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Non-Alcoholic Fatty liver Disease (NAFLD) Management Secondary to Hypothyroidism in 1412 Patients

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Abstract

As studies indicated hypothyroidism is associated with Non-Alcoholic Fatty Liver Disease with increased serum level of triglycerides. Since NAFLD is a condition of triglyceride accumulation in the hepatocytes and thyroid hormones affect synthesis and mobilization of triglycerides, hypothyroidism could independently increase the risk of NAFLD. Our study aimed to screen NAFLD among hypothyroidism patients to evaluate the influence of thyroid dysfunction on the pathogenesis of NAFLD. By following up of 1412 patients during 4 years, in this study, we found that the prevalence of hypothyroidism among NAFLD patients was 41%. After pharmacotherapy for hypothyroidism, improvement was seen in 62% of NAFLD patients without considering any notable treatment for NAFLD. Also, improvement in diabetic NAFLD patients with thyroid dysfunction with levothyroxine therapy were significant. This study results showed; lower thyroid function known as hypothyroidism was related to increased risk of developing NAFLD.

Keywords: Non-alcoholic fatty liver disease, Thyroid dysfunction, Hypothyroidism, Risk factor

Introduction

Non-Alcoholic Fatty Liver Disease (NAFLD) occurs when triglyceride forms 5-10% of liver's weight. It might progress to alcoholic steatohepatitis (NASH), fibrosis, cirrhosis and in 15-20% of cases to hepatocellular carcinoma [1]. As studies indicated, obesity, metabolic syndrome, diabetes mellitus, insulin resistance, hyperlipidemia are risk factors for development of NAFLD [2]. Since NAFLD is an asymptomatic disease most of the time, many patients with NAFLD, remain undiagnosed. So, screening individuals with interlinked risk factors could be beneficial in early detection and management of it.

Ultrasonography is the first line modality of detecting NAFLD [3]. The prevalence of this the most chronic liver disease is estimated approximately 31% among developing countries [4].

Thyroid hormones have major influences on metabolic pathways. Considering the role of thyroid hormones in lipid metabolism, it participates in synthesis, mobilization and degradation of lipids. Further, cholesterol and triglyceride concentrations are inversely correlated with thyroid hormone levels [5]. As evidences from recent studies indicated, hypothyroid patients appear to have increased incidence of NAFLD [6]. Moreover, carbohydrate metabolism is stimulated by thyroid hormones with increased insulin sensitivity in glucose metabolism which shows correlation between thyroid dysfunction and insulin resistance as well as diabetes mellitus [7]. Due to notion of association between hypothyroidism

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Table 1: Characteristics of study participants.

		All individuals (n=1412)
Sex, n (%)	Male	541 (38.3)
	Female	871 (61.7)
Age (years),	median (IQR)	39 (46)
	range (min-max)	18-96
BMI,	Median (IQR)	27 (6.3)
	Range (min-max)	16-48.3
Serum ALT (IU/L),	median (IQR)	43 (57)
	range (min-max)	33786
Serum AST (IU/L),	median (IQR)	51 (59)
	range (min-max)	35309
TSH,	median (IQR)	4 (53)
T4	range (min-max)	0.2-8.3
	median (IQR)	4.5 (48)
	range (min-max)	3.2-10.6
Hyperlipidemia, n (%)	Yes	830 (58.8)
Hypothyroidism, n (%)	No	582 (41.2)
	Yes	607 (43)
Diabetes mellitus, n (%)	No	805 (57)
	Yes	833 (59)
	No	579 (31)
	Grade 1	946 (67.4)
NAFLD grade, n (%)	Grade 2	409 (29.3)
	Grade 3	57 (3.3)

n: number; IQR: interquartile range; ALT: alanine transaminase; AST: aspartate transaminase; BMI: body mass index; NAFLD: non-alcoholic fatty liver disease; TSH: thyroid stimulating hormone; T4: thyroxine.

and development of NAFLD supported by some recent studies, this study aimed to determine appropriate treatment and management of thyroid dysfunction related fatty liver disease which seems to be overlooked by clinicians.

Patients and Methods

Ultrasonography was performed for all participants to detect NAFLD. Thyroid function test was performed for all NAFLD individuals to indicate hypothyroidism among them. Participants with history of alcohol consumption and hepatitis B or C and other chronic and active liver diseases, thyroid surgery and participants on thyroid medications, were excluded. A checklist containing the age, weight, height, history of diabetes mellitus, history of hyperlipidemia was filled by patients. NAFLD was diagnosed by Ultrasonography as the routine method. Fasting serum levels of alanine transaminase (ALT), Aspartate Transaminase (AST), cholesterol, triglycerides, glucose and hemoglobin A1c (HbA1c), T4 and TSH were performed for all participants. Levothyroxine (LT4) therapy was performed for all hypothyroidism patients. They were followed up till thyroid function test became normal, therefore, ultrasonography was performed as the first-line investigation for hepatic steatosis to assess NAFLD grading after pharmacotherapy for hypothyroidism. Also, the ALT and AST serum level were assessed after pharmacotherapy. Metformin was prescribed for diabetic NAFLD patients as the drug of choice. Diabetes mellitus and obesity as a main risk factor of developing NAFLD were considered.

Results

This study included 1412 patients with diagnosis of NAFLD during 4 years. Most (61.7%) of study participants were female with median age of 39. Hypothyroidism was detected in 43% of patients. Diabetes mellitus was found in 59 % of participants. Hyperlipidemia was observed in 41.2 % of individuals. 35% of participants, regarding to BMI =>25 were obese and overweight. Women affected by hypothyroidism were more prevalent than men. The prevalence of different grades of fatty liver were 946 (67.4%) with grade 1 fatty liver, 409 (29.3%) with grade 2 fatty liver and 57 (3.3%) with grade 3 fatty liver. Data on patients' characteristics is summarized in table 1.

Patients with hypothyroidism were prescribed levothyroxine and were followed up. Improvement were seen in 62% of NAFLD patients after treatment of low thyroid level.

Using ultrasonography, change in fat composition in liver was seen after pharmacotherapy for thyroid dysfunction in patients detected by NAFLD.

Higher TSH level as well as lower T4 level were associated with increased risk of developing NAFLD.

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