

Study the levels of Hormones TSH, T3, Testosterone and the extent of its relationship with TG in women who have been taken corticosteroid as a treatment for asthma

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Abstract- The present study aimed to assess a new knowledge of Thyroid-stimulating Hormone(TSH), Triiodothyronine hormone(T3) and Testosterone hormone concentrations in women who have been taken medicines of corticosteroid as a treatment for asthma and try to find out a relationship between these hormones and triglyceride(TG) concentration, since this study was conducted on (80 blood samples) of women.(50 blood sample) from women who have been taken medicines of corticosteroid as a treatment for asthma for a period 5-15 years and who have ages between (21-41) years and do not suffer of health problems as (hypertension disease, heart disease, diabetes), as well as a control group consisting of (30 blood sample) from normal women who do not suffer from any health problems and their ages are between (21-41) years. The results of this study revealed the presence of a significant decrease ($P < 0.05$) in the concentration of TSH and Testosterone hormone for a group of patients women who have been taken corticosteroids as a treatment for asthma in comparison to the control group. while the results exhibited that existence of a significant increase ($P < 0.05$) in the concentration of T3 to a group of patients women compared to the control group. the study subjected a positive correlation between concentrations of TSH and TG for a group of patients women.

Key Words- Corticosteroid, TSH, T3, Testosterone, Asthma, TG.

1. INTRODUCTION

Corticosteroids are steroid hormones which either normally produced by the body from adrenal glands or manufactured outside the body by man [1]. The manufacture Corticosteroids (in different forms: tablets, injections, inhalers, creams or gels which Long-term control or Quick - relief) have anti-inflammatory effect, its lower inflammation and suppress the immune system by minimizing some of the chemicals in the body which secretes respond to inflammation [2,3]. Corticosteroids are described to treat many of conditions and diseases such as (arthritis, colitis, cystic fibrosis, bronchitis, allergic, skin rashes, and asthma). Examples of corticosteroids are: hydrocortisone, cortisone, prednisone, Methylprednisolone, Fluticasone, Budesonide, betamethasone, dexamethasone, glucocorticoid. [4,5,6].

Thyroid-Stimulating Hormone, also named thyrotropin, thyrotropic-Hormone, TSH, or hTSH in human, is a Hormone which results from anterior lobe of pituitary gland and enhances the growth of thyroid gland and stimulates it to produce its hormones (thyroxin (T4) and Triiodothyronine (T3)). the first used of Thyroid-stimulating hormone was in 1941[7,8].

Triiodothyronine Hormone (T3) hormone has been secreted by thyroid gland where it is synthesized and stored [9]. It affects in heart rate and control of metabolism processes and regulates the development, growth and temperature of the body [10,11].

Testosterone is a steroid hormone of androgenic hormones which has been secreted from Leydig cells in testes (in male), adrenal glands, and the ovaries (in female) and regulate its production by luteinizing hormone (LH) [12,13]. Testosterone in the male is responsible for: (the development of male reproductive organs, raise the muscles as well as bone mass, secondary sexual characteristics and growing of body hair and to preventing osteoporosis), whereas in female it backs up muscle and bone solidity and shares in sex drive [14,15].

Triglyceride (TG), also called triacylglycerol and triacylglyceride, is a lipid compound consisting of glycerol and three fatty acids [16]. It can be found in the human bodies as well as in animals, as constituent (such as in blood plasma and human skin

oils), and food. It is worth to mention that the liver can also produce triglycerides [17]. After each meal, the blood becomes rich in triglycerides. Thus cells and tissues use it for energy or store it as a fat [18].

Asthma is a chronic inflammatory respiratory disease. It affects the lungs in which the airways, they carry air from and to the lungs, become narrow and caused difficulty in breathe [19]. Asthma symptoms have been included shortness of breath or difficulty in breathing (Dyspnea), Secretion, chest tightness or feeling with pain in Chest, cough for a long time (especially during the night with Wheezing of breath), inability to sleep at night and to do sport exercises and the lips and nails become gray or blue color [20]. The asthma is considered from non-communicable diseases compared to other illnesses, such as colds, but at the same time the prevalence of asthma appears to be on the rise, about 10 % of the world's population has been infected with asthma [21]. However, there are many of reasons and factors take part in getting asthma such as genetics, environmental stimuli (e.g. a pollen of plants, herbs, fungi and mold), animals dung, dust and pathogens (e.g. viruses) and asthma triggers (e.g. smoke, strong odors and chemicals) [22,23].

