LIPID PROFILE OF NEWLY DIAGNOSED TREATMENT NAÏVE HIV PATIENTS IN PORT HARCOURT, RIVERS STATE, NIGERIA

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Abstract

HIV/AIDS is known to destroy the body's immune system producing several complications such as lypodystrophy and most anti-retroviral drugs are lypodystrophic predisposing to cardiovascular problems. Research on the lipid profile of the HIV infected population in our environment is limited. A positive correlation has been established between the development of lypodystrophy, cardiac abnormalities and raise plasma TCH and LDL and a negative one with HDL[1]. The present study searched for abnormalities in the lipid parameters (LDL, HDL, TGH and TCH) of newly diagnosed HIV subjects as compared to HIV negative healthy controls.

The lipid profile for 150 HIV positive, (pre-diagnosed by managing physicians) treatment naïve subjects were compared to that for 42 healthy subjects (had personal knowledge of HIV status). The mean LDL, HDL, TCH, and TGH for the treatment naïve HIV subjects were, 1.08 ± 0.82, 1.29 ± 0.56, 4.45 ± 2.29, 1.27 ± 0.66 respectively while that for controls were, 1.40 ± 0.69, 1.12 ± 0.58, 2.94 ± 0.86, 0.97 ± 0.43 respectively.

The treatment naive HIV subjects had a low mean $\mathbf{HDL:}\frac{HDL}{TCH}$ *(0.28). The mean concentrations of the lipid parameters stratified by gender showed no differences in HDL and TGH, however, the HIV positive treatment naïve male subjects had a significantly higher LDL and TCH than the HIV female subjects. The lipid profile of the HIV negative healthy control subjects was within normal limits and a minimal cardiovascular risk was noted amongst the HIV positive treatment naïve subjects. It is pertinent to do a routine lipid profile on patients as available drugs are known to be lypodystrophic, especially protease inhibitors.*

Key Words: *Lipid Profile, HIV, Treatment naïve, cardiovascular risk, Rivers State, Nigeria*

.INTRODUCTION

Lipids and their transporting lipoproteins have been extensively studied primarily because of their strong contribution to the pathophysiology of atherosclerosis and obesity, a major cause of coronary artery disease.[2]

Plasma lipids are in the form of lipoprotein i.e. very low density lipoprotein (VLDL), intermediate density lipoprotein (IDL), low density lipoprotein (LDL), high density lipoprotein (HDL).[2] In the development of lypodystrophy and cardiac abnormalities, a positive correlation has been established with plasma TCH and LDL cholesterol concentration and a negative correlation with plasma HDL cholesterol[1] i.e. HDL has been found to be cardio protective.

The pathogenesis of HIV dyslipidemia is largely unknown; Continuous viral replication leads to immune mediated destruction of the key immuneffector cells, (CD4+ lymphocyte) leading to a myriad of complications such as metabolic abnormalities (Lipid derangements and fat maldistribution).[3] Fat maldistribution; characterized by fat wasting or fat accumulation is often also referred to as lypodystrophy and in combination with insulin resistance and hyperlipidemia is called lypodystrophy syndrome.[3,4]

HIV induced lypodystrophy is a heterogeneous syndrome yet to be objectively defined. It comprises of; Peripheral lipoatrophy, central fat accumulation, lipomata, hyperlipidemia, insulin resistance and lactic acidaemia.[4] Anti-retroviral drugs in use have also been implicated in the emergence of lypodystrophy seen in HIV patients. Both nucleoside analogues and protease inhibitors have been

implicated and also predispose the subjects to cardiovascular problems.[5] In Benin city, in Nigeria, Frank (2005) showed that highly active antiretroviral therapy (HARRT) is associated with hypertriglyceridemia, lypodystrophy, hypercholesterolemia, and insulin resistance[6].

