International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 7; Issue 7(I); July 2018; Page No. 14455-14457
DOI: http://dx.doi.org/10.24327/ijcar.2018.14457.2622

Research Article

STUDY OF SERUM URIC ACID AND SERUM CREATININE IN HYPOTHYROID PATIENTS

Sandip Lambe[1]., Pankaja Naik[1]., Asmita Patil[1] and Kanchan Lambe[2]

[1]Department of Biochemistry, Smbt Ims & Rc, Dhamangaon, Nashik
[2]Department of OMDR, S.M.B.T. IDSR, Dhamangaon, Nashik-422403

A R T I C L E I N F O

Article History:

Received 20th April, 2018
Received in revised form 7th
May, 2018 Accepted 16th June, 2018
Published online 28th July, 2018

Key words:

Hypothyroidism, Thyroxine, Uric acid, Creatinine

A B S T R A C T

Hypothyroidism is an endocrinological disease that manifests as varying degrees of thyroid gland failure and metabolic abnormalities. Prominent among them being hypodynamic circulation leading to decreased blood supply to kidneys leading to renal impairment.The present study was undertaken in a tertiary care hospital with the prime objective to evaluate the effect of hypothyroidism on kidney function by assessment of serum uric acid and serum creatinine in primary hypothyroidism patients and by correlating the changes in the levels of these two parameters with serum thyroid hormones.

INTRODUCTION

The thyroid gland produces two hormones Tri-iodothyronine (T_3) and Thyroxine (T_4) which have a main role in maintaining thermogenic and metabolic homeostasis.[1] Primary hypothyroidism is due to failure of thyroid glands to produce adequate amounts of thyroid hormones. It is the most common form of hypothyroidism.[2] In western world, the leading cause of primary hypothyroidism is Hashimoto's thyroiditis but in countries like India, specially the northern Maharashtra region, Iodine deficiency remains the most common cause.[3,4] About 42 million people in India suffer from thyroid diseses.[4]

Hypothyroidism leads to a variety of metabolic and hemodynamic alterations in the body. Prominent ones pertaining to the present study being reduction in renal plasma flow and decreased glomerular filtration.[5,6,7] These changes are mainly due to hypodynamic circulation seen in hypothyroidism.[5] These hemodynamic alterations in kidneys lead to changes in the levels of serum uric acid and creatinine levels. Hence thepresent study was undertaken to assess the changes in the levels of these parameters in hypothyroid patients so that uric acid and creatinine levels can be monitored in a patient with hypothyroidism and to correlate the changes in the levels of these parameters with the severity of hypothyroidism.

MATERIAL & METHODS

The present study was conducted in a tertiary care hospital over a period of one year in department of Biochemistry after approval from the institutional ethics committee.

Selection of Study population: Patients were selected from those attending the OPD of Department of Medicineof the tertiary care hospital. 100 newly diagnosed patients of primary hypothyroidism based on the levels of serum T_3, T_4 and TSH were taken as cases and 100 healthy age matched and gender matched volunteers were taken as controls.

***Sample size calculation*:** Sample size calculated using Power and sample size version 3.0 software. Minimum sample size needed in in each arm = 70

***Study design*:** Hospital based cross sectional study with comparison groups.

Inclusion criteria

1. Patients and healthy volunteers willing to enter the study in the age group 30 to 59 years
2. Newly diagnosed cases of primary hypothyroidism attending the out patientDepartment of Medicine.

Exclusion criteria

1. Study subjects less than 30 years and more than 59 years
2. Secondary hypothyroidism
3. Hypothyroidism patients on treatment
4. 6. Pregnant and lactating women
5. 7. Patients with acute or chronic kidney diseases
6. 8. Patients on diuretics, aminoglycosides or any other medical supplementation

***Sample collection*:** 6 ml venous blood from antecubital vein was drawn after taking all the aseptic precautions. The sample was transferred to plain bulb from that serum was separated by

Corresponding author:* **Sandip Lambe
Department of Biochemistry, Smbt Ims & Rc, Dhamangaon, Nashik

centrifugation after coagulation which was used for estimation of Thyroid profile, uric acid and creatinine. All the samples were estimated on the same day. Haemolysed samples were discarded.

