Comparative Effects of Injectable and Oral Hormonal Contraceptives on Lipid Profile

Chukwubike U. Okeke¹, Solomon A. Braide², Benjamin N. Okolonkwo³, Roseanne Okafor², Pascal C. Enen², Adebayor Adegbe², Holy Brown² & Ngozika B. Okwandu³.

Received 24/10/2011, Reviewed 27/11/2011, Accepted 11/12/2011

Key words: injectable contraceptives, oral contraceptives, lipids profile, women

DOI: 10.5083/ejcm.20424884.64

ABSTRACT

Background and Aims
The continual use of hormonal contraceptives among women within reproductive age has been on the increase. The effects of these contraceptives on lipid metabolism vary depending on the type of hormonal contraceptive. This study was carried out among Nigerian women, to compare the effects of injectable hormonal contraceptives to that of combined oral contraceptives on lipid profile (triglyceride, total cholesterol, high density lipoprotein-cholesterol and low density lipoprotein-cholesterol).

Methods
The lipid profile of a total of 83 women (50 of whom were non-users of contraceptives while the remaining 33 used different hormonal contraceptives; 26 of them used the injectable hormonal contraceptives while 7 used oral contraceptives) were estimated using enzymatic methods except low density lipoprotein-cholesterol (LDL-C) which was by calculation.

Results
There was a significant change (p < 0.05) in triglyceride (TG) and LDL-C levels, and no significant change (p > 0.05) in total cholesterol (TC) and high density lipoprotein-cholesterol (HDL-C) levels in women on oral contraceptives, while in injectable hormonal contraceptive users, there was significant change (p < 0.05) in HDL-C and LDL-C, and no significant change in TG and TC levels. The Castelli risk index I and II (TC/HDL-C and LDL-C/HDL-C) were more reduced in women using injectable contraceptives (1.65 and 0.45, respectively) than in oral contraceptive users (1.80 and 0.56, respectively).

Conclusion
The result indicated that the use of injectable hormonal contraceptives is more beneficial than combined oral contraceptives among these women.

INTRODUCTION

The effects of estrogens and progestagens on lipoprotein metabolism are of importance because of the involvement of lipoproteins in endothelial damage and arterial occlusions. Low density lipoprotein-cholesterol (LDL-C) is mainly implicated in the endothelial damage because of its ability to form atherosclerotic plaque. High-density lipoprotein – cholesterol (HDL-C) has pleiotropic effects that prevent or alleviate endothelial damage.

The alterations in lipid metabolism that occur with the use of hormonal contraceptives have aroused considerable concern that hormonal contraceptives might increase the risk of premature atherosclerosis. Low dose hormonal contraceptive did not pose the damage of increasing the incidence of cardiovascular and thromboembolic disease.

Sitruk-Ware stated that desogestrel and other new progestins which are non-androgenic, have no negative effect on the lipid profile. Likewise, Lello et al observed that combined ethinyl estradiol (20ug) and levonorgestrel (100ug) has no effect on lipid profile. Teichman reported that recent changes in oral contraceptive formulation with lower progestins have led to production of more favourable pills. From the previous studies there were inconsistent reports on the effects of hormonal contraceptives. Some reported an adverse relationship while others reported beneficial relationship.

This study was carried out to compare the effects of injectable hormonal contraceptives and oral contraceptives on lipid profile among Nigerian women within reproductive age.
MATERIALS AND METHODS

This study was carried out in an urban city, Port Harcourt in Rivers State, Nigeria on a total of 83 women who were randomly selected. The subjects were apparently healthy and were within the reproductive age. Fifty of these women who were not on any contraceptives were regarded as control group; of the remaining 33 women, 26 of them who were on injectable contraceptive (Medroxyprogesterone) were regarded as Group 1, and the remaining seven, who were on combined oral contraceptives, were regarded as Group 2. The women on contraceptives were attending Rumueme Health Centre and Orogbum Health Centre in Port Harcourt, Rivers State, Nigeria.

Informed consents were obtained from the subjects and necessary permission was obtained from relevant authorities of the institutions involved.

