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Blood Lipid profile in Sudanese hypothyroid patients

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Abstract

The effect of hypothyroidism on the blood lipids profile in Sudanese hypothyroidism patients were studied in (80) individuals divided into two groups. Forty hypothyroid patients and (40) euthyroid. They were chosen from the patients visiting the National Tumour Centre (NTC) in Khartoum State. The study carried out from (October 2000 up to April 2001). The objective of this study was to estimate the levels of thyroid hormones and lipid profile parameters of Sudanese hypothyroid patients compared them to control group, and also to study the effect of hypothyroid condition in lipid profile answer specific question about difference in sex factor between males and females. Blood sample were taken, thyroid hormones measurement used immunradometric assay (IRMA) and radioimmun assay (RIA), which used specific reagents obtained from department of isotope (Beijing, china), lipids profile test were measured by commercial kits of enzyetic-spectrophotometric, from Biosystem, S.A brova, Barcelona (Spain). The means levels results of thyroid hormones T_4, T_3 showed significant ($P < 0.001$) decreased in hypothyroid groups compared to control groups of both sex. TSH showed significant ($P < 0.001$) increased in hypothyroid groups compared to control groups of both sex Table-1. The means level of total lipids and triglycerol showed significant ($P < 0.001$) increased in hypothyroid of both sex compared to control group, but hypothyroid female showed slight increased without significant when compared to males hypothyroid Table-2. The means levels of cholesterol and phospholipids showed significantly increased ($P < 0.001$) in hypothyroid groups of both sex compared to control group of both sex Table-3. In contrast to total lipids and traiacylglycerol of hypothyroid males the means level of cholesterol and phospholipids showed increased when compared to hypothyroid females Table-3. This study concluded that the levels of thyroid hormones in hypothyroid group reported lower values of T_4 and higher values of TSH compared to euthyroid subjects, but T_3 exhibited no clear difference between hypothyroid groups and euthyroid groups. The four lipids parameters reported higher values in hypothyroid subjects compared to the euthyoid. The plasma lipids profile is highly affected in hypothyroid female reported significantly ($P < 0.001$) higher triacylglycerol levels compared to males group.

Key wards: Hypothyroidism, lipid profile.

Introduction

The thyroid gland disorders are one of the commonest endocrine disorders in human. This disorders affects all age groups and both sex with the females to be affected more than males. Thyroid disorders can be congenital or acquired[1]. Thyroid dysfunction is one of the public health problems in Sudan iodine deficiency has been recognized since the year 1952 by Woodman, who described three areas of deficient in iodine namely the Upper Nile in the South, around Damar in the North and Darfour in the Western part of Sudan [2]. Later Kambal eta l., reported that in Darfour province the prevalence of goiter was 58% [3] . In recent study conducted by Osman and Fath at Darfour among (20) neonates and (190) children aged one month to seven year, the means of serum concentrations of T_4 was found to be very low and serum TSH was high, and the incidence of hypothyroidism was estimated as (25%)[4]. Thyroid hormones appear to stimulate virtually all aspects of lipids metabolism including synthesis, mobilization and degradation. The changes in plasma lipids concentrations are well known as metabolic consequences of thyroid dysfunction. Hypothyroidism was associated with hypercholesterolemia and frequency also with moderate hypertriglyceridemia[5]. In general degradation was affected more than synthesis, Norbert and Tietz, and Baragall et al., demonstrated that thyroid status in human is an important factor in the regulation of lipoprotein metabolism[5,6]. It was found that hepatic lipogenic capacity was increased in hyperthyroidism and reduced in hypothyroidism[7]. In study of the effect of thyroid subclinial hypercholesterolaemia in patients with subclinical hypothyroidism indicated that subclinical hypothyroidism was two to three times more frequent in people with an elevated total plasma cholesterol[8]. In this study we estimate the effects of hypothyroidism condition on blood lipid profile as total lipid, triacyglycerol, total cholesterol and phospholipid in hypothyroid patients compared to controls groups of both sex, and to estimate sex factor differences.

Material and Methods

Subjects: The patients were chosen from (NTC) in Khartoum State. They were referred to different parts of Sudan. The selection of the patients in the study was based on the following criteria: i. Should be newly admitted to NCT. ii. Not have taken

any specific treatment for thyroid disease. iii. Should have symptoms and sign of hypothyroidism.

Thyroid hormone measurement T_3, T_4 and TSH: All thyroid hormones measurement used immunradometric assay (IRMA) and radioimmun assay (RIA) which used specific reagents obtained from department of isotope (Beijing, china). The reagents include tracers, standards and antibodies.

Determination of lipid profile: All lipids profile test were measured by commercial kits of enzyetic-spectrophotometric, Biosystem, S.A brova, Barcelona (Spain).

Statistical analysis: All values were express as mean±SD. All statistical analysis were performed using (SPSS) Statistical Package for Social Science Verision (16) USA. The student t-test used for evaluation differences between thyroid function test T_3,T_4, and TSH and for lipid parameters. The least significant difference is considered at ($P < 0.001$).

