



The Histological structure of Thyroid gland and the relationship between the hyperthyroidism and total protein, albumin, globulin, liver enzymes and some minerals deficiency

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Abstract : The cross comparative present study was conducted out on the hundred patients were suffered from hyperthyroidism in the hospitals of four governments (Karbala, Babylon, Dywania and Najaf). This work was extend from September (2014) to fibruary (2015), which involved both females and males at ages were ranged (15-70) year old. The preset study was designed to identify the relationship among hyperthyroidism and many factors such as hormonal, mineral, liver enzyme, albumin, globulin and total protein. Our findings in all govnrments were investigated the feale patients with hyperthyroidism had more percent, in Karbala(76%) , Babylon (68%), Dywania (68%) and Najaf (68%) when compared with male patients percent (32% in Dywanian, Babylon and Najaf) while in Karbala was (24%). The age factor was noticed, that the age group (26-40) years were exposed to hyperthyroidism in both females and males. Thyroid gland Also the present study was pointed at variance in the mineral (calcium, potassium and phosphor), total protein and liver enzyme (Got and GPT) with hormonal assay (T3 , T4, TSH) in the biostatistical analysis, such as person correlation and P value. As well as this cross comparative study was appeared relation between and within groups of patients by used the (ANOVA). Our observations was revealed significance value between total protein and level of thyroxin (T4) and T3 (Triiodothyronine), from another hand , there was high significance value between calcium and thyroxin, also between total protein and thyroxin, but that found significance value between potassium and total protein with thyroid stimulating hormone (TSH) Relationship between hyperthyroidism and total protein, albumin, globulin, liver enzyme and some mineral deficiency.

Keywords: Thyroid gland, Histological structure, hyperthyroidism, total protein, albumin, globulin, liver enzymes, mineral deficiency.

Introduction:

Thyroid gland was described by¹ (130-200 AD) but the name was applied to it first² named it thyroid from its proximity to thyroid cartilage. The cartilage as named thyroid (shield like), by Galen Because of its characteristic shape³.

Thyroid gland originates as out pouching in the floor of the pharynx, which grows downward anterior to the trachea, and can be identified in human embryo by the third week⁴. Colloid spaces may be seen in the gland by the end on ninth week ; follicular elements from and can be shown to contain colloid. By the fourteenth week the thyroid of the fetus is essentially and adult gland⁵.

In the adult, the thyroid gland consists of two lobes connected by an isthmus, a bridge of tissues. The thyroid gland is located in the neck below the larynx, on either side of and anterior to the trachea.

Brownish-red and soft during life Usually weighs about 25-30g (larger in women) surrounded by a thin, fibrous capsule of connective tissue. External to this is a "false capsule" formed by pretrachealfascia Right and left lobes United by a narrow isthmus, which extends across the trachea anterior to second and third tracheal cartilages In some people a third "pyramidal lobe" exists, ascending from the isthmus towards hyoid bone . this gland is highly vasculature and supplied by the superior thyroid artery and the inferior thyroid artery⁶ . the follicular cells of thyroid gland produce two powerful metabolically active mmodified amino acids, T3 and T4,⁷ . In general, thyroid hormones play essential roles in regulating vast hysiological states in the body⁸. Thyroid hormones play essential roles regulation the metabolism of major biomolecules such as carbohydrates , lipids, and proteins⁹. Protein synthesis and breakdown is stimulated by thyroid hormones. The influence of thyroxin on normal body growth is derived largely from the stimulation of protein synthesis¹⁰. Thyroid hormones stimulate the rate of carbohydrate absorption, gluconeogenesis, and insulin secretion¹¹. Thyroid hormones are important factor for the other physiological phenomena such as growth, puberty, and mental development¹². On the other hand, over production of thyroid hormones disturbs the normal body status causes retardation of growth, body wasting, heat intolerance increase metabolic rate, and infertility^{13,14}.

Hyperthyroidism is the most endocrine disorder in human and animals , manifest itself in exposure of body tissues to excessive levels of thyroid hormones, tri-iodothronine (T) and tetra-idothyronine of thyroxin (T4) , the two main hormones of thyroid gland¹⁵.

