

Incidence of secondary dyslipidemia and NAFLD in women with hypothyroidism

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ABSTRACT

Background: Hypothyroidism is one of the underlying conditions in most of the women with dyslipidemia. Derangement in the thyroid hormone levels can affect mainly the cholesterol biosynthesis and lipoprotein metabolism. They even develop atherosclerosis and various cardiovascular events. Hence dyslipidemia management by treating underlined hypothyroidism is one of the best ways to deal with the said problem. For the same screening of thyroid profile is must in all middle aged dyslipidemia. **Methods:** The present study included 540 cases and 550 controls. All patients diagnosed with hypothyroidism were enrolled into the study. Thyroid function tests- serum T3, T4 and thyroid stimulating hormone (TSH) were done for all the study participants. **Results:** Out of 540 cases of hypothyroidism 269 (49.8%) patients showed dyslipidemia with type 2 Diabetes and NAFLD, 126 (23.3%) patients showed dyslipidemia with type 2 diabetes but no NAFLD, 145(26.8%) study participants reported with no dyslipidemia or type 2 diabetes or NAFLD.

Conclusion: The present study reported high incidence of dyslipidemia and NAFLD in female with hypothyroidism

Keywords: Hypothyroidism, dyslipidemia, NAFLD, Metabolic syndrome, Type 2 diabetes

INTRODUCTION

Incidence of cardiovascular disease is increasing in women. Dyslipidemia, metabolic syndrome and hypothyroidism was found to be associated with CVD risk in these women. TSH, T3 and T4 are essential for the normal functioning of different parts of the body, disturbance in their levels can cause a wide variety of symptoms. The most common symptoms of hypothyroidism are fatigue, cold sensitivity, constipation, dry skin, and weight gain. Thyroid hormones controls variety of metabolic pathways. Dysfunctional thyroid gland considerably affects mainly lipoprotein metabolism and indirectly carbohydrate metabolism also. Due to these metabolic derangements it is associated to the risk of development of cardiovascular disease (CVD) [1-2].

A minute elevation in concentration of circulatory TSH can affect the lipid profile. Many researchers have studied the presence of NAFLD in hypothyroidism; some studies have shown contradictory results [3-5]. Liu et al. observed a positive correlation between T3 and TSH levels with the risk of NAFLD in hypothyroidism patients [3]. A done by Van der Bergh et al. supported that NAFLD patients have higher T3 and lower T4 levels; but did not reported the differences related to TSH [4]. While Guo et al. in their meta-analysis reported that TSH level may be positively correlated with NAFLD, independently of T3, T4 levels [5]. Hence screening of thyroid profile may be useful indicator for the treatment of dyslipidemia and NAFLD in

diminishing the further risk of CVD [6]. The aim of this study is to compare the prevalence and association of dyslipidemia and NAFLD with thyroid profile in women with hypothyroidism.

Materials and methods

The present study was carried out on females with hypothyroidism and controls. The study included 540 patients and compared with age and gender matched controls 550. Biochemical investigations like fasting Blood Sugar (FBS), Glycosylated hemoglobin, thyroid profile (Free T3, Free T4, and TSH) and Lipid Profile were performed for all the study subjects. The results were tabulated on excel sheets and statistical comparison and analysis was done with SPSS Version 20.0. Inclusion Criteria: Patients suffering with hypothyroidism, Age between 35 and 55 years. Exclusion Criteria: Hyperthyroidism, other endocrine disorders, pregnancy.

Results: The present study observed a significant increase anthropometric parameters and lipid parameters in hypothyroidism patients than controls. TG and LDL have shown an increased pattern in their circulatory levels - TG [168.4 (\pm 86.5)/ 120.4 (\pm 42.5)], LDL [121.1 (\pm 43.4)/ 98.2 (\pm 38.5)] and HDL [43.8 (\pm 6.4)/ 54.6 (\pm 8.5)]. A significant difference was found in circulatory levels of T3, T4 and TSH in hypothyroidism patients than controls [56.1 (\pm 15.3)/ 116.3 (\pm 30.2)], [0.32 (\pm 0.19)/ 6.4 (\pm 2.7)] and [18.5.5 (\pm 4.7)/ 1.5 (\pm 0.4)] respectively. A significant increase has been observed in hypothyroidism patients than study controls. Further NAFLD and type 2 diabetes was confirmed in some of the hypothyroidism study participants and they were further grouped based on the presence of dyslipidemia, type 2 diabetes and NAFLD. Out of 540 women with hypothyroidism 269 (49.8%) women showed dyslipidemia with type 2 Diabetes and NAFLD, 126 (23.3%) women showed dyslipidemia with type 2 diabetes but no NAFLD, while 145(26.8%) women reported with no dyslipidemia or type 2 diabetes or NAFLD. Further a significant association has been observed with dyslipidemia and NAFLD in hypothyroidism while Type 2 diabetic patients did not show any significant association with TSH.

