Assessment of White Blood Cell Count and Platelet Count in Women on Hormonal Contraceptives in Owerri, Imo State, Nigeria

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ABSTRACT

The aim of this study is to assess WBC and platelet count in women on hormonal contraceptives in Owerri, Imo state, Nigeria. Seventy women were enrolled for this study, fifty were on hormonal contraceptive as a form of birth control, while twenty women were not on hormonal contraceptives. Blood sample was collected from the subjects and platelet and WBC count was determined. Platelet count was significantly (P<0.05) increased in the test subject (350.76 ± 49.56 x 109/L) when compared with the control subjects (240.50 + 46.3 X 1 09/L). Total WBC count was significantly (P<0.05) increased in the test subject (6.48+1.22 x 109/L) when compared with the control subjects (4.59+ 0.99 x 109/L). The subjects on oral contraceptive above 7 months (391.83+40.7x 109/L) have a significant (P=0.001) increase when compared with the subjects on oral contraceptive within 3-7 months (340.68+44.57 xl09/L).The subjects on oral contraceptive above 7 months (8.13+0.43xl09/L) have a significant (P<0.05) increase when compared with the subjects on oral contraceptive within 3-7 months (5.92+0.90xl09/L). There was no statistically significant (P>0.05) difference in the mean value of platelets and WBC count among the different age groups when compared using the ANOVA for more than two groups. Long term use of oral contraceptive has an effect on platelet and WBC count.

Key words: White blood cell count, Platelet count, Women, Hormonal contraceptives

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INTRODUCTION

Contraception is the use of various devices, drug agents, sexual practices or surgical procedures to prevent conception or impregnation (pregnancy). This process help couples plan when they want to have a child. Hormonal contraceptives are the most popular type of birth control pills. The pills stop ovulation, preventing the ovaries from releasing eggs. They also thicken cervical mucus, making it harder for sperm to enter the uterus. Obesity, breakthrough bleeding, nausea, high blood pressure (hypertension), high cholesterol, signs of a blood clot and bloating are some of the more commonly reported hormonal pills side effects . On the other hand, oral contraceptive increases a woman's risk to liver diseases, kidney diseases, cerebrovascular disease and cervical cancer [1].

The first available preparation of hormonal contraceptives contained a high dose of the estrogen EE2 which was linked to increased risk of thrombosis. Estrogen containing contraceptives particularly at a reduced dose can led to an additional risk reduction of venous thrombosis. Hormonal contraceptives are often associated with side effects commonly; nausea, headache, breast tenderness, weight gain, irregular bleeding, and mood changes.

Oral pills are the most frequently used hormonal contraceptives and comrnonly contribute to increased blood pressure, blood clots, heart attack and stroke. In Europe and North America studies have demonstrated that estrogen/progestogen oral contraceptives are associated with myocardial infarction, thromboembolism and stroke commonly among women over the age of 35 and smokers.

A woman taking the pill is 1.9 times more likely to die from cerebrovascular disease and 2.5 times more likely to die from cervical cancer.

The lowering of the estrogen dose from >50 µg to 30 µg has been shown to be associated with a significant decrease in the risk of venous thrombosis . The cause of differences in the coagulation and haemostatic status between women using hormonal contraceptives from widely diverse geographical areas is not clearly understood.

Oral contraceptives are taken by about 100 million women worldwide. Studies have shown that synthetic hormones used for Oral conceptive greatly increased the risk of blood clotting. Clots typically form in the legs and can cause

serious injury and death-if they travel to the heart, lungs or brain [2].

WHO recommended that studies should be conducted in different settings to bring about a clearer picture.

Women in Nigeria have all resorted to the use of oral contraceptive pill as a means of family planning or birth control measure, without knowing the adverse effect of the drug on their body system.

The most drastic adverse effect associated with hormonal contraceptive use is predisposition to higher risk of thromboembolic phenomena.

Postinor-2 is an oral contraceptive tablet containing the synthetic progestogen (Levonorgestrel). Progestins have antiplasmin and antithrombin activity. Its use increase platelet count and aggregability, thus predisposing to hypercoagulability, Bleeding time is a function of platelet activity.