A fasting blood sample of 5ml volume was withdrawn from each patient and the serum of which was used to estimate quantitatively the levels of triglyceride (TG), total cholesterol (TC) and HDL-C, using enzymatic methods of the test kit produced by Human Diagnostic9, but LDL-C level was calculated based on the value of TC, HDL-C and TG (LDL-C mmol/l = TC-HDL –TG/2.2).10

STATISTICAL ANALYSIS

The various data generated were subjected to statistical analysis using the mean, standard error, students-paired t-test, and probability tests with p-value equal to or less than 0.05 was regarded statistically significant (p ≤ 0.05).

RESULTS

The results are presented in the tables below.

From Table 1 below, the increase in TG level in women on oral contraceptives (group 2) was statistically significant (p < 0.05) but the increase in women on injectable contraceptives (group 1) was not significant (p > 0.05). The change in TC among both groups of women on oral and injectable hormonal contraceptives was not significant (p > 0.05). The cholesterol fraction of HDL-C was not significantly elevated in women on oral contraceptives but its increase in women on injectable contraceptives was significant (p < 0.05). LDL-C fraction was significantly reduced in both women on oral and injectable contraceptives (p < 0.05).

In Table 2 below, the ratio of LDL-C/HDL-C in women taking oral contraceptives (group 2) was higher than that of women taking injectable contraceptives (group 1).

DISCUSSION

In women taking combined oral contraceptive (COC), it was observed that TG level was significantly elevated (p < 0.05), LDL-C had a significant decrease (p < 0.05) while HDL-C and TC had no significant change (P > 0.05). This was also observed by Aldrighi et al11 and Lobo et al12. This elevation of TG might be as result of increased synthesis of TG by the liver. Godland1 stated that orally administered estrogens increased hepatic triglyceride synthesis. He stated in general that progestagens oppose these effects according to type and dose. This suggests that combined oral contraceptives with high dose of estrogen can lead to high TG level.
The low TC and high HDL-C observed in this study agreed with the finding made by Maschaic et al. According to La Rosa et al., the high TG and HDL-C levels and low LDL-C level might be attributed to the effect of estrogen component of the oral contraceptives.

In women taking the injectable hormonal contraceptive, medroxyprogesterone, the elevated levels of TG and TC were not significant (p > 0.05) but HDL-C level was significantly elevated. LDL-C level of these women was significantly reduced. Adekunle et al. made similar finding except that LDL-C was significantly raised in their study. Cromie et al. observed decreased TC, LDL-C and high HDL-C in women taking medroxyprogesterone and estradiol cypionate. It was observed in this study that Castelli risk index I and II (TC/HDL-C and LDL-C/HDL-C) of each of the groups are lower than that of the control (non-users) group. The Castelli risk index I and II (cardiovascular risk indices) of the injectable contraceptive users (1.65 and 0.45, respectively) were lower than that of the oral contraceptive users (1.80 and 0.56, respectively).

This is contrary to finding made by Aldrighi et al., Cromie et al. observed maintenance of TC: HDL-C ratio. Berenson et al. observed a lower LDL-C: HDL-C ratio in oral contraceptive users and high LDL-C: HDL-C ratio in injectable contraceptive users than in non-users. Oyelola in his study on Nigerian women observed high TC/HDL-C and LDL-C/HDL-C in oral contraceptive users than in non-users, and no change in these ratios among injectable users. This was as a result of high TC and LDL-C levels he observed in oral contraceptive users. WHO in their study reported no risk of cardiovascular disease among users of injectable contraceptives. The increase in TG observed in this study could not cause cardiovascular disease because ratios of LDL-C: HDL-C or TC: HDL-C (which are regarded as more prognostic values for predicting cardiovascular disease risk) were relatively low in this study.

In conclusion, injectable hormonal contraceptives in this study exerted a more beneficial effect on lipid metabolism than combined oral contraceptives, in that cardiovascular risk indices I and II (TC/HDL-C and LDL-C/HDL-C) were more reduced in women taking injectable hormonal contraceptives than in those on combined oral contraceptives.

REFERENCES