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Lipid Profiles in People Living with HIV/AIDS on ARV Therapy in an Urban Area of Osun State, Nigeria

[1]T. Oduola, [2]A.A. Akinbolade, [2]L.O. Oladokun, [3]O.G. Adeosun, [4]I.S. Bello and [5]T.I. Ipadeola

[1]Department of Haematology, Special Investigation Unit,
[2]Department of Medical Laboratory, State Hospital, Osogbo, Nigeria
[3]Department of Chemical Pathology,
[4]Department of General Medical Practice,
Obafemi Awolowo University Teaching Hospital Complex,ile- Ife, Nigeria
[5]Department of Haematology, Ladoke Akintola University of Technology,
Teaching Hospital, Osogbo, Nigeria

Abstract: Antiretroviral medications have been reported to have adverse effect on lipid metabolism. Lipid profiles and CD4-T-lymphocytes levels were assessed using standard techniques, in people living with HIV/AIDS (PLWHA) on ARV therapy and in asymptomatic HIV - infected patients who were not on drugs, for a period of 15 months. CD4-T-lymphocytes counts were significantly lower ($P< 0.05$) in both groups of patients when compared to uninfected healthy controls. Total cholesterol (TC), high density lipoprotein (HDL), low-density lipoprotein (LDL) and triglycerides (TG) levels in PLWHA on ARV therapy were not significantly different ($P>0.05$) from those of uninfected healthy control.The values of these parameters in ARV-naïve patients were not significantly different from those of healthy controls except TC and HDL which were significantly lower in ARV-naïve patients. These parameters elevated above baseline values in the two groups of patients during the study period but remained within the reference range, hence constituted no risk to cardiovascular disease. Further studies that will examine the effect of specific ARV agents on lipids in a larger number of PLWHA and for a longer period in this environment are needed.

Key words: Antiretroviral · Therapy · People living with HIV/AIDS · Lipids profiles · CD4 T-lymphocytes

INTRODUCTION

Development of undesirable changes in lipid and glucose metabolism that mimic the metabolic syndrome which may be proatherogenic, is common in HIV-infected patients on antiretroviral (ARV) therapy [1].

Cardiac risk factors are known to exist in both HIV positive and negative individuals. These risk factors range from hypercholesterolemia and hypertriglyceridemia to a family history of heart disease [2]. It has been found that HIV positive patients possess higher titres of circulating adhesion molecules than normal subjects [3], and to have a seven percent absolute risk for developing heart disease within a decade [4]. In addition, some indirect evidence from retrospective cohort analyses and non-invasive imaging of peripheral arteries indicates that HIV-positive individuals are at higher risk for atherosclerosis than HIV-negative individuals. In the aetiology of arteriosclerosis, low-density lipoprotein particles are trapped within the walls of blood vessels, where they undergo oxidation and subsequently attract monocytes. The monocytes engulf the LDL particles and become macrophages. Macrophages help form fatty streaks, which gradually become atherosclerotic plaques. Impairment of reverse cholesterol transport leads to further accumulation of lipids within the vessel walls. Unstable plaques may rupture and cause intravascular thrombosis and obstruction of blood perfusion [5]. Current knowledge regarding the aetiology of altered lipid metabolism in HIV-positive patients does not afford a clear picture of whether HIV disease itself or ART is largely to blame, there are proponents on each side of the debate. The principal confounding factor is the sheer number of potential contributors to dyslipidaemia in

Corresponding Author: Dr. T. Oduola, Department of Haematology, Special Investigation Unit,
Obafemi Awolowo University Teaching Hospital Complex, Ile-ife , Nigeria

HIV-positive patients. These patients are susceptible to traditional cardiac risk factors, as well as the following HIV-specific factors: disease - drug interactions, effects of medications' metabolites on lipid metabolism, HIV disease-related inflammation, fat redistribution, creation of insulin resistance by antiretroviral drugs, altering of lipoprotein metabolism and HIV infection of the heart tissue. Other factors include accelerated replication of the virus, opportunistic infections, viral infections, autoimmune response to viral infection, drug - related cardio toxicity, nutritional deficiencies and prolonged immune suppression [5-7].

