ISSN: 0975-3583, 0976-2833 VOL14, ISSUE7, 2023

Original Research Article

The study of thyroid dysfunction in Liver Cirrhosis Patients

Dr. Vikram Singh[1] (Senior Resident), Dr. Sunil Singh[2] (DrNB Resident), Dr. Dinkar Dubey[3] (Registrar Consultant) & Dr. Santosh Kumar Upadhyay[4] (Senior Resident)

Dr, Baba Saheb Ambedkar Medical College and Hospital[1&4]
Artemis Hospitals, Gurugram[2&3]

Corresponding Author: Dr. Santosh Kumar Upadhyay

Abstract:
Aims and objectives: the present study was conducted to study thyroid hormone level (FT3, FT4, and TSH) in the liver cirrhosis patient and also to find out the relation of thyroid hormone level and severity of cirrhosis of the liver.
Material and methods: A observational cross sectional study was carried out on the patient admitted with chronic liver decease at Dr. BSA hospital New Delhi during October 2019 to march 2021 among 150 liver cirrhosis patients. Thyroid functional test and child pugh score was recorded.
Results: Child pugh score A was found in 12% patients, Child pugh score B was found in 37.4% patients and Child pugh score C was found in 50.6% patients. Child Pugh grade A to C the prevalence of serum FT3 level decreased (p value<0.001). Child Pugh grade A to C the prevalence of serum FT4 level increased (p value<0.001). Child Pugh grade A to C the prevalence of serum TSH level increased (p value<0.001). FT3 value was showed negative correlation with child pugh score while FT4 and TSH value were showed positive correlation with child pugh score.

Conclusion: FT3 value showed negative correlation with child pugh score while FT4 and TSH value showed positive correlation with child pugh score.

Keywords: thyroid, dysfunction, Liver, Cirrhosis Patients.

Study Designed: Observational Study.

1. Introduction

Liver diseases are most common all over the world (prevalence being 4-17.5percent) as well as in India and the prevalence of liver diseases is likely to be increased in future.[1] Among the various functions of liver, one function is synthesis of carrier proteins and metabolism of hormones. Thus, liver diseases, have been shown to be associated with various endocrinal disturbances.[2] The liver dysfunction leads to secondary dysfunction of endocrine glands directly due to the toxic effects and indirectly by the alteration of the carrier protein synthesis. Therefore, chronic liver disease may be accompanied by signs of apparent hormonal imbalance.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE7, 2023

Thyroxine and tri-iodothyronine are essential for normal organ growth, development and function. These 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. Thyroid dysfunction may perturb liver function, liver disease modulates thyroid hormone metabolism, and a variety of systemic diseases affect both organs.[3] Hence, it is not surprising that thyroid dysfunction have been reported in various spectra of liver disease and associated with severity of liver disease.[4]

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 concentrations are often decreased, sometimes profoundly and their levels correlate well with severity of liver dysfunction[5].

Inspite of this, liver also plays an important role in inactivation of thyroid hormones by D3. In addition to central role in de iodination to active and deactive thyroid hormones, the liver performs specific functions relating to thyroid hormone transport. >99% of thyroid hormones bound to thyroxine binding globulin, thyroid binding prealbumin and albumin in plasma. The free hormone component is in equilibrium with protein bound component and this free form is available for metabolic function[6].

2. Material & Method

Study area: Dr. BSA Hospital, Rohini, New Delhi

Study subject: Patients admitted under department of medicine in Dr. BSA hospital New Delhi.

This study was carried out on the patient admitted with chronic liver decease at Dr. BSA hospital New Delhi. On admission, detailed history, examination and relevant investigations were done after receiving informed consent from patient.

Duration of study: October 2019 to march 2021.

Type of study: Observational Cross sectional Study

SAMPLE SIZE

The study of Punekar P (2018) et al observed that incidence of thyroid dysfunction in cirrhosis of liver patients was 77%. Taking this value as reference, the minimum required sample size with 10% margin of error and 5% level of significance is 69 patients. So total sample size taken is 150.

Formula used is:-

$N \geq (i(1-i))/(ME/z_{\alpha})^2$

Where Z_{α} is value of Z at two sided alpha error of 5%, ME is margin of error and is incidence rate.

Calculations:-

$n>=((.77*(1-.77))/(.1/1.96)^2=68.03=69$(approx.)

Inclusion criteria:

1. Case – Age >18–80 years male and female.
2. Known and established cases of cirrhosis liver by:-i. clinical,
ii.radiological (ultrasound abdomen),
iii.biochemical study.
3. Patients who were willing to part of study after consent.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE7, 2023

Exclusion criteria:

1. Known cases of thyroid disorder.
2. Patient with history of

i. organ failure,
ii. cancer, radio or chemotherapy
iii. individual with active infection of bone and muscle disease,
iv. chronic kidney disease, nephrotic syndrome.

3. Patient who had not meet up inclusion criteria are excluded from this study.
4. Patient using drugs that interfere with thyroid metabolism such as levothyroxine, propylthiouracil, carbimazole, iodine, amiodarone, and beta-blockers.

