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A STUDY THE CORRELATION BETWEEN THYROID PROFILE AND LIVER FUNCTION TEST IN LIVER DISEASE

KEY WORDS: Liver Disease, FT3, FT4, TSH

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ABSTRACT

BACKGROUND: Liver plays an important role in the metabolism of thyroid hormones, as it is the most important organ in the peripheral conversion of tetraiodothyronine (T4) to triiodothyronine (T3) by Type 1 deiodinase. **METHODS:** This case–control study included 100 decompensated liver disease patients and 100 apparently healthy controls. Serum FT3, FT4, and thyroid-stimulating hormone (TSH) levels were measured using electrochemiluminescence immunoassay .**RESULTS:** Liver disease patients had statistically significant lower level of FT3 ($P < 0.05$) and FT4 ($P < 0.05$) but had higher level of TSH ($P < 0.05$) compared with the controls. **CONCLUSION:** The mean FT3 and FT4 levels were found to be significantly decreased and the mean TSH levels were significantly increased in liver cirrhosis cases compared to healthy controls.

INTRODUCTION

The thyroid gland produces two-related hormones, thyroxine (T4) and triiodothyronine (T3). Acting through thyroid hormone receptors α and β, these hormones play a critical role in cell differentiation during development and help maintain thermogenic and metabolic homeostasis in the adult. T4 is secreted from the thyroid gland in about twenty-fold excess over T3. Both hormones are bound to plasma proteins, including thyroxine-binding globulin, transthyretin (formerly known as thyroxine binding prealbumin), and albumin.[1]

The liver plays an important role in the metabolism of thyroid hormones, as it is the most important organ in the peripheral conversion of tetraiodothyronine (T4) to T3 by Type 1 deiodinase[2,3] Type I deiodinase is the major enzyme in the liver and accounts for approximately 30%–40% of extrathyroidal production of T3, it can carry out both 5'-and 5-deiodination of T4 to T3. Moreover, the liver is involved in thyroid hormone conjugation and excretion, as well as the synthesis of thyroid binding globulin.[4] T4 and T3 regulate the basal metabolic rate of all cells, including hepatocytes, and thereby modulate hepatic function. The liver metabolizes the THS and regulates their systemic endocrine effects. Thyroid diseases may perturb liver function; liver disease modulates thyroid hormone metabolism; and a variety of systemic diseases affect both the organs. There are clinical and laboratory associations between thyroid and liver diseases. Patients with chronic liver disease may have thyroiditis, hyperthyroidism, or hypothyroidism. Patients with subacute thyroiditis or hyperthyroidism may have abnormalities in liver function tests, which return to normal as the thyroid condition improves[5]

MATERIAL AND METHODS

Study Design

This was a case–control study.

Study population

This case–control study included 100 apparently healthy controls and 100 liver disease patients (case) from wards, outpatient department, and Intensive Care Unit in Department of Medicine with clinical, biochemical, and radiological evidence of liver disease.

Inclusion criteria

Case – Age >18 years male and female. Known and established cases of liver disease by clinical, radiological (ultrasound abdomen), and biochemical study. Patients who were willing to part of study after consent.

Control – Apparently healthy age- and sex-matched individuals more than18years.

Exclusion criteria

Known cases of thyroid disorder without liver disease. Patient with history of organ failure, cancer, radio or chemotherapy and individual with active infection such as bone and muscle disease, cardiac, pancreatic (diabetes), chronic kidney disease, nephrotic syndrome, and patient who had not meet up inclusion criteria are excluded from this study.

Patient using drugs that interfere with thyroid metabolism such as levothyroxine, propylthiouracil, carbimazole, iodine, amiodarone, and beta-blockers.

Statistical analysis

All the statistical analysis was performed using Epi-info software. A statistical value <0.05 was considered as significant. The results were expressed in the form of tables. Student's *t*-test was used to compare the continued variables between two groups. The analysis of variance was used to test the significance of continued variables within groups. All values are reported as mean ± standard deviation.

RESULTS

Table 1. Socio - demographic profile

Variable	Case	Control	p-value
Age in Yrs	46.38±10.38	47.05±9.86	>0.05
Sex (M:F)	68:32	67:33	>0.05

Table 2. Thyroid function test

Variable	Case	Control	p-value
fT4	1.26±0.51	1.88±0.31	<0.05
fT3	1.93±0.56	3.14±0.49	<0.05
TSH	4.11±1.72	3.09±1.24	<0.05

DISCUSSION

The results of the present study showed a statistically

significant decrease in FT4 levels in all cirrhotic patients compared to controls ($P < 0.0001$). In comparison of cirrhosis with HE and cirrhosis without HE, mean FT4 level were low but statistically not significant ($P = 0.09$). Kayacetin *et al*.[4] reported that serum levels of FT3 and total T4 were significantly lower in all cirrhotic patients with HE compared to cirrhosis without HE. Our results are consistent with this study.

The results of the present study showed a statistically highly significant increase in TSH levels in all cirrhosis patients compared to healthy controls ($P < 0.0001$). El-Feki and Abdalla *et al* [6] concluded the same results. Antonelli *et al*.[7] found that the level of TSH was significantly higher in patients with cirrhosis. Our results are consistent with these studies.

Joeimon *et al*.[8] reported similar results, but Kayacetin *et al*.[4] observed no significant difference in TSH Level in liver cirrhosis patients.

CONCLUSION

The mean FT3 and FT4 levels were found to be significantly decreased and the mean TSH levels were significantly increased in liver cirrhosis cases compared to healthy controls.

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