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ORIGINAL ARTICLE

Clinical Study of Liver Cirrhosis with Special Reference to Thyroid Function: A Cross Sectional Study

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ABSTRACT

Objective: The objective of this study was to assess liver cirrhosis with special reference to thyroid function.
Study Design: The study was a cross-sectional one.
Setting: Research was conducted at Department of Medicine, Shaikh Zayed Hospital, Lahore from August 2022 to January 2023.
Material and Methods: In this study, 115 patients with cirrhosis who were both male and female and between the ages of 20 and 70 were included. These patients underwent thyroid function tests. Each patient provided written informed consent.
Results: The average patient's age was 51.78±9.17 years old, and their ages ranged from 35 to 70. The vast majority of patients (n=119, or 55.6%) were between the ages of 53 and 70. Patients included 71 males (61.73% of the total) and 44 females (38.8%). The average duration of illness was 23.78 ±10.05 months, although it may be as little as 8 months. A total of 34 patients (29.56%) were classified as Child Class-B, while 81 patients (70.43%) were classified as Child Class-C. The range of serum TSH was from 3.5 to 5.8 uIU/ml (mean 4.32±0.43 uIU/ml), while the range of serum fT3 was from 1.2 to 2.9 pg/ml (mean 1.87± 0.38 pg/ml). The average serum fT4 concentration was 1.68 pg/ml (standard deviation = 0.47).
Practical Implication: Especially in low and middle income countries, there is a lack of consistent data on the impact of cirrhosis on thyroid function and the association of thyroid hormone levels in patients with cirrhosis. In order to better understand the medical picture of cirrhosis of the liver and its relationship to thyroid function, the current investigation was carried out at a tertiary care center.
Conclusion: Liver cirrhosis patients had lower mean blood levels of fT3 and fT4. However, the mean serum TSH level was higher in this group of individuals. It was shown to be significantly higher in patients with more advanced liver disease, but not to differ significantly by age, gender, or disease duration.
Keywords: Thyroid Function, Liver Cirrhosis, Child-Pugh Classification

INTRODUCTION

The final step of both acute and chronic liver injury is cirrhosis. Cirrhosis is most commonly caused by alcohol abuse and chronic hepatitis C in developed nations.[1,2] The eventual result of both short-term and long-term liver damage is cirrhosis. Since the liver is the primary organ responsible for the metabolism and catabolism of numerous proteins, interactions between the liver and the endocrine system are of great importance.[3,4]

The liver convert's (T4), (T3), and (TSH) into their active forms in the periphery, hence it plays a key role in thyroid hormone metabolism. In addition, it helps circulate proteins that bind to the thyroid through conjugation.[5] Thyroid dysfunction has been described in a wide range of liver illnesses and has been linked to the progression of liver disease.[6]

These shifts are pathological shifts associated with end-organ damage and biochemical abnormalities attributable to liver dysfunction.[4,6] Acute and chronic liver illnesses share a common thread: thyroid dysfunction. Thyroid hormone deficiency is a predictor of the deterioration of liver disease's synthetic functions.[4] Researchers found that the average TSH, FT3, and FT4 levels in cirrhotic individuals were 2.07±026U/ml, 2.15±0.66pg/ml, and 1.25±0.17pg/ml, respectively.[7] (TSH), (FT3), (FT4) levels in cirrhotic individuals were 1.172±0.1542 pg/ml, 2.151±0.6698 pg/ml, and 1.646±0.5803 pg/ml, respectively, according to another study.[8] TSH was found to be 3.10.2U/ml, FT3 mid FT4 was 2.90.1pg/ml, and FT4 was 11.9±0.5pg/ml, on average, in cirrhotic patients, according to a single study.[9]

This research was motivated by a need to characterize the median levels of thyroid hormone in patients with liver cirrhosis. Thyroid hormone levels have been demonstrated to be abnormal in the medical literature for cirrhotic individuals, with conflicting results reported from earlier investigations. Furthermore, we were unable to locate any regional proof to support this hypothesis. Therefore, we intend to perform this research in order to collect first-hand data for future use. This research will allow us to recommend that patients with cirrhosis undergo routine thyroid function testing to detect abnormalities early on, when treatment is more effective and patients are less likely to suffer from permanent organ damage.

