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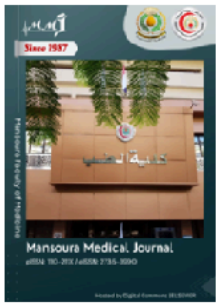

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BIOCHEMICAL EVALUATION OF SOME INDICES OF OXIDATIVE STRESS IN PATIENTS WITH HYPERTHYRODISM BEFORE AND AFTER TREATMENT

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BIOCHEMICAL EVALUATION OF SOME INDICES OF OXIDATIVE STRESS IN PATIENTS WITH HYPERTHYRODISM BEFORE AND AFTER TREATMENT

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ABSTRACT

This study aimed to evaluate changes in plasma malondialdehyde, total thiol concentration and total antioxidant activity in newly diagnosed Graves' disease and toxic multinodular goiter patients prior to antithyroid treatment and after restoration of stable euthyroid state.

Forty subjects were included in this study. Thirty patients with hyperthyroidism, which were classified into two groups, the first (group I) Comprised 15 patients with hyperthyroidism due to untreated Graves' disease, and the second (group II) Comprised 15 patients with hyperthyroidism due to untreated toxic multinodular goiter. Ten patients of each group were treated pharmacologically with antithyroid drug carbimazol (30 mg/day for 8 weeks). Total thyroxin (T_4), total triiodothyronine (T_3), TSH, malondialdehyde, total thiol concentration and total antioxidant activity were estimated before initiation of treatment. After apparent attainment of euthyroid state, all tests were repeated for ten of the patients with Graves' disease and ten of the patients with toxic multinodular goiter.

The results of this study revealed that there were a statistically highly significant increase in plasma malandialdehyde (MDA), a significant decrease in plasma thiol and very highly significant decrease in total antioxidant activity in both patient groups when compared to healthy controls. After treatment, plasma MDA levels

were highly significantly decreased and total antioxidant activity was very highly significantly increased in both patient groups when compared to control one. As regard thiol, it was significantly increased in group I only.

From this study it could be conclude that, intensification of lipid and protein peroxidation process and the impairment of plasma antioxidant activity in patients with hyperthyroidism due to Graves' disease or toxic multinodular goiter confirm the presence of oxidative stress and the disturbances in the antioxidant systems might be an indicator of patients' susceptibility to free radical damage. So, supplementation of antioxidants as an adjuvant to medical antithyroid treatment could help to prevent oxidative damage in hyperthyroid patients. Also, we suggest that measuring oxidative stress parameters could be a better way of follow up of thyroid state improvement both from the chemical and economic point of view.

Introduction and Aim of work :

Free radicals, can be produced by several different biochemical processes within the body including: reduction of molecular oxygen during aerobic respiration yielding superoxide and hydroxyl radicals; by-products of chemistry such as oxidation of catecholamines which produce electrons, which can reduce molecular oxygen to superoxide; production of superoxide and hypochlorous acid by activated phagocytes: and nitric oxide production by vascular endothelium and other cells (1).

Under physiological conditions, free radicals generation is controlled by a large number of anti- free radical systems which act as protective mechanisms (2). These systems consist of antioxidant enzymes such as superoxide dismutase, catalase, glutathione peroxidase and glutathione reductase, as well as non-enzymatic antioxidants, among which the most important are vitamins C and E, carotenoids, glutathione and uric acid (3).

The disturbance of the pro-oxidant / antioxidant balance resulting from the increased production of free radicals, inactivation of detoxification systems or excessive consumption of antioxidants, is a causative factor in the oxidative damage of cellular structure and molecules, such as lipids, proteins and nucleic acids (2).

Acceleration of the basal metabol-

ic rate and the energy metabolism of tissues represents one of the major functions of thyroid hormones [4]. Thyroid hormones influence mitochondrial respiration by altering the concentration and the redox state of the components in the electron- transport system [5]. Also they may directly stimulate the generation of superoxide anion by neutrophils and alveolar macrophages [6].

