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Original research article

A study on thyroid function tests as a biomarker to differentiate acute from chronic liver disease

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Abstract

Aim: To determine the spectrum of thyroid abnormalities in both acute and chronic liver disease patients admitted to medical wards in ACSR Govt. General Hospital, Nellore

Methodology: It was a cross-sectional study, a period of 18 months. Patients admitted to medical wards, ACSR Govt. General Hospital, Nellore.

Results: In the present study, the mean age of Acute Liver Disease patients was 33.30 ± 11.17 and the mean age of chronic liver disease cases was 49.20 ± 12.75. Majority were male i.e. 80% and female were 20%. Among the chronic liver disease patients 4% had features of Hypothyroidism. 2% of Acute Liver disease patients had Encephalopathy and 20% had Icterus. Among chronic liver disease patients, 42% had Upper GI bleed, 205 had Encephalopathy, 58% had Ascites, 70% had Icterus and 52% had Edema. 38% of the study population had No ascites, 48% had Grade 1 Ascites out of which all had Chronic Liver disease and 14% had Grade 2 Ascites where 2% had Acute Liver Disease and 12% had Chronic Liver disease. Based on the grade of Encephalopathy, 14% had Grade 1 Encephalopathy out of which 2% had Acute Liver Disease and 12% had Chronic Liver Disease. Grade 2 Ascites were observed in 8% of the Chronic liver disease patients who had Grade 2 Encephalopathy. In the present study, Total Bilirubin and Direct Bilirubin had a statistically significant correlation observed with Thyroid profile as the p-value calculated to be <0.05. In the present study, a statistically significant Positive correlation was observed between AST, ALT, and Total T4 as the p-value was calculated to be <0.05. There was a decrease in Free T3 and Free T4 levels with an increase in severity and this finding was statistically significant as the p-value calculated to be <0.05.

Conclusion: In the present study, Total Bilirubin and Direct Bilirubin had a statistically significant correlation observed with Thyroid profile, statistically significant Positive correlation was observed between AST, ALT, and Total T4 and Total Bilirubin was significantly correlated with Free T3, Free T4 and Total T3 and Direct Bilirubin was significantly Negative correlation was observed with Free T3, Free T4, and Total T3.

Keywords: Thyroid function, biomarker, differentiate acute, chronic liver disease

Introduction

The thyroid gland produces the related hormones triiodothyronine (T3) and thyroxine (T4). These hormones, acting through the receptors of thyroid hormones alpha and beta, play a critical role in cell differentiation during development to maintain adult thermogenic and metabolic homeostasis. In about twenty-fold excess of T3, T4 secretes from the thyroid gland. Both the hormones, thyroxine-binding globulin, transthyretin (formerly known as thyroxine-binding prealbumin), and albumin are bound to plasma proteins [1-3].

The liver has a very important role in thyroid hormone metabolism, as it is the most important organ in the Type 1 deiodinase peripheral conversion of tetraiodothyronine T4 to T3. The major enzyme in the liver, type I deiodinase, accounts for approximately 30%-40% of T3 extrathyroid production; it can perform both T4 to T3 5 and 5-deiodination. Besides, the liver is involved in the conjugation and excretion of thyroid hormones, as well as thyroid-binding globulin synthesis [4-6].

T4 and T3 regulate the basal metabolic rate, modulating the hepatic function of all cells, including hepatocytes. THS is metabolized by the liver, and its systemic endocrine effects are regulated. Thyroid diseases can disrupt the function of the liver; liver disease modulates the metabolism of thyroid

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hormones; both organs are affected by a range of systemic diseases [7, 8].
To date, available studies have shown that the most common improvement in plasma thyroid hormone levels is a reduction in the total concentration of T3 and free concentration of T3, which is stated to be correlated with hepatic dysfunction severity. But no study has clearly identified levels of FT4 and thyroid-stimulating hormone (TSH) with liver cirrhosis severity. Serum concentrations of T4 either remain normal or slightly low. Serum TSH levels remain, however, normal or slightly elevated [9-11].
The present study was conducted to determine and compare the spectrum of thyroid abnormalities in both acute and chronic liver disease and to find a correlation between thyroid function and the level of liver dysfunction. The study also was intended to assess the utility of thyroid function tests as a biomarker to differentiate acute from chronic liver disease among patients admitted in medical wards in ACSR Govt. General Hospital, Nellore

Aims and Objectives

1. To determine the spectrum of thyroid abnormalities in both acute and chronic liver disease patients admitted to medical wards in ACSR Govt. General Hospital, Nellore.
2. To compare the thyroid hormone levels in the liver disease - both acute and chronic patients to that of healthy controls.
3. To assess the correlation between thyroid function and the level of liver dysfunction.
4. To assess the utility of thyroid function tests as a biomarker to differentiate acute from chronic liver disease.

