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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/15024
DOI URL: <http://dx.doi.org/10.21474/IJAR01/15024>



RESEARCH ARTICLE

STUDY OF SERUM CALCIUM, CREATININE AND URIC ACID IN HYPOTHYROID PATIENTS

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Manuscript Info

Manuscript History

Received: 15 May 2022
Final Accepted: 18 June 2022
Published: July 2022

Key words:-

Serum Calcium, Creatinine, Uric acid,
Hypothyroidism

Abstract

Aim: The study is to determine Serum Calcium, Creatinine and Uric acid levels in hypothyroidism cases.

Materials and methods: A total of 25 cases were selected randomly for one year study from SVRRGGH, Tirupati with exclusion criteria (renal disease, bone disease, diabetes mellitus and other medical conditions and patients who are on medication that going to affect purines and mineral metabolism). Sca²⁺, creatinine and SUA were done on Erbachem 5X and thyroid hormones were done chemiluminescence.

Results: The mean values of serum calcium were low and creatinine and SUA levels were high in hypothyroidism cases. The p value is <0.0001 and is considered highly significant and TSH were correlated with this parameters for knowing effect of hypothyroidism on renal function, mineral and purine metabolism.

Conclusion : Hypothyroidism patients need to be regularly evaluated for these parameters, as early detection and correction can prevent the complications associated with this metabolic dysfunction.

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Introduction:-

The prevalence of hypothyroidism varies in different regions of the world and is more prevalent in women¹ that can disrupt all aspects of metabolism. Subclinical hypothyroidism affects virtually every tissue in the body. This includes slowing of physical and mental activity². Thyroid hormones exerts its major influences on bone and purine metabolism and on renal function. Serum levels of calcium decreased significantly in participants with high TSH. Evidence shows that calcium can decrease its absorption as well as activity of the thyroid gland may lead to inadequate hormonal production by the gland³ and a research from the Endocrine Journal also found that hypothyroidism is not associated with disturbed metabolism of calcium⁴. Literatures shows that thyroid dysfunction also causes remarkable changes in glomerular and tubular functions and electrolyte and water homeostasis. Hypothyroidism is accompanied by a decrease in glomerular filtration, elevation of serum creatinine and alteration of the ability for water excretion^{2,5}. A recent study suggests that thyroid hormone may regulate uric acid levels in patients with subclinical hypothyroidism by regulating insulin resistance⁶. Uric acid is mainly produced by the liver, and it is a water-soluble antioxidant⁷. The UA content in serum is identified as independent risk factor to predict the risk of metabolic syndrome^{8,9}. Therefore, it was suggested that UA might be related to the thyroid function. At present, there are many studies on uric acid, which also found to be related to cardiovascular disease, kidney disease, etc., but there are some controversies with their correlation. As a result, our study was performed to evaluate these biochemical parameters in hypothyroidism and also to show their association with TSH in hypothyroidism patients.

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Material and Methods:-

A total of 25 cases were selected randomly for one year study from SVRRGGH, Tirupati for a period of 6 months with exclusion criteria (renal disease, bone disease, diabetes mellitus and other medical conditions and patients who are on medication that going to affect purines and mineral metabolism) and matched with healthy controls. Blood samples were collected and estimated for Serum Calcium ($s.ca^{2+}$) by , Serum Creatinine by jaffe's method and Serum Uric acid (SUA) by Uricase method. All these parameters were done on Erbachem 5X except thyroid hormones were done on chemiluminescence.

The data were statistically analyzed using Graph pad and excel. The student T test was used determine the association between all these parameters with TSH levels. A p value <0.0001 was considered statistically significant.

Results:-

The mean and SD of serum calcium was low compared to controls and mean and SD of serum creatinine, uric acid level was high in hypothyroid cases compared to controls. In this study TSH had positive correlation with serum calcium, negative correlation with serum creatinine and uric acid and were statistically significant.

Table 1:- Comparison of Serum Calcium, Creatinine, Uric acid and Thyroid between cases and controls.