It has been suggested that the hypermetabolic state in hyperthyroidism is associated with increases in free radical production and lipid peroxide levels [4] and may also induce changes in the antioxidant protective system potential [7]. Also Resch et al [8] stated that, hyperthyroidism may be associated enhanced oxidative stress involving enzymatic and non enzymatic antioxidants.

Thyroid hormones increase the metabolic activity of almost all tissues of the body. Mitochondrial oxygen consumption has been shown to be increased in the hyperthyroid state, suggesting that excessive amounts of reactive oxygen species (ROS) may be generated and H_2O_2 generation may be subsequently increased in the hyperthyroid state [9].

This study was conducted to evaluate the changes in plasma levels of some oxidants and antioxidants (malondialdehyde concentration, total thiol concentration and total antioxidant activity) in patients with hyperthyroidism due to either Graves' disease or toxic multinodular goiter prior to antithyroid treatment and after attainment of euthyroid state.

SUBJECTS AND METHODS

This study was carried out on forty subjects: Thirty patients with hyperthyroidism due to either Graves' disease or toxic multinodular goiter and ten apparently healthy volunteers as a control group.

Patients with hyperthyroidism were selected from medical endocrinology unit and general surgery department of Mansoura University Hospital. Patients and control groups were subjected to thorough clinical examination with special stress on local examination of the thyroid gland.

Smokers and pregnant females were not included in this study. Also, any patient having one or more of the following diseases was excluded from the study: any acute illness, any chronic disease, any other endocrinal

disease, diabetes mellitus, hypertension.

The subjects included in this study were classified into the following groups:

Group I :

Comprised 15 patients with hyperthyroidism due to untreated Graves' disease (2 males and 13 females) of age ranging between 18 and 50 years. Ten patients of this group were treated with the antithyroid drug carbimazol [30mg/day for 8 weeks].

Group II :

Comprised 15 patients with hyperthyroidism due to untreated toxic multinodular goiter (3 males and 12 females) of age ranging between 20 and 50 years. Ten patients of this group were treated with the antithyroid drug carbimazol [30mg/day for 8 weeks].

Diagnosis was based on thorough clinical examination, thyroid ultra sonography and thyroid function tests.

Estimation of total thyroxin (T_4), total triiodothyronine (T_3), total thyroid stimulating hormone (TSH), total antioxidant activity, total thiol concentration and malondialdehyde was carried out before initiation of treatment. After attainment of euthyroid state, all tests were repeated for 10 of the patients with Graves' disease and 10 of patients with toxic multinodular goiter.

Group III :

This is the control group which included 10 apparently healthy volunteers whose age and sex matched the patient groups.

Sampling :

Fasting venous blood samples (5 ml) were taken in the morning by aseptic vein puncture from all subjects. Blood samples were collected in heparin treated tubes. After centrifugation at 1500 rpm for 5 minutes, the plasma was separated, divided into aliquots and stored at -20° C until the time of assay of different biochemical parameters including:-

-Total triiodothyronine (T_3) concentration by an enzymatic immunoassay kits provided by Biotec laboratories Ltd (U.K) according to sterling (10).

-Total thyroxin hormone (T_4) concentration by an enzymatic immunoassay kits provided by Equipar ,

Diagnostics (Italy) according to Liewendahl [11].

-Total Thyroid stimulating hormone (TSH) concentration by an enzymatic immunoassay kits provided by Biotec laboratories Ltd (U.K) according to woodhead and weeks [12].

-Malondialdehyde concentration using thiobarbituric acid reactive substances method according to walker and Shah. [13].

-Total thiol concentration according to Hu [14].

-Total antioxidant activity according to Rice-Evans and Miller [15].

The reagents used in the last three parameters were purchased from Sigma Aldrich Chemic, Germany.

