Vitamin E ameliorate the lipids problem induces by contraceptives

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ABSTRACT

Background: Women on different contraceptive methods have been linked with the development of various changes in lipids profile. Therefore, the relationship between contraceptive use and lipids changes needs to be investigated. **Method:** This was a cross-sectional randomized study conducted on non-lactating, non-pregnant women who were on different methods of contraceptives for at least a period of 6 months and were attending the Family Planning room at Al-shomaly hospital south of Babylon government. The study population consisted of a countryside population. One hundred twenty-five divided into five groups 25 women each group: (1): taken oral contraceptive (microgynon tablet), (2) taken oral contraceptive (microgynon tablet) with 400 IU vitamin E per day, (3) on injectable contraceptive (depo Provera), and (4): on injectable (depo Provera) with 400 IU vitamin E per day and (5): not taken any things as control individuals.**Conclusion**: contraceptives have a series role in elevation of lipids profiles, and use of vitamin E can reduce a degree of these effects.

Introduction: Hormonal contraceptives are among the most reliable reversible methods of contraception. Their composition, dosage and usage vary, leading to differing rates of risk, side effects and advantages, as well as therapeutic and preventive effects [1].

In the United States, hormone therapy delivered as oral contraceptives (OC) is one of the most commonly prescribed birth control methods, used by 11.6 million or 19% of women [2].In the early 1980s, third-generation oral contraceptives, containing the progestagens desogestrel or gestodene, were developed in an attempt to reduce the risk of cardiovascular diseases and to decrease androgenic side effects such as weight gain, acne, and adverse changes in metabolism of lipoprotein. However, in 1995 and 1996, 4 studies reported that women who used so-called third-generation oral contraceptives containing desogestrel or gestodene were at higher risk of venous thromboembolism than users of oral contraceptives with the second-generation progestagen, levonorgestrel [3].

Contraceptives prevent of pregnancy through Estrogenic effects which Inhibit ovulation by suppressing follicle stimulating hormone (FSH) and luteinizing hormone (LH),Prevent implantation by producing changes in secretions within uterus, Acceleration of ovum transport, and Cause degeneration of the corpus luteum while Progestational effects which Inhibit ovulation partly by suppressing luteinizing hormone (LH), Produce thick cervical mucus, prevent penetration of sperm, Inhibit the enzymes that permit sperm to penetrate the ovum, and Alter Fallopain tube secretion and slow ovum transport.[4] Injectable and oral contraceptives appear to influence the concentrations of serum lipids and lipoproteins. Since hyperlipidemia is one of the risk factors of coronary artery disease (CAD), investigations of the hyperlipidemic effects of contraceptives are importance [5] [6]. Contraceptive induces an increase in the production rate of apoB-containing lipoproteins all along the VLDL→IDL→LDL cascade[7]. Depo Provera (medroxyprogesterone acetate, DMPA) when given as 150 mg by deep intramuscular injection every 12 calendar weeks (84 days+5 days). Oral contraceptive methods involve remembering to take a pill each day, in the case of the progestogen only pill within the same three hours each day [8].

Vitamin E has a role in maintaining membrane integrity and protection from reactive oxygen species which has been implicated in both carcinogenesis and arterial injury by ischemia. As an antioxidant, it is capable of stopping the propagation of potent oxidants formed during cellular metabolism or introduced as toxic chemicals. It prevents peroxidation of membrane phospholipids [9]. vitamin E supplementation significantly reduced circulating oxidized LDL and reduced LDL oxidative susceptibility[10].

METHOD: This study was a cross-sectional randomized study conducted on One hundred and twenty-five, non-lactating, non-pregnant women, aged 20−45 years who were on contraceptives for not less than 6 months participated in the study who were on different methods of contraceptives and were attending the Family Planning room at Al-shomaly hospital south of Babylon government. The study population consisted of a countryside population. These women were randomly categorized into five groups with 25 women in each group

Group (1): 25 women were on oral contraceptive (microgynon tablet)

Group (2): 25 women were on oral contraceptive (microgynon tablet) has taken 400 IU vitamin E per day.

