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# Serum lipid profile in women using etonogestrel subdermal contraceptive implant

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**Abstract**
**Objective:** We determined whether the use of etonogestrel subdermal contraceptive implant affects serum lipid indices.
**Methods:** Forty nine women with a mean age of 33.4±4.8years were enrolled into this prospective cross-sectional study with longitudinal follow up. After insertion of a single rod 68mg etonogestrel sub-dermal contraceptive implant, they were followed up for 6 months. Serum low-density lipoprotein (LDL), high-density lipoprotein (HDL), cholesterol and triglycerides were determined at insertion and 6 months post insertion and compared using Chi-square, Fisher's exact and Student's t-test as appropriate.
**Findings:** There was no reported contraceptive failure during the 6-month period. The mean serum total cholesterol, triglycerides, HDL and LDL values at 6-month post-insertion (170.82±51.77, 139.43 ± 44.05, 46.54 ± 6.53 and 125.58 ± 26.79 respectively) were all statistically significant higher than mean serum values at insertion (217.83± 44.62, 182.76± 37.07, 52.41±7.75, 149.02± 38.89 respectively) ($p<0.001$).
**Conclusion:** Our findings suggest that etonogestrel subdermal contraceptive implant may be associated with some increase in serum lipid values, within the first 6 months of insertion, in Nigerian women. However, this requires evaluation by further studies.
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**Keywords:** sub-dermal contraceptive, serum lipid profile, contraceptive implant, etonorgestrel

## Introduction
The voluntary control of fertility is of paramount importance to our present day society [1]. From a global perspective, countries currently face the crisis of rapid population growth that has begun to threaten human survival [1]. At the present rate, in several of the more socioeconomically disadvantaged countries, populations will double in less than 20 years [1]. Widespread use of safe and effective contraception remain central to adequate population control.
Efforts are currently geared towards discovering an ideal contraceptive [2]. Hormonal contraceptives are recognized as one of the most effective means of preventing pregnancy [1]. However despite several modifications in the composition of the steroidal hormonal contraceptives they are not completely void of side effects [3]. These steroids have been suggested to cause some degree of metabolic alterations such as changes in lipid metabolism [3].
Etonogestrel sub-dermal contraceptive implant is an effective second generation single rod implant [4]. The rod contains etonogestrel (the biologically active metabolite of desogestrel) with an ethylene-vinylacetate copolymer as carrier material, providing effective contraception for up to three years [5]. Progestogens may influence various metabolic parameters and modulate oestrogen-induced alterations in lipid metabolism [3, 4].
We assessed serum lipid values in women using etonogestrel sub-dermal contraceptive for possible changes.

## Materials and Methods
This was a prospective cross-sectional study with follow-up which enrolled 49 consecutively consenting women, who opted for etonogestrel sub-dermal contraceptive implant, at the family planning clinic of the Lagos State University Teaching Hospital, Lagos, Nigeria, over a 6 month period. Women on lipid altering medications, hormonal contraception in the preceding 1 year and known diabetics were excluded from the study.

A structured, interviewer administered questionnaire was used to obtain information on the women's socio-demographic data, anthropometry and fasting serum lipid values a day prior to insertion and 6 months after insertion. Each woman was seen about 8:00a.m and venous blood sample obtained for fasting lipids. Insertion of single-rod, 68mg etonorgestrel implant (Implanon) was performed by a trained personnel under aseptic condition.

Serum lipid values determined were serum total cholesterol, triglycerides, HDL and LDL and they were measured by spectrophotometric analysis using a multipurpose autoanalyzer, Analytik Jena™ Spectrophotometer Spekol 1300 (Jena, Germany). The kits used were from Biosystems S.A., Barcelona. The study reference values were total cholesterol: 120 – 200mg/dl, serum triglyceride: 10 -200mg/dl, serum HDL Cholesterol: 40 – 6-mg/dl and serum LDL Cholesterol: 100 - 129mg/dl.

Data obtained and entered into SPSS version 22 (Statistical Package for Social Sciences Inc, Chicago, IL), presented using descriptive statistics and analyzed using Chi-square, Fisher's exact and Student's t-test as appropriate.

## Results

A total of 49 women on etonogestrel sub-dermal implant had their serum fasting lipids determine immediately prior to insertion and 6 months following insertion. Their mean age was 33.4±4.8years, mean body mass index (BMI) was 26.0 ±4.99, mean systolic blood pressure (BP) was 110.95± 9.60mmHg and mean diastolic blood pressure was 71.45 ± 8.11. Women between the age ranges of 30-39years accounted for most (63.3%) of the study population. None of the women smoked cigarettes (Table 1).

There was significant increase in the proportion of women who had their serum total cholesterol (p=0.026), triglyceride (p<0.001) and LDL (p=0.005) at normal values prior to insertion increase to high values at 6 months post insertion (Table 2).

The mean serum total cholesterol (170.82 ± 51.77), triglycerides (139.43 ± 44.05), HDL (46.54 ± 6.53) and LDL (125.58 ± 26.79) at insertion of the etonogestrel sub-dermal contraceptive implant were significantly lower than the values (217.83± 44.62, 182.76± 37.07, 52.41±7.75 and 149.02± 38.89 respectively) by 6-months post insertion (Table 3).