STATISTICAL ANALYSIS

Statistical analysis was carried out using SPSS statistical package for social science program version 10, 1999. The data were categorized as parametric using kolmogrov smirnov test. The quantitative data are presented in the form of mean, standard deviation and range.

F Test (one way Anova) was used to compare mean and standard deviation of more than two groups. Student t test was used to compare mean and standard deviation of two groups. Paired t test was used to compare mean and standard deviation of the same group before and after treatment. p values <0.05 were considered significant.

<0.01 were considered highly significant.

<0.001 were considered very highly significant.

No significance was detected when p values were more than 0.05.

Pearson correlation coefficient was used to see if the value of two variables are associated.

RESULTS

Table 1 shows that there is a very highly and a highly significant decreases of plasma T_3 levels in group 1 and group II after treatment when compared with their level before treatment ($p<0.001$, $p<0.002$ respectively). Also there is a very highly significant decrease of plasma T_4 levels after treatment when compared with their levels before treatment ($p<0.001$). But on other hand, there is a very highly significant elevation of plasma TSH

after treatment when compared with its level before treatment in both groups ($p<0.001$).

Table 2 reveals that there is a very highly significant increase in plasma malondialdehyde concentration in group I and group II when compared with healthy controls ($p<0.001$). Also there is a very highly significant decrease of plasma malondialdehyde concentration in both groups after treatment when compared to the level before treatment ($p<0.001$). There were non significant differences in both patient groups before treatment, and also after treatment.

Table 3 shows that these is a highly significant and significant decreases of plasma thiol concentrations in group I, and group II respectively as compared with healthy subjects ($p=0.002$, $p=0.011$ respectively). Also it is found that there is a significant increase of total thiol concentration in patients with Graves' disease after treatment when compared with their level before treatment ($p=0.014$). On the other hand there is a non significant difference of plasma total thiol concentration in patients with toxic multinodular goiter after treatment when compared with their level before treatment ($p=0.166$).

Table 4 shows that there is a very highly significant decrease in plasma total antioxidant activity in group I, and group II as compared with healthy controls ($p <0.001$). Also there is a very highly significant increase in the plasma antioxidant activity in both groups after treatment when compared with the level before treatment ($p <0.001$). Meanwhile, there is in significant difference in both patient groups before treatment and after treatment.

Correlations

Pearson correlation study reveals a highly significant positive correlation between plasma malondialdehyde and total T_3 level ($r=0.44$, $p=0.004$) and a very highly significant positive correlation between plasma malondialdehyde and T_4 level ($r= 0.73$, $p<0.001$) in studied groups before treatment. Meanwhile, there is a very highly significant negative correlation between plasma malondialdehyde and TSH ($r=-0.059$, $p<0.001$) (table 5). After treatment, all the above correlations do not reach the level of significance (table 6).

About total thiol, there is also a

significant negative correlation between total thiol concentration and total T_3 level (r=-0.32, p=0.041) and highly significant negative correlation between total thiol concentration and total T4 level (r=-0.45, p=0.004) but there is a very highly significant positive correlation between total thiol concentration and TSH level (r=0.59, p<0.001) (table 5). After treatment, a significant negative correlation between total thiol concentration and total T3 level is found (r=-0.406, p=0.026) (table 6).

As regard total antioxidant activity, a very highly significant negative correlation between total antioxidant activity and total T_3 level (r=-0.053, p<0.001) and total T4 level (r=-0.54, p<0.001) is found. However there is a non significant positive correlation between total antioxidant activity and TSH (r=0.27, p=0.092) (table 5).