Materials and Methods

- **Type and duration of study:** Cross-sectional study, a period of 18 months.
- **Study Population:** Patients admitted to medical wards, ACSR Govt. General Hospital, Nellore.

Inclusion criteria

- Patients admitted to medical wards with a diagnosis of acute or chronic liver disease.
- Age greater than 12 years.

Exclusion criteria

- Age less than 12 years.
- Patients refusing to undergo study.

Sampling method and size: By the simple random method, % 0 cases.

Method of data collection

A detailed clinical history was elicited from patients selected for the study. A comprehensive physical examination was carried out on them, followed by a thorough review of their hospital records. Data is collected regarding the duration of symptoms, clinical features of liver disease, and features of thyroid disease. Patients were divided into acute or chronic liver disease based on history, physical examination, and imaging. Any patient with a duration of illness more than 2 months was considered to have chronic liver disease. On imaging, coarse echoes and features suggestive of cirrhosis were taken as markers of chronic liver disease. Ascites were graded into three categories; 0- no ascites, 1- easily controlled ascites, 2- difficult to control ascites. Hepatic encephalopathy was graded into 3 categories; 0-none, 1-minimal, and 2-advanced.
Complete thyroid profile (thyroid-stimulating hormone [TSH], free thyroxine [FT4], total thyroxine [TT4], free triiodothyronine [FT3], and total triiodothyronine [TT3]) of patients selected for the study was carried out using the chemiluminescent immunological method. Patients underwent complete liver function tests. This included total and direct bilirubin, enzymes (aspartate aminotransferase [AST], alanine aminotransferase [ALT], alkaline phosphatase [AP]), serum total protein and albumin, and prothrombin time. Prothrombin time was estimated using the method. All patients underwent an abdominal ultrasonography to confirm the diagnosis and to look for ascites splenomegaly and features of portal hypertension.
The Child-Pugh score was calculated for patients with chronic liver disease as a measure of the severity of the liver disease. Thirty age and sex-matched healthy controls were selected from among the attendees of the patients. They were given a complete physical examination liver function test evaluation to exclude liver disease. A complete thyroid profile (TSH, FT4, TT4, FT3, and TT3) was carried out on them.

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Statistical analysis

Data entry and tabulation was done using Microsoft Excel 2013 and SPSS Version 16. Descriptive statistics include Mean, Standard deviation for Quantitative data and, Frequency, percentages for Qualitative data were calculated. Nonparametric statistics including the Chisquare test were used to find the significant difference between the study variables. Parametric statistics including t-test was used to find the significant difference between the study variables. The p-value of <0.05 was considered to be statistically significant.

Results

Table 1: Distribution based on age

Age	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)	Total
<20	1 (2%)	0	1 (2%)
21 - 30	3 (6%)	3 (6%)	6 (12%)
31 - 40	4 (8%)	8 (16%)	12 (24%)
41 - 50	1 (2%)	11 (22%)	12 (24%)
51 - 60	1 (2%)	11 (22%)	12 (24%)
61 - 70	0 (0%)	5 (10%)	5 (10%)
71 - 80	0 (0%)	2 (4%)	2 (4%)
Total	10 (20%)	40 (80%)	50 (100%)
Mean ± SD	33.30 ± 11.17	49.20 ± 12.75	

In the present study, the mean age of Acute Liver Disease patients was 33.30 ± 11.17, and the mean age of chronic liver disease cases was 49.20 ± 12.75.

Among the Acute Liver Disease patients majority belonged to the 21-40 years age group and in chronic liver disease majority were in the 41-60 years age group.

Table 2: Distribution based on gender

Gender	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)	Total
Male	7 (14%)	33 (66%)	40 (80%)
Female	3 (6%)	7 (14%)	10 (20%)
Total	10 (20%)	40 (80%)	50 (100%)

In the present study, the majority were male i.e., 80% and female were 20%. Among the Acute Liver Disease patients, males were 14% and females were 6% and in chronic liver disease patient's males were 66% and females were 14%.