A previous study reported an increased rate of thrombosis of 1-3 per 100,000 individuals per year and there is increasing use of oral contraceptives in Nigeria. White blood cells are mainly involved in the fight against infection, white blood cells includes, the neutrophils, eosinophils, basophils, monocytes and lymphocytes. There are deliberating issues on the effect of oral contraceptive on white blood cell count, some studies has it that there is a decrease in WBC count in women that take oral contraceptive as a method of birth control, while others has it that there is an increase in WBC count. Due to the paucity of information on the effect of oral effect of oral contraceptive on WBC and Platelet count, this study is aimed at assessing the effect of oral contraceptive on WBC and platelet count [3].

AIMS

The study was done to assess WBC and platelet count on women on hormonal contraceptives in Owerri, Imo state, Nigeria.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in Family Health Clinic (FHC) of the Department of Community Medicine, Federal Medical Centre Owerri.

STUDY POPULATION

Seventy women were enrolled for this study, fifty were on hormonal contraceptive as a form of birth control, while twenty women were not on hormonal contraceptives.

ETHICS AND ADVOCACY

As part of the requirements for conducting surveys on human subjects, a letter of introduction was collected from the HOD department of medical laboratory science, Imo state university. The study was approved by the Research Ethics Committee of the Federal Medical Centre, Owerri, Imo state. Questionnaires were given to the study subjects. In addition, all study participants gave a written informed consent before they were enrolled in this study and samples taken [4].

INCLUSION AND EXCLUSION CRITERIA

Subject for this study were randomly selected from among clients attending the family health clinic, FMC, Owerri, Imo state.

Inclusion criteria included; age (> 18 years), hormonal contraceptives use for a period of three months' and above and willingness to give a written informed consent to participate in the study. Exclusion criteria included; age (<18 years), non- hormonal contraceptive use and contraceptives use of <3 months, presence of underlying disease condition that could affect their clotting system and failure to offer a written informed consent to partake in the study,

SAMPLE COLLECTIONS

2 ml of the participants' blood samples were collected by a venepuncture into EDTA bottle and stored at 4°C. The sample was thoroughly mixed by gently inversion.

DETERMINATION OF TOTAL WIDTE BLOOD CELLS (WBCS)

Test method

Manual WBC counting method was used as follows.

0.02mls of venous blood was added to a tube containing 0.38ml of Turk's solution. The Neubauer chamber was charged with well mixed diluted blood, the cells was allowed to settle for 5 minutes and then viewed using X 10 objectives of the microscope.

DETERMINATION OF PLATELET COUNT

Test method

A 1: 20 dilution of the blood and the diluting fluid was prepared by adding 0.02 ml of blood to a test tube containing 0.38 ml of diluting fluid. The Neubauer chamber was charged with well mixed blood and the platelet was allowed to settle in a moist chamber for 20 minutes. The ruled area in the chamber was located and platelet counted using the x40 objectives.

Calculation

Total number of platelets/
ul=number of platelet counted x 50 STATISTICAL ANALYSIS

Data obtained was analysed using Statistical Package for Social Science (SPSS) version 20.0. The data was tested for normal distribution. The mean and standard deviation was determined for the continuous normally distributed variables. A p-value of <0.05 was considered significant in all statistical comparisms.

RESULT

Table 1: Age distribution of subjects on hormonal contraceptives.

Age group	Frequency
27-31	24(48%)
32-36	19(38%)
37-41	7(14%)
Total	50

Table 2: Comparison of mean value of Platelet count and Total WBC count for test study and control.

Haematological parameter	Test n=50	Control n=20	P- value	Platelet count (l09/L)	350.76 ± 49.56	240.50 + 46.39	0
WBC count (l09/L)	6.48 + 1.22	4.59+ 0.99	0				

KEY:

WBC: White blood cell

P<0.05 (Significant); P>0.05 (Not significant)

Analysis

Platelet count was significantly (P=0.000) increased in the test subject (350.76 + 49.56 x l09/L)) when compared with the control subjects (240.50 + 46.3 X l09/L). Total WBC count was significantly (P=0.000) increased in the test subject (6.48 + 1.22 x l09/L) when compared with the control subjects (4.59 + 0.99 x l09/L).

Table 3: Comparison of the relationship between the mean value of Platelet count, Total WBC count and Duration of exposure to oral contraceptive.

