



## EFFECT OF CONTRACEPTIVES IN SOME HEMATOLOGICAL AND BIOCHEMICAL LEVELS - A REVIEW

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### Abstract

The purpose of this review was to assess the effects of contraceptives on selected parameters. Contraceptives used widely across the world to pregnancy control that gives grounds for assessing their influence on various hematological and biochemical parameters of the human system since its safety has become controversial. Contraceptives act to inhibition of FSH and LH to blocking fertilization by different methods such as barrier methods, hormonal contraception and using of various devices. Contraceptives can affect on hematological, biochemical parameters, so the women to stop of contraception is the fear or occurrence of side effects. According to the literature studies, hormonal contraceptive users had higher ferritin and hemoglobin levels than the noncontraceptors. Contraceptives are not changing the Eosinophil, Neutrophil, Basophil, MCH and MCV counts, but lower in total WBC, increases in triglyceride, cholesterol levels, elevate the body mass index, carbohydrates, uric acid due to increasing the level of cortisol in blood.

**Key words:** Contraceptives, Hormonal, Hematological parameters and Biochemical parameters.

### 1. Introduction

Hormonal contraceptives are methods of control birth that affect the endocrine system. They act to ovulation inhibiting by blockage the secretion of luteinizing hormone and follicle stimulating hormone. They also prevent the transportation of sperms, cervical mucus thicken, thereby fertilization blocking (Brito *et al.*, 2011). Hormonal contraceptives may comprise a progesterone-only or combination of progesterone and estrogen and could well administered via different routes (intramuscular, oral, transdermal implants, vaginal and associated with the intra-uterine device) (Coffie *et al.*, 2020). Contraception is the prevention of intentional fertilization through use of barrier methods, sexual practices, hormonal contraception and using of various devices (Speroff and Darney, 2011). Humans for last

centuries, have relied on their attention to avoid pregnancy (Smith, 2014). Contraception is as old presence, oral contraceptives have been a well known since the 1960s.

Women are using oral contraceptives worldwide as simple contraception form (Stuart *et al.*, 2011). At twentieth century, the orally contraceptive is one of the most influential and greatest developments (Santow, 1993). It is recorded as the most easiest method of contraception, and reliable. They are available widely in most chemist shops and pharmacies. Oral contraceptives are more trustworthy, non-permanent denots of contraceptives beyond correctly applied the regular method (Anjum *et al.*, 2014). Appropriate treatment can successfully gets a contraception rate as more than 98 % (Trussell, 2004). Planning programmes Global family exist in the developed world for several times and designed primarily to provide pair husbands with family planning methods that best procedure their needs. Birth control is a major factor in

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maintaining the reproductive and general health, women welfare and public health, and permitting them to select the planned pregnancy movement (Bearinger *et al.*, 2007). The global organizations and World Health organization (WHO) are looking for methods to raise the information amount and reach women who take contraceptives and other family planning resources around the world. In many countries of the third world, the population growth is rapidly and the accompanied results necessitated constant treatise for appropriate methods of birth control.

The most common reason for the women to stop of contraception is the fear or occurrence of side effects (Westhoff *et al.*, 2007). Pulmonary embolism myocardial infarction, and cerebrovascular accident consider the common severe conditions that are healththreatening or directly life to the women taked contraceptivs (Dean, 2005).

## 2. Mechanism of action of contraceptive

Pituitary and some adrenal hormones help in growing up the organs development and sexuality behaviors, which are responsible for pregnancy and parturition. Luteinizing hormone (LH) and Follicle stimulating hormone (FSH) are stimulating hormones to direct the ovaries and uterus (Sharquie *et al.*, 2007). Under the effect of LH, the FSH stimulates the follicles to grow up and enter the fallopian tube by rupturing the ovaries wall (El-Hayek *et al.*, 2014). Thickness the uterus endothelium will changes and supplements depending on the ovaries1 estradiol and progesterone hormones concentrations (Hasin *et al.*, 1996).

The negative feedback inhibition mechanism of progesterone or estradiol or both, on the pituitary hormones FSH and LH has been used to fake the pregnancy that is a principle of contraceptive mode of action, Fig 1 (King, 2000). Manufactured of many kinds of contraceptives used to control the birth as pharmaceutical pills. In practical the women are feeding these types daily, weekly or monthly suffer a lot of changes in their body weights, cardiovascular disease, blood pressure, and high cholesterol levels (Edelman *et al.*, 2006). Combination of contraceptive contains both

estrogen and progesterone. These bills are synthetic hormones such as estrogens (mestranol, ethinyl estradiol) or progesterone (norgsetrel, norethindrone acetate) (Goldzieher and Brody, 1990;Schindler *et al.*, 2008). Progesterone only bills were used for breast feeding women because estrogen reduces milk production (Sulak *et al.*, 2007).

