

## Effect of Using Combined Oral Contraceptive on Thyroid Hormones and Lipid Profile in Female

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### Abstract

This study was performed to know the effect of contraceptive pill on the thyroid hormone triiodothyronine, thyroxin, and thyroid stimulating hormone, and lipid profile, (total cholesterol, triglyceride, and, high density lipoprotein). Blood samples were collected from 60 women's at the midcycle which divided to two groups, group (A) consist of 30 women taking combined oral contraceptive more than one year. and group (B) which consists 30 women never take oral contraceptive and considered as control group. The age of these women varies from 20 to 35 years. The results of the current study showed that the levels of triiodothyronin and thyroxin were significantly higher among women taking combined contraceptive compared to control group, while the TSH level was significantly lower in group A although it was in the normal range, comparative with control group. The level of triglyceride and total cholesterol were significantly higher in women of group (A) comparative with control group (B), and the HDL level was significantly lower among combined contraceptive users compared to control group.

### تأثير استخدام موانع الحمل المركبة على هرمونات الغدة الدرقية ومستوى الدهون لدى الإناث

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### الخلاصة

أجريت هذه الدراسة لمعرفة تأثير حبوب منع الحمل على هرمونات الغدة الدرقية، والهرمون المحفزة للغدة الدرقية، ومستوى الدهون (الكوليسترول الكلي، الغلiserيدات الثلاثية، والبروتين الدهني عالي الكثافة). جمعت عينات الدم من 60 امرأة في منتصف الدورة الشهرية، تم تقسيمهم إلى مجموعتين، المجموعة (A) تتكون من 30 امرأة أخذن موانع الحمل المركبة عن طريق الفم لأكثر من سنة واحدة. ومجموعة (B) التي شملت 30 امرأة لم تستخدم وسائل منع الحمل عن طريق الفم والتي عدت كمجموعة سيطرة لمقارنة النتائج. تراوحت اعمار النساء في هذه الدراسة بين 20 و 35 سنة. اظهرت النتائج وجود زيادة معنوية في مستوى T3 و T4 في المجموعة (A) مقارنة مع المجموعة B (مجموعة السيطرة). وأظهرت النتائج انخفاضاً معنوياً في مستوى TSH في المجموعة A على الرغم من أنها كانت ضمن المعدل الطبيعي، بالمقارنة مع مجموعة السيطرة.

اظهرت النتائج ان هناك ارتفاع ذو معنى ، في تركيز الغلوسريدات الثلاثية TG والكولسترول الكلي TC في المجموعة A مقارنة بمجموعة السيطرة B، بينما اظهرت النتائج انخفاضاً معنوياً ، في البروتين الدهني عالي الكثافة HDL في مجموعة النساء اللواتي يتناولن موانع الحمل المركبة مقارنة بمجموعة السيطرة .

## Introduction

One of the most popular method to prevent the pregnancy is the using of contraceptive drug, oral contraceptives (OCs), also known as "the pill", are the most widespread method of contraception in the young women. The primary mechanism of action is inhibition of ovulation [3]. Combined hormonal contraceptives (COCs) drug include estrogen and a progestogen, this pill act primeval by preventing ovulation by the inhibition of follicle-stimulating hormone FSH, and luteinizing hormone LH [21]. The progestogen composite also make the mucus of the cervical comparatively impenetrable to sperm and reduce the acceptance of the endometrium to implantation. These mechanisms make the combined hormonal contraceptives very potent in the inhibition of pregnancy. Yearly failure rates be different about 0.02% (two per 10000 women/year)[19]. Combined oral contraceptive (COC) preventing pituitary gland production and secretion of follicle-stimulating hormone (FSH), and luteinizing hormone (LH), and notched the mid-cycle precipitance of both hormones. The result is preventing follicular evolution, ovulation, and the genesis of corpus luteum [11]. The thyroid gland structure formed of two lobes (left and right) correlate together by a thin, midst isthmus forming a "butterfly" form. It is located in the neck, opposite to the trachea, under the larynx, the weight of it is about 15-20g, in the adult. It is high vascular organ with blood supply about 5mL /g/min of

tissue[1]. The thyroid function is to supply thermal, and to regulate metabolic processes [9]. The hormones that secretion from thyroid gland, which called thyroid hormones (THs) are fundamental for normal growth and evolution, and prompt metabolism in most tissues [16]. THs raise oxidative phosphorylation in the mitochondrial and preserve amino acid, and electrolyte transport into the cells, they intensify calorigenesis and oxygen exhaustion in most tissues. Thyroid gland generate two associated hormones, which are 3, 5,3',5'-tetraiodothyronine (thyroxine T4) and 3,5,3'-triiodothyronine (T3). The main product of the thyroid gland is T4 (about %90)[4]. Most of the T3 hormone (more than 80%) is deduce from T4 by iodination in peripheral tissues like liver, kidneys, and muscles. In target cells of hormone action, most of the influence of T4 results from this alteration to T3 [16]. This changing can also produce 3, 3', 5'-triiodothyronine (opposite of T3; rT3) which is physiologically inert [9].

## Aim of study

This study was preformed to estimate the level of the thyroid hormones and lipid profile in women taking COCs, to detect the possible relationship between the COCs and these biochemical parameters.