There are several causes of hyperthyroidism one of which an autoimmune disorder, its etiology involve the production an antibodies against thyroid stimulating hormone (TSH) receptors, that result in excess production of (T3) and (T4)¹⁶.

This disorder had also been found to affect women five times more than male¹⁷. Hyperthyroidism is also called thyrotoxicosis, a general term, refers to hyper metabolic state that results because of excess thyroid hormones (18). Hyperthyroidism is also called thyrotoxicosis, which is refers to hyper metabolic clinical syndrome which occurs when there are elevated in serum levels of (T3) and/ or (T4)^{13,14}.

Thyrotoxicosis can also occur without hyperthyroidism. Some people develop thyrotoxicosis due to inflammation of thyroid gland (Thyroiditis), which can lead to excessive release of thyroid hormone already stored in the gland¹⁹.

Hyperthyroidism is thus of the major causes of secondary osteoporosis²⁰.

Thyroid hormones stimulate bone resorption directly there by increasing the serum calcium and phosphorous levels and suppressing PTH²¹. There are variable reports on serum phosphorous levels in patients with hyperthyroidism. Most of the studies indicate hyperphosphatemic state. However, A few studies show normal or low levels of serum phosphorous^{21, 33}.

The aim of Study:- Investigation the effects of hyperthyroidism on the minerals (Calcium, phosphorus, and potassium(in serum.

Investigation the effects of hyperthyroidism on the liver enzyme, (GOT, GPT and ALP). Estimation of Total serum protein and albumin and their relationship with hyperthyroidism. Determination of the levels of (T3, T4 and TSH).

Materials and Methods:-

1. Subjects of Study:- This study was carried out an five months period, from September 2014 to February 2015 in Babylon, Al-dywania, Karbala and Najaf hospitals. The subject of study was 130; patient and healthy subjects of both sexes, male and female. The total number of patient were (100) 70 females and 30 males. Thirty subjets were used as control group. Their ages range between 15 years to 70 years.

2. Chemicals: the chemicals materials sources used in this work were follow:-

No.	Chemicals materials	Sources
1	Total protein kit.	Spinreact.
2	Albumin kit.	Human
3	Total calcium kit.	Human
4	Total potassium kit.	Human
5	Total phosphorus kit.	Human
6	Alkaline phosphatase kit	Teco diagnostic, Anaheim , CA
7	TSH kit.	Biocheck, Inc
8	T4 kit	Biocheck, Inc
9	T3 kit	Biocheck, Inc

3. Instruments:- the following table shows the main instrument used in this work and their sources.

No.	Instruments	Sources
1	Centrifuge.	heraeusChrist, Vamed, Com.Germany
2	Centrifuge tubes.	Mes (1.0gm) Fisonsm (England).
3	Plain tubes.	AFma- Dispo, Jordan.
4	Micro-pipette 100 -1000 ml	Gilson, France
5	Disposable syringe.	Pecton Dickinson, (Spain).
6	Spectrophotometer.	PHE Unicam Sp9.
7	Minividus.	Biomerieax
8	Cobasic 11	Germany

Result:-

The present study was revealed the anatomical and histological structure ofThe thyroid gland is composed of 2 lobes connected by an isthmus.It is surrounded by a dense irregular collagenousconnective tissue capsule, in which (posteriorly) the parathyroid glandsareembedded.The thyroid gland is subdivided by capsular septa into lobules containing follicles.These septa also serve as conduits for blood vessels, lymphatic vessels, & nerves.