Recent increases in access to highly active antiretroviral therapy (HAART) have made the management of drug toxicities an increasingly crucial component of HIV care in developing counties [8]. The spectrum of adverse effects related to HAART in developing countries may differ from that in developed countries because of the prevalence of conditions such as anaemia, malnutrition, and tuberculosis and frequent initial presentation with advanced HIV disease. The severity of adverse effects may vary as a result of host genetics and diagnostic delays attributable to inadequate laboratory monitoring [6]. Although lipids metabolism in HIV patients on ART has been widely studied in many places across the globe, none has been documented in our locality, hence this study is undertaken to determine the effects of ART on lipids profiles in HIV-positive patients in this environment.

MATERIALS AND METHODS

Subjects: A total of 36 subjects (mean age = 32.3yr), 16 males and 20 females were enrolled for this study. Out of this number, 26 were PLWHA attending the Living Hope Care, Ilesa, Osun State, Nigeria, 16 (7 males and 9 females) received ARV therapy, while 10 (5 males and 5 females) were asympotomatic HIV - infected ARV -naive patients. The remaining 10 subjects (5 males and 5 females) were apparently healthy uninfected subjects (control).

Blood Collection and Analytical Procedures: Ten ml of blood (fasting sample) was collected through a clean venepuncture from each of the subjects before the commencement of the drug. Five ml was dispensed into tripotassium K_3EDTA (Sequestrene) specimen bottles. Plasma samples were obtained from each blood sample after centrifugation, and analyzed for TC, HDL and triglycerides using standard techniques, LDL values were then calculated.

The remaining 5ml of blood was dispensed into K_2EDTA for quantitation of $CD4^+$ T-lymphocyte using Dynabeads technique.

Blood collection was repeated at 3^{rd}, 6^{th}, 9^{th}, 12^{th}, and 15^{th} month after the commencement of ARV therapy. Blood samples were similarly collected from the ARV - naive patients and control subjects .

Statistical Analysis: The mean and standard deviation and the level of significance for the differences between means were computed by students test SPSS 6.

RESULTS

The mean + S.D of lipids and CD4 profiles in health and in PLWHA on ARV medications were presented in Table I. The CD4 count was significantly lower ($P<0.05$) in PLWHA before commencing ARV therapy (M_0) than in healthy controls, and this remained so with ARV therapy

Table 1: Mean±SD of Lipid and CD4 Profiles in Health and in PLWHA on ARV Therapy

	Control					PLWHAs on ARV				
	TC	HDL	LDL	TG	CD4	TC	HDL	LDL	TG	$CD4^+$
M_0	169.50 ±18.95	47.60±6.48	105.60 ±24.53	105.90 ±43.11	827.80±236.11	142.69±36.10	39.06±20.45	77.63±30.17	117.31±64.42	147.31±64.58
P-value	0.61	0.29	0.05	0.61	0.00					
M_3	171.90±15.81	48.30±4.57	100.60±14.66	118.00±24.61	839.00±236.01	143.37±35.43	42.06±21.91	74.69±27.22	126.75±65.58	245.93±139.10
P-value	0.04	0.35	0.02	0.68	0.00					
M^6	168.60±11.74	48.90±5.92	95.60±12.78	120.90±15.03	857.00±179.82	158.88±38.36	45.19±15.59	86.38±28.61	127.81±64.29	376.25±228.67
P-value	0.46	0.48	0.34	0.54	0.00					
M^9	170.00±16.89	48.60±5.21	96.44±12.82	127.73±12.68	830.00±241.48	165.25±34.07	45.63±15.50	88.19±29.74	147.56±81.40	436.81±260.30
P-value	0.70	0.58	0.59	0.40	0.00					
M^{12}	171.10±18.00	48.40±4.81	97.08±116.45	128.50±13.36	854.00±209.03	168.81±29.87	44.00±14.51	91.31±24.25	168.25±97.02	484.63±204.19
P-value	0.32	0.35	0.48	0.16	0.00					
M^{15}	172.30±15.41	48.40±8.09	97.30±13.36	129.40±11.59	881.00±228.59	177.50±30.81	46.13±15.88	91.25±29.41	171.25±97.29	500.31±179.64\
P-value	0.64	0.64	0.92	0.14	0.00					