Group (3): 25 women were on injectable (depo Provera) and

Group (4): 25 women were on injectable (depo Provera) had taken 400 IU vitamin E per day.

Group (5): 25 women were not taken any things as control individuals.

A questionnaire was used to collect patient information, That does include demographic data, history, and duration of contraceptive use. The questionnaire was given to each patient to complete in the Family Planning room of hospital to ensure confidentiality.

Results

The ages of women were 20–45 years and that of the controls, 20–45 years. The mean ages of the five groups were 31.53±1.84 years (cases) and 29.25±8.09 years (control) and were not statistically significantly different. 25 women were on OC combined estrogen and progesterone [0.03 mg EE and 0.15 mg LNG]), 25 women were on OC has taken 400 IU vitamin E per day, 25 women were on an IC (Depo-Provera [150 mg medroxyprogesterone]), 25 women were on an IC (Depo-Provera) has taken 400 IU vitamin E per day and 25 as control.

The mean BMI for the case group was 25.14±4.2 kg/m_2, while that of the control group was 23.83±0.85kg/m^2

Test parameter	**C (n=25)**	**OC (n=25)**	**IC (n=25)**	**OC + vitE (n=25)**	**IC + vitE (n=25)**	***P-value***
Age (years)	**29.25±8.09**	**33.11±6.32**	**29.91±5.48**	**33.41±6.32**	**32.2±5.97**	**NS**
BMI (kg/m2)	**23.83±0.85**	**26.4±1.12**	**25.24±0.63**	**25.82±1.12**	**22.30±0.94**	**0.003**

Table (1): women characteristics, including age (years), BMI (kg/m_2) Abbreviations: (C, control; OC, oral contraceptive; vitE, vitamin E)

Compare between control group, OC Group (1) and IC group (3).

At the end of the study, we are found that there was a significant difference between Control, OC Group (1) and IC group (3). (P=0.002) (See Table 2, figure 1).

1. Total Cholesterol (TC), Triglyceride (TG), and LDL levels for OC group (1) and IC group (3) were higher as compare with the control.

2. Total Cholesterol (TC), Triglyceride (TG), and LDL levels for OC group (1) were higher as compare with the IC group (3).

3. HDL levels for the control group were higher as compare with OC Group (1) and IC group (3).

Test parameter	C (n=25)	OC (n=25)	IC (n=25)	P-value
TC (mmol/L)	3.37±0.60	4.33±0.86	4.10±0.71	0.002
TG (mmol/L)	0.64±0.21	0.81±0.21	0.77±0.41	
HDL (mmol/L)	1.31±0.25	1.3±0.25	1.35±0.39	
LDL (mmol/L)	1.74±0.57	2.65±0.94	2.29±0.80	