The principal concerns that arise from these metabolic disorders are possible increased risks of premature atherosclerosis and cardiovascular disease[7]. In addition to these concerns, in Nigeria, the only drugs available to most patients are principally those implicated in the pathogenesis of lypodystrophy syndrome, and because of poverty in underdeveloped nations, the patients have no other drug alternatives but the ones offered for free in governments' antiretroviral programme. Therefore, the clinicians are compelled to give the available drugs. It is therefore pertinent that newly diagnosed HIV patients do a baseline lipid profile so that the clinicians will be able to recognize the patients who are already at risk of developing dyslipidemia and subsequent cardiovascular abnormalities and make necessary modifications on treatment regimen as well as dietary advice.

METHODS

A total of 192 adult Nigerians, 97 males (50.5%) and 95 females (49.5%) who met the inclusion criteria for the study were recruited after obtaining informed consent. They were made up of newly diagnosed HIV subjects who came to the hospital to complete their investigations before commencement of therapy and hospital staff.

Inclusion criteria:

- *Only males and non-pregnant females above 15 years of age, with HIV positivity confirmed by the managing physicians using the ELISA technique
- Anti-retroviral drug naïve and had
- A willingness to give informed consent.

Exclusion criteria;

- Those < 15 years,
- Pregnant and nursing mothers, subjects on any form of anti retroviral agent and any form of ill health.

Controls: 42 apparently healthy adults (33 males and 9 females) acted as control subjects. Their lipid parameters were estimated (HDL, LDL, TGH and TCH). Similar inclusion and exclusion criteria as stated above were used. Blood sample was collected from all subjects into EDTA bottle for lipid assay. Samples were separated and assayed within three hours of collection. Lipids were analyzed using enzyme substrate method. The Randox® based on these methods was used for the assay.

Results were analyzed using the SPSS version 11 for windows. The mean and standard deviation of the measured parameters were calculated. The student t-test was used as appropriate with a p value of <0.05 considered as statistically significant.

RESULTS

Of the 192 subjects recruited for the study, 64 (66%) of the males were HIV positive (treatment naive) and 33 (34%) were HIV negative while 86 (90.5%) of the females were HIV positive and 9 (9.5%) were HIV negative.

The mean triglyceride (TGH) for the HIV positive treatment naïve subjects and that for the HIV negative subjects are shown on Table 1. There seemed to be no statistically significant differences between both values, $p = 0.005$.

The mean for the HIV positive treatment naïve female subjects and that for the healthy control female subjects are shown on Table 3, and the mean for the HIV positive treatment naïve males and the HIV negative healthy control are shown on Table 2.

LDL cholesterol values for the HIV positive treatment subjects were found not to be significantly different, P=0.002. The mean for the HIV positive treatment naïve females and the healthy controls are shown on Table 3.

The mean LDL cholesterol values for the HIV positive treatment naïve male subjects and for the HIV negative subjects on table 2 shows a higher mean for the HIV positive subjects.

The mean HDL cholesterol values for HIV positive treatment naïve subjects and for the healthy control subjects and values for both sexes are shown on table 2 and 3. They were not significantly different.

The mean TCH for the HIV positive treatment naïve subjects and that for the HIV negative subjects, (table 1) were found to be significantly different. The mean TCH for the HIV positive treatment naïve male subjects (table 4) and that for the male HIV negative subjects were equally found to be significantly different.

The HIV positive treatment naïve male subjects were therefore noted to have higher mean LDL cholesterol and mean TCH as compared to the HIV positive treatment naïve female subjects.

Table 1: Mean lipid values of HIV positive treatment naïve subjects and HIV negative controls (mmol/l)

LIPID TYPE	MEAN	
	HIV POSITVE TREATMENT NAÏVE SUBJECTS	HIV NEGATIVE SUBJECTS
Tg (mmol/L)	1.27 ± 0.66	0.97 ± 0.43
LDL (mmol/L)	1.08 ± 0.82	1.40 ± 0.69
HDL (mmol/l)	1.29 ± 0.56	1.12 ± 0.58
CH (mmol/L)	4.45 ± 2.29	2.94 ± 0.86

Table 2: Comparison of values TCH, HDL, LDL and TG for H.I.V positive males and healthy control males (mmol/l)