Key: M_0 - Month 0; M_3 - Month 3; M_6 - Month 6 ; M9 - Month 9 ; M^{12} - Month 12; M^{15} - Month 15.

Table 2: Mean ± SD of Lipid and Cd_4 Profiles in Health and in Asymptomatic HIV Patients Not on ARV Therapy

	Control					ARV - Naïve PLWHAs				
	TC	HDL	LDL	TG	CD4	TC	HDL	LDL	TG	$CD4^+$
M_0	169.50±18.95	47.60±6.48	105.60±24.53	105.90±43.11	827.80±236.11	126.60±42.26	40.60±15.71	67.20±29.94	99.80±46.62	480.00±176.95
P-value	0.01	0.01	0.05	0.80	0.00					
M_3	171.90±15.81	48.30±4.57	100.60±14.66	118.00±24.61	839.00±236.01	127.80±39.63	40.6±13.83	40.60±13.74	103.00±41.55	427.00±100.04
P-value	0.01	0.02	0.04	0.51	0.00					
M^6	168.60±11.74	48.90±5.92	95.60±12.78	120.90±15.03	857.00±179.82	135.30±34.65	41.80±12.92	73.30±23.41	102.40±38.17	466.00±138.24
P-value	0.03	0.01	0.22	0.44	0.00					
M^9	170.00±16.89	48.60±5.21	96.44±12.82	127.73±12.68	830.00±241.48	147.40±33.29	43.00±14.06	81.70±23.93	112.10±34.58	461.00±175.58
P-value	0.10	0.01	0.74	0.55	0.00					
M^{12}	171.10±18.00	48.40±4.81	97.08±116.45	128.50±13.36	854.00±209.03	146.50±21.13	43.40±10.18	83.20±16.58	107.90±36.54	424.50±131.73
P-value	0.03	0.01	0.46	0.64	0.00					
M^{15}	172.30±15.41	48.40±8.09	97.30±13.36	129.40±11.59	881.00±228.59	157.20±25.42	42.80±6.80	88.90±24.04	121.30±37.88	467.50±141.54
P-value	0.09	0.01	0.70	0.79	0.00					

Key: M^0 - Month 0; M^3 - Month 3; M_6 - Month 6; M^9 - Month 9; M^{12} - Month 12 M^{15} - Month 15

throughout the study period. However, there was a gradual significant increase (P<0.05) in CD4 count in PLWHA after the commencement of ARV therapy. The values of TC, HDL, LDL and TG PLWHA before and after commencement of ARV therapy and healthy controls were not significantly different (P>0.05) except for TC and LDL at the third month.

Table 2 shows mean + S.D of lipids and CD4 profiles in health and in ARV - naive PLWHA. The CD4 values were significantly lower (P<0.05) in ARV -naive PLWHA than in healthy controls throughout the study period. There was no significant difference (P>0.05) in the TG and LDL values between ARV - naive PLWHA and healthy subjects except LDL at the 3rd month.

The HDL and TC values were significantly lower (P<0.05) in ARV - naïve patients than in healthy subjects throughout the study period, except TC at the ninth month.

