

Evaluation of Lipid Profile Levels among Patients Complaining from Thyroid disorders at King Abdulaziz Medical City, Riyadh

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Abstract:

This study aimed to identify prevalence of diabetes mellitus (DM) among thyroid patients and to evaluate the levels of different type of lipid profile among those patients. Hundred patients diagnosed with hyperthyroidism or hypothyroidism of all age groups admitted at King Abdulaziz Medical City, Riyadh (KAMC-R) in 2013 were enrolled in this study. Relevant biochemical laboratory data for study population was retrieved from biochemistry laboratory database and the obtained data were analyzed using SPSS computer program. The result showed high prevalence of DM (57%) among patients and mean level of HbA1c (7.9%). Results of this study observed normal levels of total cholesterol, triglycerides, high density lipoprotein, and low density lipoprotein (4.1), (1.7), (1.0), (2.3) when compared with

reference values (5.2), (1.7), (1.6), (2.6) respectively. This study concluded that thyroid disease could be considered as a risk factor for developing DM.

Key words: Hypothyroidism, hyperthyroidism, diabetes mellitus, lipid.

INTRODUCTION:

Thyroid gland controls a varied number of metabolic reaction and hormones secreted by this gland considerably touch the metabolism and breakdown of organic compound like lipoprotein, which a count as risk factor for some cardiac diseases. Slightly increase of different levels in lipid profile including cholesterol, triglycerides, high density lipoprotein HDL low density lipoprotein LDL, usually being with parallel with slightly increase of thyroid stimulating hormone as well as being with in normal levels ⁽¹⁻⁴⁾. Also Furthermore thyroid hormone affects different number of analytes that engaged in heart and blood vessels diseases, because these hormones disturb enzyme secretion and breakdown of adipocyte ⁽⁵⁻⁶⁾.

Patient with hypothyroid may show increase concentration of HDL levels due to increased concentration of sub fraction particle known as HDL₂. Two mechanisms are influenced in the increase of HDL₂, the first one is a decrease in the activity of HL which lead to reduce in HDL₂ catabolism, while the second mechanism is a decrease activity of specific protein Cholesterylester transfer protein CETP activity which results in reducing in transformation very low density lipoprotein to high density lipoprotein causing accumulation of HDL. Moreover patients with hypothyroidism have increased levels of apolipoproteins (a), which usually account as risk factor for cardiovascular disease ⁽⁷⁻¹²⁾. Hypothyroidism can lead to progress of atherosclerosis in people fed with animal

cholesterol, while administrating of thyroid hormones as medications reduces the incidence of developing of atherosclerosis⁽¹³⁾.

Hyperthyroidism is assigned as one of considerable factor that can cause acquired hypobetalipoproteinemia; furthermore hyperthyroidism can be accounted as indirect means for treatment of lipid profile in hyperlipidemic patients⁽¹⁴⁾. Furthermore excess of thyroid hormone increase the rate of lipid metabolism especially break down of stored triglycerides within adipose tissue result in increased production of non-esterified fatty acid, eventually increase the rate of lipid peroxidation and formation of ketones bodies. Low level of serum cholesterol in patient with hypothyroidism may be as result of increase biliary excretion of cholesterol⁽¹⁵⁻¹⁷⁾.

When comparing the incidence of hyperthyroidism to hypothyroidism, occurrence of first condition is lesser (2.2%) in contrast with hypothyroidism in the all population. Correspondingly, a decrease in prevalence of hyperthyroidism is clear in the decrease number of hyperlipidemic patients⁽¹⁸⁾.

MATERIALS AND METHODS

A quantitative retrospective chart review study was conducted at Department of Clinical Chemistry, King Abdulaziz Medical City (KAMC) in Riyadh, Saudi Arabia, during the period from August to December 2014. Clinical data from patients diagnosed with thyroid diseases, of all age groups, admitted at KAMC in 2013 and excluding patients with partial or total thyroidectomy.

Data collection methods

After approval from Institutional Review Board of National Guard, relevant data for study population was obtained from biochemistry laboratory database, computer printout of

demographic data, discharge clinical events, and outcomes were collected from medical records department at KAMC. All data were tabulated in the master sheet prior to analysis.

Data management and analysis plan

The statistical analysis was performed using SPSS version 20 (The International Business Machines Corporation, New York). The descriptive results are expressed as mean \pm standard deviation and percentage. Variables of the patients group were correlated with each other by Pearson correlation test.