Parameters	Cases	Controls	P value
Serum Calcium	7.54±0.34	10.08±0.54	<0.0001
Serum Creatinine	0.74±0.17	0.56±0.13	<0.0001
Serum Uric acid	6.16±1.14	5.06±0.56	<0.0001
FT3	0.46±0.10	1.08±0.32	<0.0001
FT4	2.36±1.12	8.5±2.12	<0.0001
TSH	31.78±2.92	2.32±0.14	<0.0001

Graph 1:- Comparison of Serum Calcium, Creatinine, Uric acid and Thyroid between cases and controls.

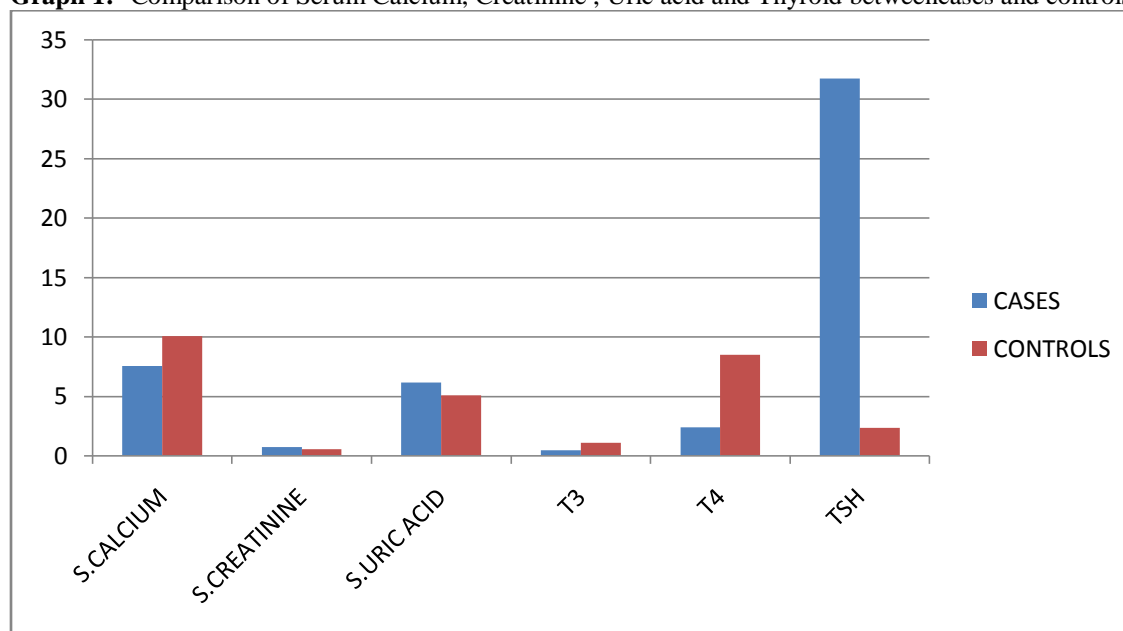
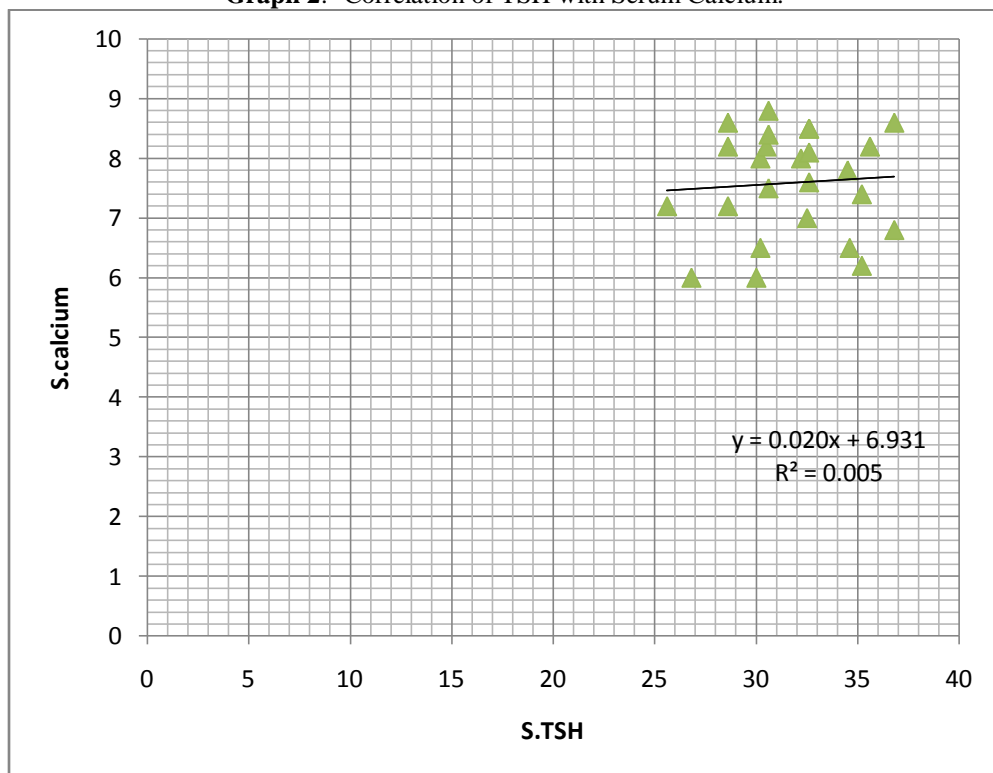
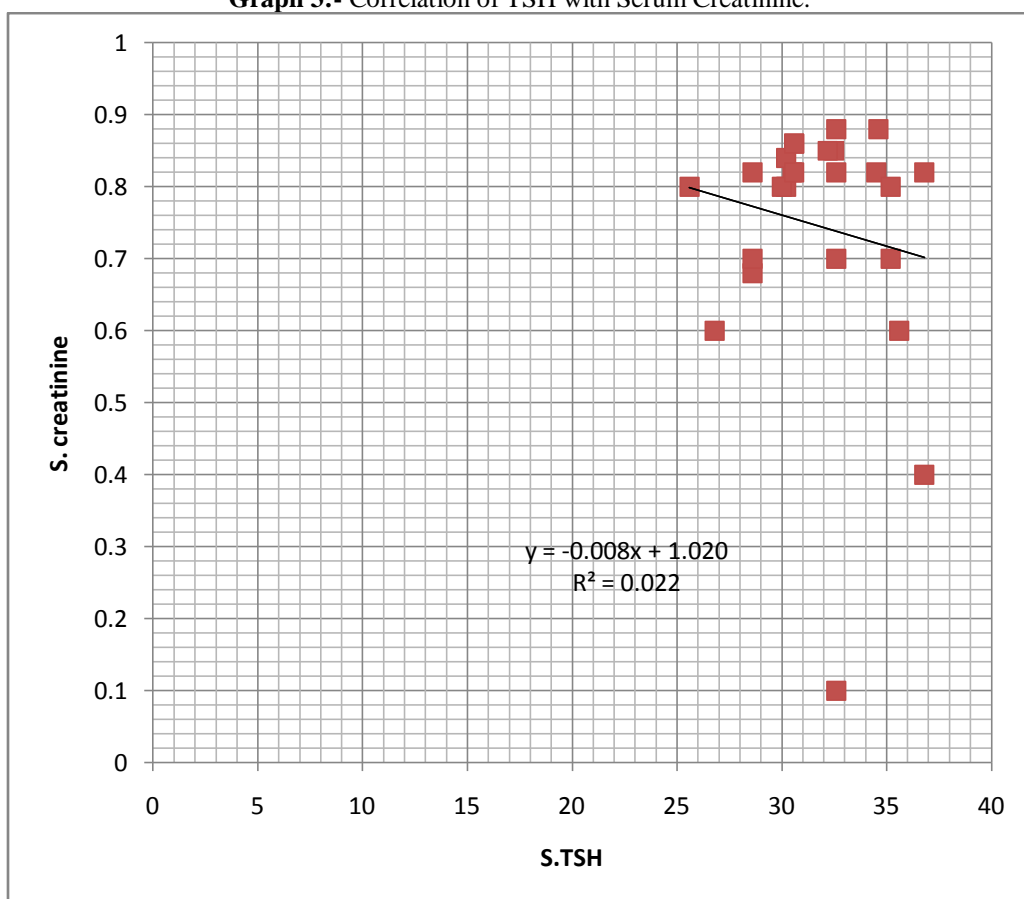
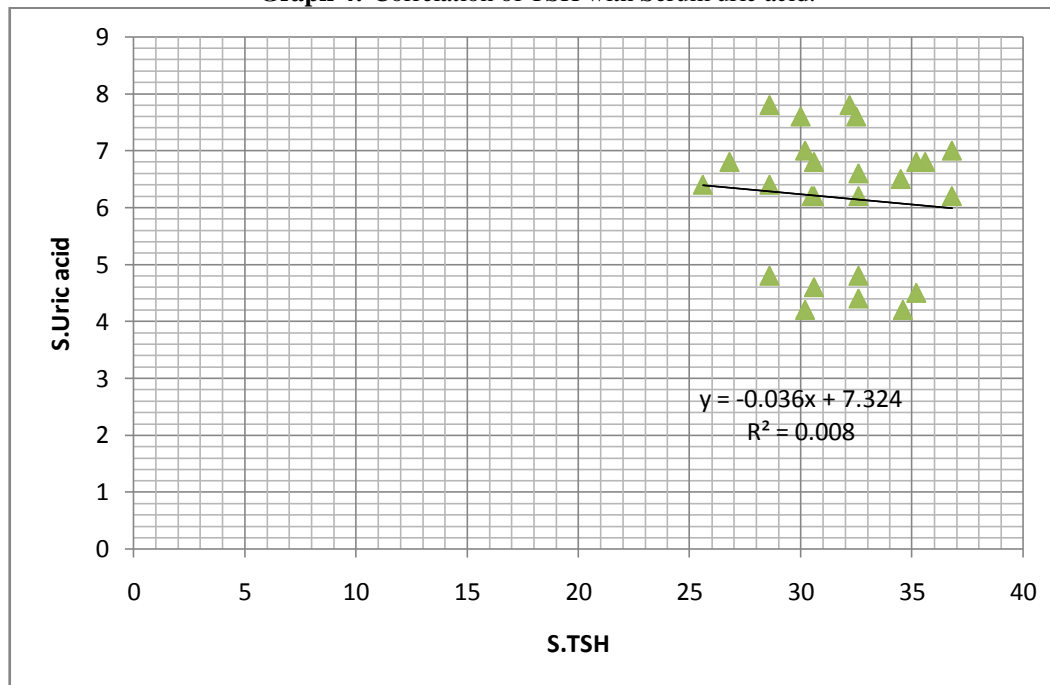


