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Research Article

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Profile of Dyslipidemia in Pregnant and Postpartum Women: Evidence from a Study in Enugu, Nigeria

Francis Onukwube Ugwuene, Alphonsus Ogbonna Ogbuabor* and Eberechukwu Grace Okoh

Department of Medical Laboratory Sciences, Faculty of Allied Health Sciences, Enugu State University of Science and Technology, Agbani, Nigeria

***Corresponding Author**
Alphonsus Ogbonna Ogbuabor, Department of Medical Laboratory Sciences, Faculty of Allied Health Sciences, Enugu State University of Science and Technology, Agbani, Nigeria.

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Abstract

Pregnancy and the postpartum period are characterized by significant physiological and metabolic adaptations, including alterations in maternal lipid metabolism. This study evaluated the lipid profile of pregnant, postpartum and non-pregnant control women to determine the impact of pregnancy and delivery on maternal lipid levels. Venous blood samples were collected from participants and analyzed using standard enzymatic methods to measure Total Cholesterol, Triglycerides, and High-Density Lipoprotein. Low-Density Lipoprotein, and Very Low-Density Lipoprotein were calculated using Friedewald's formula. Results showed that pregnant women exhibited a significant increase in lipid levels compared to postpartum women ($p<0.05$) while both pregnant and postpartum women exhibited higher lipid levels than nonpregnant control groups ($p<0.05$). These findings indicate that pregnancy and postpartum period induce temporary dyslipidemia which should be monitored to facilitate early identification of women at risk of cardiometabolic complications and inform strategies for maternal health management.

Keywords: Dyslipidemia, Pregnancy, Postpartum, Enugu

1. Introduction

Pregnancy is characterized by extensive physiological and metabolic adaptations which ensure adequate nutrition necessary for fetal development and preparation of the mother for delivery and lactation [1]. These adaptations are largely driven by hormonal modulation of energy balance, nutrient mobilization and cardiovascular function. Following childbirth, the postpartum period is characterized by a progressive return toward pre-pregnancy physiological states, although the pace of this recovery varies among individuals [2]. A clear understanding of this transition is essential as deviation from expected metabolic patterns may predispose mothers to immediate or long-term health complications.

Lipid metabolism is a key component of these adaptations. Pregnancy induces predictable increase in lipid profile concentration to meet the metabolic demands of the fetus and the mother. Although these lipid alterations are considered physiological, excessively elevated values constitute dyslipidemia and have been associated with hypertensive disorders, gestational diabetes, and an increased risk of future cardiovascular disease [3,4].

Comparative evaluation of lipid profiles among pregnant women, postpartum mothers and healthy non-pregnant controls provides valuable insight into the magnitude of pregnancy related metabolic changes and the extent of postpartum recovery. Despite the clinical relevance, there is paucity of data on this topic, this study therefore aims to assess and compare the lipid profile parameters across these three groups as understanding these changes is essential for maternal health interventions.

2. Materials and Methods

2.1. Study Design

The study used a comparative cross-sectional design involving three groups of participants; pregnant women, postpartum women and non-pregnant control women.

2.2. Study Population

Participants were selected from antenatal and postnatal clinic using a systematic sampling technique. Eligible women were those without pre-existing metabolic disorders, chronic illnesses, or lipid altering mediations.

2.3. Ethical Considerations

Ethical approval was obtained from the health research ethics committee prior to the commencement of the study. The ethical approval number is ESUT/HREC/2024/11/162. Research details were made known to the respondents and their informed consent were obtained before inclusion in the study.

2.4. Sample Collection

Venous blood samples were collected from each participant after an overnight fast. Samples were drawn onto plain tubes, allowed to clot, retract and centrifuged to separate serum for biochemical analysis.

2.5. Biochemical Analysis

Serum Total Cholesterol, Triglycerides, and High-Density Lipoprotein were measured using standard enzymatic colorimetric methods while Low-Density Lipoprotein, and Very Low-Density Lipoprotein were calculated using Friedewald's formula.

2.6. Data Analysis

Data was analyzed using statistical package for social sciences (SPSS) version 27. Group comparisons were carried out using ANOVA. Statistical significance was set at $p < 0.05$.