Table 3: Distribution based on thyroid disease

Thyroid Disease	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)	Total
Hyperthyroidism	0 (0%)	0 (0%)	0 (0%)
Hypothyroidism	0 (0%)	2 (4%)	2 (4%)

In the present study, among chronic liver disease patients, 4% had features of Hypothyroidism.

Table 4: Distribution based on duration of symptoms in months

Duration of Symptoms in months	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)	Total
<1 Month	10 (20%)	3 (6%)	13 (26%)
1 - 6 months	0 (0%)	12 (24%)	12 (24%)
6 - 12 months	0 (0%)	10 (20%)	10 (20%)
12 - 24 months	0 (0%)	9 (18%)	9 (18%)
>24 months	0 (0%)	6 (12%)	6 (12%)
Total	10 (20%)	40 (80%)	50 (100%)

In the present study, based on the duration of symptoms in months 26% had duration within 1 month and 24% had the duration of symptoms within 1-6 months, 20% had duration within 6-12 months and 18% with the duration of symptoms within 12-24 months, >24 months duration of symptoms was observed in 12% of the patients.

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Table 5: Distribution based on presenting complaints

Presenting complaints	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)	Total
Upper GI Bleed	0 (0%)	21 (42%)	21 (42%)
Encephalopathy	1 (2%)	10 (20%)	11 (22%)
Ascites	0 (0%)	29 (58%)	29 (58%)
Icterus	10 (20%)	35 (70%)	45 (90%)
Edema	0 (0%)	26 (52%)	26 (52%)

Table 5 shows distribution based on presenting complaints where 2% of Acute Liver disease patients had Encephalopathy and 20% had Icterus.
Among chronic liver disease patients, 42% had Upper GI bleed, 205 had Encephalopathy, 58% had Ascites, 70% had Icterus and 52% had Edema.

Table 6: Distribution based on grade of Ascites

Grade of Ascites	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)	Total
Grade 0	9 (18%)	10 (20%)	19 (38%)
Grade 1	0 (0%)	24 (48%)	24 (48%)
Grade 2	1 (2%)	6 (12%)	7 (14%)
Total	10 (20%)	40 (80%)	50 (100%)

Table 6 shows distribution based on Grade of Ascites where 38% of the study population had No ascites, 48% had Grade 1 Ascites out of which all had Chronic Liver disease and 14% had Grade 2 Ascites where 2% had Acute Liver Disease and 12% had Chronic Liver disease.

Table 7: Distribution based on grade of Encephalopathy

Grade of Encephalopathy	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)	Total
Grade 0	9 (18%)	30 (60%)	39 (78%)
Grade 1	1 (2%)	6 (12%)	7 (14%)
Grade 2	0 (0%)	4 (8%)	4 (8%)
Total	10 (20%)	40 (80%)	50 (100%)

Based on the grade of Encephalopathy, 14% had Grade 1 Encephalopathy out of which 2% had Acute Liver Disease and 12% had Chronic Liver Disease.
Grade 2 Ascites were observed in 8% of the Chronic liver disease patients who had Grade 2 Encephalopathy.

Table 8: Distribution based on thyroid profile

Thyroid profile	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)
Free T3	2.17 ± 0.63	1.78 ± 0.63
Free T4	1.18 ± 0.20	1.13 ± 0.36
Total T3	100 ± 33.41	98.50 ± 39.54
Total T4	10.09 ± 2	6.35 ± 1.85
TSH	1.83 ± 1.13	3.65 ± 2.67

Table 8 shows the mean thyroid profile among acute and chronic liver disease.

Table 9: Distribution based on liver function tests

Liver function tests	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)
AST	298.10 ± 216.08	120.25 ± 85.93
ALT	285.90 ± 218.68	133.07 ± 123.08
ALP	202.40 ± 36.26	200.75 ± 62.95
Total Bilirubin	8.2 ± 4.72	8.47 ± 6.25
Direct Bilirubin	4.51 ± 3.14	4.80 ± 3.74

Table 9 shows the mean Values of Liver function tests and shows elevated liver enzymes in Acute liver disease compared to chronic liver disease.

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Table 10: Distribution based on biochemical profile

Biochemical profile	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)
Total protein	7.04 ± 0.25	6.83 ± 0.41
Albumin	3.82 ± 0.34	3.29 ± 0.45
Prothrombin Time	16.30 ± 2.58	25.03 ± 6.75

Table 10 shows the Biochemical profile of Acute and Chronic liver disease where the mean total protein and Albumin were high compared to Chronic liver disease. Prothrombin time was More in Chronic liver disease compared to Acute Liver disease.

