



A STUDY TO ASSESS THE CORRELATION OF FT3, FT4 AND ULTRASENSITIVE TSH WITH SEVERITY OF LIVER DYSFUNCTION ACCORDING TO CHILD PUGH SCORE IN CIRRHOTIC PATIENTS

General Medicine

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ABSTRACT

Background: Cirrhosis affects multiple physiological systems, including thyroid hormone regulation. This study explores the association between thyroid hormone levels and liver dysfunction severity. **Objective:** To assess the correlation of free triiodothyronine (FT3), free thyroxine (FT4), and ultrasensitive thyroid-stimulating hormone (US-TSH) with liver dysfunction in cirrhotic patients, using the Child-Pugh classification. **Methods:** Eighty cirrhotic patients were categorized into Child-Pugh classes A, B, and C. Serum levels of FT3, FT4, and US-TSH were measured and analyzed in relation to disease severity. **Results:** FT3 levels significantly declined with worsening Child-Pugh class. FT4 and US-TSH levels showed variable patterns, possibly indicating adaptive physiological responses. **Conclusion:** Thyroid hormone alterations, particularly reduced FT3 levels, are associated with advanced liver dysfunction. Routine thyroid function testing in cirrhotic patients may offer additional clinical insight. Further research is needed to clarify the prognostic value of these hormonal changes.

KEYWORDS

Ft3, FT4, TSH, Cirrhosis, Child-Pugh score

INTRODUCTION

The liver and thyroid gland share a complex physiological relationship, each influencing the other's function. The liver is essential for the metabolism, activation, and transport of thyroid hormones, while thyroid hormones regulate hepatic growth, metabolism, and enzymatic activity^[1,2]. In cirrhosis, a chronic liver condition marked by progressive fibrosis and impaired hepatic function, these interactions become significantly altered^[3].

Cirrhosis remains a major global health concern and is associated with considerable morbidity and mortality. The Child-Pugh score, which incorporates serum bilirubin, albumin, prothrombin time, ascites, and hepatic encephalopathy, is widely employed to assess disease severity and prognosis^[4]. In recent years, attention has turned toward evaluating thyroid function—specifically free triiodothyronine (FT3), free thyroxine (FT4), and thyroid-stimulating hormone (TSH)—as potential indicators of disease severity in cirrhotic patients^[5,6].

Multiple studies have reported low FT3 levels in patients with worsening liver disease, a condition referred to as “low T3 syndrome”^[7,8]. This may reflect an adaptive metabolic response to chronic illness, aiming to reduce energy expenditure. Some evidence also suggests an increase in TSH levels as hepatic function declines, though findings have been variable^[9,10]. These hormonal shifts may have pathophysiological significance, including associations with hepatic encephalopathy, ascites, and coagulopathy^[11].

Despite these observations, the relationship between thyroid dysfunction and cirrhosis severity remains incompletely understood. Establishing a clearer correlation between thyroid function tests and Child-Pugh scores may enhance risk stratification and help guide clinical decisions. This study investigates the correlation between FT3, FT4, and TSH levels with liver dysfunction severity in cirrhotic patients.

MATERIALS AND METHODS

This cross-sectional observational study was conducted in the Department of General Medicine at RKDF Medical College Hospital and Research Centre, Bhopal, from April 1, 2023, to October 30, 2024. A total of 80 patients with clinical, biochemical, and ultrasonographic evidence of liver cirrhosis were enrolled after obtaining informed written consent. The study received approval from the Institutional Research and Ethics Committee.

Study Design And Setting

Patients were recruited from both inpatient and outpatient

departments. All participants underwent a structured clinical evaluation using a standardized proforma. A total of 80 cirrhotic patients were included in the study.

Inclusion Criteria

- Age >18 years.
- Confirmed diagnosis of liver cirrhosis based on clinical, biochemical, and imaging findings.

Exclusion Criteria

- Age <18 years.
- Known thyroid disorders.
- Pregnant women.
- Patients on medications affecting thyroid function (e.g., amiodarone, lithium, iodine compounds, antithyroid drugs).

Data Collection And Procedures

Each participant underwent detailed history taking, physical examination, laboratory testing (including FT3, FT4, and ultrasensitive TSH), and relevant imaging. The severity of liver disease was assessed using the Child-Pugh classification.

Thyroid hormone levels were compared across Child-Pugh classes (A, B, and C). Data were entered in Microsoft Excel and analyzed using SPSS software (trial version). Appropriate statistical tests were applied to assess correlations between thyroid parameters and liver disease severity.

RESULTS:

Table – 1 Demographic Distribution Of Study Population

Variable	Category	Number of Patients	Percentage
Age Group	<30 years	07	8.75%
	31–50 years	63	78.75%
	>50 years	10	12.5%
Gender	Male	62	77.5%
	Female	18	22.5%

Table-2 Correlation of FT3, FT4, and Ultrasensitive TSH With Child-pugh Score Categories

Parameter	Level	Child-Pugh Score			Total	P value
		A	B	C		
FT3 (pmol/ml)	<2.3	4	27	24	55	0.00000196
	2.3–4.2	8	7	1	16	
	>4.2	7	2	0	9	

FT4 (pmol/ml)	<0.8	2	15	8	25	0.0357
	0.8–2.0	17	21	15	53	
	>2.0	0	0	2	2	
TSH (uIU/ml)	0.25–5.0	16	8	4	28	0.0000153
	5.0– 10	3	28	21	52	
	>10	0	0	0	0	

A statistically significant negative correlation was observed between FT3 levels and the severity of liver dysfunction ($p < 0.05$), indicating that lower FT3 levels were associated with more advanced liver disease. Similarly, FT4 levels showed a statistically significant association with the Child-Pugh score ($p < 0.05$), with a trend toward lower FT4 in more severe liver dysfunction. Furthermore, altered TSH levels were significantly related to liver disease severity ($p < 0.05$), with higher TSH values observed more frequently in patients with advanced cirrhosis. These findings indicate a strong interdependence between thyroid function and liver disease progression.

DISCUSSION

The present study highlights a significant association between thyroid dysfunction and the severity of liver cirrhosis. A progressive decline in FT3 and FT4 levels, along with elevated TSH levels in more advanced Child-Pugh classes, suggests a state of “euthyroid sick syndrome” frequently seen in chronic liver disease^[12]. This relationship likely stems from impaired hepatic conversion of T4 to T3 and altered hormone metabolism^[13,14]. Such dysfunction can influence prognosis and disease progression, underscoring the relevance of routine thyroid evaluation in cirrhotic patients^[15,16].

CONCLUSIONS

This study establishes a significant correlation between thyroid hormone levels (FT3, FT4, and ultrasensitive TSH) and the severity of liver dysfunction in cirrhotic patients, as measured by the Child-Pugh score. A marked decline in FT3 and FT4, along with altered TSH levels, was noted with advancing liver disease. These findings suggest that thyroid dysfunction—particularly a low FT3 state—may reflect worsening hepatic function. Routine evaluation of thyroid parameters may serve as an important adjunct in monitoring liver disease progression. Further prospective studies are recommended to investigate the prognostic and therapeutic implications of thyroid dysfunction in cirrhotic patients.

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