Table 2:- Correlation of TSH with Serum Calcium, Serum Creatinine and Serum Uric acid.

Correlation in parameters	P value	r value
TSH vs Serum Calcium	<0.0001	0.071
TSH vs Serum Creatinine	<0.0001	0.14
TSH vs Serum Uric acid	<0.0001	0.093

Graph 2:- Correlation of TSH with Serum Calcium.**Graph 3:-** Correlation of TSH with Serum Creatinine.

Graph 4:-Correlation of TSH with Serum uric acid.**Discussion:-**

The purpose of this study is to determine the effects of hypothyroidism on mineral and purine metabolism and on renal function. Our study shows that serum calcium was low in hypothyroidism patients which is compared with previous studies Shivala et al¹⁰ and Sridevi et al¹¹ and also our study demonstrated a significant high level of serum creatinine and uric acid in cases than controls ($p < 0.0001$). This study was consonance with Kreisman SH et al¹, were hypothyroidism related with low plasma renin might can cause high levels h of serum creatinine and uric acid levels.

Conclusion:-

Hypothyroidism patients need to be regularly evaluated for serum calcium, creatinine and uric acid as early detection and treatment can prevent the further complications related to disorder which will be helpful in the management of thyroid patients. Further detailed studies regarding the role of calcium supplementation in such cases to prevent progression of disease is highly put forward in near future.

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