Table 11: Distribution based on Liver and Spleen size

Liver and Spleen size	Acute Liver disease Frequency (%)	Chronic Liver disease Frequency (%)
Liver size	12.28 ± 1.49	10.97 ± 1.66
Spleen size	7.59 ± 0.78	11.33 ± 2.62

Table 11 shows the mean Liver size was more in Acute Liver disease and the mean spleen size was more in chronic liver disease.

Table 12: Correlation between thyroid profile and chronic liver disease

	Thyroid Profile	R-value	P-value
ALT	TSH	-0.10	0.53
	Free T3	0.03	0.85
	Free T4	0.14	0.38
	TT3	0.04	0.78
	TT4	0.27	0.08
AST	TSH	-0.09	0.57
	Free T3	-0.02	0.90
	Free T4	0.07	0.66
	TT3	0.02	0.90
	TT4	0.25	0.10
ALP	TSH	-0.25	0.10
	Free T3	-0.003	0.98
	Free T4	-0.05	0.75
	TT3	0.02	0.88
	TT4	0.15	0.34
Total Bilirubin	TSH	-0.02	0.90
	Free T3	-0.63	0.0001*
	Free T4	-0.45	0.0001*
	TT3	-0.58	0.0001*
	TT4	-0.48	0.0001*
Direct Bilirubin	TSH	0.06	0.0001*
	Free T3	-0.65	0.0001*
	Free T4	-0.43	0.0001*
	TT3	-0.56	0.0001*
	TT4	-0.49	0.0001*

*Statistically significant

In the present study, total bilirubin and direct bilirubin had a statistically significant correlation observed with Thyroid profile as the p-value calculated to be <0.05.

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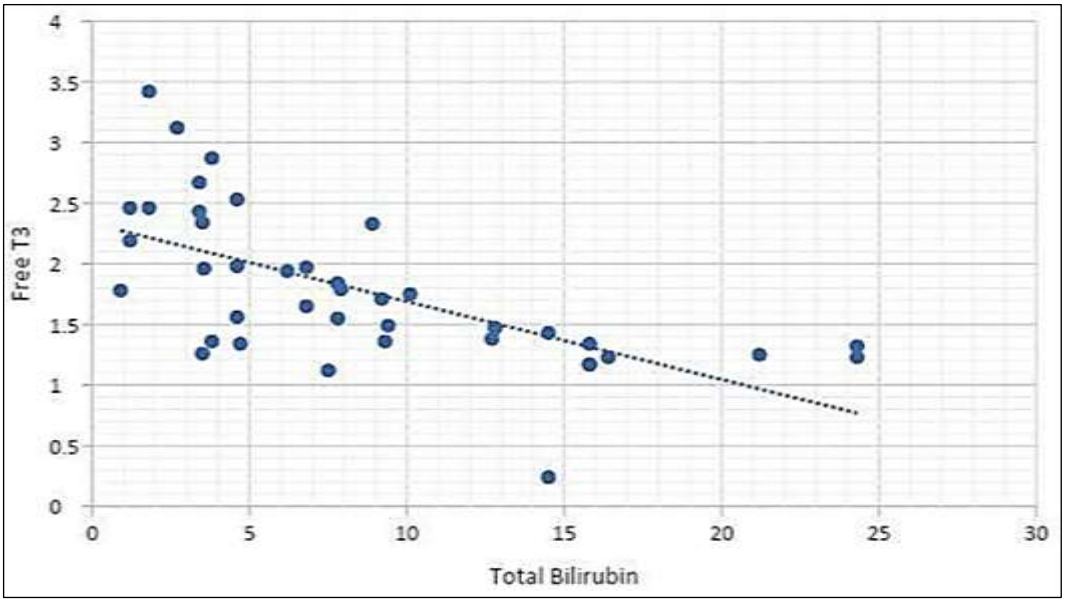
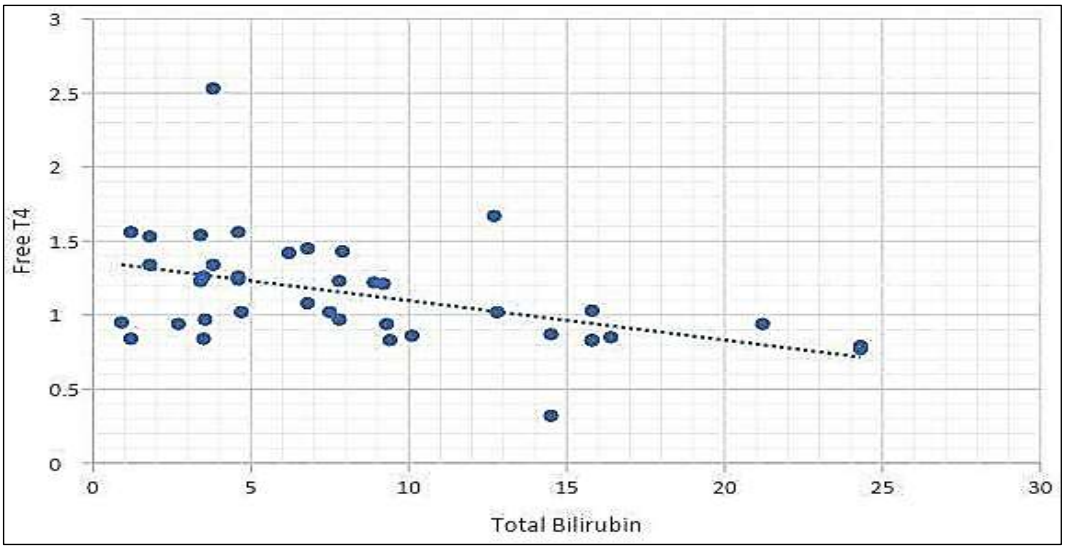


