IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 1 Ser.1 (January. 2023), PP 01-03
www.iosrjournals.org

Hypothyroidism in Association with Non-Alcoholic Fatty Liver Disease

[1.] Cherukuri Naveen Gupta [2.] Kilaparthi Madhuri Sudha
[3.] Prahallad Chandra Mishra [4.] Malipeddi Praneeta

Keywords: Hypothyroidism, Fatty liver

Date of Submission: 20-12-2022 Date of Acceptance: 03-01-2023

I. Introduction

Non-alcoholic fatty liver disease (NAFLD) is a liver ailment that is characterized by fat accumulation in the liver and occurs in people who drink little to no alcohol. NAFLD falls into one of two categories:

1. Simple steatosis, often known as NAFLD is the presence of fat in the liver with little to no fibrosis or inflammation.

2. Non-alcoholic steatohepatitis (NASH) is a condition characterized by fat, inflammation, and variable degrees of fibrosis scarring.(1)

The diagnosis of NAFLD is one that is quickly expanding, and it is the most common reason for abnormal liver function tests globally. The rising prevalence of obesity and other metabolic risk factors around the globe is largely blamed for the increasing pattern of NAFLD prevalence. According to epidemiological research, NAFLD affects 9% to 32% of the general population in India, with a higher prevalence among people who are overweight or obese and those who have diabetes or prediabetes.

The recent emergence of NAFLD due to hypothyroidism is one cause for concern. Thyroid hormones alter the equilibrium of hepatic lipids through a number of mechanisms, including the promotion of free fatty acid transport to the liver for re-esterification of triglycerides and an increase in fatty acid beta-oxidation,and consequently hepatic fat storage. It is crucial to identify at-risk people as early as possible since treating hypothyroidism may lower the likelihood of developing NAFLD and its related complications.(2)

AIMS AND OBJECTIVE

To study the relationship between Hypothyroidism and Non-Alcoholic Fatty Liver Disease.

II. MATERIALS AND METHODS

Study design:
Cross sectional study
Setting:
Patients with Hypothyroidism are enrolled for the study at the department of General medicine, MIMS, Vizianagaram.
Sample size determination: χ^2 tests - Goodness-of-fit tests: Contingency tables
Sample size: 50
Inclusion Criteria:
Patients who are older than 18 and have hypothyroidism.
Exclusion Criteria:
Patients having a BMI of greater than 30, Diabetes Mellitus, dyslipidaemia, alcohol use of more than 20 grams per day, and patients who were HIV-positive or who had Hepatitis B, C, or both were excluded from the study.
Procedure:
Weight gain, weariness, constipation, aversion to the cold, dry skin, voice changes, menstruation irregularities, and other symptoms were included in a questionnaire. A person's past medical, surgical, and personal histories, including alcohol and drug use, were elicited. A physical examination was done, which covered vital signs, height, weight, BMI, and a head-to-toe check for hypothyroidism.

The CVS, RS, abdomen, and CNS were examined as part of the systemic examination. Hepatomegaly was present or absent during the abdominal examination.
All 50 patients underwent testing including complete blood counts, RBS, Renal and Liver function tests, fasting lipid profiles, coagulation profiles, viral markers, CRP, TFT (free T3, free T4, TSH) and USG Abdomen. Those who tested positive for fatty liver underwent a fibroscan to determine their NAFLD stage.

III. OBSERVATIONS AND RESULTS

The mean age of the study population was 34.5 ∓ 5.4 years. Males were 6 and females were 44. Among men, USG showed normal liver in 100% of the cases. Among women, USG showed fatty liver in 18.1 % (8 cases). Of the 50 cases, 8 (16%) patients had fatty liver on ultrasound. Of the patients with normal USG findings, T3 values were normal in 36 (85.71%) of the patients. Of the patients with fatty liver, T3 values were low in all the 8 patients (100%). The difference in data is statistically significant with p value <0.05. Therefore, T3 values are lower in patients with non-alcoholic fatty liver disease compared to normal population.

IV. DISCUSSION

Non-alcoholic fatty liver disease (NAFLD) is significantly linked to hypothyroidism, a metabolic disorder marked by low levels of thyroid hormone and elevated TSH in the blood. Approximately 30 percent of the global population suffers from non-alcoholic fatty liver disease (NAFLD). Hepatic steatosis and non-alcoholic steatohepatitis (NASH) are a part of the NAFLD spectrum. Multiple extra-hepatic factors contribute to NAFLD's development.

Thyroid hormones are crucial for controlling metabolic processes throughout the body and the liver's use of fats.The expression of genes involved in the beta-oxidation of fatty acids (FAs) is regulated in the liver by crosstalk between thyroid hormone receptors and peroxisome proliferator-activated receptor alpha (PPAR). Impaired TH signalling leads to decreased FA consumption, resulting in the esterification and accumulation of FAs in the liver in the form of triglycerides (TGs) (3).

