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PREVALENCE OF NON ALCOHOLIC FATTY LIVER DISEASE IN HYPOTHYROID PATIENTS IN NORTH INDIA

Biochemistry

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ABSTRACT

Objective: To know about the association between hypothyroidism and non-alcoholic fatty liver disease. **Materials And Methods:** It is a cross-sectional prospective study, demographic, clinical, laboratory, and radiological data of 100 adult patients with hypothyroidism were evaluated. **Results:** A total of 100 adult Participants were included in this study. Out of 100 participants 66 individuals with NAFLD had TSH more than 35 IU/ml. There was statistically significant difference in TSH levels with the participants with NAFLD. **Conclusion:** The study suggested that high TSH concentration is associated with increased risk of NAFLD. Subjects with subclinical hypothyroidism and overt hypothyroidism are at a higher risk for the development of NAFLD than those with normal thyroid function . Hence the principal finding of our study was a strong association of NAFLD with hypothyroidism

KEYWORDS

Hypothyroidism, Non-Alcoholic Fatty Liver, Thyroid Stimulating Hormone

INTRODUCTION

The thyroid gland is significantly involved in energy homeostasis, lipid and carbohydrate metabolism, regulation of body weight and adipogenesis.(1,2) In a clinical setting, subclinical hypothyroidism has been associated with metabolic syndrome, cardiovascular mortality and disturbance of lipid metabolism.(3,4) In recent years, growing body of evidence has led to speculation on the association between NAFLD and thyroid dysfunction. Early identification of at-risk patients is important since treatment of hypothyroidism may reduce the risk of NAFLD and its potential complications.(5)

Non-alcoholic fatty liver disease means accumulation of fat mainly triglyceride exceeding 5% of liver weight, affecting approximately 20% of population in developed countries.(6) A correlation between thyroid dysfunction, especially clinical or subclinical hypothyroidism, and NAFLD has been noticed. Disturbance in thyroid hormone concentrations may promote hyperlipidemia and obesity, thus contributing to NAFLD.(7,8)

Low thyroid hormone levels are related with hypo metabolism categorized by decreased weight gain, resting energy expenditure, reduced lipolysis, increased cholesterol levels, and reduced gluconeogenesis.(9) Thyroid hormones similarly have a role in hepatic lipid metabolism and hepatic insulin resistance.(10)

Working Classification Of NAFLD:

Type 1 NAFLD – Steatosis with no inflammation or fibrosis.
Type 2 NAFLD – Steatosis with nonspecific lobular inflammation but absent of fibrosis or hepatocyte ballooning.
Type 3 NAFLD – Steatosis with inflammation and fibrosis of variable levels
Type 4 NAFLD – Steatosis, inflammation, hepatocyte ballooning and fibrosis .

The objective of the present study was to see the prevalence of non alcoholic fatty liver disease in hypothyroid patients.

MATERIALS AND METHODS-

This study was conducted in the department of medicine, S.N. Medical College and Hospital, Agra on all newly diagnosed and old cases of 100 adult hypothyroidism patients attending the OPD or admitted in the wards. A written informed consent was obtained from each patient to take part in the study. The normal thyroid hormone concentrations (TT4: 12.8 – 20.4 pmol/l; TT3 3.92- 6.74 pmol/l). The ultrasound examination was done by an expert radiologist under standardized conditions in radiology department by a single radiologist. Examinations included assessment of the liver, gallbladder, kidneys and spleen.

Inclusion Criteria:

The diagnosis of clinically manifest hypothyroidism required reduced TT4 concentration (< 12.8 pmol/l) and elevated TSH levels (TSH ≥ 34 IU/ml).