Oral contraceptives of combination of steroid hormones acts both peripherally and centrally to change normal reproductive function. By inhibiting the secretion of the gonads, impeded of ovulation, follicular maturity is impaired as well. Reactions of multiple complex happen in the pituitary and hypothalamus as a result of ingestion of steroid (Bronson, 1981).

Combined of progestin-only and oral contraceptives methods, the major mechanisms are inhibition of ovulation and alters in the mucus of cervical that prevent the penetration of sperms. Hormonal methods, especially low-progestin dose products and pills emergency contraceptive, endometrium effects that can in theory affect implantation (Rivera *et al.*, 1999).

## 3. Contraceptives and Hematological parameter

According reviewed in many studies of the hematological parameters of different contraceptive types were demonstrated a different manner between different non hormonal and hormonal contraceptives (Al-Rumaidh *et al.*, 2018). Progestinonly hormonal prep is related with an increase risk of blood clots with reports of platelets involvement (Afsar *et al.*, 2005). Irregularities of menstrual cycle is more common found in contraceptives injectable hormonal users than non-users, particularly irregularities menstrual flow and amenorrhea (Bentzen *et al.*, 2012). In contraceptives injectable hormonal users, hematocrit and hemoglobin were preserved slightly better than non-users (Afsar *et al.*, 2005). Implants of norplant were fairly low effect on blood clotting, it is assumed that fibrinolysis system due to the estrogen deficiency and a low progestogen dose that is received to the body (Shaaban *et al.*, 1984).



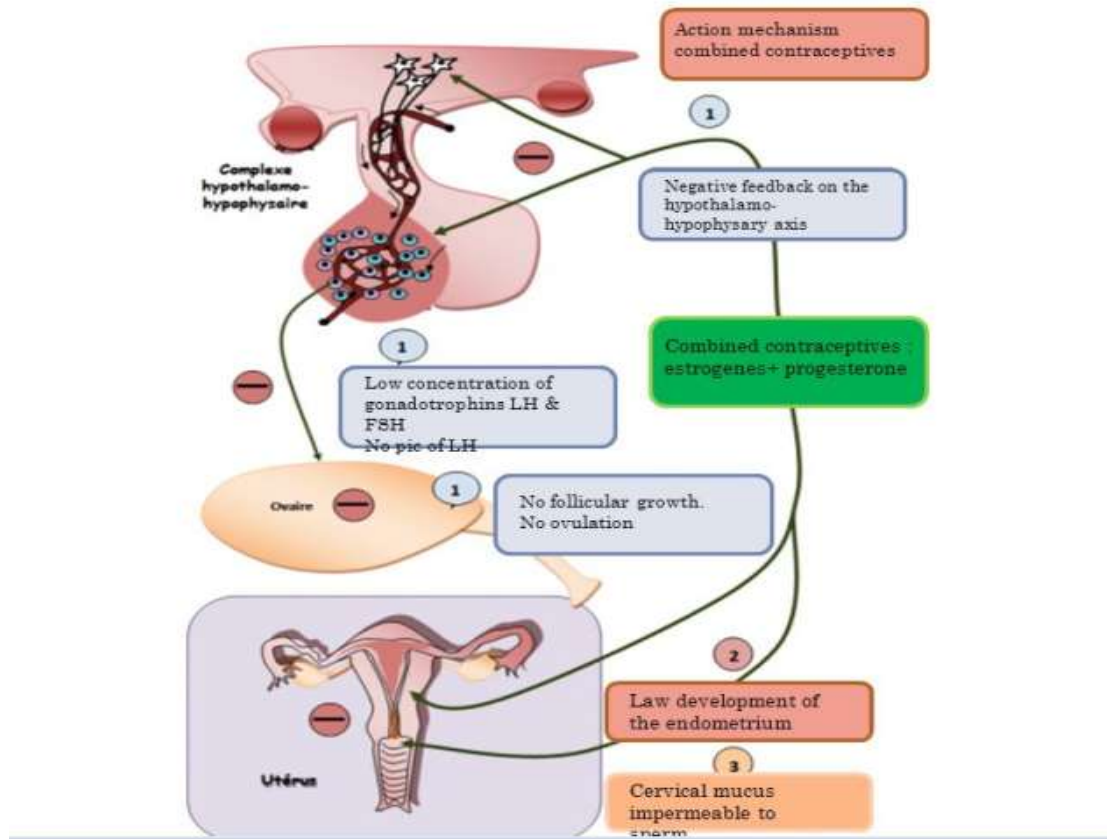


Figure - 1: Mechanism action of oral contraceptives.

#### 4. Contraceptives affect on Hemoglobin and Ferritin

Generally, the current hormonal contraceptive users had higher ferritin and hemoglobin levels than the noncontraceptors. The hemoglobin levels were varied differences between noncontraceptors and women using hormonal contraceptive, that are influenced by the use of contraceptives (Bathija *et al.*, 1998).