Table (1): Plasma total T3, T4 and TSH levels before and after treatment in groups with hyperthyrolism:-

	Group I		Group II	
	Before treatment	After treatment	Before treatment	After treatment
Total T_3 (ng/ml) Mean ± S.D	2.66± 0.78	1.56 ±0.35	2.56± 0.59	1.65±0.26
Test of significance	t =4.63 p<0.001		t =3.91 p=0.002	
Total T_4 (µg/dl) Mean ± S.D	11.92± 2.57	5.8±1.06	12.99± 4.09	5.07±1.12
Test of significance	t =5.1 p<0.001		t =6.91 p<0.001	
TSH(µIU/ml) Mean ± S.D	0.226± 0.08	1.09±0.42	0.228± 0.063	1.005±0.216
Test of significance	t =6.22 p<0.001		t =13.17 p<0.001	

Group I: patients with Graves' disease.
Group II: patients with toxic multinodular goiter.

Table (2): Comparison of plasma malondialdehyde concentrations (nmol/ml) in studied groups before and after treatment:-

Biochemical parameters	Control	Group I	Group II	Tests of significance	
Before treatment Mean ± S.D Range	1.21±0.29 (0.89-1.76)	2.2± 0.311 (1.56-2.72)	2.12± 0.37 (1.95-2.7)	F=30.23 t_1 =7.88 t_2 =6.73 t_3 =0.62	p <0.001 p_1 <0.001 p_2 <0.001 p_3 =0.54
After treatment Mean ± S.D Range		1.33 ±0.12 (1.15-1.53)	1.35±0.172 (1.03-0.56)	t = 0.30	P= 0.76
t		9.13	5.25		
p		<0.001	<0.001		

t_1 p_1 control versus I t_2 p_2 control versus II t_3 p_3 I versus II

Table (3): Comparison of plasma total thiol concentrations (mmol/l) in studied groups before and after treatment:-

Biochemical parameters	Control	Group I	Group II	Tests of significance	
Before treatment Mean ± S.D Range	0.37±0.088 (0.29-0.56)	0.248± 0.078 (0.08-0.38)	0.294± 0.054 (0.19-0.37)	F=8.48 t_1 =3.75 t_2 =2.8 t_3 =1.88	p <0.001 p_1 =0.002 p_2 =0.011 p_3 =0.71
After treatment Mean ± S.D Range		0.31 ±0.086 (0.19-0.49)	0.336±0.12 (0.18-0.59)	t = 0.38	P= 0.76
t		3.04	1.59		
p		0.014	0.166		

Table (4): Comparison of plasma total antioxidant activity (mM/l) in studied groups before and after treatment:-

Biochemical parameters	Control	Group I	Group II	Tests of significance	
Before treatment Mean ± S.D Range	0.71±0.115 (0.50-0.88)	0.539± 0.075 (0.4-0.65)	0.543± 0.071 (0.45-0.68)	F=15.9 t_1 =4.59 t_2 =4.66 t_3 =0.14	p <0.001 p_1 <0.001 p_2 <0.001 p_3 =0.88
After treatment Mean ± S.D Range		0.67 ±0.122 (0.5-0.83)	0.63±0.096 (0.48-0.78)	t = 0.90	P= 0.37
t		5.25	4.47		
p		<0.001	<0.001		

Table (5): Pearson correlation between different biochemical parameters before treatment:-

Biochemical parameters	MDA (nmol/ml)	Total thiol (mmol/l)	TAS (mM/l)
Total T_3 (ng/ml) r p	0.44 0.004	-0.32 0.041	-0.053 <0.001
Total T_4 (µg/dl) r p	0.73 <0.001	-0.45 0.004	-0.54 <0.001
TSH (µIU/ml) r p	-0.59 <0.001	0.59 <0.001	0.27 0.092

MDA: Malondialdehyde.
TAS: Total antioxidant status.