Method of Estimation

Parameter	Method of estimation	Equipment
Thyroid profile (Serum T_3, T_4 and TSH)	Chemiluminescence assay	Snibe Maglumi 1000
Serum Uric acid	Enzymatic method	Mindray BS 220 Autoanalyser
Serum Creatinine	Enzymatic method	Mindray BS 220 Autoanalyser

***Statistical analysis*:** All the demographic and biochemical parameters were expressed as Mean±SD**.** Unpaired t test was used for comparison between cases and controls**.** Pearson's correlation coefficient was calculated to assess the correlation. p value<0.05 was considered statistically significant and p<0.001 was considered as highly significant**.** Software GRAPH PAD Prism version 7.0 was used for analysis.

RESULTS

Table 1 table Showing Age Wise Distribution Of Study Subjects

Age in years	Cases		Controls		p Value
	n	%	n	%	
30 to 40	32	32	30	30	
41 to 50	38	38	42	42	
51 to 59	30	30	28	28	
Total	100	100	100	100	
Mean Age	43.52 ± 9.1		43.23 ± 9.3		0.823

The above table shows age distribution in cases and controls. There was no statistical difference between the mean age of cases and controls. (p value= 0.823)

Table 2 Table Showing Comparison of Thyroid Profile in the Study Subjects

Parameter	Cases (n=100) Mean ± SD	Controls (n=100) Mean ± SD	p Value
Serum T_3 (ng/ml)	0.81± 0.14	1.58± 0.22	p=0.0001
Serum T_4 (µg/dL)	3.55±1.37	7.67± 2.83	p=0.0001
Serum TSH (mIU/ml)	8.45±2.12	4.95± 1.88	p=0.0001

p<0.001= highly significant

Table No 2 shows the comparison of mean serum T_3, T_4 and TSH values between hypothyroidism cases and healthy controls. On comparison it was found that mean serum T_3 andT_4 levels were decreased statistically highly significantly in cases compared to controls while mean serum TSH levels were increased highly significantly in cases as compared to the controls.

Table 3 Table Showing Values of Serum Uric Acid And Creatinine In The Study Subjects

Parameter	Cases (n=100) Mean ± SD	Controls (n=100) Mean ± SD	p Value
Serum Uric acid	8.66±2.77	5.11±1.48	p= 0.0001
Serum Creatinine	1.46±0.52	0.93± 0.27	p= 0.0001

p<0.001= highly significant

Above table shows the comparison of serum uric acid and creatinine levels in between primary hypothyroidism cases and healthy controls. Both the levels are significantly higher in cases compared to controls.

Table 4 table Showing Correlation Between Serum T_3 and Serum Uric acid and Creatinine In Hypothyroidism Patients

Parameter	Serum T_3
Serum Uric acid	r= - 0.9856 p< 0.0001
Serum Creatinine	r= -0.8994 p< 0.0001

p<0.001= highly significant

Table 5 Table showing correlation between serum T_4 and serum uric acid and creatinine in hypothyroidism patients

Parameter	Serum T_4
Serum Uric acid	r= - 0.9467 p< 0.0001
Serum Creatinine	r= -0.9248 p< 0.0001

p<0.001= highly significant

The above tables (Table no. 4 and 5) show the correlation between the mean serum T_3 and T_4levels with serum uric acid and creatinine levels in hypothyroidism patients. From the above table it was found that a statistically significant negative correlation was observed between mean serum $T_3$and T_4 levels and serum uric acid and creatinine levels.

DISCUSSION

The present study, evaluating and correlating the changes in the levels of serum Uric acid and Creatinine in patients of primary hypothyroidism, was conducted in a tertiary care hospital over a period of one year.

The results of our study indicate that there is a statistically significant elevation in the levels of serum Uric acid and Creatinine in patients of hypothyroidism. Further from correlation of serum T_3 and T_4 levels with serum uric acid and creatinine levels, it was observed that as the severity of hypothyroidism increased, more significant increase occurred in serum uric acid and creatinine.

