ORIGINAL ARTICLE

Assessment of Lipid Profile in HIV Seropositive Pregnant Women attending Ante-Natal Clinic in Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State, Nigeria

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ABSTRACT

Background: Undesirable changes in lipid metabolism have been reported among HIV-infected individuals undergoing anti-retroviral therapy. Considering the peculiarity of pregnant women who are also faced with similar metabolic changes, it becomes necessary to ascertain lipid changes that occur in them, and assess the effect of anti-retroviral therapy (ART), diet and physical exercise on their lipid profile.
Methods: The study was conducted in Nnamdi Azikiwe University Teaching Hospital, Nnewi in Anambra State, Nigeria. One hundred subjects were recruited for this study. This comprised of 50 HIV sero-positive pregnant women (test) and 50matched HIV sero-negative, pregnant women (controls) attending ante-natal clinic. Questionnaires and patient records were used to obtain data and information on the subjects. They were categorized into three groups based on dietary intake (carbohydrate-rich, protein-rich and cholesterol-rich) and into two groups based on exposure to physical activity, at least one hour daily exercising and non-exercising. After an overnight fast, 5mls of blood was collected from all subjects into plain tubes and sera analyzed for total cholesterol (TC), triglyceride (TG), low density lipoprotein cholesterol(LDL-C) and high density lipoprotein cholesterol (HDL-C) using the VITROS 350 automatic chemistry analyzer.
Result: The lipid profile of HIV sero-positive pregnant women were significantly lower than in sero-negative pregnant women ($p=0.028$).There was no statistically significant difference in lipid profile between those on ART and those not on ART. With physical exercise decreased levels of lipids were observed in both test and control groups ($p<0.05$). There was significant difference in the TC and LDL-C with respect to the diets for carbohydrate-rich, protein-rich and cholesterol-rich diets ($p<0.05$) in the control group.
Conclusion: Findings from this study suggest that HIV does alter the lipid profile of HIV-infected pregnant women. This, however, causes a deranged lipid profile. Physical activity and diet also play important roles in the regulation of lipid levels.
Keywords: *Anti-retroviral therapy, cholesterol, triglyceride*

INTRODUCTION

Human Immunodeficiency Virus (HIV), the causative agent for the pandemic disease Acquired Immunodeficiency Syndrome (AIDS) may have effect on lipid metabolism since elevation of lipid profiles has been

reported in HIV sero-positive individuals.[1,2] Anti-retroviral medications help people infected with HIV live longer and healthier lives. The goal of HIV treatment is to reduce the patient's viral load and prevent destruction of the immune system.

These medications may be given in combination, and like most, are not devoid of side effects. Some of the reported side effects include progressive elevation of lipid values.[3]The pregnant woman undergoes many profound metabolic changes in order to provide for increased basal metabolic rate and oxygen consumption, as well as the needs of the growing uterus, fetus and placenta.[4]Theincreased metabolic rate/requirements alters the metabolism of carbohydrate, proteins and fats in pregnancy.[4]The physiologic state of pregnancy itself is associated with changes in serum lipids.[5]

During the second half of pregnancy there is increase in plasma lipids.[6]Hofman,*et al*, investigated the association of serum lipid level and pregnancy among Dutch women and discovered that Total cholesterol and High density lipoprotein (HDL) increased with duration in normal pregnancy.[7] Gestational diabetes mellitus (GDM) can also induce a state of dyslipidemia consistent with insulinresistance.[6]

It has also been recognized that during pregnancy, the electrolytes show little change but there is a 40% increase in the values of serum triglycerides, cholesterol, phospholipids and free fatty acids.[8]This study intends to assess the influence of nutritional status, and physical activity on the lipid profile of HIV sero-positive pregnant women on HAART and those not yet on HAART.