2. MATERIALS AND METHODS

2.1 Samples of the study

This work was carried out in Sadr Teaching Hospital in Najaf City \ Center of Allergy and Asthma. The study was conducted on 80 women; 50 women who have been taken medicines of corticosteroid as a treatment for asthma and their ages are between 21-41 years, and 30 women of control group, who do not suffer from any health problems which their ages are between 21-41 years.

2.2 Blood samples

5 ml of venous blood samples have been drawn by using a disposable needle for each two groups. Then, the blood samples were transferred to special tubes which do not contain anticoagulant material. The blood samples were left at lab temperature for 10 minutes for clotting, after that, they have been centrifuged by centrifuge in speed (6000 cycles per minute) for 10 minutes, and then the serum has been separated and transferred into new disposable tubes.

2.3 The process of laboratory testing was included in both groups:

2.3.1 Hormonal parameters

2.3.1.1 Measurement the concentration of Thyroid-Stimulating Hormone in serum.

Thyroid-Stimulating Hormone (TSH) Elisa kit (Biocheck, Inc, England) was used to determine a quantity of TSH in human serum.

2.3.1.2 Measurement the concentration of Triiodothyronine Hormone in serum.

Triiodothyronine Hormone (T_3) Elisa kit (Biocheck,inc, England) was used to determine a quantity of T_3 in human serum.

2.3.1.3 Measurement the concentration of Testosterone Hormone in serum

Testosterone hormone Elisa kit (Biocheck,inc, England) was used to determine a quantity of testosterone hormone in human serum.

2.3.2 Estimation of Triglycerides concentration in Serum

Triglycerides kit (Randox Lab - France) was used to determine a quantity of TG in human serum according to enzymes' method [24].

2.4 Statistical Analysis

Results have been analyzed by using SPSS Statistics version 17.0 Multilingual program (2008), IBM-USA. The results have been represented as (mean ± standard Error). T-test has been used in the comparison between the patients and control groups in the results. Correlations coefficient, regression analysis and regression coefficient have been calculated to assess the correlations between the parameters [25]. The existing differences between groups are being statistically differentiated when (p<0.05). The figures have been formed by using (graph pad program) version 5.01 multilingual programs, 2007, USA [26].

3. RESULT

3.1 The changes in hormonal criteria in women who have been taken corticosteroid as treatment for asthma:

3.1.1 Change in thyroid stimulating hormone concentration.

The results in figure (1) and the table (1) exhibit a significant decrease (p<0.05) in the concentration of TSH 0.768±0.025 µIU/ml in the group of patients women comparing with the control group 2.103±0.049 µIU/ml.

Table 1. Concentration of thyroid stimulating hormone, Triiodothyronine hormone and Testosterone Hormone in the group of patients women who have been taken corticosteroids as a treatment for asthma comparing with the control group.

Parameters	Patients group	Control group
	Mean ± SE	Mean ± SE
TSH (µIU/ml)	*0.768±0.025	2.103±0.049
T ₃ (ng/ml)	*1.659±0.027	1.192±0.007
Testosterone (ng/ml)	*0.185±0.003	0.384±0.006

* mean significant difference between patients

group and control group at (p<0.05)