Exclusion Criteria:

a) chronic liver disease with other etiologies rather than NAFLD b) alcohol consumption > 20 g/day, (> 14 drinks per week in males or 7 drink/week in females) c) using iron supplements, d) presence of any kind of infection, or history of rheumatological disorders, e) The patients who were taking medications known to cause fatty liver disease, f) Patients with chronic diseases like chronic kidney disease, any malignancy or overt diabetes mellitus, g) Unstable Patient

After selection of patients, fulfilling the above criteria, about 10 ml of blood sample was collected from each study participant through phlebotomy of the cubital vein and following test were performed-random glucose, alanine aminotranferase, aspartate aminotransferase, gamma glutamyl transferase, alkaline phosphatase, c-reactive protein, albumin, cholesterol.

TSH, TT3,TT4 and Anti-TPO were measured. Regular precision controls was perfomed to assure proper functioning of all laboratory equipment.

The approval of the Ethics and Research Committee was obtained.

Statistical Tools

The Information collected regarding all the selected cases were recorded in a Master Chart.

All data entered in EXCEL sheet analyzed using the appropriate SPSS Software for means, standard deviations and with confidence interval. P- value of < 0.05 is considered statistically significant.

RESULTS AND ANALYSIS

A total of 100 adult Participants were included in this study . From 100 participants, 67 (67%) individuals were females whereas 33 (33%) individuals were males. Most of the males (57.58%) and females (50.75%) were in the same age group of 31-40 yrs.

Table 1: Age And Sex Wise Distribution of Hyothyroid Patients (N= 100)

Group Age (Yrs)	Male		Female		Total	
	Number	%	Number	%	Number	%
<30	1	3.03	13	19.40	14	14.00
31-40	19	57.58	34	50.75	53	53.00
41-50	12	36.36	20	29.85	32	32.00
>50	1	3.03	0	0.00	1	1.00
Total	33		67		100	

Table 2: Mean Age of Hypothyroidism Patients

Sex	Number	Mean	SD	t-value	p-value
Male	33	39.42	6.19	- 1.874	0.0639
Female	67	37.03	5.90		

The subjects included in our study were more females (67%) as compared to males (33%).

Table 3: Symptoms at Time of Presentation of Non Alcoholic Fatty Liver Disease in Hypothyroidism (N = 100)

Symptoms	Female		Male		Total	
	No.	%	No.	%	No.	%
Dry Skin	4	12.12	16	23.88	20	20.00
Hair Fall	4	12.12	9	13.43	13	13.00
Irregular Menses	-	-	11	16.42	11	11.00
Lethargy	18	54.55	8	11.94	26	26.00
Weight Gain	7	21.21	23	34.33	30	30.00
Total	33	100.00	67	100.00	100	100.00

Chi-Square = 23.7 p- value = < 0.0001

The most common symptom at the time of presentation was weight gain seen in 30% of subjects followed by lethargy seen in 26%, dry skin in20%, hair fall in 13% and irregular menses in 11% females.

Table 4 : TSH of Non Alcoholic Fatty Liver Disease in Hypothyroid Patients (N=100)

TSH (IU/ml)	Male		Female		Total	
	No.	%	No.	%	No.	%
≤ 5.0	0	0.00	0	0.00	0	0.00
5.1-20.0	5	15.15	5	7.46	10	10.00
20.1-35.0	6	18.18	8	11.94	14	14.00
35.1-50.0	11	33.33	22	32.84	33	33.00
50.1-65.0	2	6.06	17	25.37	19	19.00
>65.0	9	27.27	15	22.39	24	24.00
Total	33	100.00	67	100.00	100	100.00

Chi-square = 8.34 p- value = 0.080

The TSH value of NAFLD in hypothyroid patients was highest 33% in the range of 35.1- 50.0 IU/ml, followed by 24% in the range of > 65.0 IU/ml, 14% in range of 20.1- 35.0 IU/ml and 10% in the range of 5.1 – 20.0 IU/ml. No patients was found to have TSH value ≤ 5.0. Most of the males (33.33%) and females (32.84%) of non alcoholic fatty liver disease in hypothyroidism had TSH value in the same range of 35.1-50.0 IU/ml with p value 0.08 , which was significant.