Table (6): Pearson correlation between different biochemical parameters after treatment:-

Biochemical parameters	MDA (nmol/ml)	Total thiol (mmol/l)	TAS (mM/l)
Total T_3 (ng/ml)			
r	0.69	-0.406	-0.29
	0.71	0.026	0.118
Total T_4 (µg/dl)			
r	0.117	-0.205	-0.16
p	0.53	0.27	0.38
TSH (µIU/ml)			
r	-0.13	0.28	0.34
p	0.44	0.122	0.059

DISCUSSION

The results of this work revealed a very highly significant increase of plasma malondialdehyde concentration in patients with Graves' disease and toxic multinodular goiter patients when compared with healthy controls. Treatment with carbimazol was effective in decreasing the plasma malondialdehyde levels in patients with Graves' disease as well as toxic multinodular goiter patients. Also before treatment, there was a highly significant positive correlation between plasma MDA and total T_3 and a very highly significant positive correlation between plasma MDA and total T_4 but there was a very highly significant negative correlation between plasma MDA and TSH. However, after treatment all these correlations were non significant.

Adali et al. (16) studied the effects of propylthiouracil (PTU), propranolol and vitamin E on lipid peroxidation and antioxidant status in hyperthyroid patients and they found that plasma malondialdehyde levels in hyperthyroid patients were significantly high as compared to the control group. After treatment plasma malondialdehyde levels were significantly decreased in the propylthiouracil plus propranolol treated group. Bianchi et al. (17) reported that, in hyperthyroidism plasma levels of thiobarbituric acid-reacting substances (TBARS) were increased and that they returned to normal after treatment with thyrostatic drugs. Seven et al. (18) studied the impact of propylthiouracil therapy on lipid peroxidation and antioxidant status in hyperthyroid patients and found that a significantly higher TBARS in hyperthyroid patients and PTU therapy caused a relief in oxidative stress as reflected by significantly decreased TBARS levels. Komosinska-Vassev et al. (19) demonstrated that the level of TBARS was significantly higher in patients with untreated Graves' disease than controls and that TBARS levels returned to the euthyroid range following antithyroid therapy with thiamazole. Sewerynek et al. (20) showed a significant elevation of MDA/LDL in patients with Graves' disease and normalization of this ratio in the course of methimazole treatment. Konukoglu et al. (21) stated that, before the PTU therapy, plasma TBARS concentration was significantly high in hyperthyroid patients . Four weeks after PTU therapy, plasma TBARS was decreased. Also, Seven et al. (22) found that a significantly higher TBARS in Basedow patients in com-

parison to controls. Treatment with PTU was effective in decreasing TBARS in PTU-treated Basedow patients compared to pre-PTU administration. Aliciguzel et al. (23) reported a significantly increased malondialdehye concentration in patients with untreated toxic multinodular goiter when compared with healthy control subjects.

Mano et al. (5) observed that the concentrations of lipid peroxide, determined indirectly by measurement of TBARS, were decreased and the concentrations of catalase, Mn-superoxide dismutase (Mn-SOD) and glutathione peroxidase (GSH-Px) were increased in the cerebral cortex of hyperthyroid aged rats when compared with euthyroid rats. They suggested that lipid peroxides were lowered by the increased activities of free radical scavengers in hyperthyroid state. Even if lipid peroxide was generated it did not play an important role, because the activities of SOD, GSH-Px and catalase were increased in the hyperthyroid state and scavenged free radicals or lipid peroxides. On the other hand, Rom-Boguslavskaia et al. (24) studied lipid peroxidation in euthyroid and thyrotoxic tissue samples of the human thyroid gland. They found that the content of TBA-active lipid peroxidation products was considerably increased in the thyrotoxic tissue.

The significant elevation of plasma malondialdehyde in patients with Graves' disease and toxic multinodular goiter could be attributed to the fact that thyroid hormones increase the mitochondrial respiration. They do so by many complex changes in the number and activity of the mitochondrial respiratory chain components. Hyperthyroidism accelerates mitochondrial electron transport which is one of the major sites of superoxide radical generation, this results in increased generation of superoxide at the site of ubiquinone . Superoxide radical can lead to the formation of many other reactive species, including hydroxyl radicals, which can readily start the free radical process of lipid peroxidation (4).

