



IMPLICATIONS OF THYROID DYSFUNCTION ON LIVER ENZYMES

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ABSTRACT

BACKGROUND: The liver has an important role in thyroid hormone metabolism. Normal level of thyroid hormones also important for normal hepatic function [1]. Thyroid disorders often accompany abnormal serum enzyme levels and disturbances in liver functions. Thyroid diseases may be associated with elevation of alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP). [2] Thyroid hormones regulate the basal metabolic rate of all cells including hepatocytes, and hence, modulate hepatic function; the liver in turn metabolizes the thyroid hormones and regulates their systemic endocrine effects. [3] Thyroid dysfunction may perturb liver function. So, the objective of this study is to evaluate the changes in liver function in thyroid dysfunction.

AIMS: Aim of the present study is to determine the biochemical markers of liver function test i.e. Aspartate transaminase (AST), Alanine transaminase (ALT) and Alkaline phosphatase (ALP) in patients with thyroid dysfunction and to evaluate the effect of altered thyroid hormones on liver function tests. Also to find their possible correlation i.e. Pearson's correlation between Liver specific enzymes & thyroid hormones in patients attending clinical biochemistry OPD at tertiary care Unit, IGGMC, Nagpur.

MATERIALS & METHODS – This study include about 100 patients attending clinical Biochemistry OPD, IGGMC, Nagpur for routine thyroid test. Estimations of thyroxine (T4), triiodothyronine (T3), thyroid stimulating hormone (TSH) done & Liver specific enzymes like activities of aspartate transaminase (AST), alanine transaminase (ALT), alkaline phosphatase (ALP) estimated in all patients. Collected sample was analysed for liver enzymes, run on Autoanalyser EM 460 in clinical Biochemistry Laboratory, IGGMC, Nagpur. Thyroid tests was run on Elisa reader & washer. Serum values of Thyroid stimulating hormone (TSH), thyroxine (T4) and tri-iodo thyronine (T3) were assayed by ELISA tests and values were compared & correlated with Liver enzymes level. The data was analysed & Pearson's Correlation was obtained, p value <0.05 considered as significant.

RESULTS: Results of our study shows Positive Pearson's correlation between TSH & Liver enzymes in thyroid dysfunction while there is Negative Pearson's correlation between T3, T4 with Liver enzymes. P value is found to be statistically significant i.e. <0.05.

CONCLUSIONS: Thyroid dysfunction patients should be regularly checked for biochemical parameters of Liver enzymes.

It can be concluded that thyroid hormones altered liver function tests. It is thus recommended that liver function tests interpretation in thyroid dysfunction must be advised to prevent progression of disease.

KEYWORDS : Liver Function Test, Thyroid Dysfunction, T3, T4, Tsh, Ast, Alt And Alp

INTRODUCTION

Thyroid diseases are among the commonest endocrine disorders worldwide, it has been estimated that about 42 million people in India suffer from thyroid diseases. Hypothyroidism is the common thyroid disorder with the prevalence of 3.9% in India [3]. Thyroid hormones are essential for normal organ growth and development. Thyroid hormones regulate the basal metabolic rate of all cells, so alteration in their level can affect the entire metabolism. Thyroid hormones regulate hepatocytes and thereby modulate hepatic function. The liver in turn metabolizes the thyroid hormones and regulates their systemic endocrine effect. [4,5]

Thyroid dysfunction may perturb liver function. Knowledge of the association between hypothyroidism and deranged biochemical markers of liver function is important for the clinician, to consider an evaluation of thyroid function in the work up of the patient with altered liver function tests. [6,14] This may emphasize the need for monitoring liver function in hypothyroid patients and vice versa. The present study was undertaken to study the influence of thyroid hormones on liver function (transaminases) in hypothyroidism. Present study was done to evaluate the biochemical parameters of thyroid function test (T3, T4, TSH) and liver function test (AST, ALT and

ALP) and to find out any possible correlation among the measured parameters.

