

Non-Alcoholic Fatty Liver Disease in Primary Hypothyroidism

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Abstract

Introduction: Non-alcoholic fatty liver disease (NAFLD) is the most common chronic liver condition world-wide. Hypothyroidism is also a common disorder affecting general population especially in women.

Objectives: To determine the association between primary hypothyroidism and NAFLD.

Materials and Method: This is a cross-sectional descriptive type of observational study where 100 cases of primary hypothyroidism in age group 15-75 years of both sexes were selected from February 2018 to January 2019 in CMH Momenshahi having higher level of Thyroid stimulating hormone(TSH). In all cases ultra-sonogram of hepatobiliary system was done by efficient sonologist who was blind about clinical scenario of the patients.

Results: Mean age of patients 29±SD7.57. Among 100 cases 56(56%) having NAFLD among them 95% were female and 5% were male.

Conclusion: NAFLD was significantly correlated with primary hypothyroidism.

Key-words: Primary Hypothyroidism, Non-alcoholic fatty liver disease, Cholesterol, Triglycerides, high density lipoprotein, low density lipoprotein.

Introduction

Nonalcoholic fatty liver disease (NAFLD) is the most common chronic liver condition worldwide¹. It is defined as hepatic steatosis by imaging or histology but without secondary causes of hepatic fat accumulation, such as significant alcohol consumption and long term use of steatogenic medication². In this world, the prevalence of NAFLD^{3,4} diagnosed by imaging in general population is about 25% and in Bangladesh 34.34%. The growing pattern of NAFLD prevalence is generally attributed to global increase in the prevalence of obesity and other metabolic risk factors⁵. Reduced production of thyroid hormone is the central feature of the clinical state termed hypothyroidism^{6,7}. Thyroid disorders are common in the general population with hypothyroidism being the predominant disorder in the adult population^{8,9}.

Thyroid hormones play an important role in regulating body weight, lipid metabolism and insulin resistance. Low thyroid hormone levels are related with hypo-metabolism categorized by decreased weight gain, resulting energy expenditure, reduced lipolysis, increased cholesterol levels and reduced gluconeogenesis¹⁰.

Therefore, thyroid hormones may have a close relationship with the pathogenesis of NAFLD¹¹. However, the association of NAFLD with thyroid function or hypothyroidism remain controversial in adults^{12,13}. An expanding number of illnesses have been accounted for to be to NAFLD; for example, cancer, cardiovascular ailment, type 2 diabetes, and chronic kidney ailment^{14,15}. This study is an effort to assess the association between primary hypothyroidism and NAFLD

Materials and Method

This is a cross sectional descriptive type of observational study of thyroid patient where a total of 100 were studied during February 2018 to January 2019. Patients of both sexes, age limit from 13 to 70 years and suspected case of hypothyroidism were included. Patients with hepatitis or liver cirrhosis or with hepatotoxic drug intake or associated any debilitating illness and pregnant women were excluded. All those patients were seen in medical outdoor department of Combined Military Hospital (CMH), Momenshahi. A detailed history and clinical examination were carried out in a predesigned case record form. Under aseptic precaution morning sample of venous blood was taken from patients of hypothyroidism after 12 hours overnight fasting with disposable syringe and needle. Serum FT-4, TSH were measured by chemiluminescence immunoassay by Cobas C411. Patients with TSH level 6 μ IU/ ml and above were considered to be having hypothyroidism. Abdominal ultra-sonogram scanning was performed in all cases by a skilled sonologist by 7.5 MHz linear transducer who was blind to all clinical and laboratory data of patient.

Results

Out of 100 patients 56% of the patients are from age group 26-35 years, 26% from 36-45 years, 14% from 15-25 years, 3% from 46-55 years and 1% from 66-75 years. Mean age of patient 29±7.57 years. Most of the patients are from age group 26-35 years (Table-I). Fig-1 Bar chart showing clinical presentation of hypothyroidism patients. Most of the patients (18%) presented with vague symptoms like general weakness, 15% with menstrual irregularity, 14% with weight gain. Other presentations are thyroid swelling (11%), subfertility (10%), leg swelling (8%), body ache (8%), incidental finding (5%), abortion (4%), cold intolerance (2%), decreased libido (2%), alopecia (1%), whitish spots (1%) and 1% recurrent syncope (Figure-1). About 55% patients having fatty liver and 44% having no fatty liver (Figure-2). Barr chart showing mean level of cholesterol, TG, HDL and LDL 195.14±44.57, 164.49±83.87, 40±3.91 and 122±41.72 respectively (in mg/dL) (Fig-3).