**Table 1:** Socio – Demographic Characteristics of the Respondents

| Variable | | Frequency (N = 49) | Percentage (%) |
|---|---|---|---|
| **Age (in years)** | | | |
| | 20-29 | 12 | 24.5 |
| | 30-39 | 31 | 63.3 |
| | 40+ | 6 | 12.2 |
| | Mean ± SD | 33.4±4.8 | |
| | Range | 25-45 | |
| **Occupation** | | | |
| | Professionals | 1 | 2.5 |
| | Civil Servants | 15 | 37.5 |
| | Self-employment | 17 | 42.5 |
| | Unemployed | 7 | 17.5 |
| **Marital Status** | | | |
| | Single | 1 | 2.7 |
| | Married | 35 | 94.6 |
| | Divorced/Separated | 1 | 2.7 |
| **Body Mass Index** | | | |
| | Underweight (<18.5Kg/m$^2$) | 1 | 2.0 |
| | Normal (18.5 – 24.9 Kg/m$^2$) | 22 | 44,9 |
| | Overweight (25.0 – 29.9 Kg/m$^2$) | 17 | 35.7 |
| | Obese I (30.0Kg/m$^2$+) | 9 | 18.4 |
| | Mean ± SD | 26.0 ±4.99 | |
| **Smoking** | | | |
| | Yes | 0 | 0 |
| | No | 49 | 100 |
| Systolic BP | Mean ± SD | 110.95± 9.60 | |
| Diastolic BP | Mean ± SD | 71.45 ± 8.11 | |

**Table 2:** Lipid Profile of the Respondents

| Variables | Pre-Insertion (%) | Post-Insertion (%) | $\chi^2$ | p-value |
|---|---|---|---|---|
| **Total Cholesterol (mg/dL)** | | | | |
| Normal | 32 (65.3) | 21 (42.9) | 4.971 | ***0.026*** |
| High | 17 (34.7) | 28 (57.1) | | |
| **Triglycerides (mg/dL)** | | | | |
| Normal | 47 (95.9) | 31 (63.3) | | ***<0.001**** |
| High | 2 (4.1) | 18 (36.7) | | |
| **HDL (mg/dL)** | | | | |
| Low | 10 (20.4) | 3 (6.1) | | 0.071* |
| Normal | 39 (79.6) | 46 (93.9) | | |
| **LDL (mg/dL)** | | | | |
| Normal | 40 (81.6) | 27 (55.1) | | ***0.005**** |
| High | 9 (18.4) | 22 (44.9) | | |

*Fisher's exact test applied

**Table 3:** Mean Difference in Lipid Profile of Respondents

| | Pre-Insertion | Post-Insertion | | |
|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | t-test | p-value |
| Total Cholesterol (mg/dL) | 170.82 ± 51.77 | 217.83± 44.62 | -10.350[t] | <0.001 |
| Triglycerides (mg/dL) | 139.43 ± 44.05 | 182.76± 37.07 | -8.277[t] | <0.001 |
| HDL (mg/dL) | 46.54 ± 6.53 | 52.41±7.75 | -6.894[t] | <0.001 |
| LDL (mg/dL) | 125.58 ± 26.79 | 149.02± 38.89 | -5.884[t] | <0.001 |

t- Paired Samples t– test applied

## Discussion

A total of 49 women on etonogestrel sub-dermal implant had their serum fasting lipids determined immediately prior to insertion and at 6 months following insertion. We found the mean age of women who opted for etonogestrel subdermal contraceptive implant was 33.4±4.8years. This is similar to the mean age of 32.9 ± 5.70years of women on subdermal contraceptive implants reported by Adeyemi *et al* [6] in southwestern Nigeria, 31.4±6.2 years reported by Madugu *et al* in Northern Nigeria [7] and 33.6 ±2.4years noted by Roberts *et al* [8] in Southern Nigeria. Women between the age ranges of 30-39years accounted for most (63.3%) of the study population this may be explained by the need of women in this age group for the long acting contraceptive option, provided by the etonegestrel implant, due to increased likelihood of completion of family size in them.

In this study, there was significant increase in the proportion of women who had their serum total cholesterol (p=0.026), triglyceride (p<0.001) and LDL (p=0.005) at normal values prior to insertion increase to high values at 6 months post insertion (Table 2). This is not consistent with findings by Olumuyiwa *et al* in southwestern Nigeria who observed that LDL remained unchanged; triglycerides were reduced whereas the HDL levels were increased at both 6 and 12 months post insertion in women on Implanon. [9] Aisien *et al* found that the serum cholesterol rose without significant changes at 6 months but noted that the observed changes in the serum lipids and lipoproteins in women on Implanon were within normal values and to dissipated with time [10].

Biswas *et al* also did not observe significant changes in lipid profiles in women on etonorgestrel implants [11]. Despite similar sample sizes with Olumuyiwa and Aisien *et al* our differences in our findings with findings of these studies may partly be due to their longer follow up.

We found that the mean serum total cholesterol (170.82 ± 51.77mg/dl), triglycerides (139.43 ± 44.05mg/dl), HDL (46.54 ± 6.53mg/dl) and LDL (125.58 ± 26.79mg/dl) at insertion of the etonogestrel sub-dermal contraceptive implant were significantly lower than the values (217.83± 44.62mg/dl, 182.76±37.07mg/dl, 52.41±7.75mg/dl and 149.02±38.89mg/dl respectively) by 6-months post insertion (Table 3). Values reported by Olumuyiwa *et al*, [9] at 6 months following insertion of Implanon were total cholesterol of 112.52±34.9mg/dl, serum triglycerides of 37.67±19.9mg/dl, HDL of 22.85±8.5mg/dl and LDL of 83.94±28.1mg/dl. Their values were much lower than our findings at 6 months and this difference may be due to the different auto-analyser spectrophotometer and commercial kits used in the studies.

Etonogestrel subdermal contraceptive implant may be associated with some increase in serum lipid values, within the first 6 months of insertion. Whether these increases are transient or deleterious should be subjects of further studies.

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