ORIGINAL RESEARCH PAPER

Internal Medicine

UTILITY OF THYROID PROFILE AS A PROGNOSTIC MARKER IN LIVER CIRRHOSIS PATIENTS: A CROSS-SECTIONAL STUDY

KEY WORDS: Liver Cirrhosis; Free T3; Free T4; Thyroid-stimulating Hormone; Child–Pugh; MELD

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ABSTRACT

Background: Cirrhosis alters hepatic metabolism and transport of thyroid hormones. The study evaluated thyroid function tests as correlates of disease severity in patients with liver cirrhosis. **Materials and Methods:** A hospital-based cross-sectional observational study of 65 adult patients with established cirrhosis was conducted at Maharaja Agrasen Medical College, Agroha, Haryana, from January to December 2025. Serum free T3 (fT3), free T4 (fT4) and thyroid-stimulating hormone (TSH) were measured and related to Child–Pugh class and MELD score. Statistical analysis used IBM SPSS version 22 with significance at $p < 0.05$. **Results:** Of 65 participants, 69.2% were male; alcohol-related disease was the largest etiological subgroup (43.1%). Child–Pugh Class A comprised 18.5%, B 38.5% and C 43%; mean MELD was 18.2 ± 5.6. Mean fT3 was 1.65 ± 0.52 pg/mL, mean fT4 1.20 ± 0.45 ng/dL and mean TSH 4.10 ± 1.70 μIU/mL. Thyroid parameters varied significantly across Child–Pugh classes ($p < 0.001$): mean fT3 declined from 3.4 pg/ml in Class A to 2.2 pg/ml in Class C; fT4 from 1.4 to 0.8 ng/dl; TSH rose from 2.4 to 5.9 μIU/ml. Correlations with MELD were $r = -0.551$ (fT3, $p < 0.001$), $r = -0.724$ (fT4, $p = 0.017$) and $r = 0.673$ (TSH, $p < 0.001$). **Conclusion:** Thyroid profile abnormalities, especially reduced fT3, were associated with worsening cirrhosis severity and may complement established scoring systems. Larger prospective studies are needed to confirm predictive utility.

INTRODUCTION

Cirrhosis is the final common pathway of many chronic liver diseases and carries risks of portal hypertension and hepatic insufficiency. Disease severity is commonly assessed with Child–Pugh classification and the Model for End-Stage Liver Disease (MELD) score.

The liver is important in converting thyroxine to triiodothyronine and synthesising thyroid-hormone carrier proteins. Disordered hepatic function may result in non-thyroidal illness syndrome and low-T3 physiology. The study examined the association of serum thyroid parameters with established severity indices rather than testing an intervention.

MATERIALS AND METHODS

An institution-based, cross-sectional observational study was conducted in the Department of General Medicine, Maharaja Agrasen Medical College, Agroha, Haryana, from January to December 2025. A total of 65 adult patients with established liver cirrhosis were selected consecutively after consent and ethics review.

Clinical history and examination, biochemical studies and imaging were used to establish cirrhosis and its features. Child–Pugh class and MELD score were recorded. MELD was calculated using serum creatinine, bilirubin and INR (natural logarithm formula).

Inclusion Criteria: Clinically established cirrhosis of the liver; age ≥18 years; willingness to participate.
Exclusion Criteria: Age < 18 years; thyroid disease preceding liver disease; medications influencing thyroid function (including steroids or levothyroxine); pregnancy; chronic kidney disease, diabetes mellitus or other stated metabolic/chronic confounders.

Blood was collected under aseptic precautions. Serum free T3 and free T4 were measured by direct radioimmunoassay and TSH by chemiluminescence immunoassay. Reference intervals were fT3 2.1–4.4 pg/mL, fT4 0.8–2.7 ng/dL and TSH 0.35–5.5 μIU/mL. Bilirubin, creatinine, INR and abdominal ultrasonography supported severity assessment.

Data were analysed with IBM SPSS version 22. Categorical variables were reported as counts and percentages and continuous variables as mean ± standard deviation. Student t-test and ANOVA were used for continuous variables, chi-square for categorical data, with $p < 0.05$ deemed statistically significant. Correlation statistics are reported as in the source thesis.

RESULTS

Of 65 participants, 69.2% were male; alcohol-related disease was the largest etiological subgroup (43.1%). Child–Pugh Class A comprised 18.5%, B 38.5% and C 43%; mean MELD was 18.2 ± 5.6.

Table 1. Child-Pugh Score Distribution of the Study Participants (n=65)

CP Score	Frequency	Percentage
Class A	12	18.5
Class B	25	38.5
Class C	28	43
Total	65	100

Inference: 43% of patients were in Class C (severe disease), 38.5% in Class B, and only 18.5% in Class A.