Discussion

Derangement in thyroid function may affect lipid profile also. It has been observed that in hypothyroidism most of the patient has dyslipidemia. Undiagnosed hypothyroidism could be the main reason for most of the dyslipidemic patients [7]. A critical evaluation of thyroid function has to be done in these patients for regulating dyslipidemia by correction in thyroid dysfunction [8, 9]. Most of the post-menopausal women suffering with metabolic syndrome have to be screened for thyroid function to avoid the morbidity and mortality due to cardiovascular diseases. The screening of thyroid function is cost effective and prevents the advancement of CVD due to dyslipidaemia and other metabolic derangements [10]. TSH and LDL showed statistically significant association in our study, but TSH and FBS failed to show a significant correlation. There is a link between the carbohydrate and lipid metabolism. Metabolism of lipids is directly associated with that of insulin and the association between lipid and carbohydrate disorders in patients with hypothyroidism is related to increased risk of atherosclerosis or myocardial infarction [11]. Various studies reported the association of NAFLD with hypothyroidism [12-15]. In a study Adams et al observed association between hypothyroidism, NAFLD and CAD risk [12]. Ballestri et al studied the extra hepatic complications associated with NAFLD [13]. Padsalge et al in 2019, reported high levels of ALT and AST in hypothyroidism [14]. Hence it has been observed in various studies that dyslipidemia and NAFLD both are associated with hypothyroidism. Dyslipidemia and NAFLD both are considered as the risk factors for atherosclerosis. Blum suggested significance of thyroid hormone therapy in atherosclerotic patients with subclinical hypothyroidism [15].

Conclusion: The present study reported high incidence of dyslipidemia and NAFLD in female with hypothyroidism. TSH can be used as an indicator for therapeutic management of dyslipidemia in women with hypothyroidism.

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Table 1: Demographical Characteristics of study subjects

Variables	Hypothyroidism (n=540)	Controls (n=550)	P value
Age	49.4 (\pm 17.8)	47.3 (\pm 13.6)	NS
BMI	28.9 (\pm 4.3)	24.8 (\pm 3.6)	0.005
WC	100.4 (\pm 11.5)	95.5 (\pm 10.7)	0.001
WHR	1.03 (\pm 0.3)	0.96 (\pm 0.6)	0.001
FBS	132.6 (\pm 55.4)	96.3 (\pm 28.3)	0.000
HBA1c	6.1 (\pm 1.8)	5.7 (\pm 1.4)	0.005
TG (mg%)	168.4 (\pm 86.5)	120.4 (\pm 42.5)	0.005
TC (mg%)	220.2 (\pm 55.3)	173.4 (\pm 32.1)	0.005
LDL (mg%)	121.1 (\pm 43.4)	98.2 (\pm 38.5)	0.005
HDL (mg%)	43.8 (\pm 6.4)	54.6 (\pm 8.5)	0.001

Table No. 2: Comparison of Thyroid profile in Controls and subjects with Hypothyroidism

Variables	Hypothyroidism (n=540)	Controls (n=550)	P value
T3 ng/dl	56.1 (\pm 15.3)	116.3 (\pm 30.2)	0.000
T4 μ g/dl	0.32 (\pm 0.19)	6.4 (\pm 2.7)	0.000
TSH mU/L	18.5 (\pm 4.7)	1.5 (\pm 0.4)	0.000

Table No. 3: Subgroups of hypothyroidism patients

Group	Hypothyroidism	Cases
Group-I	Dyslipidemia , type 2 Diabetes, NAFLD	269
Group-II	Dyslipidemia and type 2 Diabetes but no NAFLD	126
Group-III	No dyslipidemia/ type 2 Diabetes/ NAFLD	145