

ORIGINAL ARTICLE

Study of serum zinc and copper levels in hyperthyroid patients

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BACKGROUND: The objective of this study is to analyse levels of trace elements in hyperthyroidism. The contents of the trace elements (Zn, Cu) in the serum of patients was determined and compared to that of normal subjects. **METHODS:** Serum sample of 50 patients of known case of hyperthyroidism and normal subjects were taken. Serum Zinc and serum copper were estimated by spectrophotometric method in Fully automated Erba XL-640 Analyzer. **RESULT:** In the current study there is significant rise in copper concentration and decrease in zinc concentration in serum of hyper thyroid patients compared to that of normal group (P value <0.05). **CONCLUSION:** As hormones influences trace element metabolism at several levels of actions including excretion and transport of trace metals. So trace elements assay can be used as diagnostic / prognostic help with other biochemical parameters in patients with different hormonal disorders.

Key words: ZINC . COPPER . HYPERTHYROID

INTRODUCTION

The Commonest endocrine disorders of world are the thyroid diseases. Population study estimated about 108 million people in India are suffering from endocrine and metabolic diseases of which thyroid abnormalities contribute about 42 millions.¹ Hyperthyroidism may results from generalised thyroid gland over activity or due to some other causes.² However clinical, physiological and biochemical alterations occur when tissues are exposed to increased concentrations of thyroid hormones.³ Different studies also supported that functional abnormalities of hyperthyroidism virtually affects many organ systems.⁴

The maintenance of optimal health requires an adequate supply of carbohydrates, proteins, lipids, macronutrients, micronutrients, and trace elements. Many trace elements play an essential role in a number of biological processes through their action as activators or inhibitors of enzymatic reactions, by

competing with other elements and proteins for binding sites, by influencing the permeability of cell membranes, or through other mechanisms. Trace elements are known to influence hormones action, secretion, activity and binding to target tissue. Conversely, hormones influence trace metals metabolism at several levels of action, including excretion and transport of trace metals. Hence, trace elements assay in biological fluids can be used as diagnostic or prognostic aid in patients with different hormonal disturbances along with other biochemical parameters.

MATERIAL AND METHODS

The cross sectional case control study was conducted in civil hospital, ahmedabad during 1st august to 31st october 2016. Hundred (hyperthyroidism{50} and euthyroid patients{50}) (n=100), their age range between 13-80 years (62 female and 38 male) participated in this study. The mean age of patients was found to be 38.57.±17.15 in female and 42± 14.12 in male. The patients were diagnosed depending on the results of the following examinations: clinical examinations, serum hormones level (T3, T4 and TSH).

Venous blood samples were collected from patients with Hypothyroidism in fasting condition and similar conditions

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were maintained while taking the blood samples of controls. About five millilitres of venous blood from were drawn by utilizing disposable plastic syringes in the morning and transferred into sterile plain test tube. The blood was allowed to clot and centrifuged at 5000 rpm for 5 minute. Sera were separated and stored at -4°C until analysis.

The supernatant blood serum was used for the analysis of metals copper and zinc by colorimetric/spectrophotometric method .

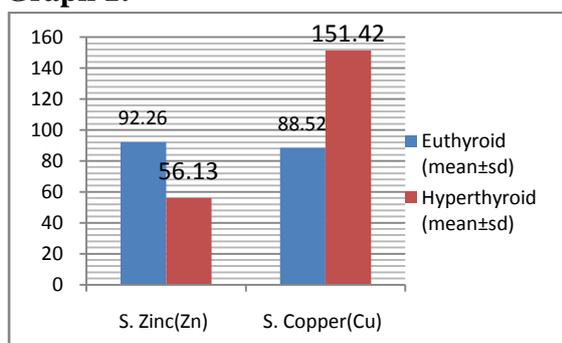
RESULT

Table (1) showed the results of serum trace elements expressed as mean±standard deviation. Serum zinc level of hyperthyroidism patients are significantly lower (p<0.0001) than the level in normal subjects while copper is significantly higher(P value <0.0001) shown in Table (1).

Table 1: Level of trace elements in controls & cases

Test parameter	Euthyroid (mean±sd)	Hyperthyroid (mean±sd)	P value
S. Zinc(Zn) (ug/dl)	92.26±3.15	56.13±12.46	<0.0001
S. Copper(Cu) (ug/dl)	88.52±13.46	151.42±29.07	<0.0001

Graph 1:



DISCUSSION

S. Zinc levels: The current study has shown significant decrease of serum Zn levels in hyperthyroidism. Our result is in agreement with the results of some previous studies.⁵⁻¹² The probable explanation is that the albumin is the major transporter of Zn in plasma.They also suggested that the lower (S) Zn level in hyperthyroidism may be secondary to the sequestration of metallothioneins in liver, which may be a response of increased production of interleukin-6 (IL-6)

produced during inflammation.¹² Furthermore, Varga et al¹³ found the decrease of RBC Zn content may be a reflection of reduced (S) Zn in hyperthyroidism. Influence of TSH may also contribute the alteration of (S) Zn in human thyroid tissue.

S.Copper levels: We observed significant rise of cu concentration in hyperthyroids when compared to controls. Our study is in agreement with the findings of Aihara K et al.¹⁴ Most of the plasma cu is bound to Ceruloplasmin and only a small portion is bound to plasma albumin. Hence rise of (S) cu may be a result of increased Ceruloplasmin in hyperthyroidism. Plasma Ceruloplasmin level was also reported to be increased in patients with hyperthyroidism. A possible explanation is that the Ceruloplasmin is one of the acute phase reactant that increases in response to inflammation.

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