ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 01 | January - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

THYROID FUNCTIONS IN CHRONIC LIVER DISEASE

General Medicine

Dr. Chirumamilla Upendra Postgraduate, Department of General medicine, Andhra medical college, Visakhapatnam

Dr. Koduru Yositha Meenakshi Postgraduate, Department of General medicine, Andhra medical college, Visakhapatnam

Dr. Yedla Ramesh Naidu Professor, Department of General medicine, Andhra medical college, Visakhapatnam

ABSTRACT

Background: Thyroid hormones regulate basal metabolic rate of all cells including hepatocytes, thereby modulate hepatic function. Liver plays an important role in thyroid hormone metabolism being involved in conjugation, excretion, peripheral deiodination and in synthesis of thyroid binding globulin. **Materials And Methods:** 40 patients with symptoms and signs with biochemical and radiologic evidence of chronic liver disease were taken into study. Detailed history was taken, physical examination, systemic examination was done and all routine investigations were sent.

KEYWORDS

basal metabolic rate, modulate hepatic function

INTRODUCTION

Thyroid hormones regulate the basal metabolic rate of all cells including hepatocytes, and thereby, modulate hepatic function.

The liver plays an important role in thyroid hormone metabolism being involved in their conjugation, excretion, peripheral deiodination and in the synthesis of thyroid binding globulin. The total and free thyroxine have been reported as normal, increased or decreased in various liver diseases; abnormalities in thyroxine binding globulin serum concentration and a reduced thyroid hormone binding capacity, perhaps because of a hypothetical circulating inhibitor, have also been reported.

Moreover, total and free triiodothyronine concentration are often decreased, sometimes profoundly and their levels correlate well with severity of liver dysfunction.

In order to further evaluate the thyroid function in liver disease, this study measures T3, T4, FT3, FT4 serum levels in patients with chronic liver disease.

AIM OF THE STUDY:

To evaluate

1. Thyroid functions in patients with chronic liver disease.
2. To assess the severity of liver dysfunction in relation with interpretation of thyroid function.

MATERIALS AND METHODS

Setting: 40 patients with symptoms, signs with biochemical and radiological evidence of chronic liver disease who were admitted in the general medical ward of King George Hospital were enrolled for this study after prior written and informed consent

The age group of these patients ranged from 25 years to 75 years

Period Of Study: JANUARY 2022 – OCTOBER 2022
Sample Population: 80 Patients – 40 cases and 40 controls

38 Out of these 40 cases, 30 patients were males and 10 patients were females.

Out of the 30 males, 25 had had alcohol related chronic liver disease and out of the remaining 5, 2 patients had Wilson's disease, 3 had post viral chronic liver disease.

Out of the 10 females, 5 had post viral chronic liver disease, 2 patients had alcoholic liver disease and remaining had cryptogenic cirrhosis.

All subjects were hospitalized because of signs and symptoms of decompensated liver disease.

Inclusion Criteria

- Patients with symptoms, signs with biochemical and radiological evidence of chronic liver disease
- Those patients willing to participate in the study

Exclusion Criteria

- Patients with upper gastro intestinal bleeding,
- Patients with acute hepatic encephalopathy
- Patients with renal failure
- Patients on thyroid medications already

METHODOLOGY

Our patients did not show clinical signs or symptoms of thyroid dysfunction and did not receive medications that might have affected the radio immunoassay performed in the study.

As a control group 40 healthy subjects (30 men; 10 women) aged 25 – 75 years, matched for their age, sex was investigated.

All the patients were assessed for the duration of chronic liver disease and were also asked about past history of jaundice, blood transfusion, marital and sexual history and duration of alcoholism (if present).

Every patient was investigated in the following order after the completion of physical examination

- Blood:
- Hemoglobin
- Total WBC count; Differential count
- ESR
- Random blood sugar
- Blood urea
- Serum creatinine
- Liver function tests
- Ultrasound abdomen and pelvis
- Portal vein Doppler
- Serum T3, T4, TSH FT3, FT4
- Serum T3, T4 was determined by standard radioimmuno assay. Serum free
- T3 (FT3) and free T4 (FT4) were measured by direct radioimmuno assay.