METHODOLOGY

Subjects: The study was conducted in Nnamdi Azikiwe University Teaching Hospital, Nnewi in Anambra State, South-East Nigeria. One hundred subjects were recruited for this study, comprising of50 HIV sero-positive pregnant women and 50 HIV sero-negative pregnant women attending ante-natal clinic in the hospital. Ethical approval was sought and obtained from the Hospital Ethical Committee, and informed consent was obtained from the participants.

Pregnant women with known HIV status and having no history of diabetes mellitus and (or) cardiovascular diseases were selected randomly using questionnaires. Subjects were categorized into three groups based on dietary intake (carbohydrate-rich, protein-rich and cholesterol-rich). They were further categorized into two groups based on their level of physical activity, at least one hour daily exercising and non-exercising. They were grouped into these categories based on the data obtained from the questionnaires.

The subjects were instructed to fast overnight for at least 8hours as required for tests for lipids. After an overnight fast, 5mls of blood was collected from all participants into plain tubes and allowed to clot. The clotted samples were spun in a centrifuge and the separated sera analyzed for total cholesterol, triglyceride, low density lipoprotein and high density lipoprotein using the VITROS 350 automatic chemistry analyzer.

Data Analysis: The mean, standard deviation and level of significance for the difference within means were determined using the student t-test and ANOVA. This was computed with the SPSS *version 16*.

RESULTS

The mean ±SD (mmol/l) of lipid profile in HIV-infected and non HIV-infected pregnant women based on trimester, dietary intake and physical exercise were represented in Table 1. The lipid levels of the control group were higher than those of the test population and

both groups had progressive increase. The progressive increase in total cholesterol and triglyceride levels with increasing gestational age was statistically significant ($p<0.05$) for HIV-infected and non HIV-infected subjects.

The control group rich in protein diet had the highest total cholesterol (TC) level of 5.73 while the test group rich in protein diets had highest HDL-C of 1.70. The test population rich in protein diet also had the highest LDL-C level (4.03±0.94). The highest triglyceride level was recorded amongst the test population with increased cholesterol diet (1.90±0.92). A statistical significance ($p<0.05$) was observed when the LDL-C values were compared for carbohydrate-rich, protein-rich and cholesterol-rich diets ($p<0.05$) in the control group, while TC also showed significance ($p<0.05$) when compared for carbohydrate-rich, protein-rich and cholesterol-rich. There was statistically significant ($p<0.05$) decrease in the levels of HDL-C and triglyceride levels of the control group that did exercise but no statistical significance was observed in TC and LDL-C respectively. The test group that exercised when compared with those that did not exercise also showed no significant increase ($p>0.05$).

Table 2 shows a comparative analysis of the mean ±SD (mmol/l) values of the lipid components in HIV sero-positive pregnant women on highly active ante-retroviral therapy (HAART) with those not yet on the therapy. Those on therapy had higher TC, HDL-C and TG but it was not statistical significant ($p>0.05$). However, those not on HAART had higher LDL-C levels when compared with those on therapy but this observation was not statistically significant ($p>0.05$).

Table 1. Mean ±SD (mmol/l) of lipid profile in HIV-infected and non HIV-infected pregnant women based on trimesters, dietary intake and physical exercise.