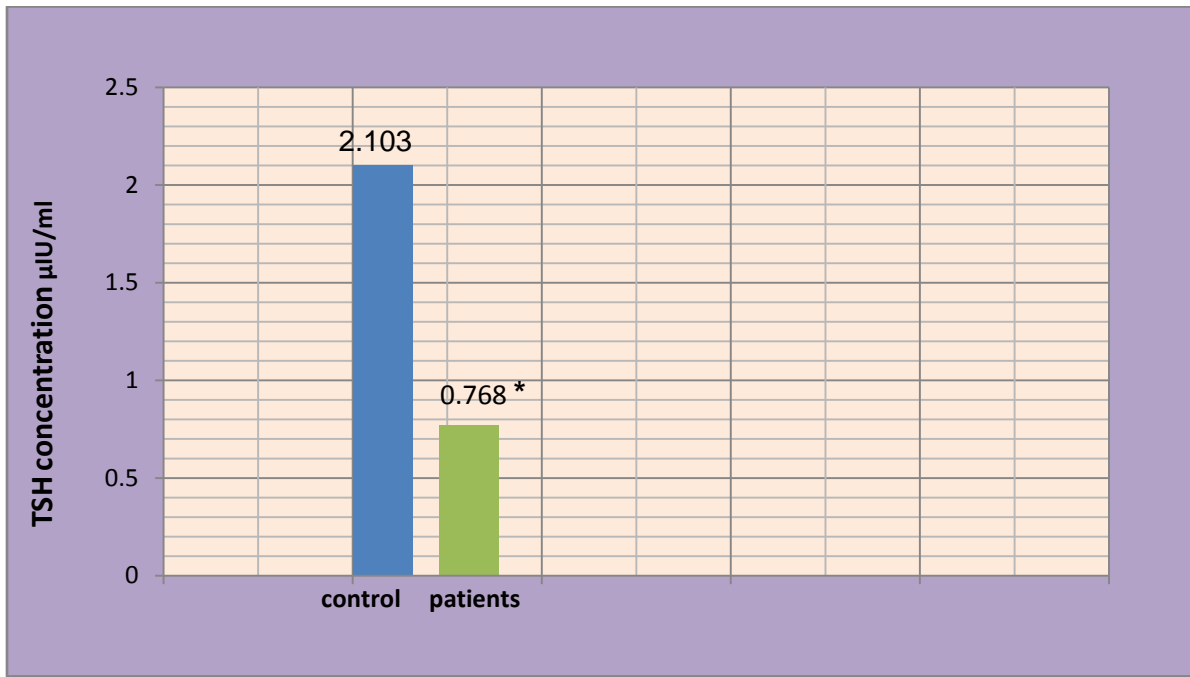


Figure 1. Concentration of thyroid stimulating hormone in patients women who have been taken corticosteroids as a treatment for asthma and the control group.

- The Values are (means \pm SE).
- * mean significant difference at ($p < 0.05$).

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3.1.2 Change in Triiodothyronine Hormone concentration

The results in figure (2) and the table (1) represent a significant increase ($P < 0.05$) in the concentration of T_3 1.659 \pm 0.027 ng/ml in a group of patients women compared to the control group 1.192 \pm 0.007 ng/ml.

