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Original Research

Assessment of prevalence of non-alcoholic fatty liver disease in hypothyroid patients

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ABSTRACT:

Background: Non-alcoholic fatty liver disease (NAFLD) means accumulation of fat mainly triglycerides exceeding 5% of liver weight, affecting approximately 20% of population in developed countries.The present study was conducted to assess prevalence of non-alcoholic fatty liver disease in hypothyroid patients. **Materials & Methods:**96 cases of hypothyroidism of both genderswere enrolled.Staging and grading were performed according to the Brunt et al scoring. The size, the presence of focal lesions, hepatic steatosis was recorded. Serum ferritin was measured by ELISA. **Results:** Out of 96 patients, males were 36 and females were 60.TSH (μIU/ml) level <5 was seen in 5, 6-20 in 9, 21-35 in11, 36-50 in 35, 50-65 in 16 and >65 in 20 patients. Fatty liver grade I was seen in 12, II in 20 and III in 8 patients. Serum ferritin level in grade I males was 162.5 and in females was 172.6. in grade II males was 511.4 and in females was 236.8 and grade III was seen in 583.2 and in female was 378.4. The difference was significant (P< 0.05). **Conclusion:** Serum ferritin could help in predicting the natural history of NAFLD in hypothyroidism patients. The serum ferritin levels were found to be increased in patients of fatty liver with hypothyroidism.

Key words: Hypothyroidism, Liver disease, Serum ferritin

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INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) comprises a broad spectrum ranging from simple steatosis, non-alcoholic steatohepatitis with fibrosis, which can eventually progress to cirrhosis and hepatocellular carcinoma.[1] Non-alcoholic fatty liver disease (NAFLD) means accumulation of fat mainly triglycerides exceeding 5% of liver weight, affecting approximately 20% of population in developed countries.[2]

Non- alcoholic fatty liver disease (NAFLD) is a chronic liver disease with a histological spectrum ranging from steatosis alone to non- alcoholic steatohepatitis (NASH), the latter having an increased risk for progression to cirrhosis. The prevalence of NAFLD in adults has been reported to be as high as 33% making it the most common cause of chronic liver disease in the United States.Thyroid dysfunction especially hypothyroidism has been associated with insulin resistance, dyslipidemia and obesity all of which are important components of the metabolic syndrome.[3]

Disturbances in thyroid hormone concentrations may promote hyperlipidaemia and obesity, thus contributing to NAFLD. Early identification of at-risk patients is important since treatment of hypothyroidism may reduce the risk of NAFLD and potential complications.[4]The link between diabetes and NAFLD is well established unlike hypothyroidism which has mushroomed to be a risk factor for NAFLD very recently. However, clinical data supporting this association are incomplete and the pathophysiology underlying this association remains unclear. Additional information is needed to confirm and better characterize the proposed association between NAFLD and hypothyroidism.[5] The present study was conducted to assess prevalence of non-alcoholic fatty liver disease in hypothyroid patients.

MATERIALS & METHODS

The present study consisted of 96 cases of hypothyroidism of both genders. All were enrolled after obtaining their written consent.

Demographic profile such as name, age, gender etc. was recorded. All were subjected to USG. Diagnosis of fatty liver disease was made if large fat vacuoles were present in the liver parenchyma, displacing the nuclei to the border of the cells. Steatosis was graded as 1 if less than 33% of the hepatocytes were affected, grade 2 when 33 - 66% of the hepatocytes were affected, and grade 3 if more than 66% of the hepatocytes were affected. Staging and grading were performed according to the Brunt et al scoring. The size, the presence of focal lesions, hepatic steatosis was recorded. Serum ferritin was measured by ELISA. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 96		
Gender	**Male**	**Female**
Number	36	60

Table I shows that out of 96 patients, males were 36 and females were 60.

Table II TSH level in patients having NAFLD with hypothyroidism

TSH(µIU/ml)	Number	P value
<5	5	0.02
6-20	9	
21-35	11	
36-50	35	
51-65	16	
>65	20	

Table II, graph I shows that TSH (µIU/ml) level <5 was seen in 5, 6-20 in 9, 21-35in11, 36-50 in 35, 50-65 in 16 and >65 in 20 patients. The difference was significant (P< 0.05).