	CONTROL				**TEST**			
	TC	HDLC	LDLC	TG	TC	HDLC	LDLC	TG
1st TRIMESTER	4.46±1.17	1.98±0.49	2.72±0.56	2.03±0.90	4.38±0.91	1.31±0.47	2.28±0.71	1.77±0.45
2nd TRIMESTER	5.08±0.97	2.37±0.41	3.27±0.87	1.97±0.75	4.70±1.21	1.46±0.64	2.45±0.82	1.87±0.98
3rd TRIMESTER	5.41±1.07	2.39±0.44	3.32±1.07	2.52±1.18	5.40±1.43	1.64±0.64	2.75±0.95	2.13±0.7
P Value	<0.05	>0-05	>0.05	<0.05	<0.05	>0.05	>0.05	<0.05
CHO-RICH DIET	5.05±1.12	1.38±0.45	2.96±0-.88	1.48±1.19	4.97±1.40	1.49±0.67	2.60±0.92	1.89±0.83
PRO-RICH DIET	5.73±1.0	1.28±0.50	4.03±0.94	0.91±0.77	5.50	1.70	2.58	1.87
CHOL-RICH DIET	4.94±0.95	1.10±2.30	3.72±0.77	0.47±0.07	4.43±0.56	1.50±0.32	2.16±0.42	1.90±0.92
P Value	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05
NPE	5.35±1.15	1.47±0.44	3.06±1.04	1.77±1.11	4.91±1.09	1.59±0.62	2.55±0.59	1.90±0.93
PE	4-93±1.03	1.18±0.41	3.43±0.86	0.71±0.60	4.88±1.38	1.45±0,61	2.51±0.96	1.80±0.80
P Value	0.325	0.012	0.072	0.020	0.743	0.624	0.092	0.450

PE= PHYSICAL ACTIVITYEXERCISE, NPE=NO PHYSICAL EXERCISE, TC=TOTAL CHOLESTEROL, HDL-C=HIGH DENSITY LIPOPROTEIN CHOLESTEROL

LDL-C=LOW DENSITY LIPOPROTEIN CHOLESTEROL, TG= TRIGLYCERIDE,CHO=CARBOHYDRATE, PRO=PROTEIN, CHOL=CHOLESTEROL

Table 2. Mean± SD lipid levels (mmol/l) of HIV-infected subjects on HAART and not on HAART

	TC	HDL-C	LDL-C	TG
On therapy (n=35)	4.99±1.11	1.61±0.49	2.49±0.81	1.97±0.88
Not on therapy (n=15)	4.75±1.66	1.25±0.79	2.62±0.97	1.71±0.71
P value	0.069	0.234	0.152	0.775

DISCUSSION

Undesirable changes in lipid metabolism have been reported in HIV infected individuals. Changes in plasma lipids have also been reported in pregnancy. The effect of HIV infection, pregnancy as well as diet and physical activity on the lipid profile was the subject of this study. The lipid profile of HIV sero-positive pregnant women were significantly lower than with sero-negative pregnant women. This observation was consistent with earlier reports.[3]There was, also, progressive significant increase in the total cholesterol and triglyceride levels with increasing gestational age, similar to reports by Winkher, *et al*.[9]

With physical exercise, decreased levels of lipid profile were observed in both test and control groups. This agrees with the study of Nwanjo and Ojiako**,** which suggests that the decrease is due to the alteration in basal metabolic rate.[10] On the other hand, a positive association was observed between highly active anti-retroviral therapy (HAART), total cholesterol, high density lipoprotein-cholesterol and triglyceride levels, but a negative association between HAART and low density lipoprotein, in contrast to an earlier report by Odo, *et al*.[11]The report by Tungsinpat and Aberg, supports our finding of increase in TG and HDL-C in HIV patients on ART treatment, due to presence of Non-nucleotide reverse transcriptase inhibitor.[12]

The increase in total cholesterol observed in the group on protein-rich diet suggests that the excessive protein breakdown in both groups of pregnant women due to their hyper-metabolic state results in increase acetyl-coA store, thus providing precursor for cholesterol synthesis.[13]

CONCLUSION

The findings of this study suggest that HIV infection does alter the lipid profile of HIV-infected pregnant women. This alteration however, causes a lowering in the lipid profile levels in these women. Physical activity also plays an important role in the regulation of lipid levels as lower, healthier levels were observed with exercise. Exercise (mild to moderate) should be encouraged in all pregnant women as a sedentary life style would encourage increase in lipid profiles. Physical activity will help keep a check on the increasing triglycerides, lipoproteins and mediate protein catabolism. A healthy, varied and balanced diet should also be promoted at the counseling and ante natal clinics, more so in the women living with HIV/AIDS.

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