

Research Article**Evaluation of serum lipid profile in Sudanese patient with thyroid dysfunction**Sayed Mohammed¹, Abd Alrahman Abd Alla², Abd Alazeem Siddeg³, Adel Nasr⁴¹Giad Specialized Hospital Khartoum Sudan²U. of K. Soba U. Hospital Khartoum Sudan.³Zein Medical Centre Khartoum Sudan⁴Department of Chemical Pathology, Faculty of Medical Laboratory Science, U of K Khartoum Sudan.***Corresponding author**

Sayed Mohammed

Email: sayedmse@hotmail.com

Abstract: The objective of this study was to evaluate the effect of thyroid dysfunction on serum lipid profile in Sudanese population. Blood samples were collected from 60 subjects (51 women – 9 men) in the age average from (27 – 58) the blood was analyzed for the level of FT3, FT4, TSH by the Roche Elecsys 2010 Soba University Hospital. Patient with thyroid dysfunction were categorized into hypothyroid and hyperthyroid with increased and decreased level of TSH respectively. Lipid profile of Total Cholesterol, Triglycerides, HDL cholesterol and LDL cholesterol were measured and compared between normal and patient with thyroid dysfunction. In patient Hypothyroid the result shows elevated in Total Cholesterol, Triglycerides, LDL Cholesterol, and VLDL and significantly decreased in HDL Cholesterol. Hyperthyroid patient the result shows low HDL Cholesterol with no significant changes in Total Cholesterol, Triglycerides and LDL Cholesterol. Thyroid dysfunction should be taken into account when evaluating and treating dyslipidemic patient.

Keywords: Hypothyroidism; Hyperthyroidism; Lipid Profile

INTRODUCTION

Thyroid hormones have significant effects on the synthesis, mobilization and metabolism of lipids [1, 2]. Overt hypothyroidism is associated with significant increases in circulating concentrations of total and low density lipoprotein cholesterol (LDL-C) [3, 4, 5]. Thyroid dysfunction is more common in women and epidemiological rate of prevalence rise with age [6, 7]. The serum TSH assay is an account test for detecting out of range circulating level of thyroid hormone for either of thyroid dysfunction [8]. Thyroid function significantly affects lipoprotein metabolism as well as some cardiovascular disease (CVD) risk factors [9,10,11]. Thyroid hormones can influence High Density (HDL) metabolism by increasing cholesteryl ester transfer protein (CETP) activity, which exchanges cholesteryl esters from HDL to VLDL and Triglycerides (Tg) to the opposite direction [6]. In addition, thyroid hormones stimulate the lipoprotein lipase (LPL), which catabolizes the Tg-rich lipoproteins, and the hepatic lipase (HL), which hydrolyzes HDL2 to HDL3 and contributes to the conversion of intermediate-density lipoproteins (IDL) to LDL [12,13].

MATERIALS AND METHOD

Study consists of a total of 60 subjects, 40 with thyroid dysfunction and 20 normal subjects. There were

36 females, 4 males in thyroid dysfunction group (26 hypothyroidism & 14 hyperthyroidism) and 15 females, 5 males in normal group. All subjects were between 27 to 58 years of age group. All the subjects included were recruited from Soba University Hospital, and having almost similar economic status, food habits and physical activities. Patients with any known chronic. None of the participants was diagnosed with neoplastic renal, liver disease, diabetes mellitus or familial hypercholesterolemia. Subjects receiving drugs known to affect lipid metabolism were excluded from the study. Smoking habits were comparable in both the patient and the control group. Study was carried out at chemistry laboratory of Soba University Hospital. Blood samples were collected in the morning after at least 12 hours overnight fast followed by general questionnaire for chemical investigations serum was separated by centrifuge at 3000 rpm for 10 minutes and was stored into refrigerator 4°C until analysis.

The quantitative determination of FT3 (normal range 1.9-5.1 pg/mL) FT4 (normal range 0.9-1.7 ng/dl) TSH (normal range 0.27-4.2 µU/mL) in human serum were measured by Electrochemo luminance technique (ECL) using the reagent kit by ROCHE Diagnostic GmbH Standhofer Strasse 116 D- 68305 Mannheim using Elecsys 2010 automation machine (Immunoassay) sensitivity of the method respectively. Serum total

cholesterol (normal range 50-200 mg/dl) Triglycerides (normal range 50-200 mg/dl), (Cholesterol, Triglycerides) determined by enzymatic colorimetric method. HDL cholesterol (normal range 35-55mg/dl) and LDL cholesterol (normal range 49-172 mg/dl)determined by homogenous enzymatic colorimetric assay, using the reagent kit by Roche Diagnostic GmbH Standhofer Strase 116 D- 68305 mannheim using COBAS-INTEGRA 400 Plus .

RESULT

The study originally recruited 51 female and 9 male subjects. Complete demographic and biochemical (thyroid hormones, lipid profile) data were available for 60 subjects. Hypothyroidism patients (high TSH) had significantly higher level of serum total cholesterol triglycerides LDL cholesterol and low HDL

cholesterol than in hypothyroidism which shows lower than Normal subjects. .