The normal ranges for thyroid functions in our laboratory are as follows:

- T3: 80 – 200 ng / dl
- T4: 4.5 – 12 mcg / dl
- FT3: 2.7 – 6.6 pg / ml
- FT4: 6.3 – 16.4 pg / ml

Blood samples were also collected from 40 control subjects for thyroid and liver function analysis. All the vital data and blood reports for the study and control group were entered into a master chart and analysed.

RESULTS

Table 1: Distribution of study population based on age and sex

	Cases	Controls
Male	30	30
Female	10	10
Age 25-35 35-45 45-55 55-75	 — 2, F- 3 M- 3, F- 5 M-20, F-1 M- 5, F-1	 — 2, F- 3 M- 3, F- 5 M-20, F-1 M- 5, F-1

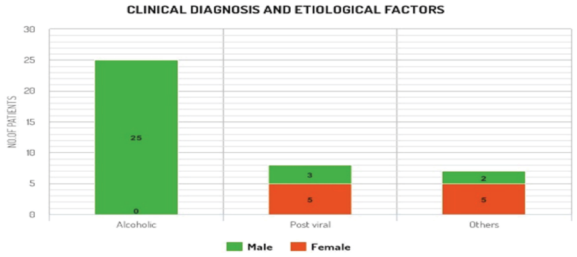

Chart 1: Distribution of study population based on clinical diagnosis end etiological factors

Table 2: Correlation between Liver function tests and Thyroid profile

	Cases	Controls	P value
LFT	45 ± 9	33.13 ± 5.64	0.043
SGOT	40 ± 7	26.9 ± 6.51	0.036
SGPT	136 ± 16.5	87.67 ± 22.4	0.029
ALP	2.5 ± 0.6	0.67 ± 0.07	0.04
TOTAL BILIRUBIN	1.8 ± 0.5	0.2 ± 0.06	0.012
DIRECT	5.66 ± 0.8	6.7 ± 0.37	0.031
BILIRUBIN	2.06 ± 0.1	3.67 ± 0.43	0.023
TOTAL PROTEIN	35 ± 5	11.87 ± 1.17	0.002
ALBUMIN	1.74 ± 0.3	1 ± 0.02	0.021
PT			
INR			
THYROID	84.1 ± 9.6	92.7 ± 8.1	<0.001
PROFILE	6.2 ± 1.3	7.1 ± 1.2	0.0013
T3(ng/dl)	3.7 ± 0.9	4.2 ± 0.7	0.0042
T4(mcg/dl)	11.5 ± 2.6	12.9 ± 2.4	0.008
FT3(pg/ml)	3.2 ± 0.9	3.7 ± 0.9	0.014
FT4(pg/ml)			
TSH(m U/ml)			

Interpretation

Patients with chronic liver disease showed significantly reduced serum levels of T3.

4 patients had low normal levels of Ft3.

5 patients had low T4 values.

All patients had normal FT4 and TSH values.

Simple correlation analysis showed that the serum T3 concentration significantly correlated with serum bilirubin, albumin and prothrombin in chronic liver disease but not with transaminases.

Statistical Analysis T3:

Out of 40 cases, T3 value ranged from a minimum of 76 to maximum of 112.2 ng/dl

- Mean value of T3 among cases was 84.1 ng/dl
- Standard deviation of T3 among cases was ± 9.6
- Out of 40 controls, T3 value ranged from a minimum of 82 to maximum of 118.0 ng/dl
- Mean value of T3 among controls was 92.7 ng/dl
- Standard deviation of T3 among cases was ± 8.1

'p' value calculated for T3 is <0.001 which is statistically significant. T4:

- Out of 40 cases, T4 value ranged from a minimum of 3.6 to maximum of 9.7 mcg/dl
- Mean value of T4 among cases was 6.2 mcg/dl
- Standard deviation of T4 among cases was ± 1.3
- Out of 40 controls, T4 value ranged from a minimum of 4.6 to maximum of 10.2 mcg /dl
- Mean value of T4 among controls was 7.1 mcg / dl
- Standard deviation of T4 among cases was ± 1.2

'p' value calculated for T4 is 0.0013 which is statistically significant. Free T3:

- Out of 40 cases, FT3 value ranged from a minimum of 2.55 to maximum of
- 6.1 pg/ml
- Mean value of FT3 among cases was 3.7pg/ml
- Standard deviation of FT3 among cases was ± 0.9
- Out of 40 controls, FT3 value ranged from a minimum of 2.8 to maximum
- of 6.4 pg/ml
- Mean value of FT3 among controls was 4.2 pg/ml
- Standard deviation of FT3 among cases was ± 0.7