Also thyroid hormones directly stimulate the generation of superoxide anion by neutrophils and alveolar macrophages (6). Videla & Fernandez (25) reported that hyperthyroidism induces an increased respiratory burst activity in rats and human polymorphonuclear leucocytes, and this effect

seems to be related to changes in the myeloperoxidase-H2O2 system of the cell. Magsino et al. (9) stated that, T3 may stimulate superoxide generation by NADPH oxidase which is a membrane enzyme responsible for producing superoxide radical that mediates bacterial killing following phagocytosis.

In the present study, there was a highly significant decrease of plasma thiol concentration in patients with Graves' disease as compared with healthy subjects and there was a significant decrease of plasma thiol concentration in toxic multinodular goiter patients when compared with healthy controls. After treatment with carbimazol, a significant increase of total thiol concentration in patients with Graves' disease was found, on the other hand there was a non significant change of total thiol concentration in toxic multinodular goiter patients.

Komosinska- Vassev et al. (19) found that plasma thiol group was significantly reduced in patients with untreated Graves' disease and that treatment with thiamazole caused changes of the oxidative protein damage indicator level toward the normal values. Also, Magsino et al. (9) reported that significant reduction of superoxide dismutase and plasma thiol levels were observed in studies of Graves' disease patients.

Oxidative damage to protein was reflected by a decrease of thiol group concentration in plasma and erythrocyte lysate in patients with newly recognized Graves' hyperthyroidism. Protein oxidation could be an important mechanism responsible for thyroid hormone-mediated tissue injury in Graves' disease. It has been shown that among the mediators involved in the pathophysiology of hyperthyroidism and subsequent tissue injury, such as thyrotoxic myopathy and cardiomyopathy, free radical-mediated lipid peroxidation plays a pivotal role. Furthermore, in animal model systems, it has been shown that the oxidation of hemoproteins can lead to their degradation. Experimental studies confirmed that thyroxin induced excess protein degradation in skeletal muscle plays an important role in the development of thyrotoxic myopathy (19).

The levels of oxidative protein damage markers depend on the levels of thyroid hormones, through their combined effects on the rates of pro-

tein degradation and oxidative damage (26). Komosinska-Vassev et al. (19) stated that the decrease of total thiol concentration in hyperthyroid patients may be due to protein oxidative damage by oxygen free radicals (OFR) generated by an excess of thyroid hormones.

The present study demonstrated a very highly significant decrease of plasma total antioxidant activity in patients with Graves' disease and toxic multinodular goiter patients when compared with healthy controls and there was a very highly significant increase in plasma total antioxidant activity in these two groups after treatment when compared with their pretreatment levels. Before treatment, there was a very highly significant negative correlation between total antioxidant and total T3 and total T4 . Meanwhile there was a significant positive correlation between total antioxidant activity and total cholesterol.

Rom-Boguslavskaia et al. (24) demonstrated that the activity of antioxidant enzymes (catalase and glutathione peroxidase) were decreased in thyrotoxic tissue of people with diffuse toxic goiter. Adali et al. (16) reported that there were a significant reduction in the levels of blood reduced glutathione (GSH), and the erythrocyte glutathione peroxidase (GPx) activity but the activities of erythrocyte superoxide dismutase (SOD) and catalase (CAT) were higher in the hyperthyroidism as compared to the control group. After treatment, GSH level and GPx activity were increased significantly and SOD and CAT activities were significantly decreased as compared to the pretreatment levels. Also Bianchi et al. (17) reported that the plasma levels of vitamin E and coenzyme Q10 were decreased in patients with hyperthyroidism.

Seven et al. (18) found a significantly higher GSH and Cu-Zn SOD levels in hyperthyroid patients. PTU therapy caused a relief in oxidative stress as reflected by a decrease in GSH and Cu-Zn SOD levels. Also, Seven et al. (22) found that significantly higher glutathione (GSH) level and Cu-Zn superoxide dismutase (Cu-Zn SOD) activity in Basedow patients in comparison to controls and their levels were significantly decreased in PTU-treated patients when compared to pre-PTU administration.