Table 1 shows the mean of Thyroid Hormones and Lipid Profile Table 2 shows normal descriptive statistics (Total Cholesterol, Triglycerides, HDL and LDL). Table 3 shows Hypothyroidism descriptive statistics (Total Cholesterol, Triglycerides, HDL and LDL). Table 4 shows Hyperthyroidism descriptive statistics (Total Cholesterol, Triglycerides, HDL and LDL). Table 5 shows statistics analysis (ANOVA). Table 6 shows significant difference (P Value) Hypothyroidism subjects showed significant increase in TSH levels and normal, FT3, FT4 levels. While, in hyperthyroidism subjects low TSH and normal FT3 and FT4. And graph 1 Hyperthyroidism, graph 2 Hypothyroidism and graph 3 Normal.

Table-1: The mean of Thyroid Hormones and Lipid Profile

Parameters	Normal N = 20	Hypothyroidism N = 26	Hyperthyroidism N = 14
TSH	1.31	11.56	0.19
FT3	4.51	4.46	5.14
FT4	0.79	1.22	1.31
Total Cholesterol	168	298	149
Triglycerides	118	281	89
HDL Cholesterol	52.5	33.2	42.3
LDL Cholesterol	92.9	208.1	88.9

Table-2: case normal Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
T. Cholesterol	20	149.00	184.00	169.0000	1.77951	8.15475
Triglyceride	20	78.00	140.00	118.0000	3.19672	14.64923
HDL	20	38.00	62.00	54.8100	1.45252	6.65627
LDL	20	65.60	109.20	90.5900	2.28413	10.46718
Valid N (list wise)	20					

Table-3: Hypothyroidism Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
T. Cholesterol	14	248.00	380.00	298.0000	8.17254	31.65213
Triglycerides	14	236.00	318.00	281.0000	6.22285	24.10098
HDL	14	28.00	40.00	33.2143	.98163	3.80185
LDL	14	164.00	297.20	208.5857	9.23004	34.53564
Valid N (list wise)	14					

Table-4: Hyperthyroidism Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
T. Cholesterol	26	124.00	177.00	154.7308	2.89804	14.77717
Triglycerides	26	66.00	131.00	92.4231	3.59409	18.32632
HDL	26	35.00	54.00	43.9349	1.05156	5.36192
LDL	26	57.60	115.20	92.3112	3.20419	16.33825
Valid N (list wise)	26					

Table-5: ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
T. Cholesterol	Between Groups	215455.723	2	107727.862	305.352	.000
	Within Groups	20815.115	59	352.799		
	Total	236270.839	61			
Triglycerides	Between Groups	364440.428	2	182220.214	516.370	.000
	Within Groups	20820.346	59	352.887		
	Total	385260.774	61			
HDL	Between Groups	4133.961	2	2066.980	67.480	.000
	Within Groups	1807.229	59	30.631		
	Total	5941.190	61			
LDL	Between Groups	147806.004	2	73903.002	175.888	.000
	Within Groups	24369.934	58	420.171		
	Total	172175.939	60			

Table-6: significant difference (P Value)

Cases	Minimum	Maximum	Mean	Standard Deviation	P_value
T. Cholesterol					
Normal	149.00	184.00	169.0000	8.15475	0.000
Hypothyroidism	248.00	380.00	298.0000	31.65213	
Hyperthyroidism	124.00	177.00	154.7308	8.15475	
Triglycerides					
Normal	78.00	140.00	118.00	14.64923	0.000
Hypothyroidism	236.00	318.00	281.00	24.10098	
Hyperthyroidism	66.00	131.00	92.4231	18.32632	
HDL					
Normal	38.00	62.00	54.8100	6.65627	0.000
Hypothyroidism	28.00	40.00	33.2143	3.80185	
Hyperthyroidism	35.00	54.00	43.9349	5.36192	
LDL					
Normal	65.60	109.20	90.5900	10.46718	0.000
Hypothyroidism	164.00	279.20	208.5857	34.53564	
Hyperthyroidism	57.60	115.20	92.3112	16.33825	