RESULTS:

The study involves 100 thyroid patients, 35 patients (35%) of them were male and 65 patient (65%) were female as indicated in table (1). 57 patients (57%) were diagnosed with diabetes mellitus type 2 while 43 patients (43%) were non diabetics as indicated in table (2). Patient's results for thyroid function, lipid and glycosylated hemoglobin were expressed as mean \pm Standard deviation as indicated in table (3). Correlation between HbA1c with triglycerides and correlation between triglycerides and cholesterol were indicated in figure (1,2,3).

Table (1): Frequency of sex among patients

Variable	Number	Percent
Male	35	35%
Female	65	65%

Table (2): Prevalence of Diabetes Mellitus among patients

Variable	Number	Percent
Diabetics	57	57%
Non diabetics	43	43%

Table (3): Base line parameter among patients

Variable	Mean	Reference value
T4	43.0±30	9.0-19.0 (mIU/L)
TSH	13.6±3.1	035-4.94 (Pmol/l)
HbA1C	7.9±2.2	4.4-6.4%
Total cholesterol	4.1±1.1	<5.18 (mmol/L)
Triglycerides	1.7±1.0	<1.70 (mmol/L)
HDL	1.0±0.3	>1.55 (mmol/L)
LDL	2.3±0.9	<2.60 (mmol/L)

The table shows mean ± Std. deviation, reference range and units between brackets



Fig (1): A scatter plot shows the relationship between levels of Triglycerides in mmol/l and HbA1c in % ($r=0.258$, $P=0.001$)

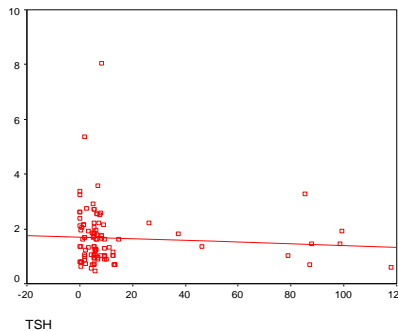


Fig (2): A scatter plot shows the relationship between levels of TSH in Pmol/l and Triglycerides in mmol/l ($r=-0.021$, $P=0.837$)

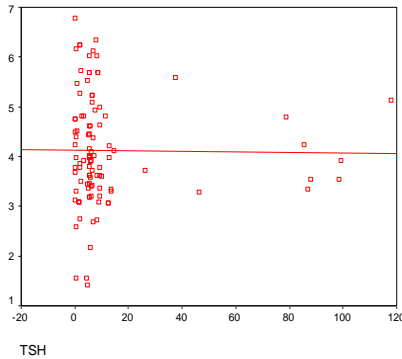


Fig (3): A scatter plot shows the relationship between levels of TSH in Pmol/l and Cholesterol in mmol/l ($r=0.018$ $P=0.857$)

DISCUSSION:

In the present study high prevalence of DM type 2 is reported among patient with thyroid disorder, our observations are agreed with previous similar studies performed by ⁽¹⁹⁾, whom indicated (20%) of thyroid patients with prediabetes and (38%) with diabetes.

Furthermore it has been noticed that a marked increase in HbA1C levels in diabetic patients, which agree with result reported by ^(20,21) (7.4%) and (9.03) respectively, this elevation of HbA1c due to impair function of thyroid hormone which in turn has regulatory impact on carbohydrate metabolism and subsequently affect the level of glucose in the blood. As elevated HbA1c and is independent risk factors of CVD, patients with elevated HbA1c can be considered as a very high risk group for cardiovascular diseases.

Our results obtained normal levels of lipid profile, which agree with the results reached by ⁽²²⁾, whom sited that all parameters of lipid profile in reference range (except HDL)

In the current study, it was found that TSH was insignificantly and independently associated with total cholesterol and triglycerides, these findings were in agreement

with the previous studies observed by ⁽²³⁾ whom indicated that association between TSH with lipid profile was not significant in their population.

Nevertheless, there are few studies reporting results different from the current study. According to study done by ⁽²⁴⁾ there was strong association between thyroid stimulating hormone and triglycerides in blood but not with total cholesterol. It has been also revealed that T4 level was significantly related to total cholesterol level as well as HDL and LDL.

CONCLUSION:

It is concluded that thyroid disease could be considered as a risk factor for developing DM. Accordingly, management of HbA1C and thyroid hormones level should be maintained.

It is also concluded that there were no obvious relation between thyroid hormone and different lipid profile.

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