trends– more studies indicated the present study, based on a limited number of cases, showed increased prevalence in hyperuricemia in hypothyroid patients. Hence analysis of uric acid levels in hypothyroid subjects may be used as an associated biochemical parameter to follow the course of the disease

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