MATERIALS AND METHODS

Study Design: The study was a cross-sectional one.
Setting& Duration of Study: From August 2022 to January 2023, researchers from the Department of Medicine at Shaikh Zayed Hospital in Lahore collected data.
Sample Size: The expected mean level of FT3, i.e. 2.151±0.6698, in patients presenting with Liver Cirrhosis was used to determine the sample size, which was determined to be 115 cases with a 95% confidence level, d=0.09.[8]
Inclusion Criteria: Male and female patients aged 20-70 with a confirmed diagnosis of liver cirrhosis.
Exclusion Criteria: Patients with a thyroidectomy or tonsillectomy in their medical history. Those who, based on their medical records and histories, are receiving hormonal treatment for thyroid dysfunction.
Data Collection Procedure: The Outpatient Psychiatry Department at Sheikh Zayed Hospital in Lahore enrolled 115 study participants who met the inclusion and exclusion criteria. Consent after careful consideration was received. The patient's demographic details (name, age, gender, and cirrhosis duration) were also recorded. A 5cc BD syringe was used to draw blood from a patient's vein while under aseptic measurement by a nurse practitioner. A vial of ringer solution was prepared from the blood specimen. The hospital laboratory analyzed all of the samples to determine the levels of thyroid hormone. Data was collected and TSH, T3, and T4 concentrations were determined (using an operational definition). The hospital followed its standard operating procedure for treating all of the patients. The data was compiled using the accompanying, custom-made proforma.
Data Analysis Procedure: SPSS version 20.0 was used to enter and analyze all the data. Age, cirrhosis length, and thyroid hormone (TSH, FT3, FT4) levels are provided as means standard

deviations. Frequency and percentage breakdowns of categorical factors have been provided. Using a significance level of.05, a post-stratification independent sample test was conducted.

RESULTS

The average patient's age was 51.78±8.15 years old, and their ages ranged from 35 to 70. The vast majority of patients (n=64, or 55.65%) were between the ages of 53 and 70. Table 1 display that the study population consisted of 71 (61.73%) male patients and 44 (38.8%) female patients. The average duration of illness was 23.78±10.05 months. As can be seen in Table 8.2, of the total number of patients, 34 (29.56%) belonged to Child Class-B, whereas 81 (70.43%) belonged to Child Class-C.

The range of serum TSH was from 3.5 to 5.8 uIU/ml (mean 4.32±0.43 uIU/ml), while the range of serum fT3 was from 1.2 to 2.9 pg/ml (mean 1.78± 0.27 pg/ml). As can be seen in Table 8.3, serum fT4 levels varied from 0.6 pg/ml to 2.5 pg/ml, with a mean of 1.68±0.47 pg/ml.

Mean levels of TSH, fT3, and fT4 did not vary significantly by age, gender, or disease duration. As can be seen in Tables 8.4 through 8.7, however, the mean serum TSH levels of Class-C children were much higher.

Table 1: Characteristics of the Patients in the Sample

Variables	Variables	Percentage % n=115
Age		51.78±8.15
	35-52 years	95 (44.4%)
	53-70 years	119 (55.6%)
Gender		
	Male	71 (61.73%)
	Female	44 (38.8%)
Duration of Disease	Mean±Sd	23.78±10.05
	<2 years	100 (46.7%)
	2-4 years	114 (53.3%)
Child-Pugh Class	Mean±Sd	
	Class-B	34 (29.56%)
	Class-C	81 (70.43%)

Table 2: Liver cirrhosis and thyroid function: a patients profile, n=115

Variables	Lab Value
TSH (µU/ml)	4.32±0.43
fT_3 (pg/ml)	1.78± 0.27
fT_4 (pg/ml)	1.68±0.47

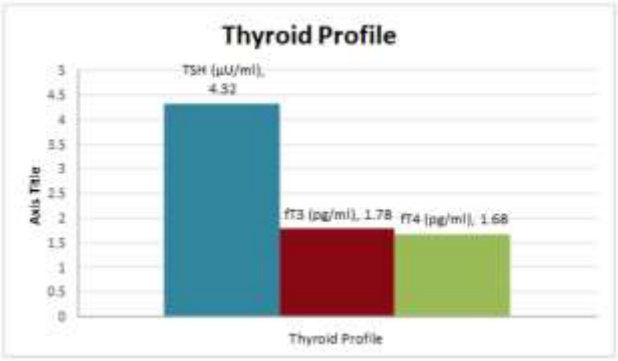

Figure 1: Thyroid Profile in Liver Cirrhosis Patients

DISCUSSION

The liver converts (T4), (T3), and (TSH) into their active forms in the periphery, hence it plays a key role in thyroid hormone metabolism. In addition, it helps circulate proteins that bind to the thyroid through conjugation.[5] The liver is thought to play a pivotal role in the excretion, breakdown and conversion of thyroid hormones. Because of this, aberrant thyroid functioning is to be predicted in individuals with liver cirrhosis across the entire hypothalamic-pituitary-peripheral axis.[10] Thyroid gland changes in people with liver cirrhosis include those in control, metabolism, and thyroid hormone, as well as those in size, architectural pattern, and morphology.[11,12]