Graph 1: Free T3 vs Total Bilirubin



Graph 2: Free T4 vs Total Bilirubin

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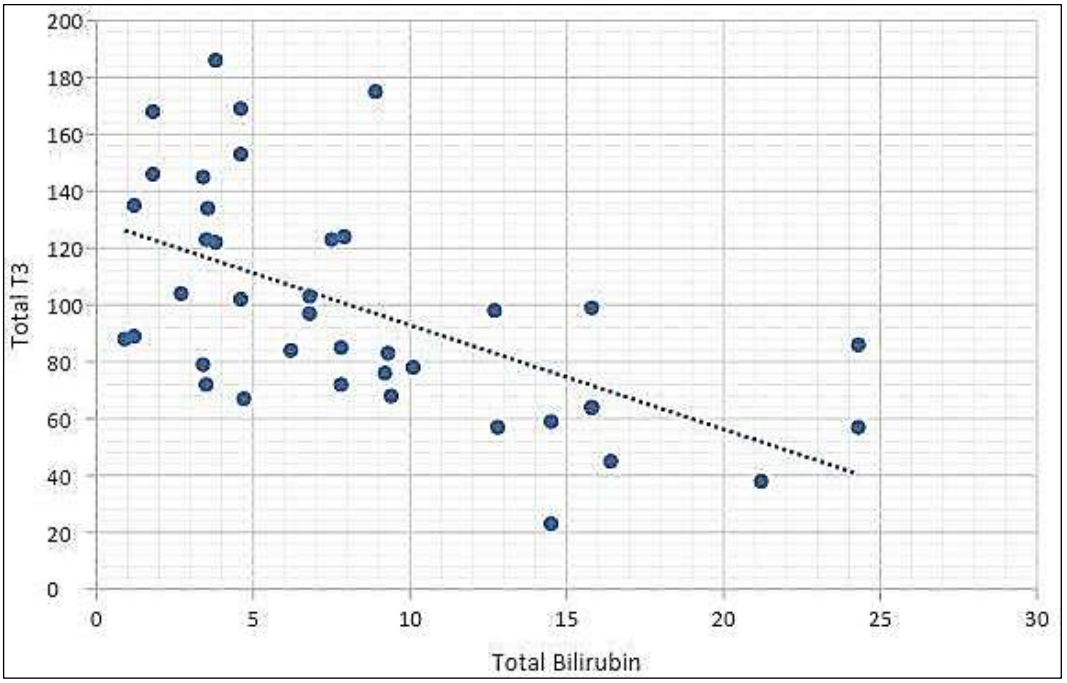
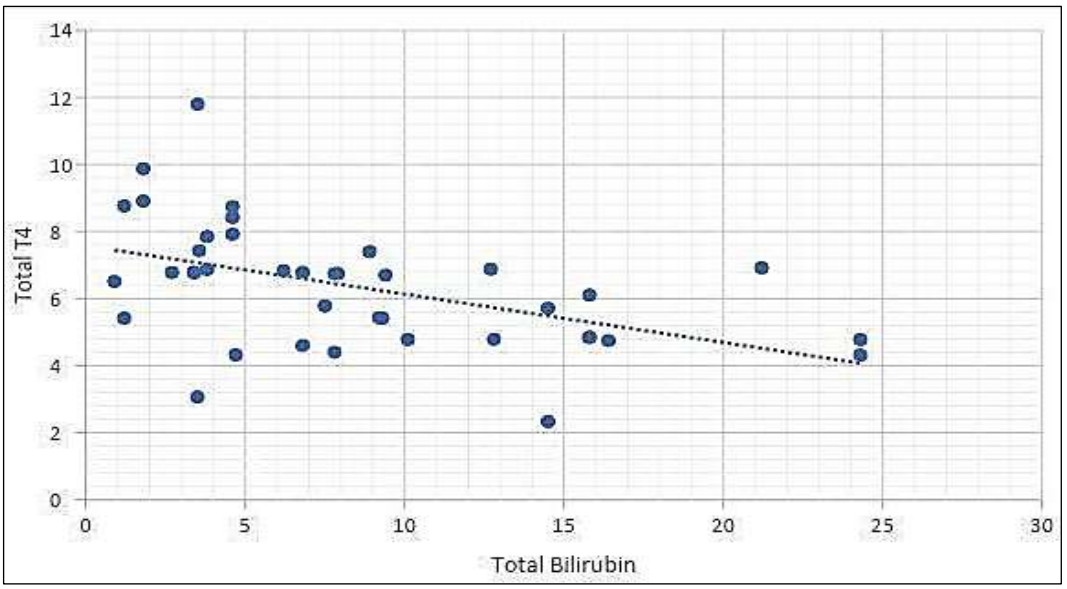


