

Bio Chemical Study of Antithyroid Peroxidase Auto Antibodies , Magnesium and Cobalt in Hyperthyroidism Patients From Different Regions of Iraq.

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Abstract

Sixty hyperthyroidism patients aged (20-45) years from different parts of Iraq , (20) from the North , (20) from Baghdad , (20) from the South of Iraq , and (20)control were tested for the presence of antithyroid peroxidase antibody(Tpo-Ab)and for Mg and Co levels in their sera.

The results revealed a significant increase in (Tpo-Ab) in all patients group from the different parts of Iraq compared to control , also a significant increase in (Tpo-Ab) for the group from North compared to other parts.

A significant decrease in Mg and Co levels in sera of patients from all parts of Iraq compared to control values , while no significant differences among patient groups were noticed ..In Conclusion anti – Tpo-Ab is specific for thyroid autoimmune disease , also Mg and Co were altered in response to thyroid hormones

Introduction

Hyperthyroidism denotes an increased secretion of thyroid hormone from the thyroid gland , which leads to a clinical picture of thyrotoxicosec(1).The most common cause of hyperthyroidism is "Graves" disease , which accounts for 60% to 90% of cases . Grave's

disease results from autologous production of antibodies directed against the TSH receptor . These auto antibodies, referred to as thyroid – stimulating immunoglobulin (TSI) ,cause continual stimulation of the thyroid to produce thyroxin(T_4)and triiodothyronine (T_3) (2).

Human thyroid peroxidase (htpo) is a glycoprotein which catalyses the iodination of thyroglobulin and the coupling of iodinated thyrosines .It is present in limited areas on the apical surface of the thyroid cell as an integral membrane protein(3).

Magnesium is an essential factor in many important enzymatic reactions , either as an integral part of a metallo enzyme or as an intermediary activator principal Magnesium- depended path ways are those involving enzyme- catalyzed transfer of phosphate groups especially those involving ATP(4).

Cobalt is an essential micronutrients contained in cyano cobalamine (Vitamin B12),the Vitamin which protects against pernicious anemia. Before toxicity was recognized ,Cobalt was once used widely as a pharmaceutical agent, prescribed to treat conditions of anemia(5).

Experimental

Blood samples were collected from (specialized center of endocrinology and diabetes) .At Al-kindly Hospital , during the period Jan 2007- sep 2007.

The subjects enrolled in this study consist of (60) patients with hyperthyroidism from different parts of Iraq , (20) from the North , (20) from Baghdad , and (20) from the South of Iraq , in addition to (20) healthy control from Baghdad , their age ranged from to (20-45) years .. The serum was obtained by the centrifugation of blood at 2500 (rpm) for (10) min . This serum was stored at (-20 c), unless it is used immediately .

- Determination of thyroid stimulating hormone (TSH), free triiodothyronine(FT3) and free thyroxin (FT4) is done by using enzyme-linked immunosorbent assay (ELISA) (6).
- Determination of thyroid peroxidase (TPO) by (ELISA) is done by using (TPO) recombinant antigen for the detection of (TPO) antibodies (7).
- Determination of Magnesium and cobalt were performed by using Atomies Absorption spectrophotometer with Hallow cathode lamps for both elements(8).
- Statistical analysis were preformed as data presented were the means and standard deviations , Student t- test was used to compare the significance of the difference in the mean value of any two groups significant($P < 0.05$),highly significant ($P < 0.00001$) was considered statistically significant (9).

Results and Discussion

Table (1) and figure (1),(2) showed the levels of thyroid hormones and TSH in the sera of hyperthyroidism patients from different parts of Iraq , i.e patients from north (N), patients from Baghdad (B) , patients from south of Iraq (S), and the healthy control group (C)

A significant decrease in TSH levels was found in the sera of the three patient groups compared to the control , yet no significant differences were detected between the three patients group.

A significant increase in FT3 , FT4 levels were found in the sera of the three patient groups compared to the control , yet no significant differencos was detected between the three patients group themselves .

Elevated FT3 and FT4 concentrations are indicative of hyperthyroidism a low TSH in the presence of elevated thyroid hormones is logical because secretion of TSH from the anterior pituitary is regulated by the negative feedback from the serum free thyroid hormone concentration (10)(11) .

Table(2) and figure(3) showed the activity of Anti TPO antibody in the sera of the three patient groups (N,B,S) and (C).

Significant differences in all patients group compared to control was found with P value ($p < 0.05$), also a significant difference between group (B and N) group (S and N) and group (S and B) was found.

Autoimmune thyroiditis is one of the most common autoimmune disorders. Auto antibodies against the thyroid gland with thyroid peroxidase antibody (Tpo-Ab) as the most common auto antibodies was demonstrated in serum in population surveys(12). Thyroid microsomal antibodies (anti-MAb) was recently proved to be directed to thyroid peroxidase (TPO), but no simple relationship between anti Tpo-Ab levels and thyroid function was observed (13).