The present study was revealed the percent of hyperthyroidism in the females more than in males in four government (Dywania, Babylon, Karbala and Najaf) as in table (1)

Table (1): show the percent of genders in (Dywania, Babylon, Karbala and Najaf) governments:

Groups	Ad.	Gender		Age		
		Male	Female	15-25	26-40	>40
Pat.	Dywania	8 (32%)	17 (68%)	6 (24%)	12 (48%)	7 (28%)
	Babylon	8 (32%)	17 (68%)	3 (12%)	9 (36%)	13 (52%)
	Karbala	6 (24%)	19 (76%)	3 (12%)	15 (60%)	7 (28%)
	Najaf	8 (32%)	17 (68%)	5 (20%)	9 (36%)	11 (44%)
	Total	30 (30%)	70 (70%)	17 (17%)	45 (45%)	38 (38%)
Con		6 (20%)	24 (80%)	8 (26.7%)	10 (33.3%)	12 (40%)

Our findings were revealed there is a relationship between potassium & thyroxin at (P < 0.05) reach to significant value. From another hand there is a relationship between total protein & (T3 & T4) as well as globulin and thyroxin an in table (2) but our observation in hyperthyroidism patients was investigated the relationship between calcium and T3 . T3 was elevated, while the relationship between calcium & T4 was decrease when compared with control, these relationship were ranged between positive & negative values as in the table (2):-

Table (2):- Appear the relationship among minerals, total protein & liver enzymes in hyperthyroidism patient in (Dywania, Babylon, Karbala and Najaf) government.

Ad.	Var.	T3		T4		TSH	
		Pearson correlation	P-value	Pearson correlation	p-value	Pearson correlation	P-value
Pat.	Calcium	.089	.379	-.022	.825	-.030	.768
	Potassium	-.089-	.381	-.249-	.012	-.079	.433
	Phosphor	-.045	.654	-.099	.329	-.026	.800
	Total protein	.213	.043	.241	.016	.037	.718
	Albumin	.050	.623	.064	.527	.107	.290
	Globulin	.186	.063	.244	.014	.006	.952
	ALP	-.073	.470	.004	.970	-.060	.553
	GOT	-.039	.699	.068	.500	-.056	.582
	GPT	-.030	.765	-.004-	.972	-.008	.938

The present study was pointed out; there are high significant values among (TSH & T4) in patient & control. There are non-significant differences between T3 in patient & controls groups as in table (3):-

Table (3) : ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	138.998	1	138.998	425.404	.000
TSH Within Groups	41.823	128	.327		
Total	180.822	129			
Between Groups	134910.729	1	134910.729	0.473	.003
T4 Within Groups	1822954.840	128	14241.835		
Total	1957865.569	129			
Between Groups	204.566	1	204.566	2.132	.147
T3 Within Groups	12279.700	128	95.935		
Total	12484.265	129			

There is a correlation between GOT & TSH in the hyperthyroidism patients in Dywania government, this correlation was reached to significant value. While in the Babylon hyperthyroidism patients, we found the correlation reached to significant value, among alkaline phosphatase, albumin and T3, and there relation between GOT and TSH had significant value, while in Karbala.

Hyperthyroidism patient that investigate there is correlation reached to significant value between calcium and thyroxin (T4). From another hand, in Najaf Hyperthyroidism patients that noticed the correlation toward significant value between phosphorus and TSH, as in the table (4):

Table (4): Appear the correlations between minerals, total proteins and liver enzymes in (Dywania, Babylon, Karbala and Najaf) governments.