Graph ITSH in patients having NAFLD with hypothyroidism

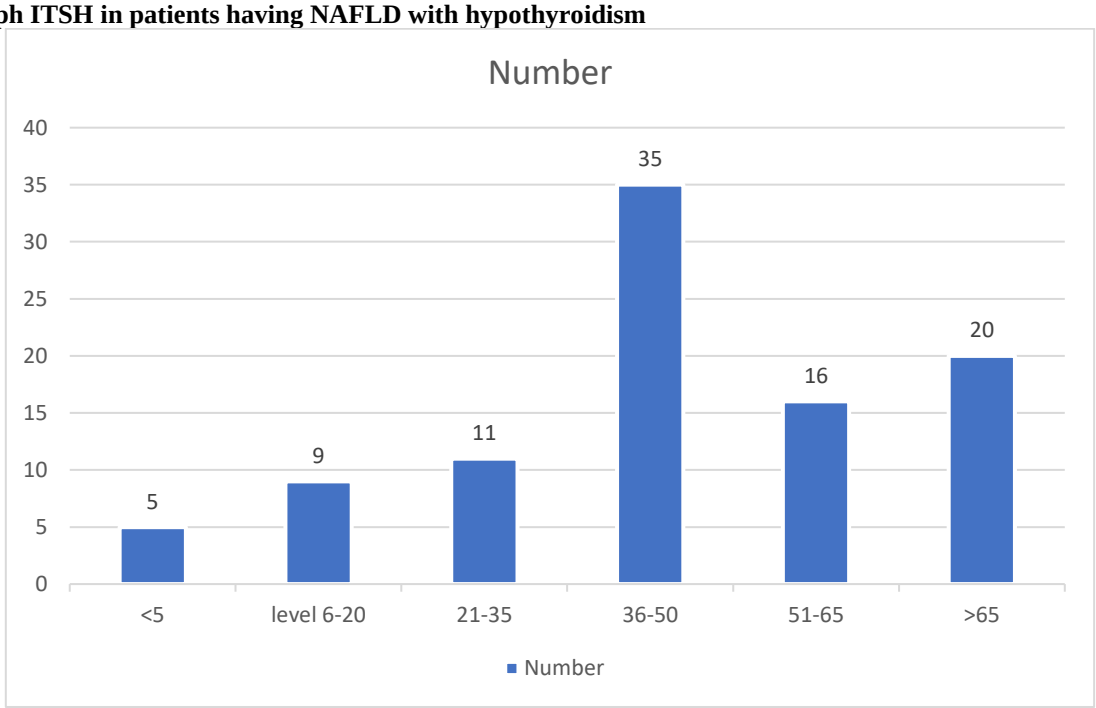

Table III Grading of fatty liverand serum ferritin level in NAFLD with hypothyroid patients

Fatty liver grade	Number	Serum ferritin		P value
		Male	Female	
Grade I	12	162.5	172.6	0.91
Grade II	20	511.4	236.8	0.01
Grade III	8	583.2	378.4	0.01
P value		0.02	0.04	

Table III shows that fatty liver grade I was seen in 12, II in 20 and III in 8 patients. Serum ferritin level in grade I males was 162.5 and in females was 172.6. in grade II males was 511.4 and in females was 236.8 and grade III was seen in 583.2 and in female was 378.4. The difference was significant (P< 0.05). It was seen that the level of serum ferritin increased with increasing age.

DISCUSSION

In India, the overall prevalence of NAFLD is 5 % to 30 % and of hypothyroidism is 10 %. There is a rise in prevalence of metabolic syndrome with adoption of western lifestyle.Insulin resistance in the setting of hypothyroidism has been documented and is associated with decreased responsiveness of glucose uptake in muscle and adipose tissue to insulin, as well as decreased glycogen synthesis in skeletal muscle in both animal and human studies.[6] These effects were alleviated by thyroid replacement. Hypothyroidism is also more common in patients with diabetes than in the general population. If hypothyroidism enhances the degree of insulin resistance in NAFLD patients, it may increase the already elevated lipolysis and free fatty acid delivery to the liver and thereby accelerate liver injury in NAFLD. There is paucity of literature in the Indian subcontinent to establish a link between NAFLD and hypothyroidism.[7]The present study was conducted to assess prevalence of non-alcoholic fatty liver disease in hypothyroid patients.

In present study, out of 96 patients, males were 36 and females were 60. Parikh et al[8]assessed the prevalence of hypothyroidism in patients with non-alcoholic fatty liver disease (NAFLD). 300 controls were selected on the basis of negative ultrasound examination. The mean age of NAFLD patients was 44.3 years and of controls was 41.6 years, respectively. The female-to-male ratio of NAFLD patients was 1.8:1 and of controls was1.94:1, respectively (p>0.05). Hypothyroidism was significantly more common in NAFLD patients compared to controls. Eighty-four patients were detected to have hypothyroidism in NAFLD group compared to only four patients in control group.

We observed that TSH (μIU/ml) level <5 was seen in 5, 6-20 in 9, 21-35 in11, 36-50 in 35, 50-65 in 16 and >65 in 20 patients.Pagadala et al[9] conducted study on 246 patients with biopsy proven NAFLD. Patients with a clinical diagnosis of hypothyroidism who were on thyroid replacement therapy were considered to be hypothyroid. Hypothyroidism was more frequent among patients with NAFLDcompared to controls and was higher in NASH patients than NAFLD patients without NASH (25% vs 12.8%, P=0.03). Subjects with hypothyroidism were 2.1 (95% CI: 1.1, 3.9,P=0.02) and 3.8.

We observed thatfatty liver grade I was seen in 12, II in 20 and III in 8 patients. Serum ferritin level in grade I males was 162.5 and in females was 172.6. in grade II males was 511.4 and in females was 236.8 and grade III was seen in 583.2 and in female was 378.4. The difference was significant (P< 0.05). It was seen that the level of serum ferritin increased with increasing age.The manner in which hypothyroidism is linked to NAFLD is not exactly known. However, many mechanisms are proposed. Hypothyroidism has been associated with insulin resistance, dyslipidemia and obesity, all of which are important components of the metabolic syndrome. In addition, hypothyroidism is also associated with the metabolic syndrome, which plays an important role in the development of NAFLD.[10] Insulin resistance in the setting of hypothyroidism has been documented and is associated with decreased responsiveness of glucose uptake in muscle and adipose tissue to insulin, as well as decreased glycogen synthesis in skeletal muscle in both animal and human studies. Hypothyroidism patients have increased levels of leptin which increases collagen production and insulin resistance in the liver. Furthermore, hypothyroidism can also increase risk of hypertension.[11]

Markers of oxidative stress including reactive oxygen species and markers of lipid peroxidation have been reported in patients with hypothyroidism; abnormalities that also occur in NASH patients to a greater extent than other forms of NAFLD. This may explain, in part, the mechanism for the increased presence of hypothyroidism in NASH patients. Recently, mitochondrial dysfunction has been implicated in pathogenesis of NASH.[12]

CONCLUSION

Authors found thatserum ferritin could help in predicting the natural history of NAFLD in hypothyroidism patients. The serum ferritin levels were found to be increased in patients of fatty liver with hypothyroidism.

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