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A Comparative Study of Lipid Profile in HIV Infected and non Infected Subjects at a Tertiary Care Centre

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Abstract

Introduction: *Metabolic derangements and body fat abnormalities are well known in HIV infection, both due to virus and to treatment. Various abnormalities in lipids are described in HIV. Increased triglyceride, low total cholesterol, low HDL, low LDL have been noted prior to treatment. With better medication and care, longevity of patients has increased resuting in worsening cardiovascular morbidity. It is hence mandatory to document the pretreatment lipid profile in HIV infected patients.*

Materials & Methods: *A comparative cross sectional study of 50 treatment naïve HIV infected patients and 50 non infected controls were included in the study. Subjects were those attending the ART clinic, and HIV positivity was confirmed by NACO guidelines. Informed consent and ethical clearance and permission from KSACS were obtained. Patients with comorbidities likely to influence the lipid profile were excluded from the study. Detailed history, clinical examination data including anthropometry were entered in proforma. Lipid profile was tested in both groups.*

Results were computed and analysed using SPSS software.

Results: *There were significant differences in lipid profile between HIV infected and non infected groups. There was statistically significant lowering of total cholesterol LDL, HDL and elevation of triglycerides & VLDL in HIV infected. There was proportionate reduction in total cholesterol, LDL and HDL as CD4 count decreased. TG, VLDL increased as CD4 decreased. (P <0.05).*

Conclusions: *Pretreatment lipid abnormalities in lipid profile noted were lower TC, HDL & LDL and higher TG& VLDL. The abnormalities linearly correlated with CD4 counts.*

Keywords: *HIV: human immunodeficiency virus, TC: total cholesterol, LDL: low density lipoprotein, TG : triglycerides, HDL: high density lipoproteins, VLDL : very low density lipoproteins, WC: waist circumference, WHR: waist hip ratio*.

Introduction

Metabolic derangements and body fat abnormalities are well known to occur in human immunodeficiency virus infection, both due to direct effect of the infection and due to treatment. Studies have shown that Highly Active

Antiretroviral Therapy (HAART) often results in lipodystrophy, esp when protease inhibitors are used in treatment.

Abnormalities in lipid metabolism has been described before the initiation of HAART. Longitudinal assessment of patients with HIV seroconversion suggest that decreased TC, HDL& LDL and increase in TG & VLDL occur before treatment.[1,2] Advanced disease is associated with increased serum triglycerides (TG) and decreased total cholesterol (TC). Patients with AIDS have lower HDL and LDL and decreased clearance of TG compared to controls.

Pathogenesis of dyslipidemia in HIV is multifactorial. Mechanisms like increased apoE levels, increased hepatic synthesis of VLDL and decreased clearance of TG are postulated.[2,3] Concomitant infections, acute phase reactants and circulating cytokines including interferons may also contribute. Increased rate of release of VLDL- TG has been observed in treatment naïve HIV patients.[1] Increased basal lipolytic activity also plays a role, as a result of increased sympathetic activity.

Hepatic lipogenesis is also increased in HIV infection.[3] Alterations in lipoprotein lipase activity leads to decreased clearance of VLDL-TG.

In addition, insulin resistance and impaired glucose tolerance have been noted in 35% of HIV infected patients.[4] This may further contribute to dyslipidemia and abnormalities in fat distribution.

Consequently, it has been noticed that there is an increase in the incidence of cardiovascular disease in HIV patients, as their longevity has improved with HAART.

Role of HIV in atherosclerosis is an unanswered question.

The elevated triglycerides are likely to cause pancreatitis, though less well reported in literature.

In short, early pretreatment detection of lipid abnormalities in HIV will help to plan treatment better. This assumes special importance in the present context of increased life span of HIV patients after the advent of HAART.

Aims and Objectives

- To evaluate the lipid profile of treatment naïve HIV patients and to compare with that of healthy HIV negative subjects
- To assess the correlation between lipid profile and CD4 count.

Materials and Methods

Study Population

Patients attending ART clinic of Govt Medical College Kottayam, who had not been initiated on ART.

Healthy volunteers who were HIV negative were the control population.

Study Design: Comparative cross sectional study

Study Period: December 2010 to November 2011

Sample Size & Method: 50 consecutive patients attending the clinic were selected. 50 non infected healthy volunteers were the control population.

Funding Agency: Nil

Ethical Concerns

IRB clearance and clearance from KSACS obtained prior to study. Informed consent from patients and volunteers was documented. Study conformed with the guidelines of declaration of Helsinki 1964, revised in 1975.

Inclusion Criteria

- Patients attending ART clinic, tested positive for HIV as per NACO guidelines, not initiated on ART.