3. Results

Table 1: Age wise comparison of the study

	Frequency	Percent
<20	4	2.7
20-30	0	0
30-40	11	7.3
40-50	60	40.0
50-60	53	35.3
>60	22	14.7
Total	150	100.0
mean±SD	51.06±9.84(18-71)	

Majority of patients 60 (40%) belonged to age group 40-50 years followed by 53 (35.3%) patients were 50-60 years age groups and 22 (14.7%) patients were above 60 years of age.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE7, 2023

Table 2: Bilirubin profile wise comparison of the study

	Mean	Std. Deviation
Serum bilirubin	8.487	5.1223
Direct bilirubin	5.713	3.7619
Indirect bilirubin	2.927	1.5762
SGOT	125.71	46.810
SGPT	84.48	46.547
Alkaline phosphatase	131.55	50.211
Serum protein	6.100	1.2026
Serum albumin	3.113	.7732
PT	17.520	4.8310
INR	1.333	.4730

Mean serum bilirubin, direct bilirubin and indirect bilirubin value was 8.48, 5.71 and 2.92.

Table 3: Correlation of the thyroid profile

		FT3	FT4	TSH
Child pugh	Pearson Correlation	-0.839**	0.520**	0.250**
	Sig. (2-tailed)	0.000 (S)	0.000 (S)	0.002 (S)
	N	150	150	150

In the study, FT3 value was showed negative correlation with child pugh score while FT4 and TSH value were showed positive correlation with child pugh score.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE7, 2023

Table 4: Comparison of severity of cirrhosis of liver with thyroid dysfunction

			thyroid dysfunction				Total
			Euthyroid	Low FT4 level	Overt hypothyroid	Subclinical hypothyroid	
Child pugh	A	N	18	0	0	0	18
		%	100.0%	0.0%	0.0%	0.0%	100.0%
	B	N	0	0	0	56	56
		%	0.0%	0.0%	0.0%	100.0%	100.0%
	C	N	0	3	16	57	76
		%	0.0%	3.9%	21.1%	75.0%	100.0%
Total		N	18	3	16	113	150
		%	12.0%	2.0%	10.7%	75.3%	100.0%

Child pugh score A showed 100% euthyroid cases. Child pugh score B showed 100% Subclinical hypothyroid cases. Child pugh score C showed 57 (75%) subclinical hypothyroid cases, 16 (21.1%) overt hypothyroid and only 3 (3.9%) low FT4 level. Comparison of severity of cirrhosis of liver with thyroid dysfunction showed statistically significant results

4. Discussion

This study revealed, firstly, that there is a significant occurrence of hypothyroidism in liver cirrhosis patients. Secondly, there is a negative correlation of free triiodothyronine with Child-pugh score. The present study revealed that cirrhotic patients had more prevalent thyroid dysfunction specially hypothyroidism because of many reasons[7].

The liver has important role in thyroid hormone metabolism because it is the manufacturer of protein that bind thyroid hormone, such as thyroid-binding globulin (TBG), prealbumin and albumin. It is also the major site of thyroid hormone peripheral metabolism and is involved in its conjugation, biliary excretion, oxidative deamination and the extra thyroidal deiodination of thyroxin (T4) to triiothyronine (T3) and to reverse T3. On the other hand the level of thyroid hormone is also important to normal hepatic function and bilirubin metabolism.[8] Conceivably, the disorders of these two organs would interact or influence each other. As liver abnormalities worsen, the T3 production from T4 is also reduced.

5. Conclusion

FT3 value showed negative correlation with child pugh score while FT4 and TSH value showed positive correlation with child pugh score. Thyroid dysfunction forms important part of spectrum of Chronic liver disease. Deterioration of functions of liver disease predicts presence of thyroid dysfunction and these patients should be evaluated for thyroid dysfunction periodically.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE7, 2023

6. References

1. Acharya SK, Madan K, Dattagupta S, Panda SK. Viral hepatitis in India. Natl Med J India 2006:19:203-17.
2. Maheshwari A, Thuluvath P. Endocrine Diseases and the Liver. Clinics in Liver Disease 2011;15(1):55-67.
3. Bandyopadhyay SK, Moulick A, Saha M, Dutta A, Bandyopadhyay R, Basu AK. A study on endocrine dysfunction in adult males with liver cirrhosis. J Indian Med Assoc 2009;107:866–9.
4. Malik R. The relationship between the thyroid gland and the liver. QJM 2002;95(9):559-
5. Handelsman D, Strasser S, McDonald J, Conway A, McCaughan G. Hypothalamic-pituitary-testicular function in end-stage non-alcoholic liver disease before and after liver transplantation. Clinical Endocrinology 1995;43(3):331-337.
6. D'Azzò G, Pinzello GB, Pace F, Garofalo P, Craxì A, Jannì A, et al. The prognostic value of thyroid function tests in predominantly non‐alcoholic cirrhotic patients: A prospective investigation. J Endocrinol Invest 1985;8:331‐6.
7. Roland Amathieu, Ali Al-Khafaji. Definitions of acute-on-chronic liver failure: the past, the present, and the future. EMJ Hepatol 2015;3[1]:35-40
8. Goglia F, Liverini G, Lanni A, Iossa S, Barletta A. The effect of thyroid state on respiratory activities of three rat liver mitochondrial fractions. Molecular and Cellular Endocrinology 1989;62(1):41-46.