The levels of hemoglobin are highest among oral contraceptive and injectable users, in other hand, intra-uterine contraceptive device showed decreased hemoglobin levels. The potential purpose for low levels of hemoglobin due to raise vaginal blood loss in intrauterine non hormonal contraceptive device which is often undergo by people who use IUCDs. Positive pattern of levels of hemoglobin accompanied with hormonal contraceptives due to low blood loss in menstrual in orally contraceptive users and low loss of menopausal with amenorrhea episodes in more users of injectables contraceptive (Ahrendt *et al.*, 2009). Therefore it could be summarized that these hormonal contraceptives consider the best option for females with anemia that are

usually present in low socioeconomic status population, but IUCDs must not be specified for females with anemia without additional provide in the iron supplements form (Fraser, 2010).

#### 5. Contraceptives and some hematological values

Erythrocyte deformability, packed cell volume, plasma fibrinogen concentration, platelet count, and total-blood viscosity and plasma periodically different during period menstrual cycle in the non hormonal contraceptives users. Elimination of this variation through the orally contraceptives use, and these indices values have increase to a rate that could predispose to thrombosis (Buchan and MacDonald, 1980).

Coffie *et al.* (2020) recorded the contraceptive had a little effect on the blood values in dose manner, in contrast, there are differences among the Hct, RBCs, WBCs. improved that contraceptives induces variations in some hematological values (Kamyab and Kamyab, 1976; Wahed *et al.*, 2008). The MCH, MCV, Eosinophil, Neutrophil, and Basophil counts, to be a non significant change achieved by (Babatunde and Olatunji, 2004; Bulur *et al.*, 2012).





WBC count is lower in contraceptive treated group (Table 1) according to findings of Sajida *et al.* (2006).

**Table - 1: The combined oral contraceptives effects of on some hematological parameters in female rats by Toryila *et al.* (2014)**

Groups	Hb (g/dl)	PCV (%)	RBC ( $\times 10^{12}/L$ )	WBC ( $\times 10^9/L$ )	Platelet ( $\times 10^9/L$ )
<b>A (36 Days)</b>	12.3 $\pm$ 1.2	38.5 $\pm$ 2.1	6.1 $\pm$ 0.7	6.1 $\pm$ 1.3	783.6 $\pm$ 13.9
Control	15.5 $\pm$ 0.6	48.7 $\pm$ 1.0	7.9 $\pm$ 0.6	9.5 $\pm$ 0.8	821.4 $\pm$ 11.4
P-value	0.001	0.002	0.001	0.003	0.153
<b>B (48 Days)</b>	12.1 $\pm$ 1.2	36.0 $\pm$ 2.0	6.0 $\pm$ 0.8	5.3 $\pm$ 1.6	559.0 $\pm$ 12.6
Control	14.6 $\pm$ 0.7	43.6 $\pm$ 1.5	7.3 $\pm$ 0.4	8.5 $\pm$ 1.1	691.4 $\pm$ 11.0
P-value	0.009	0.017	0.007	0.041	0.133
<b>C (60 Days)</b>	13.0 $\pm$ 0.9	40.4 $\pm$ 1.5	6.6 $\pm$ 0.7	6.7 $\pm$ 1.8	508.2 $\pm$ 11.1
Control	13.5 $\pm$ 0.8	42.8 $\pm$ 1.6	6.6 $\pm$ 0.6	5.8 $\pm$ 0.9	629.2 $\pm$ 12.9
P-value	0.046	0.002	0.969	0.560	0.232
<b>D (72 Days)</b>	11.5 $\pm$ 0.8	34.2 $\pm$ 1.4	5.8 $\pm$ 0.9	7.2 $\pm$ 1.4	660.6 $\pm$ 10.8
Control	13.6 $\pm$ 0.6	40.9 $\pm$ 0.9	6.8 $\pm$ 0.7	9.7 $\pm$ 1.0	642.2 $\pm$ 10.5
P-value	0.001	0.068	0.068	0.041	0.437

## 6. Contraceptives and lipid profiles

Lipid profile: there are a direct relations between the lipid profile and different concentrations of contraceptives hormonal pills, increases in triglyceride and cholesterol had recorded in woman taking in regular times of the contraceptives (Wahl *et al.*, 1983; Strauss and Nass, 2004). The higher lipid parameter increased risk to cardiovascular disease because estrogens inhibit hepatic lipase activity, the enzyme responsible for clearing cholesterol from blood (Ågren *et al.*, 2011).

## 7. Contraceptives and some serological values

Modification of hormonal levels are inducing by oral contraceptives; reversely affect the pituitary - adrenal cascades ending with cortisol releasing, a hormone of glucocorticoides effects. However, another study which showed that oral contraceptive elevate the body mass index, carbohydrates, uric acid due to increasing the level of cortisol in blood (Kirschbaum *et al.*, 1999).

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