

The effect of PTU on Chemerin levels in hyperthyroid women during early pregnancy

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Abstract

This study aims to find out the effects associated with the use of propylthiouracil on Chemerin levels in pregnant women with hyperthyroidism. The current study was conducted on 60 women with hyperthyroidism and 60 women with normal thyroid glands, where they were divided into groups according to the time periods of pregnancy. Results: shows that there was significant increase in the levels of Chemerin in the groups of treatment with PTU compared with control groups and the increase positively correlated with the progression of pregnancy. Conclusion: PTU effect in Chemerin levels which increase with progression of pregnancy of hyperthyroid women.

Key words: PTU, Chemerin, pregnancy, hyperthyroidism

Introduction

Hyperthyroidism:

The thyroid gland is one of the largest glands in the human body, as it plays a role in the metabolism, growth and development of the human body. It also helps regulate body functions through the continuous secretion of constant amounts of thyroid hormones into the bloodstream. Loss of balance between these hormones leads to either under activity or hyperactivity of the thyroid gland (1) Hyperthyroidism is defined as an abnormal rise in thyroid hormones resulting from increased production and secretion of these hormones by the thyroid gland. Thyrotoxicosis, on the other hand, is used to describe an excess of thyroid hormones, which may be due to hyperthyroidism or in the absence of hyperthyroidism, as it occurs in the case of leakage of thyroid hormones in the case of thyroiditis or in the case of patients who take excess of thyroid hormones. (2)

Hyperthyroidism is a clinical condition represented by a high level of metabolism, which is due to an increase in the level of free T4 or T3 hormone, and is accompanied by inhibition or a decrease in the level of TSH hormone in the blood (3) The clinical condition of hyperthyroidism ranges from no symptoms to thyroid storm Patients with a disease that, without treatment, may lead to the development of diseases, including convulsions, Atrial fibrillation, and heart failure. (4) Hyperthyroidism may be overt, which is accompanied by inhibition of the TSH hormone and an increase in the levels of the hormones T3 and T4 in the blood, or subclinical, as it is accompanied by inhibition of the TSH hormone and normal levels of the hormones T3 and T4. (5 ,6)

Treatment:

Antithyroid drugs (ATDs), radioactive iodine therapy and surgical intervention. The three options for treating patients with hyperthyroidism are considered effective in treating graves' disease, while patients with multinodular goiter or toxic adenoma should be directed towards radioactive iodine. or surgical. (7) Over the past eight decades, thionamiase treatments, which mean carbimazole CMZ and metabolites represented by methimazole MMI and propylthiouracil PTU, which are used in the treatment of various forms of hyperthyroidism, transfer of antithyroid drugs to it, as it works to inhibit the oxidation of iodine and inhibit the production of thyroid peroxidase in the time of duplication Iodothyronine for the formation and construction of T3 and T4 gland hormones Carbimazole is easy to obtain in many Asian and European countries, which converts to the active form methimazole with properties similar to methimazole alone.

In high doses, propylthiouracil reduces the conversion of T4 and T3 in peripheral tissues by inhibiting the action of the deiodinase of the outer ring of the T4 hormone. This therapy may have an immunosuppressive effect in addition to its anti-inflammatory effect. (8)

Use during pregnancy:

Propylthiouracil is classified as D in pregnancy. Class D is placed opposite to the presence of positive evidence, since the treatment is effective for both the mother and the fetus. It is preferable to use propylthiouracil over methimazole during pregnancy, which is also considered to be class D. Propylthiouracil is used before pregnancy and during the first three months of pregnancy, first trimester, because increasing the malformation potential of methimazole during the period of organ formation during the second and third trimesters, beyond the danger stage, and methimazole is used instead of propylthiouracil to avoid complications caused by propylthiouracil on the liver of pregnant women.(9)

Chemerin:

It is a hormonally active protein that may be involved in various metabolic, inflammatory and cardiovascular diseases (10 ,11) Chemerin is a persistent cytokine secreted primarily from white adipose tissue (WAT), which was initially considered as a chemotactic factor generated in inflammatory conditions, but recently changed adipokine to regulate adipose tissue and energy metabolism (12,13)

Chemerin is present in many tissues, including the placenta. However, its gene expression is mainly found in the liver and visceral adipose tissue under pregnancy (14, 15, 16)

It was observed that the level of Chemerin was elevated in the serum of patients with non-alcoholic cirrhosis of the liver (NAFLD) compared to healthy subjects (17). The high genetic change of the mRNA of Chemerin that originated from the liver was also confirmed to be associated with many diseases, including liver damage, liver fibrosis, and steatosis. NAFLD-additional inflammation (18)

Most importantly, Chemerin was considered as an independent agent that is established by occupation on type 2 diabetes mellitus, T2DM, and cardiovascular disease. (19 ,20)

Chemerin lacks a significant effect on glucose and lipid metabolism, and this effect occurs especially during pregnancy, but the increase in the concentration of this hormone is not at its height. (14,21).

Methodology

This research was conducted during the period from January 2022 to February 2023. A total of 120 participant in the study (60 patients and 60 control) who attend the center of diabetes in al diwanya hospital and the hospital of gynecology and obstetrics in al diwanya and its districts.

The patients were diagnosed with hyperthyroidism according to the symptoms and hyperthyroidism control test score.

Information were taken about the patients under the supervision of consultant doctor and after getting the approval from the patient himself, information were listed in info-panel.

The groups in this study are as follows:

Control groups

Composed of 60 young healthy euthyroid pregnant, divided into 3 control groups based on the duration of the pregnancy and as following:

Group 1 contains 20 euthyroid pregnant in the first month of pregnancy

Group 2 containing 20 euthyroid pregnant in the third month of pregnancy

Group 3 containing 20 euthyroid pregnant in the fifth month of pregnancy.