'p' value calculated for FT3 is 0.0042 which is statistically significant FT4 :

- Out of 40 cases, FT4 value ranged from a minimum of 6.3 to maximum of 16.4 pg/ml
- Mean value of FT4 among cases was 11.5 pg/ml
- Standard deviation of FT4 among cases was ± 2.6
- Out of 40 controls, FT4 value ranged from a minimum of 8.75 to maximum of 16.4 pg/ml
- Mean value of FT4 among controls was 12.9 pg/ml
- Standard deviation of FT4 among cases was ± 2.4

'p' value calculated for FT4 is 0.008 which is statistically significant. TSH :

- Out of 40 cases, TSH value ranged from a minimum of 1.73 to maximum of 5.4 mU/ml
- Mean value of TSH among cases was 3.2 mU/ml
- Standard deviation of TSH among cases was ± 0.9
- Out of 40 controls, TSH value ranged from a minimum of 2.0 to maximum of 5.5 mU /ml
- Mean value of TSH among controls was 3.7 mU/ml
- Standard deviation of T4 among cases was ± 0.9

'p' value calculated for TSH is 0.014 which is statistically significant.

DISCUSSION

The existence of low T3 syndrome i.e., low total T3 with normal total T4 in the absence of clinical hypothyroidism has been frequently reported in patients with chronic liver disease and it has been shown to depend on impaired liver conversion of T4 to T3.

The liver plays an important role in thyroid hormone metabolism being involved in their conjugation, excretion, peripheral deiodination and in the synthesis of thyroid binding globulin.

This study confirms a highly significant decrease in T3 serum concentration in liver disease, the lowest values correlate with severe disease .

In a large group of alcoholic patients, Israel et al reported a significant correlation between serum T3 concentration and severity of liver dysfunction as well as progressive T3 increase in those subjects eventually displaying favourable outcome suggesting that T3 concentration in patients with advanced liver disease may be considered as helpful prognostic indicator.

This study found a good correlation between T3 concentration and serum albumin, bilirubin, prothrombin time while no correlation has been found with hepatic inflammatory indices like transaminases.

This result suggests that T3 concentration should be considered as a sensitive index of hepatic function in liver disease.

Green et al found normal FT3 and FT4 in a small group of cirrhotic patients, while low FT4 and normal FT3 concentrations were present in alcoholic fatty liver.

Many studies performed on equilibrium dialysis, however showed decreased FT3 and normal or frequently increased FT4 concentration. These findings are confirmed by present study with direct radioimmunoassay of FT3 and FT4 in chronic liver disease.

These data suggest that in a patient with chronic liver disease,

euthyroidism is maintained by a subtle equilibrium between low FT3 and increased FT4 concentrations.

CONCLUSIONS

The present study in which thyroid function has been evaluated with all the clinically available indices, confirms the existence of several abnormalities in thyroid function test in chronic liver disease, although showing that euthyroidism is maintained virtually in all patients, probably as a result of low normal FT3 and high normal Ft4.

Furthermore serum T3 concentration appear to parallel the severity of liver dysfunction

REFERENCES

[1] Mansour-Ghnaei F, Mehrdad M, Mortazavi S, Joukar F, Khak M, Atrkar-Roushan Z . Decreased serum total T3 in hepatitis B and C related cirrhosis by severity of liver damage. Annals of Hepatology. 2012;11(5):667-671.
[2] Kelly G. Peripheral metabolism of thyroid hormones: a review. Alternative Medicine Review. 2000; 5(4): 306-333.
[3] Kharb S, Garg MK, Puri P, Brar KS, Pandit A, Srivastava S. Assessment of thyroid and gonadal function in liver diseases. Indian Journal of Endocrinology and Metabolism. 2015;19(1):89-94.
[4] Deepika G, Veeraiah N. Rao PN, Reddy DN. Prevalence of hypothyroidism in Liver Cirrhosis among Indian patients. International Journal of Pharmaceutical and Medical Research. 2015;3(3):4-7
[5] Eshraghian A, Taghavi SA. Systematic review: endocrineabnormalities in patients with liver cirrhosis. Arch Iran Med. 2014;17(10):713-21.