Ad.	Var.	T3		T4		TSH	
		Pearson correlation	P-value	Pearson correlation	p-value	Pearson correlation	P-value
Dywania	Calcium	.015	.942	-.096	.649	-.030	.888
	Potassium	-.279	.177	-.201	.336	.241	.245
	Phosphor	-.113	0.591	.146	.485	-.172	.410
	Total protein	-.192	.358	-.060-	.775	-.104	.622
	Albumin	-.031	.883	-.077	.715	.188	.368
	Globulin	-.100	.636	.025	.907	-.164	.434
	ALP	.315	.125	.242	.244	-.038	.858
	GOT	-.075	.721	.012	.956	.107	.043
	GPT	.218	.296	.300	.145	.309	.309
Babylon	Calcium	.104	.622	-.266	.198	.003	.989
	Potassium	-.042	.843	-.428	.033	-.350	.086
	Phosphor	-.370	.069	-.144	.586	-.097	.646
	Total protein	.358	.711	.224	.282	-.301	.143
	Albumin	.425	.034	.036	.864	-.119	.570
	Globulin	-.096	.349	.198	.343	.128	.543
	ALP	-.430	.032	-.131	.533	.056	.791
	GOT	.113	.592	.056	.790	-.459	.021
	GPT	.030	.888	-.088	.676	.005	.979
Karbala	Calcium	-.280	.175	.408	.043	-.229	.271
	Potassium	-.328	.110	-.032	.880	.022	.918
	Phosphor	-.014	.946	-.309	.133	.016	.940
	Total protein	-.218	.296	-.130	.536	-.101	.631
	Albumin	-.234	.259	-.316	.124	.018	.933
	Globulin	-.112	.595	.133	.528	-.164	.433
	ALP	-.143	.495	.248	.232	.085	.686
	GOT	.060	.774	-.192	.358	-.042	.841
	GPT	-.048	.821	-.194	.354	.118	.575
Najaf	Calcium	.223	.283	.164	.434	.036	.863
	Potassium	-.034	.871	-.109	.604	.242	.244
	Phosphor	-.013	.953	-.202	.334	.409	.042
	Total protein	.296	.151	-.312	.129	-.178	.395
	Albumin	-.027	.897	.019	.929	.004	.984
	Globulin	.304	.139	.292	.157	-.174	.407
	ALP	-.136	.518	-.011	.958	-.318	.121
	GOT	-.089	.671	.079	.709	.005	.980
	GPT	-.027	.896	.058	.784	-.082	.696

Discussion:-

Hyperthyroidism patients in all governments (Dywania, Babylon, Karbala and Najaf), our observations about relationship with gender that appeared , the number of hyperthyroidism females was (more than 70%) out of (100) patients while the number of hyperthyroidism males (less than 305), these results that agreed with previous studies^{18,16,3,34,35}. Due to sex hormonal imbalance for example (estrogen) that normally increase in females during the period of pregnancy and maturity. The elevation of calcium and phosphor in

hyperthyroidism patients in all governments, Dywania, Babylon, Karbala and Najaf) not reached to significant values when compared with control, these findings were correspond with current studies^{21, 22, 36, 37} they mentioned, hyperthyroidism was characterized by accelerated bone turnover due to direct stimulation of bone cells by elevation of (T3 and T4) concentration from another hand the most hyperthyroidism patients had normal serum calcium levels and mean calcium concentration was increased than in control, while in previous studies^{23,24,36}, mentioned, that excess of thyroid hormones stimulates osteoclasts and increase their activities to mobilize the calcium and phosphorus from bone matrix into blood^{25, 26, 38,39, 40}.

In the karbala hyperthyroidism patients was increased in the alkaline phosphatase that concerned with elevation of thyroxin, these observation was similar with previous investigation^{27, 41, 42}, they recorded that alkaline phosphatase is the main marker of bone formation and secreted from osteoblasts. Our findings was revealed decrease in serum total protein in hyperthyroidism patient, these observations were identical with previous investigation^{28,29, 43}, they explained the serum total protein was declined in the hyperthyroidism patient,

From another hand the protein synthesis and degradation was stimulated by (T3 and T4), So the excessive production of thyroid hormones accelerated the protein catabolism. The liver enzymes (GOT, GPT) was elevated, but not reach to significant value in the whole hyperthyroidism patient due to excessive thyroid hormone (T3 and T4) the present study was pointed out decrease in the thyroid stimulating hormone (TSH) in hyper- thyroidism patient in all government's (Dywania, Babylon Karbala and Najaf).

Conclusions:

1. Old age groups were exposed to hyperthyroidism.
2. The percent of hyperthyroidism patients more in females than males.
3. Increase in the thyroxin and decrease in thyroid stimulating hormone (TSH) level in the hyperthyroidism patients.
4. Increase in calcium and phosphor levels in patients with hyperthyroidism.
5. The liver enzymes of hyperthyroidism patients were changed when compared with control group.

Recommendations:-

1. We advise, the suspected persons with thyroid disease, go to endocrinologist early for early detection of hyperthyroidism.
2. Treatment other disease such as heart disease, liver disease, which related to hyperthyroidism.
3. We recommend the persons to eat the food rich in iodine to avoid iodine deficiency, especially sea fish.

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