Patients' ages ranged from 51.78 to 8.15 years old on average in this study. Similar results were found for patients presenting to Muhammad Medical College Hospital. Ali et al. (2008) found a median age of 52.9% among the Mirpurkhas.[13] Almani et al. (2008) found same mean age of 53.09±8.86 years in such patients at Hyderabad.[14] Similar mean ages among such patients in the local community were also reported by Achakzai et al. in 2016 (5411 years) and Hussain et al. in 2014 (51126.03 years).[15,16] In 2015, Tariq et al. found that the average age of such patients presenting at Civil Hospital, Karachi was just 41±6.1 years.[18] The average age of Indian patients with liver cirrhosis was estimated to be 45.8±10.45 years by Bhattacharyya et al. (2016).[19] In 2015, Deepika et al.[20] found a mean age of 44.1±3.7 years for this patient population in India. Patients in Sudan with this condition are younger on average, as documented by Mousa et al. (2016).[21] In contrast, Anastasiou et al. (2015) found that the average age of such patients in Germany was just 40.4±1.7 years.[22]

Previous research by Ali et al. found a male-to-female ratio of 1.5:1 among similar patients in the local population.[125] However, a study conducted by Achakzai et al. (2016) at Dow University Hospital in Karachi found that female patients outnumbered male patients by a ratio of 1:1.5.[15] Patients with this condition in Egypt had a comparable male to female ratio, as described by Abdel-Fattah El-Feki et al. (2016).[23] Among Iranian patients, the male to female ratio was reported to be 1.9:1 by Mansour-Ghanaei et al. (2012).[5] The male to female ratio among such patients in India was found to be 19:1 by Kharb et al. (2015).[4]

The average duration of illness was 23.78±10.05 months, although it may be as little as 8 months. Similar mean disease durations (25 years) were found by Mansour-Ghanaei et al. in cirrhotic patients presenting from Iran.[5] A total of 34 patients (29.56%) were classified as Child Class-B, while 81 patients (70.43%) were classified as Child Class-C. Similar to what we found, Bhattacharyya et al. found that at presentation, 50% of Indian cirrhotic children belonged to Child Class-C.[19] Child Class-C was found to be present in 75.70 percent of patients at Agha Khan University, Karachi, according to research by Achakzai et al.[15]

The range of serum TSH was from 3.5 to 5.8 uIU/ml (mean 4.32±0.43 uIU/ml), while the range of serum fT3 was from 1.2 to 2.9 pg/ml (mean 1.87±0.38 pg/ml). The average serum fT4 concentration was 1.68 pg/ml (standard deviation = 0.47). The range was 0.6 to 2.5 pg/ml. Similar results were found by El-Kabbany et al., who found that Egyptian patients had elevated TSH levels (4.05±1.4 U/ml) and decreased fT3 (1.9±0.2 pg/ml) and fT4 (1.6±0.4 pg/ml).[24] TSH values among Indian cirrhotic patients were similarly reported by Deepika et al. (5.12±11.67 U/ml). However, the mean fT4 was 8.47±2.33 pg/ml, while the mean fT3 was 0.62±0.26 pg/ml [126].

Mean levels of TSH, fT3, and fT4 did not vary significantly by age, gender, or disease duration. However, Class-C kids had noticeably higher mean serum TSH levels overall. Thyroid stimulating hormone levels were considerably higher in patients with Child Class-C compared to Class-B (18.114.3 vs. 3.33.1 U/ml; p0.001), which is consistent with our findings.[23]

This data suggests that cirrhotic patients are an older and more predominantly male subset of the local community. Patients with more advanced disease tend to have more severe disruptions in thyroid hormone levels. Therefore, it can be argued based on the results of the current study that thyroid hormone levels should be investigated in patients providing with cirrhosis in order to recognize those with a hormonal problem and best ways to address this complication, which may improve patient's outcome in the future.

The lack of a correlation between the patient's result and their hormone profile is a major weakness of the current study.

Such a study is strongly suggested for future investigation as it would greatly aid in patient care.

CONCLUSION

Liver cirrhosis patients had lower mean blood levels of fT3 and fT4. However, the mean serum TSH level was higher in this group of individuals. It was shown to be significantly higher in patients with more advanced liver disease, but not to differ significantly by age, gender, or disease duration.

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