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Table-I: Distribution of age and sex of patients (n = 100)

Characteristics	Frequency	Percentage	
Age in years	15-25	14	14
	26-35	56	56
	36-45	26	26
	46-55	3	3
	56-65	0	0
	66-75	1	1
	Mean±SD	29±7.57	
Sex	Male	5	5
	Female	95	95

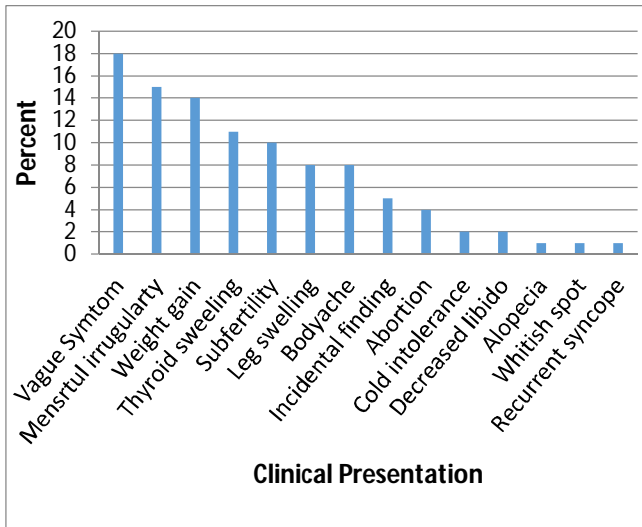


Figure-1: Clinical presentation of primary hypothyroidism

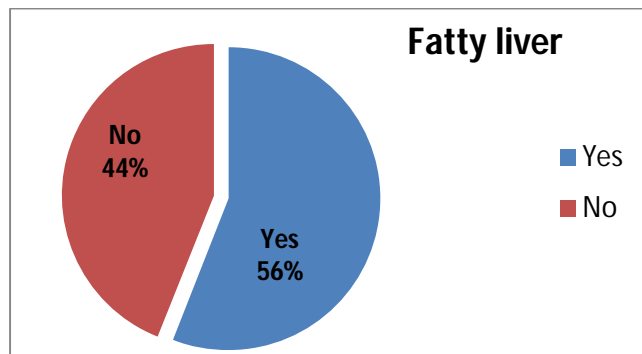


Figure-2: Fatty liver status

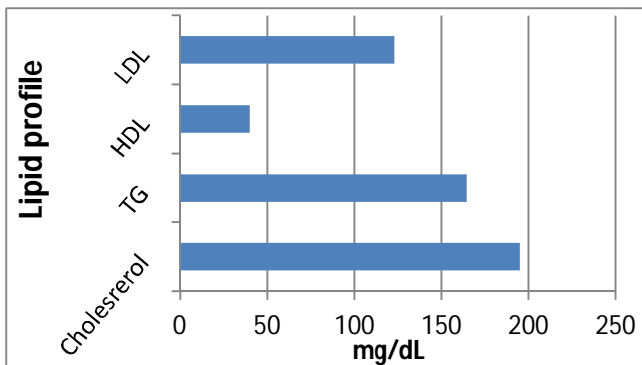


Figure-3: Lipid profile of patients.

Discussion

In this study 95% are female and 5% are male which seems to be higher than the prevalence of hypothyroidism in female. As we have conducted this study in Combined Military Hospital where male are recruited after thorough medical examination but their ladies are not. So there might be more chance of disease in their ladies than male. NAFLD is supposed to be a hepatic feature of metabolic syndrome and insulin resistance^{16,17}. Hypothyroidism has been reported to be associated with obesity and metabolic syndrome^{18,19}. All these factors are responsible for NAFLD in hypothyroidism. This study found that the prevalence of NAFLD was 56% which seemed to be higher than the general prevalence in Asia (27.4%; 95% confidence interval 23.3% –31.9%). It is also higher than the prevalence in general population in Bangladesh (34.34%)⁴. In this study, it is found significant (p value <0.005 with z value 4.64)

This finding was similar to study done by Yiting L et al²⁰ which found NAFLD was 35.98%. It is little bit lower than this study which can be explained by geographical variation and more female patients in this study group. This study was in agreement with studies done by Arafat K et al²¹ and Weiwei H et al²². In both the studies found that hypothyroidism was independently correlated with NAFLD. On the contrary results of some studies by Mazo et al²³ Eshraghian et al²⁴ failed to demonstrate association between markers of thyroid dysfunction and presence of NAFLD. These dissimilarities may be explained that their studies were done in treated cases of hypothyroidism but in this study we have taken sample both from new and also treated old cases.

NAFLD defines a spectrum of histological abnormalities from simple fatty liver to nonalcoholic steohepatitis, in a person consuming no alcohol²⁵. Thyroid hormones can stimulate expression of uncoupling proteins in the mitochondria of fat and skeletal muscle, modulate adrenergic receptors numbers by enhancing responsiveness of catecholamines, and thus control metabolic and energy homeostasis¹⁸. Leptin is considered as one of the explanations of this association because it is found to be increased in patients with hypothyroidism and it is also found to be higher in NAFLD as it can promote hepatic insulin resistance and be involved in hepatic fibro genesis²³⁻²⁵.

Conclusion

The results of the present study confirm the correlation between hypothyroidism and nonalcoholic fatty liver disease and which is statistically significant. An increased TSH is an independent risk factor for NAFLD.

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