Results and Discussion

The means level of T_4, T_3 and TSH in hypothyroid females were 44.13±45.79, 1.35±0.92, and 11.49±9.27 compared to control group which were 108.75±13.30,1.92±0.37, and 1.55±0.78 respectively, in males the means levels were (69.30±41.82, 1.86±1.28 and 10.42±10.45 compared to control 94.45±20.30, 1.69±0.51 and 1.14±0.69 respectively table-1. Thyroxine T_4 presented low value in hypothyroid when compared to control group. This finding were agreement with Kalphan et al., who suggested that in hypothyroidism the T_4 is generally low [9]. The means levels of T_3 in euthyroid of both sex studied reported no clear difference, but TSH in hypothyroid patients reported high level compared to euthyroid group of both sex. The female TSH means value showed higher levels of TSH not significant compared to males table-1. The means levels of serum total lipids and triacylycerol showed significantly ($P < 0.001$) increased in hypothyroid female group which were 344.96±94.46 and 202.25±68.48 respectively compared to the euthyroid group which were 257.51±27.38 and 123.12±40.00 respectively table-2. The means levels in males were 381.95±130.54 and 139.92±40.52 respectively compared to control groups which were 266.56±63.00 and 105.07±26.23 Table-2. This results in agreement with Stone, who reported that hypothyroidism was the most common secondary cause of hyperlipidemia[10]. The total lipids concentration in euthyroid groups of both sex reported no significant difference. This implies that the level of total lipids is not influenced by sexes. The means level of cholesterol and phospholipids showed significantly increased ($P < 0.001$) in hypothyroid female which were 194.41±52.05, and118.98±17.64 respectively compared to control groups which were 150.88±27.38 and 89.35±27.3 respectively table-3. The means levels of cholesterol showed significantly increased ($P < 0.001$) hypothyroid of both sex table-3, this results in agreement with Bea et ala., who reported that the total plasma cholesterol levels were slightly elevated in patients with clinical dysfunction of thyroid gland[1]. The hypothyroid groups of males and females reported higher values of phospholipids compared to euthyroid group, but males hypothyroid group reported significantly ($P < 0.001$) higher values compared to females hypothyroid group table-3.

Table-1
Concentrations of serum T_4, T_3, and TSH in control and hypothyroid patients of both sex

Subjects	T_4 nmol/L means±SD		T_3 nmol/L means±SD		TSHmμ/L means±SD	
	Control	Hypothyroid	Control	Hypothyroid	Control	Hypothyroid
Females	108.75±13.30[a]	44.13±45.79[b]	1. 92± 0.37[c]	1.35± 0.92[c]	1.55±0.78[d]	11.49±9.27[e]
Males	94.45±20.30[f]	69.30±41.82[g]	1.69± 0.51[h]	1.86±1.28[h]	1.14± 0.69[i]	10.42±10.45[j]

All values are means±SD. Means with rows not sharing common letter (s) are significantly different ($P < 0.001$).

Table-2
Concentrations of serum total lipid and triacyglycerol in control and hypothyroid patients of both sex

Subjects	Total lipids mg/dL means±SD		Triacyglycerol mg/dL means±SD	
	Control	Hypothyroid	Control	Hypothyroid
Females	257.51±27.38[a]	344.96±94.46[b]	123.12±40.00[c *]	202.25±68.48[d]
Males	266.56±63.00[e]	381.95±130.54[f]	105.07±26.23[g]	139.92±40.52[h]

All values are means±SD. Means with rows not sharing common letter (s) are significantly different ($P < 0.001$). Means of the same colums of males and females having different superscripts (*) are significantly different ($P < 0.001$).

Table-3
Concentrations of serum cholesterol and phospholipids normal and hypothyroid patients of both sex

Subjects	Cholesterol mg/dL means±SD		Phospholipids mg/dL means±SD	
	Control	Hypothyroid	Control	Hypothyroid
Females	150.88±27.38[a]	194.41±52.05[b]	89.35±13.35[c *]	118.98±17.64[d]
Males	163.73±27.19[e]	209.04±47.14[f]	104.64±10.75[g]	128.13±35.36[h]

All values are means±SD. Means with rows not sharing common letter (s) are significantly different ($P < 0.001$). Means of the same colums of males and females having different superscripts (*) are significantly different ($P < 0.001$).

Conclusion

The level of thyroid hormones in hypothyroid group reported lower values of T_4 and higher values of TSH compared to euthyroid subjects, but T3 exhibited no clear difference between hypothyroid and euthyroid groups. The four lipids parameters reported higher values in hypothyroid subjects compared to the euthyoid. The hypothyroid females reported higher levels of triacylyglycerol compared to hypothyroid males. The lipids profiles in all euthyroid groups of both sex showed no clear difference.

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