In a study conducted on a large thyroid function, they concluded that in the total population 8.6% of males and 18.5% of females was positive TPO-Abs, serum TSH gradually decrease with age possibly because of the development of thyroid autoimmunity(14). In across - sectional comparative study, performed in two areas of Denmark, 4649 randomly selected subjects in age groups between 18 and 65 years were examined. The results suggest that Tpo-Ab develop due to a general alteration in the immune system, where as specific antigenic mechanisms are probably of less importance. Future studies are needed to clarify the mechanism involved in the development of thyroid auto antibodies(15).

Table (3) shows the levels of Mg and Co in the sera of three hyperthyroidism patient groups and control.

A significant decrease in Mg levels in the sera of all patients group compared to control found. The present study is in agreement with other reports which found lower serum levels of Mg in hyperthyroidism patients(16)(17). Some data suggest that thyroid hormone has a direct effect on the tubule which favor the retention of magnesium (18).

A significant decrease in Co levels of the three hyperthyroidism groups compared to control were is found , this could be due to the effect of cobalt on the iodination of tyrosine which reduces the thyroxin levels (19).

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Table(1) TSH , FT3 , FT 4 levels in sera of all Studied groups

Group description	No	TSH MIu/mL mean±SD	P	FT3 pg/mL mean±SD	P	FT4 ng/mL mean±SD	P
C	20	1.8±0.18		2.4±0.26		0.95±0.09	
N	20	0.2±0.03	P<0.00001	5.7±0.92	P<0.05	2.95±0.25	P<0.00001
B	20	0.21±0.02	P*>0.00001	5.9±0.97	P*>0.05	3.0±0.15	P*>0.00001
S	20	0.22±0.03	P**>0.00001 P***>0.00001	6.1±0.92	P**>0.05 P***>0.05	3.1±0.2	P**>0.00001 P***>0.00001

P* Statistical difference between group B and N

P** Statistical difference between group S and B

P*** Statistical difference between group S and N

Table (2) Tpo (Ab) levels in sera of all studied groups

Group discription	No	Tpo-Ab Iu /ml mean \pm SD	P
C	20	44 \pm 15.3	
N	20	134 \pm 31.3	P< 0.05
B	20	111 \pm 30.5	P* $<$ 0.05
S	20	75 \pm 20.7	P** $<$ 0.05 P*** $<$ 0.05

P* Statistical difference between group B and N

P** Statistical difference between group Sand B

P*** Statistical difference between group Sand N

Table (3) Mg and Co levels in sera of all studied groups

Group description	No	Mg Mg/ml mean± SD	P	CO Mg/ ml mean ± SD	P
C	20	28.50±0.45		0.44±0.04	
N	20	10.66±1.0	P<0.05	0.012±0.007	P<0.0001
B	20	11.00±1.6	P*>0.05	0.013±0.006	P*>0.0001
S	20	11.50±1.5	P*>0.05 P***>0.05	0.014±0.005	P**>0.0001 P***>0.0001

P* Statistical difference between group B and N
 P** Statistical difference between group Sand B
 P*** Statistical difference between group Sand N

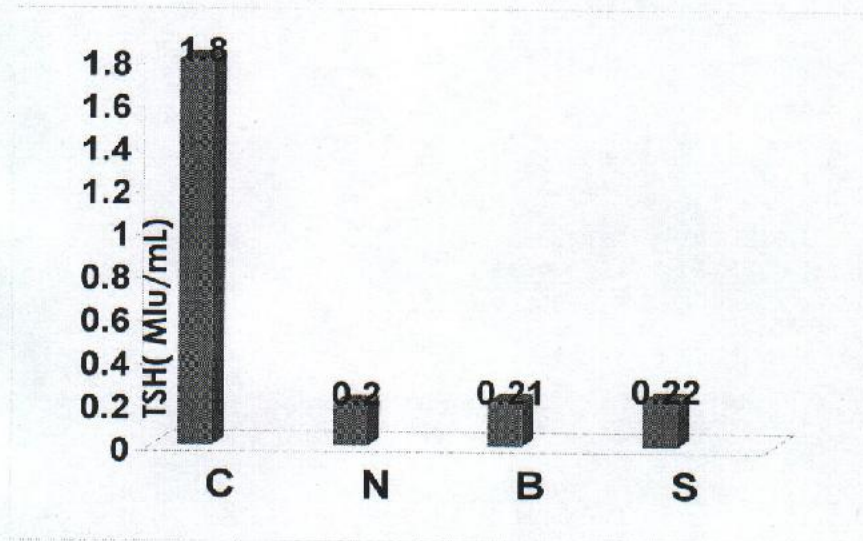


Fig.(1):TSH level in sera of all studied groups .