Aliciguzel et al. (23) showed that the erythrocyte antioxidant enzyme

activity glutathione and ceruloplasmin levels were significantly increased whereas serum vitamin E, plasma vitamin C and selenium levels were decreased in toxic multinodular goiter patients when compared to control subjects. Recently, Resch et al. (8) observed a reduction in non-enzymatic antioxidant level in hyperthyroid patients.

Mano et al. (27) measured the levels of free radical scavengers and checked superoxide radical generating systems in the human thyroid gland. Thyroid specimens from patients with Graves' disease contained significantly higher concentrations of xanthine oxidase (XOD) and GSH-Px, compared to those in the normal thyroid tissue but catalase concentration was lower. These findings suggest that free radicals were increased in the thyroid tissue of patients with Graves' disease. Mano et al. (28) also found that the level of coenzyme Q was reduced in the thyroid tissue of patients with Graves' disease.

The increase of the malondialdehyde concentration and the decrease of total thiol concentration and total antioxidant status in hyperthyroidism and their normalization in the course of treatment with carbimazol, suggest that the drug may protect against oxidative stress induced by over production of thyroid hormones.

Sewerynek et al. (20) suggested that antithyroid drugs may act by different mechanisms. They could act by decreasing the level of the thyroid hormones. Also antithyroid drugs have an antioxidative action. They also have immunosuppressive and anti-inflammatory effects.

Additionally, there is some information about the influence of methimazole on the endogenous antioxidative system. Ademoglu et al. (29) observed that hyperthyroidism tends to enhance the lipid peroxide content, to increase glutathione S-transferase activity and to decrease GSH-Px activity, as well as vitamin E and ascorbic acid levels in plasma. The achievement of euthyroidism after methimazole treatment led to normalization of these parameters. Also, Seven et al. (30) found that vitamin C supplementation potentialized the antioxidant status in both PTU-treated hyperthyroid patients and in controls.

From this study it could be conclude that, intensification of lipid and

protein peroxidation process and the impairment of plasma antioxidant activity in patients with hyperthyroidism due to Graves' disease or toxic multinodular goiter confirm the presence of oxidative stress and the disturbances in the antioxidant systems might be an indicator of patients' susceptibility to free radical damage. So, supplementation of antioxidants as an adjuvant to medical antithyroid treatment could help to prevent oxidative damage in hyperthyroid patients. Also, we suggest that measuring oxidative stress parameters could be a better way of follow up of thyroid state improvement both from the chemical and economic point of view.

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التقييم الكيميائى الحيوى لبعض مؤشرات الإجهاد التأكسدى فى المرضى المصابين بزيادة إفراز الغدة الدرقية قبل وبعد العلاج

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استهدف هذا البحث دراسة التغيرات التى تحدث فى مستوى بعض المؤكسدات ومضادات الأكسدة (تركيز ثنائى الدهيد المالون، التركيز الكلى لمجموعة الثيول والنشاط الكلى المضاد للأكسدة) فى المرضى المصابين بزيادة وظائف الغدة الدرقية ودراسة التغيرات الناتجة فى مستوى تلك المؤكسدات ومضادات الأكسدة بعد العلاج.

اشتملت هذه الدراسة على أربعين شخص. ثلاثون يعانون من زيادة وظائف الغدة الدرقية وقد تم تقسيمهم الى مجموعتين:

- المجموعة الأولى : اشتملت هذه المجموعة على ١٥ مريض من المصابين بزيادة وظائف الغدة الدرقية نتيجة مرض تضخم الغدة التسممى المنتشر (جرافز).
- المجموعة الثانية : اشتملت هذه المجموعة على ١٥ مريض من المصابين بمرض تضخم الغدة التسممى نتيجة فصوص نشيطة بها.

بالاضافة الى مجموعة من الأصحاء وقد اشتملت على ١٠ أشخاص كمجموعة ضابطة .