	HIV POSITIVE MALE	HEALTHY CONTROL	SIGNIFICANT DIFFERENCE
Mean TCH	6.59 ± 3.06	2.82 ± 0.88	Yes
Mean HDL	1.27 ± 0.45	1.02 ± 0.57	No
Mean LDL	4.40 ± 2.14	1.38 ± 0.70	Yes
Mean TG	1.28 ± 0.61	0.97 ± 0.45	No

Table 3: Comparison of values of TCH, HDL, LDL and TGH for HIV positive females and healthy control females (mmol/l)

LIPID TYPE	HIV POSITIVE FEMALES	HEALTHY CONTROL FEMALES	SIGNIFICANT DIFFERENCE
Mean TCH (mmol/l)	2.91 ± 0.96	3.37 ± 1.19	No
Mean HDL (mmol/l)	1.31 ± 0.63	1.46 ± 0.94	No
Mean LDL (mmol/l)	1.13 ± 0.80	1.48 ± 1.34	No
Mean TGH (mmol/l)	1.26 ± 0.69	0.93 ± 0.72	No

Table 4: Mean concentration of lipid parameters stratified by gender (mmol/l)

LIPID TYPE	HIV POSITIVE TREATMENT NAÏVE FEMALES	HEALTHY CONTROL FEMALES	HIV POSITIVE TREATMENT NAÏVE MALES	HEALTHY CONTROL MALES
LDL (mmol/l)	1.13 ± 0.80	1.48 ± 1.34	4.40 ± 2.91	1.38 ± 0.70
HDL (mmol/l)	1.30 ± 0.63	1.56 ± 0.94	1.27 ± 0.45	1.02 ± 0.57
TG (mmol/l)	1.26 ± 0.70	0.94 ± 0.72	1.28 ± 0.61	0.93 ± 0.45
TCH (mmol/l)	2.91 ± 0.97	3.37 ± 1.19	6.52 ± 3.10	2.82 ± 0.89

Discussion

There are scanty reports on the lipid profile of the HIV population in our environment. The current study recruited 192 subjects, 150 HIV positive and 42 HIV negative. Though it was noted that the mean Total cholesterol levels for the treatment naïve HIV positive subjects (4.45 ± 2.29) was found to be significantly different from the mean of the healthy negative controls (2.94 ± 0.86), it was however noted that the LDL cholesterol levels which is a better maker for cardiovascular risk factor is quite normal (1.08 ± 0.82). I.e. this mean value was similar to the values for the healthy controls, 1.40 ± 0.069 and for normal Caucasians 2.88 ± 0.05, though slightly lower than that gotten from studies on HIV treatment naïve Caucasians (2.34 ± 3.90).[8]

The study also noted that the high mean total cholesterol (TCH) level of 4.45 ± 2.29 for the treatment naïve HIV positive subjects, was similar to that from studies on treatment naïve HIV positive Caucasians (4.45 ± 4.1) confirming the ravaging effect the HIV virus has on the lipid profile of infected individuals. On the other hand, the mean TCH for the healthy control subjects, (2.9 ± 0.86) is lower than that obtained by Akpa *et al* in Port Harcourt and other studies in Benin and Jos (2.90 vs 4.76, 3.64, 3.54 respectively)[6,9]. This might probably indicate that the perpetuated rise in non-communicable diseases arising from increasing urbanization is not as expected.

The mean HDL cholesterol of 1.29 ± 0.55 for the HIV positive subjects is within normal range and is similar to that for HIV positive treatment naïve Caucasians (1.07 ± 1.3) and the HIV negative healthy controls (1.12 ± 0.58). However, when the mean HDL: HDL/TCH ratio is calculated for the HIV positive treatment naïve subjects, the value was low and similar to that for HIV positive treatment naïve Caucasians (0.28 Vs 0.24). The control however had a normal value of HDL: HDL/TCH ratio = 0.58.

The place of HDL: HDL/TCH ratio in predicting cardiovascular risk is well documented, thus a normal mean TCH seen in the treatment naïve HIV positive subjects does not necessarily indicate freedom from cardiovascular risk because the low levels of HDL: HDL/TCH ratio indicates a possible minimal cardiovascular risk. The control subjects on the other hand had a good HDL: HDL/TCH ratio. This difference in HDL: HDL/TCH ratio between the HIV subjects and the healthy control subjects is possibly as a result of the ravaging effects of the HIV virus on the immune system producing a host of metabolic complications.