Exclusion Criteria

1. Hiv patients on ART
2. Thyroid diseases
3. Renal diseases
4. Diabetes
5. Liver disease

Drugs: lipid lowering agents, beta blockers, thiazides, steroids

Study Protocol

Patients fulfilling the inclusion criteria were subjected to detailed history, clinical examination and investigations.

Details were entered into a proforma.

Detailed history included age, history of smoking and alcoholism, hypertension, vascular diseases like coronary artery disease, cerebrovascular accident, peripheral occlusive vascular disease.

Detailed physical examination included anthropometric measurements. Height was measured barefoot with a sensitivity of 0.5cm and weight in kg in normal outdoor clothing with a sensitivity of 500 mg. BMI was calculated using the formula

BMI= Weight (kg)/ height (m^2)

Waist circumference was measured as the narrowest measurement between the ribcage and iliac crest. hip circumference was measured as the largest measurement of the hip over the buttocks. Waist hip ratio was calculated.

Clinical category of HIV infection was documented according to CDC definition for adolescents and adults.

Laboratory parameters including haemogram, urinalysis, renal and liver function tests, FBS, TSH and serum electrolytes were recorded.

CD4 cell count was estimated by Fluorescence Activated Cell Sorter (FACS) count system. Blood was collected for lipid profile from both patients and volunteers , conforming to standard guidelines. Estimation was done in XL- 300 fully automatic analyzer.

Statistical Analysis

Data was entered and analysed using SPSS ver 19.0 software. Quantitative data was expressed as mean±SD, while qualitative data were expressed in its frequency and percentage. To compare different parameters , student t test was employed as parametric test. Chi square test (χ^2) was used as the non parametric test. Student t test for unpaired data and chi square for categorical variables were used to compare data between patients and control, or between patients having a specific factor or not. For all statistical evaluations, a two tailed probability value < 0.05 was considered significant. To find the relation between 2 variables, correlation coefficient (r) was used.

Results and Discussion

Studies have shown various lipid abnormalities in HIV infected patients, irrespective of treatment.

This study conducted on 50 patients with HIV who are treatment naïve compared their preetreatment lipid levels with those of healthy volunteers. At diagnosis 60%of the HIV infected patients had a CD4 count of <200/mm3.

In this study, there were no statistically significant difference different age groups with regard to lipid profile, FBS, WC, WHR,BMI in the study population vs control. Alcoholism also was not found to be significant. the absence of significant difference is probably due to narrow and specific age group(20-50 yrs). This has helped by avoiding the interference of age as a confounding factor esp in assessing anthropometry.

The abnormalities noted in HIV positive patients were decrease in TC, LDL& HDL and increase in TG & VLDL.

The difference in mean cholesterol values between HIV positive patients and controls were as follows:

Decrease in mean total cholesterol by 20, LDL by 30 and HDL by 7 mg/dl in HIV infected group. Increase in mean TG was by 89 and VLDL by 17 mg/dl. Similar results were obtained in the study conducted by Arun et al at thiruvananthapuram.

The lipid abnormalities became more evident when the CD4 count dropped below 350/mm3. Changes in mean total cholesterol became significant when count dropped below 200/mm3. Maximum changes occurred when CD4 dropped below 50 /mm3.

Study conducted by Khiangle et al also reported similar results. Another study by Sharon Riddler et al also reported similar changes.

Study conducted by Pasupathy et al also showed decrease in TC, LDL and HDL cholesterol. In their study, Obirikorang et al noted increased TG .

Analysis of anthropometry showed a mean waist circumference of 81cm in HIV positive patients, while the value in control group was 76cm. this was statistically significant. The mean WHR for

HIV positive group was 0.86 compared to 0.83 in control. This was statistically significant.

The mean BMI of HIV patients was 20.48 and the control group 22.86. this was also statistically significant.

The differences in anthropometry were more significant when CD4 count decreased to < 200/mm3. The changes were even more significant with counts <50/mm3. Similar results were obtained by Arun et al in his study at Thiruvananthapuram. (unpublished data)

Table 7. HDL (mg/dl)

	N	Mean	Standard Deviation	Standard error of mean	t-test for equality of means			
					t	Degree of freedom	Significance (2-tailed)	Mean difference
HIV Infected	50	38.96	5.584	0.790	-7.009	98	0.0001	-7.240
HIV Non infected	50	46.20	4.708	0.666				

t- -7.009 P-0.0001(<0.05)