Graph 3: Total T3 vs Total Bilirubin



Graph 4: Total T4 vs Total Bilirubin

Table 13: Child Pugh score and comparison of thyroid profile

	A (n=4)	B (n=11)	C (n=35)	P-value
TSH	3.7 ± 4.8	2.7 ± 2.4	3.4 ± 2.3	0.72
Free T3	2.3 ± 0.3	2.3 ± 0.7	1.7 ± 2.2	<0.001*
Free T4	1.3 ± 0.3	1.3 ± 0.5	1.1 ± 1.1	<0.05*
Total T3	125.8 ± 25.7	116.5 ± 36.8	90.2 ± 116.125	<0.05*
Total T4	8.2 ± 1.1	8.3 ± 2.0	6.6 ± 8.8	<0.05*

There was a decrease in Free T3 and Free T4 levels with an increase in severity, and these findings are statistically significant as the p-value was calculated to be <0.05.

Discussion

Liver diseases are associated with multiple endocrine disorders. In the metabolism of thyroid hormones, the liver plays a significant function in the conjugation, excretion, peripheral deiodination, and synthesis of the binding of thyroxine-globulin (TBG). Alterations in thyroid function can lead to liver dysfunction and conversely, different liver disorders can have different effects on the metabolism of thyroid hormones [12, 13].

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Liver dysfunction leads to secondary dysfunction of the endocrine glands due directly to toxic effects and indirect modification of the carrier protein synthesis. Chronic liver disease can also be followed by symptoms of apparent hormonal imbalance. Thyroxine and triiodothyronine are necessary for normal growth, development, and functioning of the organs. These hormones control the basal metabolic rate of all cells, including hepatocytes, and thus modulate hepatic function. The Liver plays a significant part in the metabolism of thyroid hormones, such as conjugation, peripheral deiodination, and thyroglobulin binding synthesis [14].

It is therefore not surprising that thyroid dysfunction has been reported in various aspects of liver disease and has been associated with the severity of the liver disease [15].

In addition to the central role of de-iodination in the activation and deactivation of thyroid hormones, the liver performs specific roles related to the transport of thyroid hormones. Slow clearance, extended half-life, and high serum concentrations of thyroxine (T4) are primarily due to heavy binding of major plasma protein binding thyroid hormones, thyroxine-binding globulin (TBG), transthyretin (TTR), and albumin. Several studies have shown that serum T4 concentration varies accordingly across the different phases of liver disease, and this is also linked to disease progression. T3 can be used as a strong laboratory index to determine the state of liver disease [16, 17].