3. Results

Groups	T. CHOL	LDL	VLDL	HDL	TG
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Pregnant (A)	5.840 ± 1.124	3.488 ± 1.030	0.825 ± 0.316	1.567 ± 0.523	1.840 ± 0.659
Postpartum (B)	5.052 ± 0.645	2.860 ± 0.741	0.663 ± 0.267	1.532 ± 0.301	1.455 ± 0.580
Control (C)	3.695 ± 0.826	2.160 ± 0.711	0.330 ± 0.113	1.215 ± 0.458	0.705 ± 0.252
F-test	38.016	16.280	22.929	4.861	26.630
P value	0.001	0.001	0.001	0.010	0.001
A vs C	0.001	0.001	0.001	0.011	0.001
B vs C	0.001	0.012	0.001	0.026	0.001

Table 1: P is Significant at <0.05

Lipid profile differed significantly among pregnant, postpartum and control groups ($p<0.05$). pregnant women showed the highest lipid levels, with postpartum intermediate and control lowest, reflecting gradual normalization after childbirth. Overall, the results demonstrated a clear progression in maternal metabolism from pregnancy induced hyperlipidemia to partial postpartum recovery, while also highlighting the persistence of elevated lipid levels in postpartum women compared to their non-pregnant counterparts.

4. Discussion

The findings of this study reaffirm the characteristic pregnancy-induced hyperlipidemia and provide clear evidence of progressive metabolic recalibration in the postpartum period. Pregnant women exhibited significantly higher levels of Total Cholesterol, Triglycerides, and High-Density Lipoprotein. Low-Density Lipoprotein, and Very Low-Density Lipoprotein compared with both postpartum and control women. This marked elevation is consistent with the metabolic demands of pregnancy, driven by hormonal influences such as estrogen, progesterone, and human placental lactogen which collectively enhance lipogenesis, stimulate hepatic lipoprotein synthesis, and promote fat accumulation for fetal growth and future lactation [1-3]. The pronounced rise in triglycerides in particular, correspond with the maternal shift towards enhanced fat storage, increased VLDL production and reduced peripheral clearance which are essential for feal development and placental steroidogenesis. Similar trends have been reported in previous studies [4-7].

The comparison between pregnant, postpartum and control groups highlight the dynamic nature of maternal lipid metabolism. The intermediate lipid levels recorded among postpartum women demonstrate the expected decline that accompanies the resolution of pregnancy-related hormonal effects [8]. However, the persistence of significantly higher lipid concentrations in postpartum women compared with non-pregnant controls suggests that lipid homeostasis does not fully normalize immediately after childbirth [9]. This partial regression underscores the complexity of postpartum metabolic recovery, which is influenced by breastfeeding status, body mass index, dietary patterns, and individual cardiometabolic predispositions. This aligns with growing evidence that postpartum lipid metabolism may take several weeks to months to return to baseline, with some women exhibiting prolonged dyslipidemia [7-10].

The graded pattern observed across all lipid fractions (pregnant > postpartum> control) has important clinical implications. First, it reinforces the need to interpret lipid results in pregnant women within the context of normal physiological changes rather than through a non-pregnant reference frame. Then, the incomplete postpartum normalization highlights an opportunity for early identification of women at risk for long term cardiometabolic disease. Pregnancy is increasingly recognized as a physiological "stress test" that may unmask underlying metabolic vulnerabilities, and elevated postpartum lipid levels may represent early indicators of future cardiovascular risk [10]. Routine postpartum lipid monitoring, particularly in women with pregnancy complications such as gestational diabetes, hypertension or obesity may therefore facilitate timely interventions such as dietary counselling and structured lifestyle modification.

The findings of this study emphasize the necessity of integrating lipid profile assessment into maternal health follow-up to ensure complete metabolic restoration and to reduce the long-term burden of cardiovascular disease among women.

5. Conclusion

In conclusion, this study demonstrates that pregnancy is associated with marked elevations in lipid profile parameters, reflecting essential physiological adaptations for fetal growth and maternal metabolic support while postpartum period shows only partial normalization of these changes. These findings reinforce the importance of monitoring lipid profiles during and after pregnancy to enable early detection of persistent dyslipidemia and facilitate timely interventions that promote long-term maternal cardiovascular health.

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