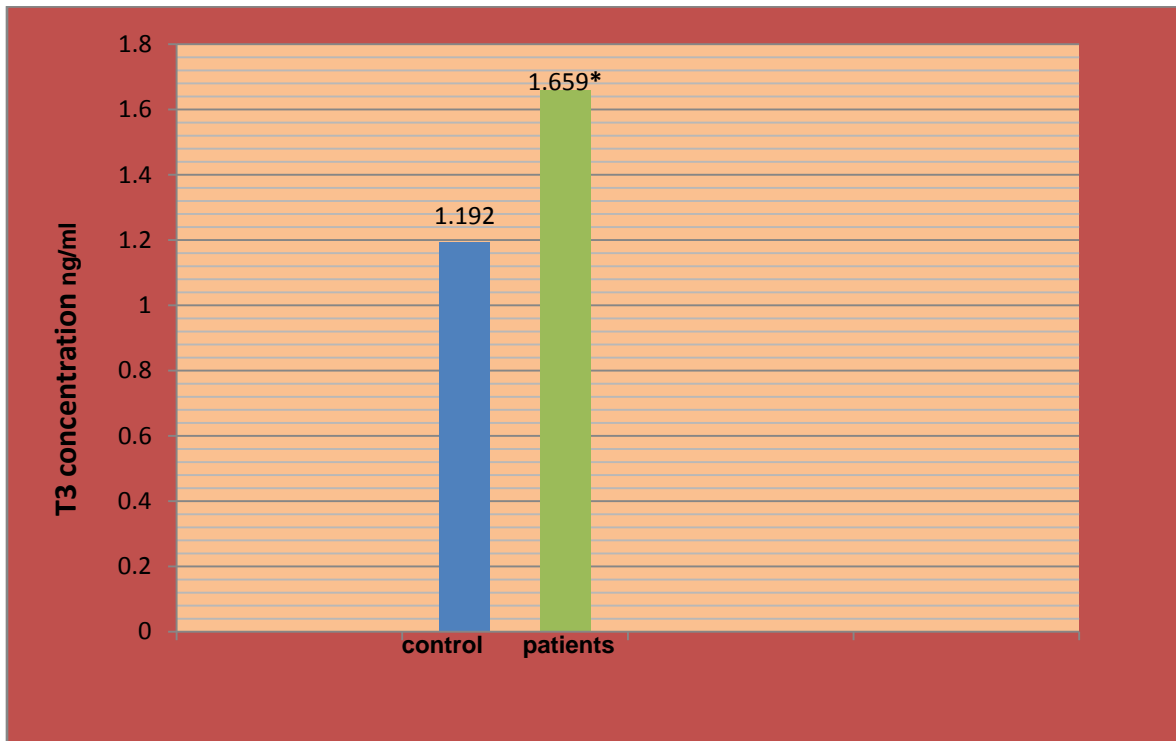


Figure 2. Concentration of Triiodothyronine hormone in patients women who have been taken corticosteroids as a treatment for asthma and the control group

- The Values are(means \pm SE).
- * mean significant difference at ($p < 0.05$).

3.1.3 Change in Testosterone Hormone concentration

The results in figure (3) and the table (1) indicate a significant decrease ($p < 0.05$) in the concentration of Testosterone Hormone 0.185 ± 0.003 ng/ml for a group of patients women compared to the control group 0.384 ± 0.006 ng/ml.