Serum T3 concentration and liver factors, such as bilirubin, can now be considered as a valuable index in thyroid-liver pathophysiology. It is important to measure the free T4 and Thyroid Stimulating Hormone (TSH) and any other laboratory test that may help prevent misdiagnosis of hypothyroid patients with liver disease. Some endocrine disorders associated with chronic liver disease have also been documented to reverse after liver transplantation. Low overall and FT3 levels can be considered an adaptive hypothyroid state that decreases the basal metabolic rate within the hepatocytes and retains the function of the liver and total body protein stores [18].

It has been proposed that this adaptation could confer a survival advantage that adapts the organism to chronic disease by reducing the basal metabolic rate within the cells and thereby reducing the caloric requirements. The research was therefore conducted to study thyroid abnormalities in liver disease and its association with liver function [19].

Age

In the present study, the mean age of Acute Liver Disease patients was 33.30 ± 11.17 and the mean age of chronic liver disease cases was 49.20 ± 12.75. Among the Acute Liver Disease patients majority belonged to the 21-40 years age group and in the Chronic liver disease majority were in the 41-60 years age group [20].

Present study	46.02 ± 13.91
Punekar *et al.*[86]	43 ± 14 years
Sudhir Kumar *et al.* [75]	41±13.7 years
Samarthana V *et al.* [79]	The majority belonged to 41-59 years
Patira N K *et al.* [87]	The majority of patients 36 (72%) belonged to the age group 41-60 yrs.

Aging-related changes in liver cells include volume changes, polyploidy (polyploidy nuclei), accumulation of dense bodies (lipofuscin) inside liver cells, a decreased area of smooth endoplasmic reticulum, and a declining number and dysfunction of mitochondria.

Gender

In the present study, the majority were male i.e. 80% and female were 20%. Among the Acute Liver Disease patients, males were 14% and females were 6% and in chronic liver disease patient's males were 66% and females were 14%. The incidence of liver disease is more in males compared to females which is similar to the studies conducted by Punekar *et al*., Sudhir Kumar *et al*., Samarthana V *et al*.

Thyroid disease

In the present study, among chronic liver disease patients, 4% had features of Hypothyroidism.

Duration of symptoms in months

In the present study, based on the duration of symptoms in months 26% had duration within 1 month and 24% had a duration of symptoms within 1-6 months, 20% had duration within 6-12 months and 18% with a duration of symptoms within 12-24 months, >24 months duration of symptoms was observed in 12% of the patients.

Presenting complaints

2% of Acute Liver disease patients had Encephalopathy and 20% had Icterus.

Among chronic liver disease patients, 42% had Upper GI bleed, 205 had Encephalopathy, 58% had Ascites, 70% had Icterus and 52% had Edema.

Punekar *et al*. in their study reported that gross ascites (74%) was found the most common presentation

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and other complications were anemia (87%), thrombocytopenia (53%), coagulation abnormality (65%), HE (38%), jaundice (32%), upper gastrointestinal
bleed (34%), azotemia (17%), pleural effusion (16%), sepsis (22%), shock (14%).

Grade of Ascites
38% of the study population had No ascites, 48% had Grade 1 Ascites out of which all had Chronic Liver disease and 14% had Grade 2 Ascites where 2% had Acute Liver Disease and 12% had Chronic Liver disease.

Grade of Encephalopathy
14% had Grade 1 Encephalopathy out of which 2% had Acute Liver Disease and 12% had Chronic Liver Disease.
Grade 2 Ascites were observed in 8% of the Chronic liver disease patients who had Grade 2 Encephalopathy.

Liver and Spleen size
The mean liver size was more in Acute Liver disease and the mean spleen size was more in chronic liver disease.

Thyroid profile and chronic liver disease
In the present study, total bilirubin and direct bilirubin had a statistically significant correlation observed with Thyroid profile as the p-value was calculated to be <0.05. Low free T3 and free T4 were found in 72.5% and 26.47% of patients with cirrhosis of the liver respectively. TSH towards the upper limit of the normal range was observed in 52.3% of patients.

Thyroid profile and Liver disease
In the present study, a statistically significant positive correlation was observed between AST, ALT, and Total T4 as the p-value was calculated to be <0.05.
Total bilirubin was significantly correlated with Free T3, Free T4, and Total T3 as the p-value was calculated to be <0.05.
Direct bilirubin had a significant negative correlation with Free T3, Free T4, and Total T3 as the p-value was calculated to be <0.05.
A study conducted by Antonelli *et al*., 2004 [20] reported that several mechanisms have been postulated for this occurrence of lower free T3 levels in patients with cirrhosis of the liver and its inverse correlation with the severity of the liver injury. The most common hypothesis states that loss of peripheral deiodination is the primary cause of decreased free T3 levels, the so-called sick euthyroid syndrome.