وقد تم استبعاد المدخنين والمرضى الذين يعانون من أمراض حادة أو مزمنة.

وقد تم قياس وظائف الغدة الدرقية وذلك بطريقة الامتزاز المناعى المرتبط بالانزيم وقياس تركيز ثنائى الدهيد المالون، التركيز الكلى لمجموعة الثيول بالاضافة الى النشاط الكلى المضاد للأكسدة وذلك بالطرق الكيميائية المختلفة لجميع مجموعات الدراسة.

وقد تم علاج ١٠ من المرضى المصابين بمرض تضخم الغددة التسممى المنتشر (جرافز) و ١٠ من المرضى

المصابين بمرض تضخم الغدة التسممى نتيجة فصوص نشيطة بها بواسطة العلاج الدوائى (كاربيمازول) بجرعة ٣٠ ملجرام يومياً لمدة ثمانية أسابيع وبعد ذلك تم قياس وظائف الغدة الدرقية وثنائى الدهيد المالون، التركيز الكلى لمجموعة الثيول بالاضافة الى النشاط الكلى المضاد للأكسدة مرة أخرى.

وقد أظهرت نتائج هذه الدراسة مايلى :

١- وجدت زيادة ذات دلالة إحصائية عالية فى تركيز ثنائى الدهيد المالون فى كل من مجموعتى المرضى مقارنة بالمجموعة الضابطة من الأصحاء ولكن تركيز ثنائى الدهيد المالون إنخفض إنخفاضاً ذو دلالة احصائية عالية فى هؤلاء المرضى بعد العلاج.

٢- وجد إنخفاض ذو دلالة إحصائية فى التركيز الكلى لمجموعة الثيول فى المرضى المصابين بمرض تضخم الغدة التسممى المنتشر (جرافز) والمرضى المصابين بمرض تضخم الغدة التسممى نتيجة فصوص نشيطة بها مقارنة بالمجموعة الضابطة من الأصحاء. وقد وجد أن التركيز الكلى لمجموعة الثيول قد ارتفع بعد العلاج إرتفاعاً ذو دلالة احصائية فى المرضى المصابين بمرض (جرافز) ولكنه ليس ذو دلالة احصائية فى المرضى المصابين بمرض تضخم الغدة التسممى نتيجة فصوص نشيطة بها.

٣- وجد انخفاض ذو دلالة احصائية عالية فى النشاط الكلى المضاد للأكسدة فى المرضى المصابين بمرض تضخم الغدة التسممى المنتشر (جرافز) والمرضى المصابين بمرض تضخم الغدة التسممى نتيجة فصوص نشيطة بها مقارنة بالمجموعة الضابطة من الأصحاء وقد وجد إرتفاعاً ذو دلالة احصائية عالية ففى النشاط الكلى المضاد للأكسدة فى هاتين المجموعتين بعد العلاج مقارنة بمستواة قبل العلاج.

ومما سبق نستخلص من الدراسة أن ارتفاع تركيز ثنائى الدهيد المالون، إنخفاض التركيز الكلى لمجموعة للثيول بالإضافة الى الانخفاض فى النشاط الكلى المضاد للأكسدة فى المرضى المصابين بمرض تضخم الغدة التسممى المنتشر (جرافز) والمرضى المصابين بمرض تضخم الغدة الدرقية متعدد العقيدات التسممى يؤكد تعرض هؤلاء المرضى للاجهاد التأكسدى وان الخلل فى نظام مضادات الأكسدة يعرضهم لتأثير الشوارد الحرة المدمر. لذلك ننصح باعطاء مضادات الأكسدة كعامل مساعد فى علاج هؤلاء المرضى لمنع التأثير الضار للشوارد الحرة. كما أن قياس مؤشرات الاجهاد التأكسدى يمكن أن يكون وسيلة أسهل لمتابعة التحسن فى حالات زيادة وظائف الغدة الدرقية كيميائيا واقتصادياً أيضاً .