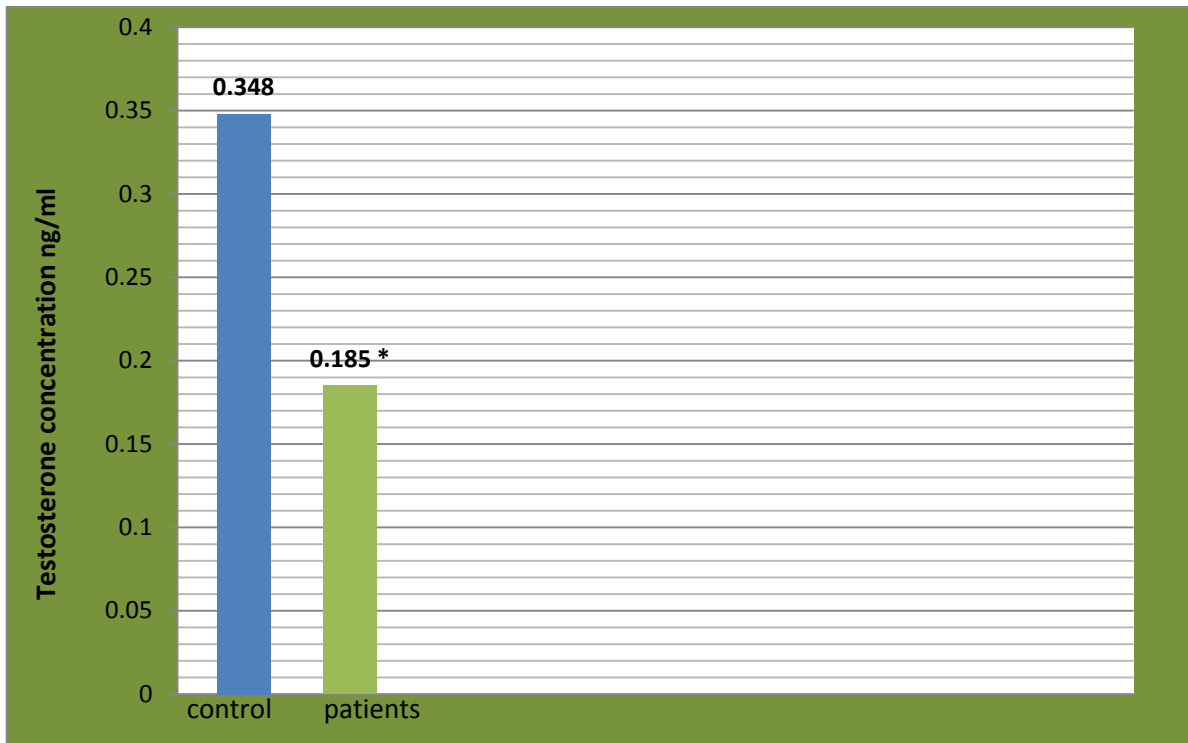


Figure 3. Concentration of Testosterone hormone in patients women who have been taken corticosteroids as a treatment for asthma and the control group.

- The Values are (means \pm SE).
- * mean significant difference at ($p < 0.05$).

3.2 The correlation between Thyroid Stimulating Hormone concentration and Triglycerides concentrations.

The results of the linear regression analysis and correlation coefficient illustrated that there is a significant positive correlation ($p < 0.05$) between the concentration of TSH and concentration of TG for the group of patients women who have been taken corticosteroids as a treatment for asthma, ($r = 0.0998$, thyroid stimulating hormone = $0.0187 + 0.007$ Triglycerides)

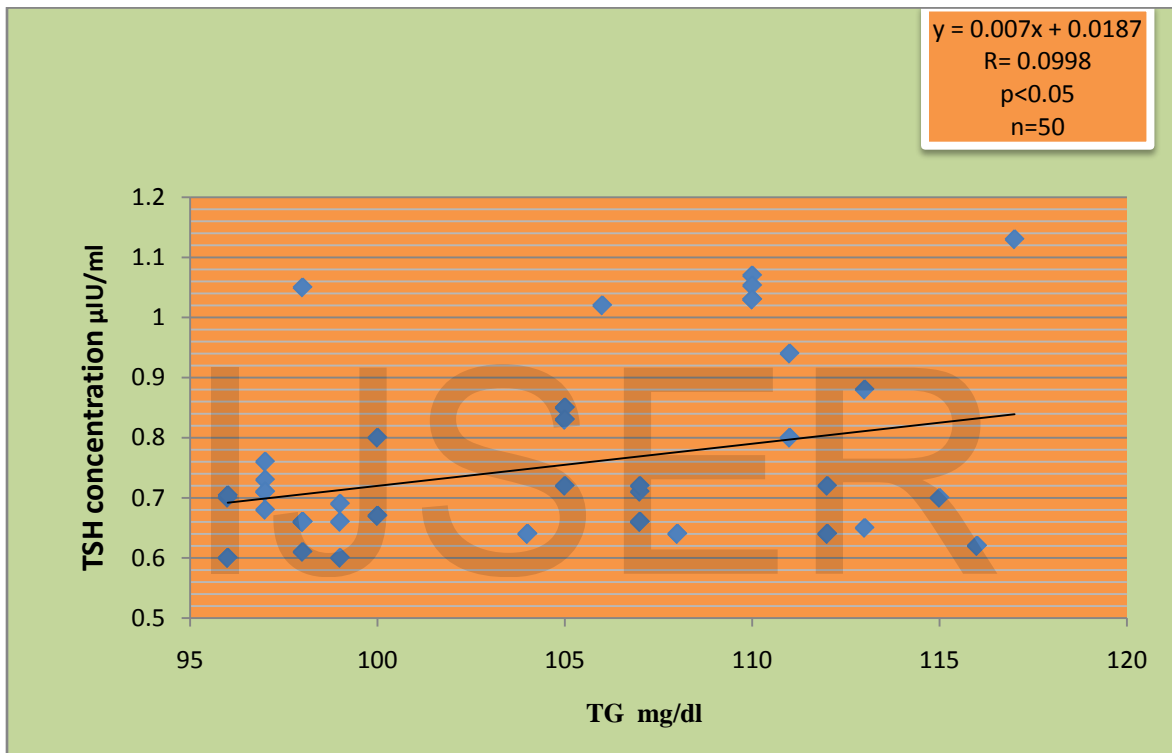


Figure 4. Correlation between the concentrations of thyroid stimulating Hormone and Triglycerides in patients women who have been taken corticosteroids as a treatment for asthma.