## Materials and methods:

### Subjects and Sample Collection

Blood samples were collected from 60 women's (30 of them were taking

COCs (they were using German birth control pills from the local pharmacy, while consist of (0.03)mg ethinylestradiol and (0.15) levonoregrel) more than one year ) and 30 of them never take contraceptive which considered as control group. We use a sterile disposable syringe, we take 5 ml of venous blood from each group subjects after (8-12) hour fasting, then the blood stand to clot in (plain tube) at room temperature, the serum was extract after put the tubes in the centerfuge at (3000 rpm) for 10 minutes, then parted into in plastic tubes and stored at (-20 C0) until the time of estimation.

### **Estimation of the thyroid hormones:**

The thyroid hormones were estimated by using Biomerieux Mini VIDAS automated immunoassay system. Testing is made with the using of self-contained reagent strips, with the necessary supplied buffers, conjugates, and diluents solution which is required to complete the assay. The results of assay occur in 30-150 minutes.

### **Estimation of lipid profile:**

Estimation of lipid profile was done via supplied kits from Biomehgreb Company for each one of the tests depending on the enzymatic – colorimetric method and calculates the values by absorbency in the spectrophotometer.

### **Statistical analysis:**

Minitab program was used for statistical analysis, version (16.0) to estimation the mean, and standard deviation. The independent *t* test was used to compare the individual variables. P value of  $\leq 0.05$  is regard as significant [2].

### **Results and Discussion:**

The results presented in table (1) showed that the levels of T3 , T4 were significantly higher in group A in compere with control group B ( $P\leq 0.05$ ) while the TSH level was significantly lower in group A in compere with control group ( $P\leq 0.05$ ). The revulsions of the thyroid hormones and oral contraceptive are studied well in other studies, explaining the interrelationship between it and thyroid gland function [14]; [13]. The elevation of thyroid hormones may be appearing after a long time of using the oral contraceptive pill as the results of the present study showed , and this corresponding with previous study Lamya, 2000.

The results of this study showed a significant increase in T3 level ,this result was agree with a study by Wiegratz, *et al.* (2003), which found a significant increase in T3 level. Combined Oral contraceptives use is associated with an increase in total T4 and T3 level, as obtained in this study, which caused by an increase in the serum-binding capacity of thyroxine-binding globulin (TBG), which reduces the clearing of these hormone [2]. The most prevalent causes of an excess in serum TBG concentrations in routine practice are an increase in estrogen manufacturing and management of estrogen [12]. The rise in T4 level is correlated with long period of exposure to estrogen therapy; and this have been clear in present study which included women using COCs more than one year. The increase of TBG in serum is depending on the dose. The normal doses of ethinylestradiol is about (20 to 35 mg per day), and conjugated estrogen (0.625 mg per day) which is increase serum TBG concentrations by approximately 30 to 50 percent, and serum T4, concentrations by 20 to 35 percent [8]. In addition, the current study showed

that the use of COCs resulted in a significant decrease in TSH level, this result corresponding with a previous study [17]; [14], the increase in T3, T4

level will reduce the secretion of TSH which induces by the decrease of these two hormones in the body.

**Table (1):- The level of the thyroid hormones**

Groups	T3 mg/ml $\pm$ SD.	(T4) nmol/L $\pm$ SD.	TSH $\mu$ lu/ml $\pm$ SD
A	1.999 $\pm$ 0.523	88.30 $\pm$ 19.52	1.21 $\pm$ 0. 26
B (control)	1.59 $\pm$ 0.456*	71.34 $\pm$ 13.24*	6.38 $\pm$ 0.59**

\*: Significant differences at ( $p \leq 0.05$ )

\*\* : Significant differences at ( $p \leq 0.01$ )

Results presented in table (2) showed that the TG, TC level were significantly higher among group A than group B ( $p \leq 0.01$ ) while the level of HDL-co significantly lower ( $p < 0.05$ ) in group A in compare to control group. Dyslipidemia is one of the most risk factors that may forward endothelial confusion, leading to the progress of atherosclerosis, and cardiovascular diseases [18]. The hormone estrogen, which is present in COCs, promote the production of HDL, and lower the production of LDL- ch [15], inhibit the damage in the endothelium. In spite of this useful action of the estrogen to the endothelium, the hormone progesterone, which is also one of the components of COCs, may decrease the plasma concentration of HDL [20]. The raise of TG may be as result of increased synthesis of TG in the liver. Godland (2004) reported that orally administered estrogens increasing hepatic triglyceride synthesis. He announces in his study in general that progestagens oppose these effects according to type of drug and the dose. This suggests that use COCs with high dose, and long term can lead to

high TG level. The androgenic progestogens have a greater ability of , balance the useful effects of the estrogen on the lipid profile [10]. This study estimation the levels of lipoproteins, total cholesterol and triglycerides in the serum of women, who use COCs, containing the progestogen, which has anti-androgenic and diuretic effect [7]. Oral contraceptives effect on lipid profile and this effect depend on the estrogen dose relation to the progestin dose, in addition to the androgenicity of the progestin. Estrogen trend to have beneficial effects by reduce the concentration of LDL-cho., and increasing HDL-cholesterol concentration, however, TGs concentration increases too. the level of TC in one study was found significantly higher in women who using contraceptives compared to control group. This results agrees with our finding [5]. Total cholesterol presents in higher levels in contraceptive users; therefore, the higher TC level among COCs users may be related to the increased levels of these lipoproteins.

**Table (2):- Concentration of lipid profile (mmol/l)**

Groups	Total-cho.	TG.	HDL-cho.
A	7.65± 2.35**	1.85±0.13**	3.11± 0.29*
B (control)	4.52± 1.89	0.81±0.05	4.51± 0.38

\*: Significant differences at ( $p \leq 0.05$ ).

\*\* : Significant differences at ( $p \leq 0.01$ ).

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