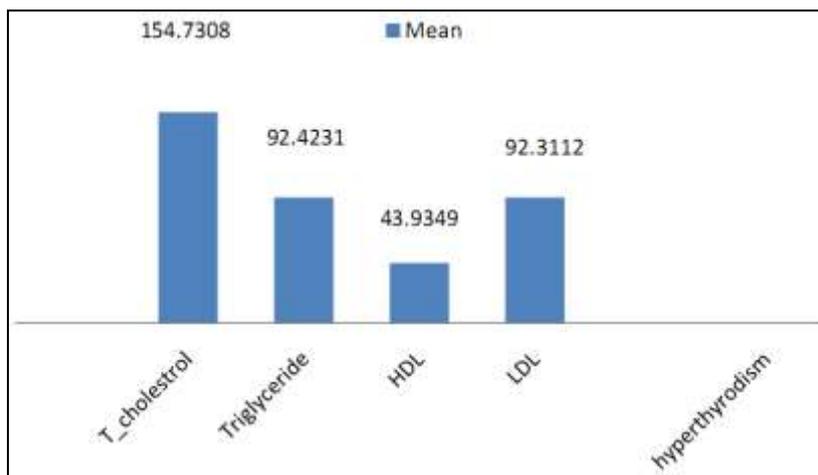


Fig 1: Lipid Profile in Hyperthyroidism

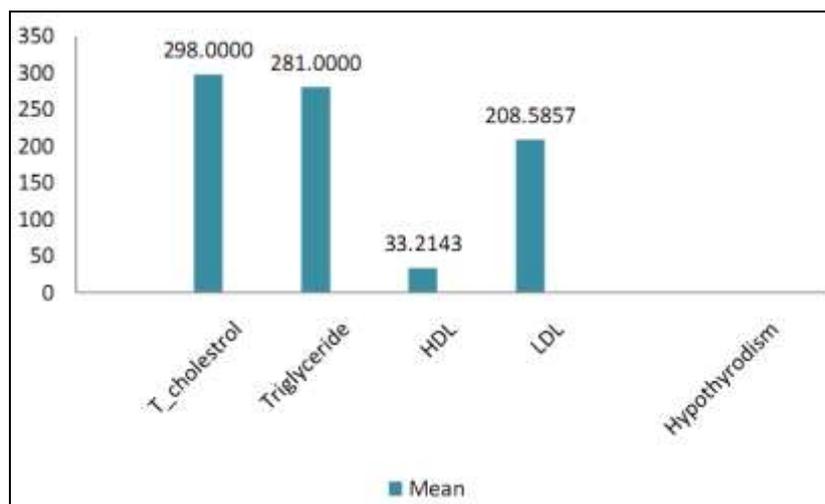


Fig 2: Lipid Profile in Hypothyroidism

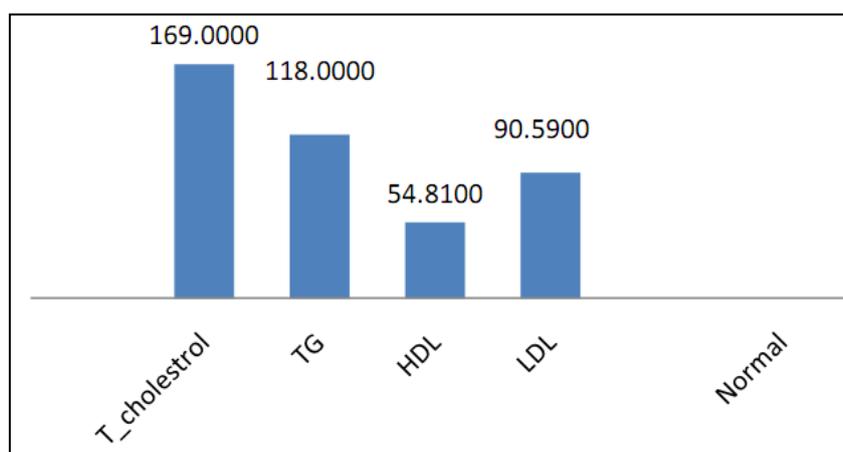


Fig 3: Lipid Profile in Normal

DISCUSSION

Normal thyroid function is the most important for normal lipoprotein metabolism so that alteration of the thyroid function leads to alteration in lipoprotein metabolism as well as lipid profile. Thyroid function affects lipoprotein metabolism as well as CVD risk factors [18]. Studies show hypothyroidism is associated with increased levels of TC and LDL-C [19], additionally increased TG [20] and decreased HDL-C levels [21]. We observed hypothyroidism showed significantly increased levels of TC, Tg, LDL-C, VLDL-C, TC/HDL-C ratio and decreased HDL-C. Indeed there have been studies indicating no significant difference in lipid profile between hypothyroid patients and controls [22, 23]. In our study hypothyroid subjects showed decreased HDL-C levels and increase parameters of Total cholesterol Triglycerides and LDL-C. Low HDL-C levels are due to increased CETP mediated transfer of cholesteryl esters from HDL to VLDL [24]. Levels of TC, TG and LDL-C remained unchanged in hyperthyroidism subjects under the study. Biochemical screening for thyroid dysfunction is critical in all dyslipidemic patients as well as in all patients with unexpected improvement or worsening of their lipid profile [25]. Our study concludes that

hypothyroidism patients show a hyper lipidemic profile, while in hyperthyroidism patients lipid profile remains unchanged.

CONCLUSION

In the Khartoum City, Sudanese population we studied, thyroid dysfunction was more common among females than males. Our results showing an association between thyroid dysfunction and hyper lipidemia agree with the results of previous studies [14, 15, 16, 17]. In addition, among subjects with hypercholesterolemia, subclinical hypothyroidism was more common.

Acknowledgment

We thank Nashwa, medical staff of Soba Hospital and all that who help and encourage us to complete this study.

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