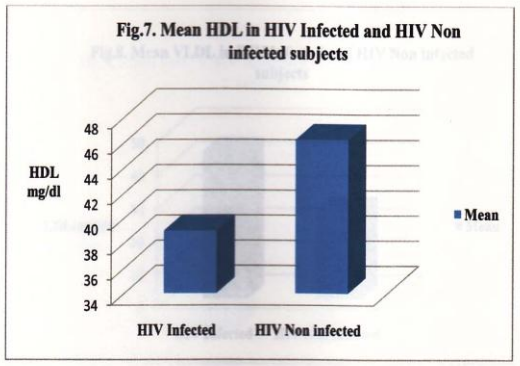
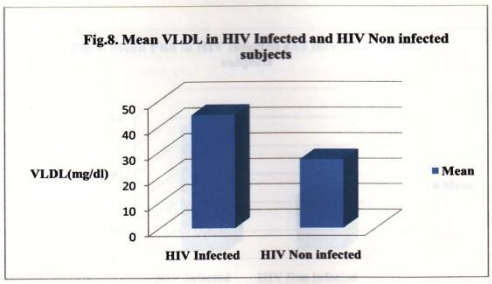


Table 8. VLDL (mg/dl)

	N	Mean	Standard Deviation	Standard error of mean	t-test for equality of means			
					t	Degree of freedom	Significance (2-tailed)	Mean difference
HIV Infected	50	44.30	12.612	1.784	9.459	98	0.0001	17.500
HIV Non infected	50	26.80	3.476	0.492				

t- 9.459 P- 0.0001(<0.05)

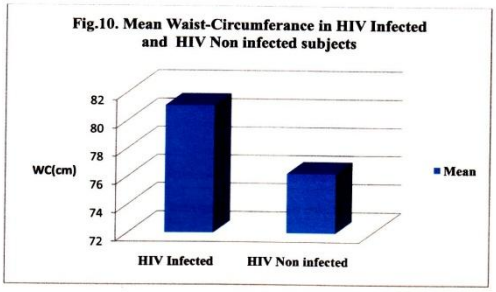


Mean VLDL in HIV Infected 44.30mg/dl and in HIV Non infected 26.80mg/dl

Table 10. Waist-Circumference (cm)

	N	Mean	Standard Deviation	Standard error of mean	t-test for equality of means			
					t	Degree of freedom	Significance (2-tailed)	Mean difference
HIV Infected	50	81.02	5.630	0.796	4.413	98	0.0001	4.820
HIV Non infected	50	76.20	5.228	0.748				

t- 4.413 P-0.0001(<0.05)



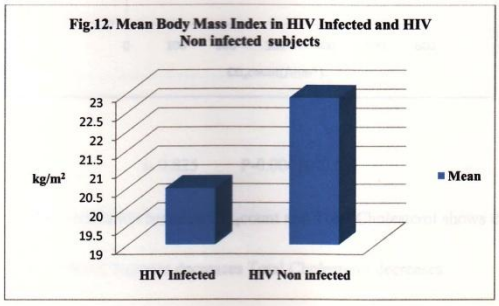
Mean waist-circumferance in HIV Infected 81.02cm

and in HIV Non infected 76.20cm

Table 12. BMI (kg/m²)

	N	Mean	Standard Deviation	Standard error of mean	t-test for equality of means			
					t	Degree of freedom	Significance (2-tailed)	Mean difference
HIV Infected	50	20.48	1.783	0.252	-5.452	98	0.0001	-2.380
HIV Non infected	50	22.86	2.519	0.356				

t- -5.452 P-0.0001(<0.05)



Mean Body Mass Index in HIV Infected 20.48kg/m²

and in HIV Non infected 22.86kg/m²

Table 13. Correlation

	Pearson Correlation Coefficient (r)	Significant level (2 –tailed)
CD 4 Count with TC	0.825	0.0001
CD4 Count with TG	-0.720	0.0001
CD4 Count with LDL	0.888	0.0001
CD4 Count with HDL	0.633	0.0001
CD4 Count with VLDL	-0.686	0.0001
CD 4 Count with FBS	-0.482	0.0001
CD4 Count with WC	-0.520	0.0001
CD4 Count with WHR	-0.652	0.0001
CD4 Count with BMI	0.649	0.0001

Conclusions

1. Significant metabolic and morphological changes occur in HIV infected, treatment naïve patients.
2. There is a statistically significant decrease in serum total cholesterol, HDL and LDL in HIV patients.
3. There is a statistically significant increase in triglycerides and VLDL in HIV infected.
4. The changes in lipid profile correlate linearly with CD4 counts.

Limitations

1) Pre seroconversion lipid values of patients was not available
2) Even though demographically matched, nutritional similarity between patients and control could not be assessed due to lack of data.

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