Haematological parameter	3-7 months n=38	Above 7 months n=12	P- value
Platelet count (109/L)	340.68 + 44.57	391.83 + 40.70	0.001
WBC count (109/L)	5.92 + 0.90	8.13+ 0.43	0

KEY:

WBC: White blood cell

P<0.05 (Significant); P>0.05 (Not significant)

Analysis

There was a statistically significant (P=0.001) difference in the mean value of platelet count and the duration of exposure. The subjects on oral contraceptive above 7 months (391.83 + 40.7x l09/L) have a significant (P=0.001) increase when compared with the subjects on oral contraceptive within 3-7 months (340.68 + 44.57 x109/L). There was a significant (P=0.000) difference in the mean value of TWBC count and the duration of exposure. The subjects on oral contraceptive above 7 months (8.13+ 0.43xl09/L) have a significant (P=0.000) increase when compared with the subjects on oral contraceptive within 3-7 months (5.92 + 0.90xl09/L).

Table 4: Comparison of mean value of Platelet count, Total WBC count and Age of subjects on oral contraceptive.

Haematoiogical parameter	27-31 yr n=24	32-36 yr n=19	37-41yr n=7	P-value
Platelet count (l09/L)	352.92 ± 52.21	340.32 + 58.46	340.28+ 26.22	0.697
WBC count (109/L)	6.41 + 1.22	6.34+ 1.26	7.37+ 1.05	0.144

KEY:

WBC: White blood cell

Yr: years

P<0.05 (Significant); P>0.05 (Not significant)

Analysis

There was no statistically significant (P=0.697) different in the mean value of platelets count among the different age groups when compared using the ANOVA for more than two groups.

There was no statistically significant (P=0.144) different in the mean value of TWBC count among the different age groups when compared using the ANOVA for more than two groups.

DISCUSSION

Platelet count is a performance indicator measuring the efficacy of both the intrinsic and the common coagulation pathways. Apart from detecting abnormalities in blood clotting, it can be used to monitor the treatment effects in patient at risk of thrombosis on heparin therapy. It can be used in conjunction with prothrombin time to measures the extrinsic pathway. Increase in platelet count predisposes patients to an increased risk of thrombosis.

The major function of the white blood cell and differentials are to fight infection, defend the body by phagocytosis against invasion by foreign organisms and to produce or at least transport and distribute immune response.

In this study it was observed that there was a statistical significant (P<0.05) difference between platelet count of hormonal contraceptives users and that of the control group. There was a significant increase in the mean value of platelet count in hormonal contraceptive users when compared to controls. Estrogen, like many lipophilic hormones, affects the gene transcription of various proteins. Thus, estrogen increases platelet count and plasma concentrations of clotting factors by increasing gene transcription.

This finding is in agreement with previous report who reported an increase in platelet count and a 0.4 seconds decrease in the mean value of the prothrombin time between subjects on hormonal contraceptives and controls. Mean values of platelet count for the subjects and controls were found to be higher compared with previous reports. This difference may indicate possible differences in the normal ranges among different races and across geographical regions. This re-affirms the need for the determination of normal ranges for coagulation parameter among African subjects instead of the erroneous use of cut off values derived from the West as diagnostic indices for Africans [5].

In the present study, there was a significant increase in the mean value of WBC count in hormonal contraceptive users when compared to controls. Generally, when estrogen is elevated, resting peripheral blood monocytes release less interleukin-1β and TNFα. Moreover, monocytes obtained from surgically postmenopausal women release a higher amount of cytokines, and importantly, the administration of estrogen restores premenopausal cytokine levels. When peripheral blood mononuclear cells are stimulated with lipopolysaccharide, mRNA expression and secretion of interleukin-lβ and TNFα are increased probably resulting in increase in white blood cell. This result agrees with the study carried out by.

The current study found out that, there was a signification relationship between duration of use of use of hormonal oral contraceptive and the mean value of platelet and WBC count. The study observed a significant (P<0.05) increase in the mean value of platelet and WBC count among subject exposed to the pill for above 7 months when compared to subjects exposure within 3-7 months. These findings indicate that early introduction of hormonal contraceptive have an insignificant effect on platelet count. This finding is in agreement, who reported a negative correlation between PT and the duration of oral contraceptives use. It is the finding who stated that, long-term use of Chinese low-dose combined oral contraceptives (COCs) had a slight negative influence on haemostatics.

The result reveals that there was no significant (P>0.05) difference in the mean value of platelet and WBC count among the different age groups compared using the analysis of variance. Our finding is consistent with previous one who observed that the mean values of the haemostatic parameters and WBC did not vary significantly based on age.

CONCLUSION

This study indicated that there was a statistically significant difference between the mean values of platelet and WBC count of contraceptives users when compared to and non-users. However, it was conclusive that long-term use of modem hormonal contraceptives increases platelet and WBC count. There is no significant relationship between oral contraceptive use and age of the subjects.

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