Original Research Paper

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Internal Medicine

A STUDY OF T3 AS A PROGNOSTIC INDICATOR IN DECOMPENSATED LIVER DISEASE.

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ABSTRACT **Introduction:** Chronic liver disease refers to a disease of the liver characterized by progressive destruction associated with regeneration of the liver parenchyma ultimately resulting in fibrosis and cirrhosis. Chronic refers to disease process which lasts for over six months. Liver plays a pivotal role in thyroid hormone metabolism. It also produces thyroid hormone binding globulin, albumin that are essential for binding thyroid hormones in circulation and delivering them to various body tissues. Chronic liver disease is associated with a low T3 syndrome. **Aim:** To study the thyroid function tests in decompensated chronic liver disease and to determine the importance of Free T3 levels as a prognostic indicator in patients with decompensated chronic liver disease. **Materials And Methods:** A observational, cross-sectional study was conducted at a tertiary care hospital evaluating thyroid profile in 53 patients with cirrhosis of liver. **Results:** Low free T3 was found in 75.47% of patients with cirrhosis of liver. Low free T3 was found to be inversely related to the severity of liver disease. A significant correlation was also found between low free T3 levels (p=0.017) and cirrhosis of Liver.

KEYWORDS :

INTRODUCTION

Chronic liver disease course which remain for over six months denotes to a disease of the liver characterized by advanced destruction related with restoration of the liver parenchyma ultimately causing in fibrosis and cirrhosis. Cirrhosis is defined as are whichever "compensated" or "decompensated." Fibrosis is the predecessor of cirrhosis. Numerous categories of cells, cytokines and miRNA are elaborate in the beginning and progression of liver fibrosis and cirrhosis. The triggered stellate cells lay down numerous forms of matrix proteins such as fibronectin, collagen. This matrix generation leads to additional initiation of HSCs and modification in hepatic angioarchitecture. These pathways are facilitated by kinase activation pathways that are intervened by PDGF, TGF-B and integrin it affects in frequent problems such as Ascites, Spontaneous bacterial peritonitis, Portal hypertension with variceal bleeding, Hepatic encephalopathy, Hepatorenal syndrome, Coagulation condition and Endocrine dysfunction. Endocrine dysfunction includes imbalances in the functions of adrenal gland, disorders in the gonadal axis, bone diseases and thyroid dysfunction. Liver plays a significant role in metabolism of thyroid hormones and also in creating circulating thyroid hormone binding globulin. Thyroid hormones are produced from a precursor glycoprotein Thyroglobulin (TG). The TG gets iodinated after emission into the thyroid follicles. The TG gets iodinated on the tyrosine residues and is coupled via an ether linkage. There is reuptake of TG into the follicular cells and proteolysis with resultant release of T3 and T4. TSH is responsible for regulation of thyroid gland function. It exerts its action via TSH receptor which is a G protein coupled receptor. T4 acts as precursor for T3. T4 is converted to T3 by the deiodinase enzymes. Type 1 deiodinase enzyme is located in thyroid gland, liver and kidneys. It has low affinity for T4. Liver plays a pivotal role in metabolism and circulation of thyroid hormone by producing Thyroglobulin. It also plays an important role in producing T3 by action of the enzyme 5'deiodinase which rT3. Low free T3 syndrome is frequently found in patients with cirrhosis. Poor nutrition has also been linked to the low levels of fT3 in passage. Release of cytokines like IL6, alcohol consumption has also been related to the low levels of fT3 in blood. Free T4 and TSH levels are not found to be expressively related to the Child Pugh class or scoring. A substantial inverse association also exists between the levels of free T3 and MELD scoring. The levels of free T3 were significantly lower in decompensated cirrhosis in comparison to compensated cirrhosis. In conclusion serum free T3 levels can be used as a reliable prognostic indicator in patients with cirrhosis.