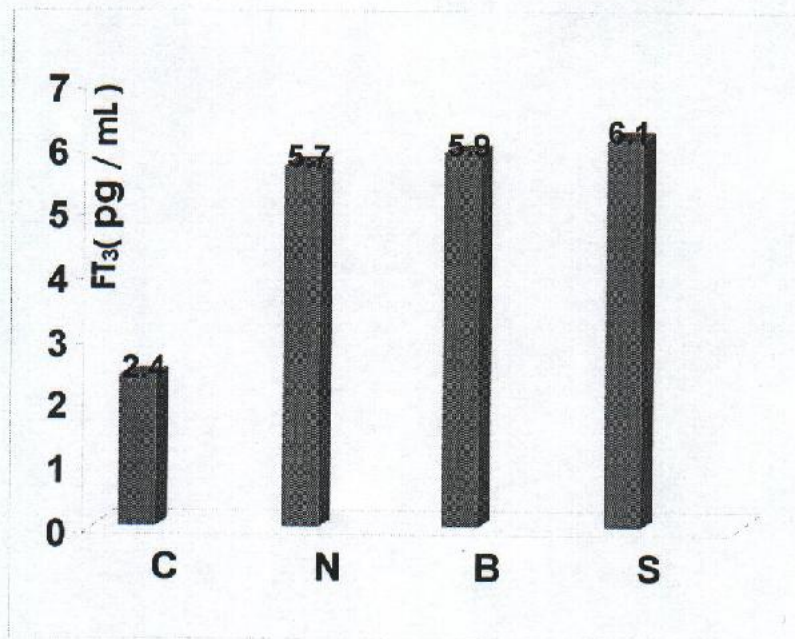


Fig.(2):FT₃ level in sera of all studied groups.

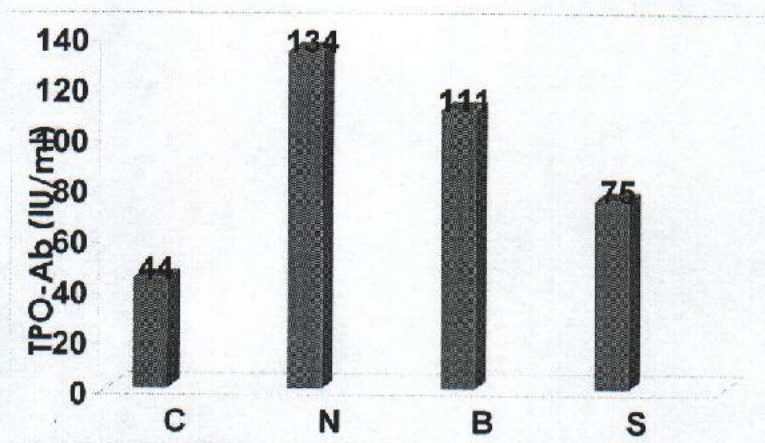


Fig. (3) :(TPO-AB) level in sera of all studied groups

دراسة كيموحيوية للأجسام المضادة الذاتية لانزيم
الثايروكسين بيروكسيديزوالمغنيسيوم والكوبلت لمرضى
فرط الغدد الدرقية في مناطق مختلفة من العراق

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الخلاصة

شملت الدراسة (60) مريضا يعانون من فرط الدرقية تتراوح اعمارهم من (45 — 20) سنة وقد تم تقسيم المرضى حسب مناطق سكنهم ، (20) مريضا من كل من (شمال العراق (N)) ، بغداد (B) ، جنوب العراق (S) ، وقد تم التحري عن وجود الاجسام المناعية الذاتية لانزيم الثايروكسين بيروكسيديز (Tpo- Ab) وكذلك قياس Co . Mg في امصالهم . كذلك تم اخذ (20) من الاصحاء (C) لنفس الفئات العمرية كمجموعه سيطره. اظهرت النتائج وجود زياده معنويه في (Tpo-Ab) في جميع مجموعات المرضى من مختلف مناطق العراق مقارنة مع مجموعة السيطره ، كذلك وجدت زياده معنويه في (Tpo-Ab) للمجموعه (N) مقارنة مع مجموعتي المرضى (B) ، (S) . وجد انخفاض معنوي في مستويات (Co, Mg) في امصال المرضى لجميع المجاميع ، (S, B, N) مقارنة مع مجموعة السيطره (C) بينما لم تظهر اي اختلاف معنوي بين مجاميع المرضى قيد الدراسة . لذا يستنتج ان (Tpo-Ab) هو خاص بمرضى المتاعه الذاتية للغدة الدرقية بصوره عامه كذلك فان مستوى (Co- Mg) قد حصل فيها تغيير يعود الى خلل في هرمونات الغدة الدرقية .