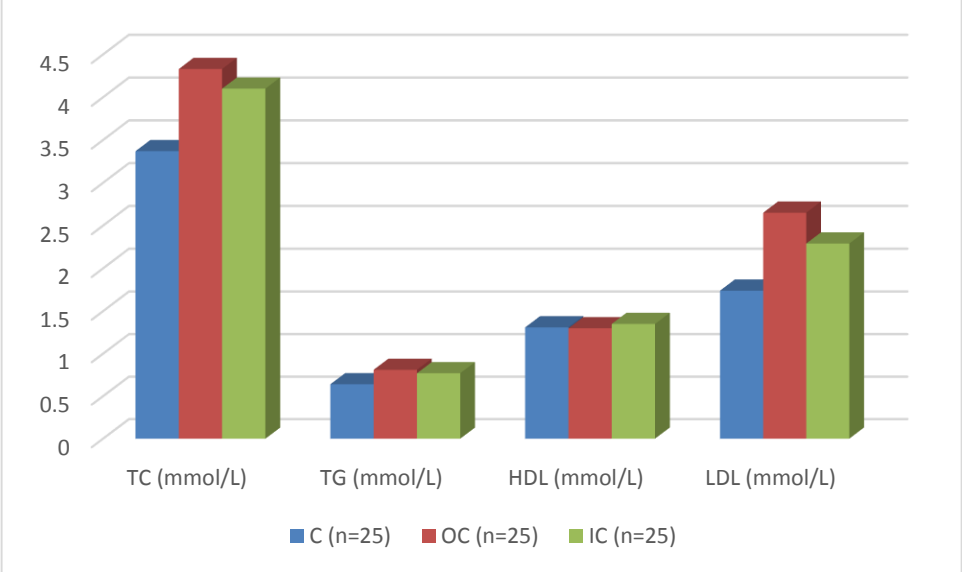


Figure (1): change in lipid profile between control group, OC Group 1 and IC group (3).

Compare between OC Group (1) and OC + vit. E group (2).

At the end of the study, we are found that there was a significant difference between OC Group (1) and OC + vit. E group (2). (P=0.002) (See Table 3, figure 2).

1. Total Cholesterol (TC), Triglyceride (TG), and LDL levels for OC group (1) were higher as compare with the OC + vit. E group (2).

2. HDL levels for the OC + vit. E group (2) was higher as compare with OC Group (1).

Test parameter	OC (n=25)	OC + vit. E (n=25)	**P-value**
TC (mmol/L)	4.33±0.86	4.12±0.96	**0.002**
TG (mmol/L)	0.81±0.21	0.73±0.21	
HDL (mmol/L)	1.3±0.25	1.33±0.25	
LDL (mmol/L)	2.65±0.94	2.55±0.94	

Table (2): change in lipid profile between OC Group 1 and OC + vit. E group (2).

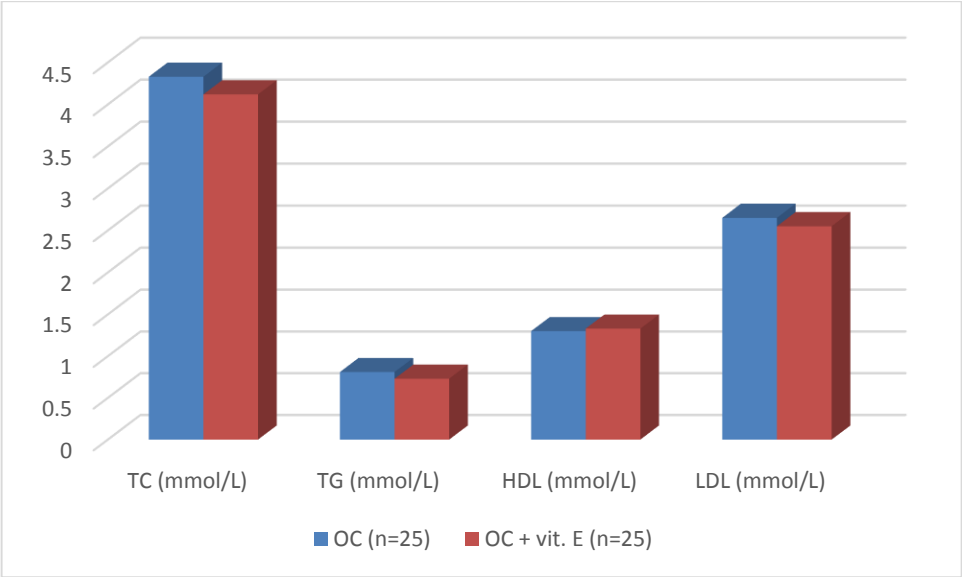


Figure (2): change in lipid profile between OC Group 1 and OC + vit. E group (2).

Compare between IC Group (3) and IC + vit. E group (4).

At the end of the study, we are found that there was a significant difference between IC Group (3) and IC + vit. E group (4). (P=0.002) (See Table 3, figure 2).

1. Total Cholesterol (TC), Triglyceride (TG), and LDL levels for IC Group (3) were higher as compare with the IC + vit. E group (4).