The results obtained in our study corroborated well with the studies carried out by Kaur Sindhu G*et al*[5], Khan A H *et al*[6] and Karanikas G *et al*[7], Marwah S *et al*[8] and Sariya S *et al*.[9]In a study conducted on newly diagnosed patients of hypothyroidism, treatment of hypothyroidism resulted in significant and sustained reduction in serum creatinine levels.[10] Thyroid dysfunction results in hypodynamic circulation changes.[5] This actually leads to reduction in renal plasma flow as well as decrease in the glomerular filtration rate.[5,6,7] Hence as less uric acid and creatinine are getting filtered, there is consequent increase in the serum levels of these analytes. In addition, serum creatinine level may be elevated due to hypothyroid myopathy.[6]

CONCLUSION

Thyroid dysfunction is common endocrine abnormality which can produce significant metabolic disturbances. In the present study, a significant elevation was seen in serum uric acid and creatinine levels in primary hypothyroidism patients. Failure to recognise thyroid dysfunction and its treatment may be may lead to impaired renal function and elevated serum uric acid and creatinine. Therefore it becomes essential to measure the levels of serum uric acid and creatinine in hypothyroidism patients to detect renal impairment at an early stage. Moreover prompt treatment of hypothyroidism will improve the renal function before significant damage can occur.In addition, hypothyroidism may be considered as a causative factor in

patients bestowing with kidney disease. The present study is one of the few studies conducted on a tribal population of Northern Maharashtra. Still further studies are required in this regard to detect the effect of treatment on the levels of serum uric acid and creatinine.

Bibliography

1. Jameson J. L, Weetman A.P. Disorders of the thyroid gland. In: Fauci A S, Longo D L, Kasper D L,Hauser S L, Jameson J L, Loscalzo J, editors. Harrison's principles of internal medicine. 18thed. NewYork: McGraw Hill; 2008:2911.
2. Primary hypothyroidism. Miller-Keane Encyclopaedia and Dictionary of Medicine, Nursing, and Allied Health, Seventh Edition. 2003. Retrieved July 30 2018 fromhttps://medicaldictionary.thefreedictionary.com/primary+hypothyroidism.
3. Chakera AJ, Pearce SH, Vaidya B. Treatment for primary hypothyroidism: current approaches and future possibilities. *Drug Des Devel Ther*. 2012; 6: 1–11.
4. Unnikrishnan AG, Menon UV.Thyroid disorders in India: An epidemiological perspective. *Indian J Endocrinol Metab*. 2011 Jul; 15(Suppl2): S78–S81.
5. Kaur Sidhu G, Malek R R, Khubchandani A, Mansuri S H, Patel M S, Oza R H.A study of serum urea, creatinine and uric acid levels in hypothyroid patients. *Int J Res Med*. 2016;5(2):115-8.
6. Khan A H, Majumder I. Serum Creatinine and Uric acid Levels in Hypothyroid Patients. *Bangladesh J Med Biochem*. 2010; 3(2):61-3.
7. Karanikas G, Schutz M, Szabo M, Becherer A,Wiesner K, Dudczak R, Kletter K. Isotopic renalfunction studies in severe hypothyroidism and afterthyroid hormone replacement therapy. *Am JNephrol* 2004; 24:41-5.
8. Marwah S, Mehta M, Shah H, Haridas N,Trivedi A. Correlation of serum uric acid and serum creatininein hypothyroidism. *Natl J Physiol Pharm Pharmacol* 2015;5:232-5.
9. Sayari S, Molaei Z, Torabi Z. The relationship between subclinical hypothyroidism and serum levels of uric acid and creatinine in children aged 2–14 years. *Ann Pediatr Endocrinol Metab.* 2018 Mar; 23(1): 38–42.
10. Schmid C, Brandle M, Zwimpfer C, Zapf J, WiesliP. Effect of thyroxine replacement on creatinine,insulin-like factor 1, acid-labile subunit, andvasular endothhelial growth factor. *Clin Chem* 2004; 50: 228-31.

How to cite this article:

Sandip Lambe *et al* (2018) 'Study of Serum Uric Acid and Serum Creatinine in Hypothyroid Patients', *International Journal of Current Advanced Research,* 07(7), pp. 14455-14457. DOI: http://dx.doi.org/10.24327/ijcar.2018.14457.2622

****