4 DISCUSSION

4.1 The change in the concentrations of thyroid stimulating and Triiodothyronine Hormones

The results in this study elucidated a significant decrease ($P < 0.05$) in TSH concentration of the group of patients women compared to the control group. These results are agreed with previous study [27]; which has concluded that the corticosteroids have inhibitory action on hypothalamus-pituitary-thyroid axis thereby to a decline in the secretion of thyroid-stimulating Hormone from the anterior lobe of the pituitary gland [28,29]. Other research [30] agreed partly with a current studying; it has been clarified that corticosteroid has direct repress on the pituitary secretion of TSH without an increase in T3.

While the results represented a significant increase ($P < 0.05$) in the concentration of T₃ in a group of patients women compared to the control group come to an agreement with a previous study [31]. It was conducted on catfish and revealed that the use of two doses of cortisol daily, during the quiescent phase, leads to increase the level of (T₄ and T₃) in plasma. Other studies [32,30] have a different opinion they have clarified that Dexamethasone inhibits the levels of T₃ in serum by reducing the TSH response to TRH (thyrotropin-releasing hormone); TSH secretion has been suppressed by the direct impact of glucocorticoids on anterior lobe of pituitary gland.

4.2 The change in Testosterone Hormone concentration

The results in this study indicated that there is a significant decrease ($p < 0.05$) in the concentration of Testosterone Hormone for a group of patients women compared to the control group. This trend may be because of the effect of corticosteroids on hypothalamic-pituitary-gonadal axis and that due to lack of secretion of Gonadotropin-releasing Hormones (GnRH) from the hypothalamus or reduction in Gonadotropic-Hormones from the pituitary gland especially luteinizing Hormone (LH). Thus leads to a lack of the secretion of ovarian hormones [33 ,34 ,35].

Corticosteroid has a direct effect on the luteinizing Hormone (LH), acts on women (granulosa-lutein cells) to discourage the backing of steroidogenesis by luteinizing Hormone and these alterations are happening by ovarian 11 β -Miydroxysteroid dehydrogenase [36 ,37].

Addition to the secretion of testosterone from the ovaries, the adrenal glands produce testosterone and in the current study may be the reason of testosterone depression is back of the inhibition of the secretion of Dehydroepiandrosterone (DHEA is considered of the important sources for the formation of androgenic hormones in women) , due to inhibition of secretion of the adrenocorticotrophic hormone (ACTH) from the pituitary gland and thus lower the production of adrenal gland hormones [38 ,39].

Probably the cause of decline the testosterone in our study is Immunologically with pituitary gland by increasing in (Interleukin 6, Interleukin 10, Interferon γ) concentrations when use corticosteroids and these immune materials reduce the response of pituitary gland lead to less in luteinizing hormone secretion and Subsequently decrease in testosterone level [40].

4.3 The correlation between the concentrations of thyroid stimulating Hormone and Triglycerides .

The existing study revealed a significant positive correlation ($p < 0.05$) between the concentrations of thyroid-stimulating hormone and Triglycerides for the group of patients women who have been taken corticosteroids as a treatment for asthma. This finding coincided with other researchers [41,42]. They found that the increasing in TSH positively and significantly associates ($p < 0.05$) to increasing of TG while other studies do not agree [43,44]. The relationship between TSH and TG has negatively affected the integrity of the cardiovascular and thus lead to atherosclerosis disease [45].

5 CONCLUSION

It can be deduced facts its: TSH concentration was low in patients women who have been taken corticosteroids as a treatment for asthma. While the concentration of T₃ was significantly high in a group of patients women and the level of Testosterone hormone in a group of patients women was low. The study located a significant positive correlation ($p < 0.05$) between the concentration of TSH and concentration of TG for the group of patients women .

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