In a study by Zeng et al(4), the following are the findings from their comprehensive review: The danger of developing NAFLD increased in those who also had hypothyroidism. Thyroid stimulating hormone (TSH) elevations may contribute to NAFLD risk. Patients with NAFLD had a considerably greater body mass index than those without the disease. There was a strong correlation between getting older and developing NAFLD. Although FT3 was not substantially connected to NAFLD risk, FT4 was due to its detrimental influence on NAFLD risk. The present meta-analysis, taken as a whole, provides compelling evidence that hypothyroidism may play a crucial role in the onset and development of NAFL.

Bikeyeva et al (5) in a similar study, found that the thyroid-liver axis and lipid metabolism rely heavily on thyroid hormones. NAFLD is brought on by a build-up of lipids and an inflammatory response in the liver, both of which can be brought on by a disruption of the lipid metabolism.

In a meta-analysis by Weiwei He et al(6), they found that there is a good correlation between the hypothyroidism and NAFLD. Both the overt and subclinical hypothyroidism were independently correlated with NAFLD and proved a strong epidemiological correlation.Compared to subclinical hypothyroidism, the association between overt hypothyroidism and NAFLD was more robust. Overt hypothyroidism, as opposed to subclinical hypothyroidism, is characterized by significantly elevated TSH levels and decreased T4 and T3 levels. TSH itself may promote hepatocyte steatosis via TSH receptor signalling which may explain why there is a more robust association between overt hypothyroidism and NAFLD.

Levothyroxine (LT4) supplementation has been shown to be useful in delaying the development of non-alcoholic fatty liver disease (NAFLD) in individuals with subclinical hypothyroidism, according to a recent research(7).

V. Conclusion:

More evidence suggested a link between overt hypothyroidism and NAFLD. This study found that among 50 individuals, the frequency of NAFLD was 16 percent.More research is needed to determine whether or whether implementing a programme to screen for thyroid dysfunction in people with NAFLD will be advantageous in the near future, and what role, if any, hypothyroidism has in the pathogenesis of NAFLD.Thyroid replacement treatment is of interest as it has the potential to slow the disease's course and enhance long-term consequences. In order to evaluate adequate information that supports and complements the current concept and maybe discover the best therapeutic choices for these two coupled disorders, new, bigger clinical studies are required.

Limitations of the study:

1. Small sample size
2. Liver biopsy is not performed to assess liver fat content
3. Study limited only to hospital based setting.

REFERENCES:

[1]. Non-Alcoholic Fatty Liver Disease | Michigan Medicine [Internet]. [cited 2022 Nov 9]. Available from: https://www.uofmhealth.org/conditions-treatments/digestive-and-liver-health/fatty-liver-disease-non-alcoholic

[2]. Effects of subclinical hypothyroidism and its treatment on serum lipids - PubMed [Internet]. [cited 2022 Nov 9]. Available from: https://pubmed.ncbi.nlm.nih.gov/12708952/

[3]. Ferrandino G, Kaspari RR, Spadaro O, Reyna-Neyra A, Perry RJ, Cardone R, et al. Pathogenesis of hypothyroidism-induced NAFLD is driven by intra- and extrahepatic mechanisms. Proc Natl Acad Sci. 2017 Oct 24;114(43):E9172–80.

[4]. Zeng X, Li B, Zou Y. The relationship between non-alcoholic fatty liver disease and hypothyroidism: A systematic review and meta-analysis. Medicine (Baltimore). 2021 Apr 30;100(17):e25738.

[5]. Bikeyeva V, Abdullah A, Radivojevic A, Jad AAA, Ravanavena A, Ravindra C, et al. Nonalcoholic Fatty Liver Disease and Hypothyroidism: What You Need to Know. Cureus [Internet]. 2022 Aug 16 [cited 2022 Dec 21];14(8). Available from: https://www.cureus.com/articles/101051-nonalcoholic-fatty-liver-disease-and-hypothyroidism-what-you-need-to-know

[6]. He W, An X, Li L, Shao X, Li Q, Yao Q, et al. Relationship between Hypothyroidism and Non-Alcoholic Fatty Liver Disease: A Systematic Review and Meta-analysis. Front Endocrinol [Internet]. 2017 [cited 2022 Dec 21];8. Available from: https://www.frontiersin.org/articles/10.3389/fendo.2017.00335

[7]. Liu L, Yu Y, Zhao M, Zheng D, Zhang X, Guan Q, et al. Benefits of Levothyroxine Replacement Therapy on Nonalcoholic Fatty Liver Disease in Subclinical Hypothyroidism Patients. Int J Endocrinol. 2017 Apr 4;2017:e5753039.

Cherukuri Naveen Gupta, et. al. "Prevention of Dental Caries Beyond Fluorides." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(1), 2023, pp. 01-03.