

## Correlation of serum uric acid and TSH in patients with hypothyroidism.

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**Abstract:** Hypothyroidism, which results from deficiency of thyroid hormones causes a generalized derangement of metabolic processes. Hypothyroidism is related with many biochemical abnormalities. One of them is increased serum uric acid levels. Disturbance in thyroid hormones affects purine metabolism which leads to alteration in the uric acid levels, leading to hyperuricemia and subsequently causing gout. Objective of the study is to assess serum uric acid levels in hypothyroid patients and to find out any correlation between serum uric acid and TSH. This study was a cross-sectional study comprising of age and sex matched 60 individuals. Study group comprised of suspected cases of hypothyroidism. Serum TSH, fT4 and uric acid level were estimated after applying inclusion and exclusion criteria.

**Keywords:** Hypothyroidism, Hyperuricemia, Uric acid, TSH, fT4.

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### I. Introduction

Thyroid gland disorders are very common endocrinal disorder. Primary hypothyroidism is very much abundant whose prevalence is 0.5–2.0% among women and around 0.2% among men. Recently the number of patients with autoimmune diseases with hypothyroidism have increased by 2.1%. (1) Impaired production of thyroid hormones occurs primarily due to thyroid abnormality or iodine deficiency. It may be secondary to pituitary or hypothalamic disorders. Hypothyroidism is associated with weight gain, cold intolerance, constipation, generalised weakness, menstrual abnormalities etc. These thyroid hormones have important effects such as regulation of body hemodynamics, thermoregulation, and metabolic processes. It affects metabolisms of carbohydrate, proteins, lipids, and maintenance of water and electrolyte homeostasis (2, 3). Hypothyroidism may also associated with renal dysfunction resulting in altered uric acid levels. Hyperuricemia can result from increased production or decreased excretion of uric acid or from a combination of two processes. (4) Uric acid is the end product of purine metabolism. Approximately 70% of the uric acid is excreted by the kidneys. 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 (5). Excess serum uric acid accumulation can lead to gout. A relation exists between thyroid hormones and uric acid synthesis and excretion. Furthermore, disturbance in thyroid hormones affect purine metabolism. This leads to alteration in the uric acid levels, causing hyperuricemia and subsequently gout. (6) Also, hemodynamic changes occur in hypothyroidism that leads to reduction in renal plasma flow and glomerular filtration rate. (7,8). So this study was designed for estimation and observation of changes in serum uric acid level in hypothyroid patients.

### II. Materials and Method

This was a cross-sectional study conducted in Malda Medical College and hospital. A study protocol was designed before undertaking this study, which was approved by the human research ethics committee. Serum TSH, fT4 and uric acid data of the patients were collected after applying inclusion and exclusion criteria. The study included 60 individuals. Men and women between the age group of 20–70 years were included in this study. They were included on the basis of value of fT4 and TSH levels. The diagnosis was based on decreased serum fT4 levels associated with increased TSH levels. All patients with hypothyroidism were diagnosed based on, fT4 (normal: 66–181 nmol/L), and TSH (normal: 0.5–4.2 mIU/L) levels. Patients who were known cases of diabetes, hypertension, renal failure (acute and chronic), hepatic disorders, bone disorders, malignancies, or were on chemotherapy or radiotherapy and pregnant ladies were excluded from the study. Serum TSH, fT4 levels were estimated using Cobas e411, which is based on ELISA technology. Serum uric acid was estimated using colorimetric method on ERBA 600 auto analyser. Uric acid level was estimated using uricase enzymatic method.

### III. Result

The statistical analysis was done with SPSS 20 software. With increasing TSH value the serum uric acid value also increased indicating that there is a positive correlation.

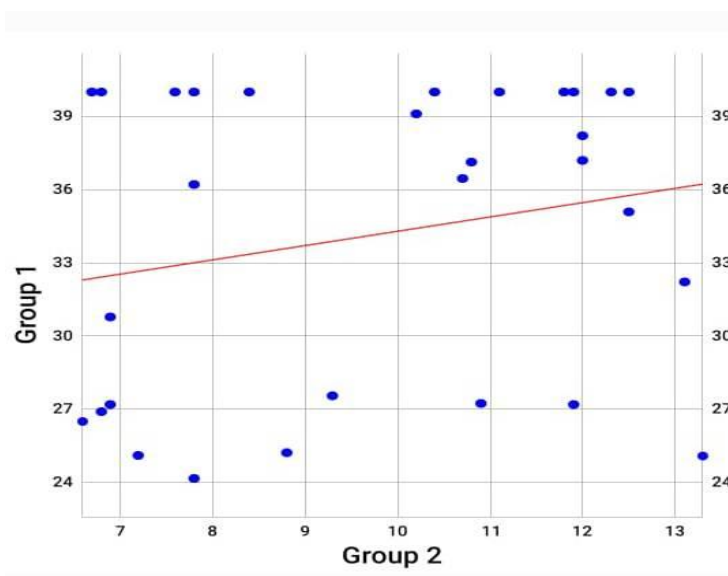


Figure 1

**Group 1:** Serum TSH value

**Group2:** Serum Uric Acid value

Coefficient of correlation = 0.218

Significant test value = 1.184

Unpaired t test was done and we found that the correlation was statistically significant with **p value** < 0.0001 and **critical t value** was found to be 2.0017.

	Group 1 (serum TSH)	Group 2(Serum Uric Acid)
Mean	34.1537	9.76
SD	6.1622	2.2979
SEM	1.1258	0.4195
95% CI of mean	(31.85) – (36.46)	(8.9)- (10.62)
N	30	30

Table1

### IV. Discussion

Our study evaluated the possible interrelationship between uric acid level and TSH level. Significant increase in uric acid level was found in the patients with hypothyroidism. Giordano et al. [8] conducted a study among 28 patients with primary hypothyroidism and showed 33.3% prevalence of hyperuricemia in patients with hypothyroidism. Similar studies were conducted by Erickson et al., [9] Dariyerli et al., [10] and Yokogoshi and Saito [11] and found hyperuricemia in patients with hypothyroidism. The results of our study were in agreement with the earlier mentioned studies.

### V. Conclusion

Our study showed that there was increased level of serum uric acid in hypothyroid patients. Serum Uric acid levels were higher in patients whose serum TSH levels were also higher. Therefore there is a significant correlation between these two parameters and they are positively correlated.

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