The mean TGH for the HIV positive treatment naïve subjects was within normal limits and similar to values from other Nigerian studies on healthy Nigerians 1.27 ± 0.66 vs 0.79 ± 0.43-Kano, 1.42 ± 0.23-Ibadan but is however lower than values for untreated HIV positive Caucasians 4.13 ± 1.05[6].
The mean concentrations of the lipid parameters stratified by gender showed no differences by gender in HDL and TGH, however, HIV positive treatment naive males had a significantly higher LDL (4.40 ± 2.91) and TCH (6.52 ± 3.10) than HIV positive females (1.13 ±0.80 and 2.91 ± 0.97), Table 4.

Conclusion/Implication for clinical practice and policy

This study has been able to establish that,

1) The lipid profile of the average Nigerian living within the Rivers state is within normal limits.

2) A low HDL: HDL/TCH ratio in HIV positive subjects before therapy was initiated indicating the existence of a cardiovascular risk. And so, although the cardiovascular risk in the HIV positive treatment-naive subjects is minimal, it is still important to monitor each patient closely by doing a routine lipid analysis on each HIV positive subject before commencement of therapy. This is because the technology for detecting patients at risk of developing cardiovascular problems is still largely unavailable in our environment. Therefore, healthcare practitioners should be advised on the need to do routine lipid profile on each patient before instituting therapy.

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References

1. Carr A, Katherine S, Samantha B, Mathew L, Freund J, Chisholm J, Cooper DA: A Syndrome of peripheral Lipodystrophy, hyperlipideria and insulin resistance in patients receiving HIV Protease inhibitors. AID 1998;12 (7) 51-58.
2. Rifai N, Warrick GR. Lipids, lipoproteins, apoliproteins, and other cardiovascular risk factors, TIETZ Textbook of clinical chemistry and molecular Diagnostics. 4th ed.: Missouri 2004;PP 903-969.
3. Carr A. HIV Lypodystrophy. AIDS 2003; 17: 141-148.Carr A, Ory D. Does HIVcause cardiovascular disease? Plos med 2006; 28: 1-2
4. Daniel P, Amalio T, Phippe S, Jean-Jacques C, Patricia H, Marlanne JR. Atherogenic Dyslipidemia in HIV infected individuals treated with Protease Inhibitors. Circulation 1999; 100:700-705
5. Imarhiagbe F. Hypertriglyceridemia in Antiretroviral Therapy. Med Gen 2005; 7:65.
6. Kulasekaram R, Beters BS, Wierzbic AS. Dyslipidemia and cardiovascular risk in HIV infection. Current. Medicine. 2000;21:1717-1725.
7. Mallon PG, Cooper DA, Carr A. HIV – Associated Lypodystrophy. HIV Medicine 2001; 3:166 – 173
8. Mayne PD. Clinical chemistry in Diagnosis and treatment. 6th Ed. London 2001;223-224.
9. Akpa MR, Agomou DI, Alasia DD. Lipid profile of healthy adult Nigerians in Port Harcourt, Nigeria, Nigerian Journal of medicine. 2006; 2:137-140.
10. Third Report of the National cholesterol Education Programme (NCEP) Expert panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults. JAMA publication 2001; 19:2486-2497.
11. Crook MA.Clinical chemistry and laboratory medicine 7th Ed. Oxford 2006; 198-213.
12. Rifai N, Warmick GR, McNamara JR, Belcher JD, Grinstead GF, Frantz ID. Measurement of low density lipoprotein cholesterol in serum: a status Report. Clinical Chemistry. 1992; 38:150-160.
13. Haeter G. Regression of Lipodystrophy in HIV-Infected patients under therapy with the new protease inhibitor Atanvir. AIDS 2004; 6:952-955.
statistics for Health and Social Sciences. Nathadex Publishers 2005;118.
14. Idogun et al: Assessment of serum lipids in Nigerian with type 2 diabetes mellitus. Pak. J.Med Sci.2007;2:708 – 712.