DISCUSSION

In this study, the CD4 levels were significantly lower (P<0.05) in both HIV patients on ARV therapy and asymptomatic HIV infected ARV - naive subjects than in uninfected healthy control subjects. This observation was consistent with earlier reports [9]. With therapy, the CD4 levels increased from third month to the end of the study. There was no statistical significant difference (P>0.05) in the lipid profiles of PLWHA on ARV and in healthy uninfected controls (except TC and LDL at the third month) throughout the 15-month study period. The values obtained for lipids in PLWHA from baseline were lower than the values for the controls but were within reference range. With therapy, there were significant increases (P<0.05) of lipid profiles in PLWHA from baseline values, although the increases were within the references range and did not point to cardiovascular (CVD) risk within the study period. Our experience is similar to that of Buchacz *et al.* [10] where their observation after 24 months of HARRT therapy seem unlikely to increase the risk of CVD.

Similarly, lipid profiles is generally lower in ARV - naive PLWHA than in uninfected healthy control subjects from the baseline values to the end of the 15th month. The increases observed in this group were similar to those of PLWHA on ARV. In conclusion the findings of this study suggest that HIV disease itself may have effect on lipid metabolism since increases in lipid profiles were observed in PLWHA on ARV and in ARV - naive PLWHA and this increases constituted no CVD risk as the values were within the reference range.

REFERENCES

1. Susan, L.R., E.Y. Kevin, F.P. Michael, C.R. Richard and D.M. Gene, 2007. Antiretroviral drug levels and Interactions Affect lipid, Lipoprotein, and Glucose Metabolism in HIV - 1 Sero negative subjects: A pharmacokinetic - Pharmacodynamic analysis. Metabolic syndrome and Related Disorders, 5(2): 163-173.
2. Expert Panel on detection, Evaluation and Treatment of High blood Cholesterol in Adults, 2001. Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP). Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA, 285: 2486-2497.

3. Bausserman, L., K. Tashima, M. Dispigno *et al*., 2002. Circulating cell adhesion molecules are elevated in HIV-positive women. 9th conference on Retroviruses and opportunistic Infections, (Abstract 694-T)
4. Henry, K., R. Zackin, M. Dube *et al*., 2002. ACTG 50565: Metabolic status and cardiovascular disease risk for a cohort of HIV - infected persons durably suppressed on an indinavir - containing regimen (ACTG372A). 9th conference on Retroviruses and opportunities Infections, (Abstract 694-T).
5. Judith, A.B., 2003. Cardiovascular risk Among HIV- Positive patients on antiretroviral therapy. JIAPAC, 2, Suppl 2.
6. Carr, A. and M. Law, 2003. An objective lipodystrophy severity grading scale derived from the lipodystrophy case definition score. J. Acquir Immune Defic Syndr, 33: 571-576.
7. Carr, A., K. Samaras, S. Burton, M. Law, J. Frenud, D.J. Chisolm and D.A. Copper, 1998. A syndrome of peripheral lipodystrophy, hyperlipideamia and insulin resistance in patients receiving HIV protease inhibitors. AIDS, 12: F51-F58.
8. Subbaraman, R., S.K. Chaguturu, K.H. Mayer, T.P. Flanigan and N. Kumarasamy, 2007. Adverse effects of highly active antiretroviral therapy in developing countries. Clin. Infect. Dis., 45(8): 1093-101.
9. Mocroft, A., A.N. Phillips, J. Gatell, B. Ledergerber, M. Fisher, N. Clumeck, M. Losso, A. Lazzasrin, G. Fatikenheuer and J.D. Lundgren, 2007. Normalisation of CD_4 counts in patients with HIV- 1 Infection and maximum virological suppression who are taking combination antiretroviral therapy: an observational cohort study. Lancet, 370(9585):407-13.
10. Buchecz, K., P.J. Weidle, D. Moore, W. Were and J. Mermin, 2008. Changes in lipid profile over 24 months among adults on first - line highly active antiretroviral therapy in the home-based AIDS care program in rural Uganda. J. Acquired Immune Deficiency syndromes, 47(3): 304-311.