Child Pugh score and comparison of thyroid profile
In the present study, there was a decrease in Free T3 and Free T4 levels with the increase in severity and these findings were statistically significant as the p-value was calculated to be <0.05.
Study by Antonelli *et al*., 2004, [20] reported that the mean serum levels of FT3 in Child A, B, and C, the lowest levels were among the Child C group (1.80 ± 0.53), followed by the Child B group (2.20 ± 0.55), while the Child A group was 1.9 ± 0.00. 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 which is similar to present study findings. In El-Feki MA *et al*., 2016, study, there was a significant decrease in FT3 levels with a p-value of <0.001 and an insignificant decrease in FT4 levels with a p-value of 0.455, and an insignificant increase in TSH value with a p-value of 0.124 [22].
However, a study conducted by Yadav *et al*., 2013, showed that there was a significantly increased TSH between cirrhotic patients and non-cirrhotic subjects and slightly decreased T3 and T4 where the p-value is 0.039, 0.014 and 0.245 respectively and also study done by Mansour-Ghanaei *et al*., 2012, who found that a significant decrease level of T3 and an insignificant change in TSH and T4 levels than control groups which is similar to our present study findings [23, 24].
According to Agrawal *et al*. 2016, conducted A study of thyroid hormones in various types of liver disease, such as acute hepatitis, chronic persistent hepatitis, and chronic aggressive hepatitis concluded that serum Free T3 (FT3) levels decreased in chronic liver disease due to chronic persistent hepatitis and chronic aggressive hepatitis and cirrhosis of the liver and were poor in acute hepatitis with the same degree of cirrhosis of the liver. The decreased FT3 in this study is likely to indicate a decrease in deiodinase activity in the liver of cirrhotic patients [24].
Although some T3 is produced in the thyroid, approximately 80-85 percent is generated outside the thyroid, primarily by conversion of T4 in the liver and kidneys. Several studies have concluded that the most consistent thyroid hormone profile in patients with cirrhosis is low overall and FT3 and elevated rT3 levels, comparable to changes in patients with the sick euthyroid syndrome. This results in a decrease in the conversion from T4 to T3 and a rise in T3.

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Conclusion

In the present study, the mean age of Acute Liver Disease patients was 33.30 ± 11.17 and the mean age of chronic liver disease cases was 49.20 ± 12.75.

Majority were male i.e. 80% and female were 20%. Among the chronic liver disease patients 4% had features of Hypothyroidism. In the present study, based on the duration of symptoms in months 26% had duration within 1 month and 24% had a duration of symptoms within 1-6 months, 20% had duration within 6-12 months and 18% with a duration of symptoms within 12-24 months, >24 months duration of symptoms was observed in 12% of the patients.2% of Acute Liver disease patients had Encephalopathy and 20% had Icterus. Among chronic liver disease patients, 42% had Upper GI bleed, 205 had Encephalopathy, 58% had Ascites, 70% had Icterus and 52% had Edema.38% of the study population had No ascites, 48% had Grade 1 Ascites out of which all had Chronic Liver disease and 14% had Grade 2 Ascites where 2% had Acute Liver Disease and 12% had Chronic Liver disease. Based on the grade of Encephalopathy, 14% had Grade 1 Encephalopathy out of which 2% had Acute Liver Disease and 12% had Chronic Liver Disease. Grade 2 Ascites were observed in 8% of the Chronic liver disease patients who had Grade 2 Encephalopathy. In the present study, Total Bilirubin and Direct Bilirubin had a statistically significant correlation observed with Thyroid profile as the p-value calculated to be <0.05.In the present study, a statistically significant Positive correlation was observed between AST, ALT, and Total T4 as the p-value was calculated to be<0.05.Total Bilirubin was significantly correlated with Free T3, Free T4 and Total T3 as the p value calculated to be <0.05.Direct Bilirubin was significantly Negative correlation was observed with Free T3, Free T4, and Total T3 as the p value calculated to be <0.05. There was a decrease in Free T3 and Free T4 levels with an increase in severity and this finding was statistically significant as the p-value calculated to be <0.05.

Conflict of Interest: None.

Funding: Nil.

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