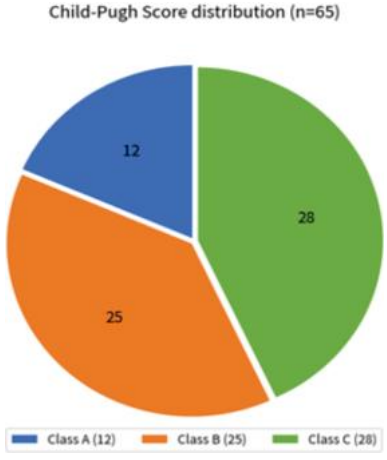


Figure 1. Child-Pugh Score Distribution of the Study Participants (n=65)

Table 2. MELD Score Distribution of the Study Participants (n=65)

Category	Mean	SD
Overall MELD	18.2	5.6
Class A	12.4	2.8
Class B	17.9	3.9
Class C	22.6	4.8

Inference: Overall mean MELD was 18.2 (±5.6). Clear gradient: Class A 12.4, Class B 17.9, Class C 22.6.

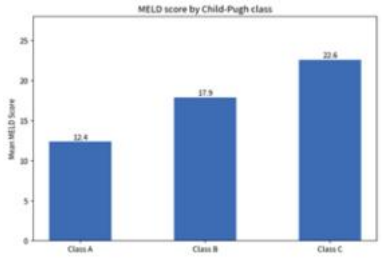


Figure 2. MELD Score by Child-Pugh Class

Table 3. Thyroid Profile Distribution of the Study Participants (n=65)

Parameters	Mean	SD
fT3 (pg/ml)	1.65	0.52
fT4 (ng/dl)	1.20	0.45
TSH (µIU/ml)	4.10	1.70

Inference: Mean fT3 (1.65 pg/ml) was below normal range, indicating widespread low-T3 syndrome. Mean TSH was elevated at 4.10 µIU/ml.

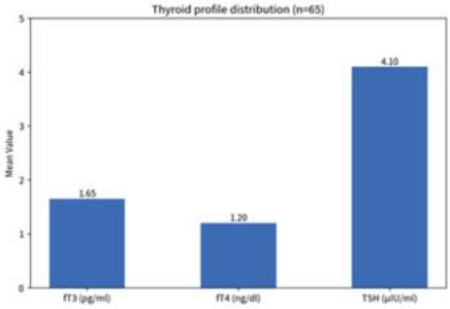


Figure 3. Thyroid Profile Distribution of the Study Participants (n=65)

Mean fT3 and fT4 decreased and TSH increased from Child–Pugh A to C ($p < 0.001$ for between-class analyses).

Table 4. Thyroid Profile Association with Child-Pugh Score (n=65)

Parameters	Class A Mean	SD	Class B Mean	SD	Class C Mean	SD	p-value
fT3 (pg/ml)	3.4	0.6	2.6	0.6	2.2	0.8	<0.001*
fT4 (ng/dl)	1.4	0.2	1.0	0.3	0.8	0.5	<0.001*
TSH (µIU/ml)	2.4	0.8	3.9	1.0	5.9	1.1	<0.001*

**Statistically significant. Inference: fT3 and fT4 declined progressively from Class A to C; TSH rose steadily with severity (all $p < 0.001$).*

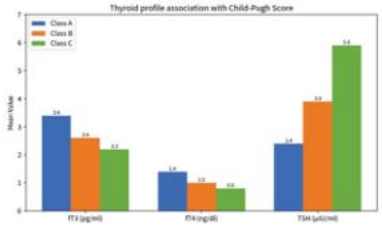


Figure 4. Thyroid Profile Association with Child-Pugh Score

Table 5. Thyroid Profile Association with MELD Score (n=65)

Parameters	r-value	p-value
fT3 (pg/ml)	– 0.551	<0.001*
fT4 (ng/dl)	– 0.724	0.017*
TSH (µIU/ml)	0.673	<0.001*

**Statistically significant. Inference: MELD correlated negatively with fT3 and fT4, and positively with TSH.*

DISCUSSION

Reduced thyroid hormones may accompany more advanced liver dysfunction because of altered deiodination, hormonal transport and systemic illness. These associations suggest potential adjunctive utility to established scoring systems, but they cannot by themselves demonstrate prospective mortality prediction. Cross-sectional design, sample size and unmeasured confounders constrain the strength of prognostic interpretation.

CONCLUSION

The thyroid profile, particularly fT3, showed significant associations with Child–Pugh and MELD severity measures in this cohort. Thyroid testing may assist alongside standard evaluation, while larger prospective studies should assess predictive accuracy, thresholds and clinical utility.

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