MATERIALS AND METHODS

A Lone centre observational prospective study was conducted in the Department of Medicine, Rama Medical College & Hospital, Hapur, India over a period of six month (January 2022 till June 2022). Sample size was calculated using the formula 4*pq/d, where p denotes the prevalence of the disease, q = 1-p and d denotes the error range. About 53 patients admitted to the medical wards with the diagnosis of decompensated chronic liver disease were chosen. After taking approval from Institutional ethical committee and written informed consent study was conducted in Rama Medical College & Hospital, Hapur, India. All enrolled patients were thoroughly evaluated by detailed history and clinical examination. All relevant were carried out. Upper gastrointestinal endoscopy, ascitic fluid examination and fasting thyroid profile including free T3, free T4 and TSH was also carried out in all enrolled patients. Severity of liver disease was assessed in patients by Child-Pugh (CP) score and Model of End Stage Liver disease (MELD) score.

Inclusion Criteria:

Patients with a diagnosis of decompensated chronic liver disease above the age of 18 years admitted in medical wards.

Exclusion Criteria:

Patients with cardiac failure, patients with chronic kidney disease, patients with pre existing thyroid dysfunction (hypo/hyperthyroidism) and patients who are terminally ill.

Statistical Analysis Plan:

All the statistical analysis were performed using SPSS version 17.0 and Microsoft excel 2007 Data were expressed as mean ± SD. ANOVA tests were used to analyse differences in biochemical parameters between the control and the test groups. Correlations were observed by using Pearson's correlation coefficient and probability (p value) < 0.05 was considered significant.

RESULT

Based on inclusion criteria, 53 patients were enrolled in our study in which 33were males and 20 were females with a mean age of 45±12.7 years.

Table1:

Free T3 levels	Child-Pugh class							
	Child-Pugh class A (n=3)		Child-Pugh class B (n=18)		Child-Pugh class C (n=32)		Total (n=53)	
	No. of Patients	%	No. of Patients	%	No. of Patients	%	No. of Patients	%
Low	1	33.33 %	11	61.11 %	28	87.5 %	40	75.47 %
Normal	2	66.67 %	07	38.89 %	4	12.5 %	13	24.53 %
$\chi 2$=7.40 (df=2); p=0.017								

Based on CP score, three patients (5.6%) were classified as Child-Pugh class A, 18 patients (33.96%) as Child-Pugh class B and rest of the 32 patients (60.377%) as Child-Pugh class C [Table-1]. describes association of free T3 with severity of liver disease as assessed by Child-Pugh classification. It displays that patient with low free T3

levels were highest in Child-Pugh class C (87.5%) followed by Child-Pugh class B (61.11%) and Child-Pugh class A (33.33%) and this difference was found to be statistically significant (p=0.017).

Table-2

Free T3 levels	MELD Score					
	MELD Score ≤20 (n=28)		MELD Score >20 (n=25)		Total (n=53)	
	No. of Patients	%	No. of Patients	%	No. of Patients	%
Low	18	64.28%	22	88%	40	75.47%
Normal	10	35.71%	3	12%	13	24.53%
$\chi 2$=6.122 (df=2); p=0.013						

Based on MELD score, 28 (52.83%) and 25 (47.16%) patients were found to be less than and more than 20 MELD score correspondingly. depicts correlation of free T3 with severity of liver, disease as assessed by MELD score. It shows that patients with low free T3 having MELD score of more than 20 were suggestively higher as compared to the patients with MELD score less than 20.

DISCUSSION

An observational study is carried out in Rama Medical College and Hospital during the period of 6 month (January 2022 till June 2022) in which total 50 a subject is included. Routine investigations of the patients are carried out mainly Thyroid profile, Liver function test etc. it was observed that the disease progresses from compensated cirrhosis to decompensated one the free T3 is decrease further. The level of free T4 is reduced and TSH values are also increased accordingly. As we completed our study we got the correlation between the thyroid function values and severity of the cirrhosis. A study by Punekar *et al* show that The mean FT3 and FT4 levels were significantly decrease and mean TSH levels were significantly increase in liver cirrhosis patients compared to healthy controls.

CONCLUSION

Thyroid dysfunction can be found at any age. Free T3 and free T4 is significantly low and TSH is high in patients of liver cirrhosis. Free T3 is more decreased in patients of decompensated cirrhosis as compared to patients with compensated cirrhosis. Thus THYROID FUNCTION TESTS should be carried out in each and every patients of liver disease as it can be used as a severity and prognostic indicator in patients of cirrhosis.

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