2. HDL levels for the OC + vit. E group (2) was higher as compare with IC Group (3).

Test parameter	IC (n=25)	IC +vit E (n=25)	**P-value**
TC (mmol/L)	4.10±0.71	3.77±0.66	**0.002**
TG (mmol/L)	0.77±0.41	0.71±0.61	
HDL (mmol/L)	1.35±0.39	1.34±0.26	
LDL (mmol/L)	2.29±0.80	2.21±0.80	

Table (2): change in lipid profile between IC Group (3) and IC + vit. E group (4).

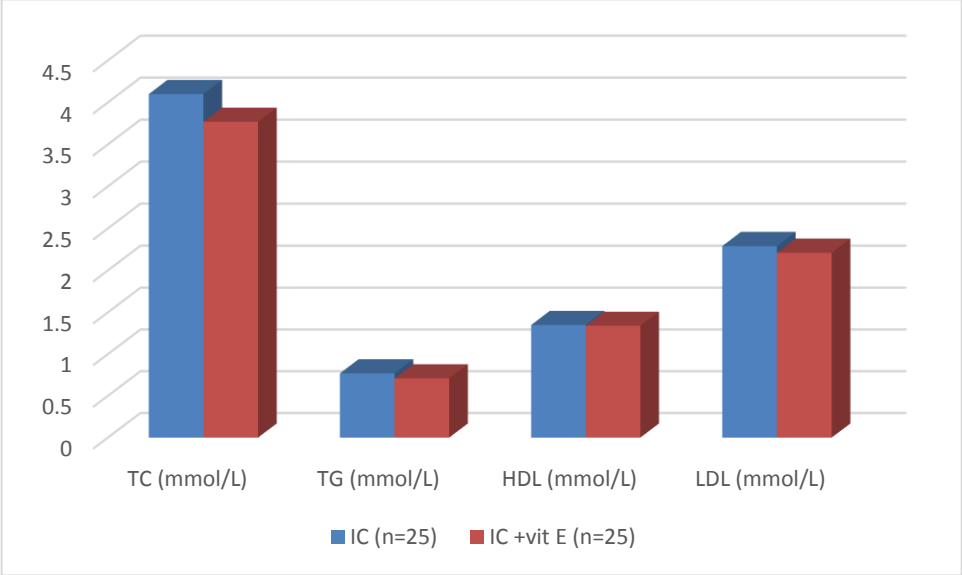


Figure (3): change in lipid profile between IC Group (3) and IC + vit. E group (4).

Discussion: Contraceptives have been in use for more than two decades, and at the present time, 150 to 200 million women are using the preparations. Apart from their gynecologic influence, the hormones have been shown to affect a number of metabolic and nutritional processes [11] . This study found that Total Cholesterol (TC), Triglyceride (TG), and LDL levels for IC Group (3) and OC group (1) were higher as compare with control group (5).

These results are agreement with Abbey B. Berenson et.al. 2010 OC users significantly greater increases in levels of triglycerides (TG), total cholesterol (TC), but they were found unchanged in LDL level [12]. Also J. W. H. DOAR AND V. WYNN 1969 show that significantly raised serum triglyceride and cholesterol levels during oral contraceptive therapy [13]. Colvin PL Jr 1993 concluded estrogens have been reported to increase hepatic catabolism of low-density lipoprotein (LDL) by the LDL receptor (LDL-R)

pathway and to increase the concentration of mRNA for the LDL receptor. This study found that HDL levels for the control group were higher as compare with OC Group (1) and IC group (3). This result agreement with Fotherby K et.al. 1982 which found that high density lipoprotein was significantly reduced when women use contraceptives. Our result was disagreeing with Shahnaz Torkzahrani et.al. 2014 found that no significant differences were noted in HDL levels [14]. MA Sissan, S Leelamma 1996 showed that decreases in the plasma HDL level in female rats receiving 17 beta-estradiol [15]. This study found that levels of triglycerides (TG), total cholesterol (TC), and LDL levels were decrease and increase in HDL level in women taken contraceptives in concomitant with vitamin E as compare with those not taken. Fatemeh et.al. 2012 The use of vitamins E has beneficial in ameliorating coronary side effect of contraceptives by decrease levels of triglycerides (TG), total cholesterol (TC) [16]. Shahnaz Torkzahrani et.al. 2014 found that the HDL level and the HDL/LDL ratio increased in women taken vitamin E with contraceptives [14].