Treatment groups are as follows:

Group 4 containing 20 pregnant with hyperthyroidism in the first month of pregnancy

Group 5 containing 20 pregnant with hyperthyroidism in the third month of pregnancy

Group 6 containing 20 pregnant with hyperthyroidism in the fifth month of pregnancy

Each of the treatment groups were compared with the same duration of pregnancy of control groups.

Blood samples collection

Peripheral whole blood (5 ml) of was aspirated from each controls and patient groups using plastic disposable syringe. This blood was immediately dispensed into gel tube, and in water bath, allowed to clot for ten minutes at 37C , at that moment were centrifuged at (3000 rpm) for 10 minutes. Then clear serum was obtained and stored frozen at -18 C until being used for hormonal and immunological parameters assay.

The hemolysed samples were discarded

Human Chemerin

Assay Principle

This kit is an Enzyme-Linked Immunosorbent Assay (ELISA).

Statistical analysis:

Statistical analysis of the present Data was presented as mean \pm SD. Multiple comparisons were performed using Two-way ANOVA followed by least significant difference (LSD) as a post hoc test. The 0.05 level of probability was used as the criterion for significance. All statistical analyses were performed using SPSS software version 32.

Results and discussion

The table 3-7 shows the level of Chemerin for each of the groups treated with PTU compared with the control group during the months of pregnancy, and as follows:

Groups	Period			Mean \pm SD
	1 st month	3 rd month	5 th month	
Control	10.9 \pm 0.52	11.17 \pm 0.69	12.01 \pm 1.19	11.36 \pm 0.96
Treatment	20.1 \pm 1.06	40.12 \pm 2.27	42.22 \pm 7.63	34.17 \pm 11
mean \pm SD	15.54 \pm 4.76	25.65 \pm 14.7	27.11 \pm 16.2	22.77 \pm 13.8
LSD _{0.05}	1.47			1.21
LSD _{0.05} interaction	2.091			

Table 3-7 means and SD of chemerin in all study groups

It was observed that there was no significant difference for the increase in the level of the chemerin between the control groups during the first months of pregnancy, while it was observed that there was a significant difference in the PTU treatment groups, as there was a significant increase in the level of the Chemerin in the treatment group for the first month compared with the control group, as well as the presence of a significant difference between The treatment for the third month G5, compared with the control group, G2. Also, a significant difference was observed for the level of this adipokaine in the treatment group for the fifth month, G6, compared with the control group, G3. Also, there was a significant difference for the increase in the level of Chemerin between the treatment groups, as it was higher in the fifth month group. G6 of them are in the two groups of the third month, G5, and the first month, G4, respectively

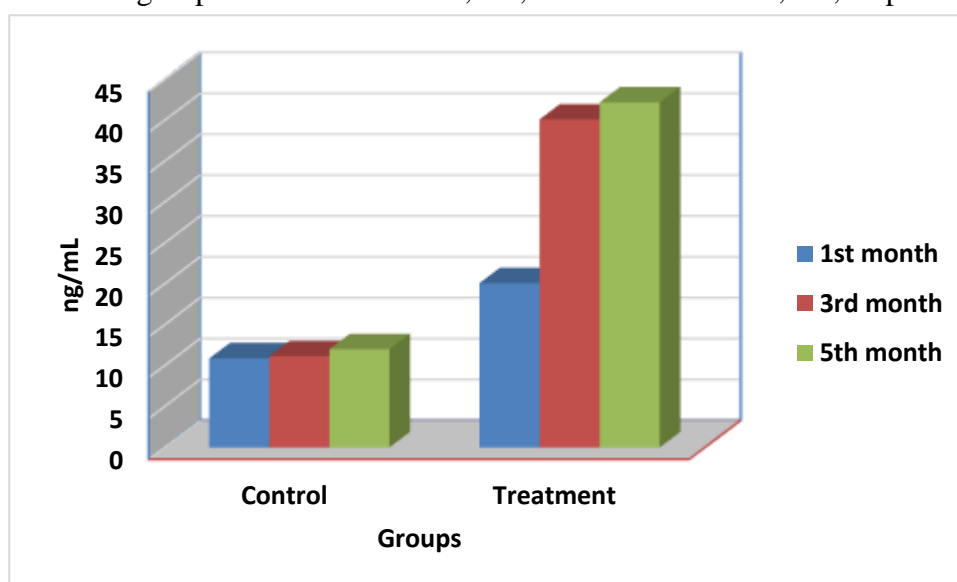


Figure 3-5 means of Chemerin levels in all study groups

Omar et al; indicates an increase in the level of Chemerin in women with hyperthyroidism compared with healthy or euthyroid women (22). Kasher-Meron et al., indicated a high level of Chemerin in pregnant women, as it was higher in the third and second trimesters than in the first three months, in addition to the direct correlation with the increase in body mass index (23). Aldoghaither et al; indicated that the level of

Chemerin is high in women with hyperactivity of the thyroid gland and is associated with an increase in the level of thyroid hormones (24), Al-Shaikn et al; mentioned that the level of Chemerin rises with pregnancy in women with hypothyroidism and is positively associated with a high level of T3 and T4 with a negative correlation with TSH(25). While Edrees et al; mentioned that the level of Chemerin is higher in people with hypothyroidism than in people with hyperthyroidism and healthy people(26).

Conclusions:

We conclude that PTU treatment has a positive effect on Chemerin levels during pregnancy and such effect increase with time and duration of treatment with the drug. A further study is needed to evaluate Chemerin levels through all pregnancy weeks.

Recommendations:

We recommend that there is periodic check for Chemerin levels during the pregnancy as its related effect on maternal health and fetal development.

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