OBJECTIVES OF THE STUDY

- 1) To evaluate the effect of thyroid dysfunction on liver function tests
- 2) To study Pearson's correlation between Liver enzymes & thyroid profile

METHOD OF COLLECTION OF DATA & SELECTION OF SUBJECTS:

This study include about 100 patients attending the clinical Biochemistry OPD, IGGMC, Nagpur for routine thyroid test. History was taken as per designed proforma and consent form was obtained. We collect 5 ml blood sample in plain bulb. Collected sample was analysed for Liver enzymes as well as thyroid test i.e. T3, T4 & TSH. (Thyroid tests was run on Elisa reader & washer).

Serum values of Thyroid stimulating hormone (TSH), thyroxine (T4) and tri-iodo thyronine (T3) were assayed by ELISA tests and values were compared & correlated with Liver enzymes (AST, ALT, ALP).

Liver Function Tests – Normal Range - Alanine Transaminases

(ALT)- 10 to 40 IU/L, Aspartate Transaminases (AST) -10 to 40 IU/L , Alkaline Phosphatase (ALP) – 44 to 147 IU/L, were estimated on fully Analyser EM 460

For T3, T4, TSH – Immunoassay Elisa kit method on Elisa Reader & Washer

Normal Range –T3 - 0.52 to 1.85 ng/ml, T4 - 5 to 15 ug/dl, TSH – 0.39 to 6.16 uIU/ml

Analysis was carried on Autoanalyser EM – 460 in clinical Biochemistry lab, IGGMC for Serum AST,ALT & ALP . All estimations was done & their values were compared & correlated. The data was analysed & Pearsons Correlation was obtained, & . P value <0.05 was considered statistically significant.

RESULTS

Table No 1 : Mean Values of T3, T4, TSH (Thyroid Test) & AST, ALT, ALP (Liver enzymes)

	Mean	Std. Deviation	N
T3	1.0427	.34098	100
T4	6.55	2.650	100
TSH	5.634	4.7064	100
AST	48.020	39.7865	100
ALT	49.890	42.0221	100
ALP	167.440	79.7502	100

Table No 2 : Pearsons Correlation between Thyroid Hormones & Liver specific Enzymes

	Correlation	AST	ALT	ALP
T3	Pearson Correlation	-.734**	-.783**	-.664**
	Sig. (2-tailed)	0.000	0.000	0.00
	N	100	100	100
T4	Pearson Correlation	-.723**	-.778**	-.727**
	Sig. (2-tailed)	0.000	0.000	0.000
	N	100	100	100
TSH	Pearson Correlation	.696**	.736**	.695**
	Sig. (2-tailed)	0.000	0.000	0.000
	N	100	100	100

** . Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Result of our study shows TSH level (Mean - 5 .63) shows positive correlation with serum enzymes specific for liver ie AST,ALT & ALP by Pearsons correlation (Table 2) Similarly Vice versa with T3 ,T4 shows Negative Pearsons Correlation with liver specific enzymes.

The findings of our study is in corroboration with findings of the study by Kalita N et al,[6]

Yadav A. et al.[7], p.d Griffiths et al [8] and Pandey R. et al.[9] Malik and Hodgson[10] mentioned that thyroid hormones T3 and T4 are essential for the growth, development and function of all organs of the body. They regulate BMR of all cells of the body including the hepatocytes and thereby modulate hepatic function. The liver in turn metabolises thyroid hormones and regulates their systemic endocrine effects. Therefore thyroid dysfunction may disturb liver function and liver disease affects thyroid hormone metabolism and a variety of systemic diseases affect both organs. It highlights a close

relationship between thyroid and liver in health and disease. In our study TSH level showed significant positive correlation with AST, ALT and ALP levels in thyroid dysfunction. (Table 2). Our study may be explained by the observations made by Targhar G. et al [11], Khan T. et al [12] and Prakash A. et al[13]. that thyroid alteration effects the liver enzymes like ALP,AST and ALT. The Pearsons positive correlation of TSH

levels with AST and ALT levels is statistically significant (p <0.05)

CONCLUSION –

To conclude, the present study indicates that thyroid disorder might cause significant effect on metabolism of various cells like hepatocytes reflected by increase in biochemical parameters of liver function test ie activity of AST, ALT and ALP . This suggests that hypothyroid patients should be regularly checked for biochemical parameters of liver function tests. Early detection and treatment can prevent the further complications related to the disorder and will be helpful during the management of thyroid patients.

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