DISCUSSION:

Hypothyroidism has been associated with insulin resistance, dyslipidemia and obesity all of which are important components of metabolic syndrome. In addition , hypothyroidism is also associated with the metabolic syndrome, which plays an important role in the development of NAFLD. In a study by Liangpunsakul and Chalasani (11) the association between thyroid dysfunction and NAFLD have been characterized by relatively small sample and gender imbalance showing female preponderance. Mean age of male patients was 45.58 yrs. And female was 45.09 yrs. which was fairly correlated.In a another study Pagadala et al (12) found that hypothyroidism was more frequent among patients with NAFLD compared to controls.

CONCLUSIONS:

The study suggested that high TSH concentration is associated with increased risk of NAFLD. Subjects with subclinical hypothyroidism and overt hypothyroidism are at a higher risk for the development of NAFLD than those with normal thyroid function . Hence the principal finding of our study was a strong association of NAFLD with hypothyroidism

REFERENCES

1. Michalaki MA,Vagenakis AG,Leonardou AS,Argentou MN,Habeos IG, Makri MG,Psyrogiannis AI,Kalfarentzos FE,Kyriazopoulou VE. Thyroid function in humans with morbid obesity. Thyroid 2006;16:73-78.
2. Raftopoulos Y,Gagne DJ,Papasavas P,Hayetian F,Maurer J,Bononi P,Caushaj PF. Improvement of hypothyroidism after laproscopic Roux-en-Y. Gastric bypass for morbid obesity. Obes Surg 2004; 14:509-513
3. Rodondi N,Den Elzen WP,Bauer DC,Cappola AR,Razvi S,Walsh JP,Asvold BO,Iervasi G,Imaizumi M,Collet TH,Bremmer A,Maisonneuve P,Sgarbi JA,Khaw KT, Vanderpump MP, Newman AB,Cornuz J,Franklyn JA,Westendorp RG,vittinghoff E,Gussekloo J. Subclinical hypothyroidism and the risk of coronary heart disease and mortality. JAMA 2010;304:1365-1374
4. Pucci E,Chiovato L,Pinchera A. Thyroid and lipid metabolism. Int J Obes Relat Metab Disord 2000; 24 suppl 2:S109-S112
5. Ineck BA,Nag TM. Effects of subclinical hypothyroidism and its treatment on serum lipids . Annal Pharmacother. 2003;37:725-730.
6. Arafat Kassem, Farag khalil,Mokhtar Ragab Ramadan,Mohammad Rashed. Association and impact of non-alcoholic fatty liver disease on thyroid function. Int.J. Curr.Res.Med.Sci. 2017;3(7): 94-107.
7. Chung GE,Kim D,Kim W,Yim JY,Park MJ,Kim YJ. Non-alcoholic fatty liver disease across the spectrum of hypothyroidism. J Hepatol. 2012;57:150-156.
8. Loria P,Carulli L,Bertolotti M,Lonardo A. Endocrine and liver interaction: the role of endocrine pathways in NASH. Rev Gastroenterol Hepatol. 2009;6:236-247
9. Pucci E,Chiovato L,Pinchera A. Thyroid and lipid metabolism. Int J Obes Relat Metab Disord. 2000;24(2):109-12.
10. Sinha RA,Singh BK,Yen PM. Thyroid hormone regulation of hepatic lipid and carbohydrate metabolism. Trends Endocrinol Metab. 2014;25:538-5.
11. Liangpunsakul S,Chalasani N. Is hypothyroidism a risk factor for non-alcoholic steatohepatitis? J Clin Gastroenterol. 2003;37:340-3.
12. Pagadala MR,Zein CO,Dasarathy S,Yerian LM,Lopez R,Mccullough AJ. Prevalence of hypothyroidism in non-alcoholic fatty liver disease. Dig Dis Sci.2012;57:528-34.