References

1. Wiegratz, I. and C.J. Thaler, *Hormonal contraception—what kind, when, and for whom?* Deutsches Ärzteblatt International, 2011. **108**(28-29): p. 495.
2. Chandra, A., C.E. Copen, and E.H. Stephen, *Infertility and impaired fecundity in the United States, 1982–2010: data from the National Survey of Family Growth.* National health statistics reports, 2013. **67**: p. 1-19.
3. Kemmeren, J.M., et al., *Effect of second-and third-generation oral contraceptives on the protein C system in the absence or presence of the factor VLeiden mutation: a randomized trial.* Blood, 2004. **103**(3): p. 927-933.
4. HOLDCROFT, C., *Combined oral contraceptive pills: a brief review.* The Nurse Practitioner, 1994. **19**(11): p. 5-11.
5. Minozzi, M., et al., *The effect of a combination therapy with myo-inositol and a combined oral contraceptive pill versus a combined oral contraceptive pill alone on metabolic, endocrine, and clinical parameters in polycystic ovary syndrome.* Gynecological Endocrinology, 2011. **27**(11): p. 920-924.
6. Scharnagl, H., et al., *Double-blind, randomized study comparing the effects of two monophasic oral contraceptives containing ethinylestradiol (20 μg or 30 μg) and levonorgestrel (100 μg or 150 μg) on lipoprotein metabolism.* Contraception, 2004. **69**(2): p. 105-113.
7. Duvillard, L., et al., *Changes in apolipoprotein B100-containing lipoprotein metabolism due to an estrogen plus progestin oral contraceptive: a stable isotope kinetic study.* The Journal of Clinical Endocrinology & Metabolism, 2010. **95**(5): p. 2140-2146.
8. Bigrigg, A., et al., *Depo Provera. Position paper on clinical use, effectiveness and side effects.* Br J Fam Plann, 1999. **25**(2): p. 69-76.
9. Okosun, R.E. and M.E. Adu, *Effect of Oral Vitamin E on Serum Lipid Profile of Apparently Healthy Nigerians in Benin City.* Tropical Journal of Pharmaceutical Research, 2015. **14**(6): p. 1071-1074.
10. Vardi, M., N.S. Levy, and A.P. Levy, *Vitamin E in the prevention of cardiovascular disease: the importance of proper patient selection.* Journal of Lipid Research, 2013. **54**(9): p. 2307-2314.

11. Webb, J.L., *Nutritional effects of oral contraceptive use: a review.* J Reprod Med, 1980. **25**(4): p. 150-6.
12. Berenson, A.B., M. Rahman, and G. Wilkinson, *Effect of injectable and oral contraceptives on serum lipids.* Obstetrics and gynecology, 2009. **114**(4): p. 786.
13. Doar, J. and V. Wynn, *Serum lipid levels during oral contraceptive and glucocorticoid administration.* Journal of Clinical Pathology, 1969. **1**(1): p. 55-61.
14. Torkzahrani, S., et al., *Amelioration of lipid abnormalities by vitamin therapy in women using oral contraceptives.* Clinical and experimental reproductive medicine, 2014. **41**(1): p. 15-20.
15. Sissan, M. and S. Leelamma, *Influence of components of oral contraceptive on lipid metabolism.* Indian journal of experimental biology, 1996. **34**(2): p. 131-134.
16. Zal, F., et al., *Effect of vitamin E and C supplements on lipid peroxidation and GSH-dependent antioxidant enzyme status in the blood of women consuming oral contraceptives.* Contraception, 2012. **86**(1): p. 62-66.