

## Study of Lipid profile in HIV Positive Patients”.

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### Abstract

The awareness of HIV/AIDS has grown worldwide in recent years. Acquired Immunodeficiency Syndrome (AIDS) has become the focus of much global concern and that is reaching epidemic proportions in some parts of the world. Most HIV infected patients develop multiple metabolic abnormalities including insulin resistance, lipodystrophy and dyslipidemia. Therefore, the aim of the study was to assess the lipid profile in HIV infected patients.

**Aim: 1)** To determine the concentration of serum total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C and triglyceride (TG) in HIV positive patients & age matched healthy controls. 2) To determine the ratio of LDL/HDL in HIV positive patients & controls. **Study Design:** Case control study **Setting:** HIV positive patients from SCSM General Hospital Solapur **Participants:** 80 clinically diagnosed HIV positive patients on ART and 41 normal subjects were recruited as control. **Results:** Serum total cholesterol, LDL and triglyceride was significantly increased ( $P < 0.01$ ) in HIV positive patients on ART as compared to controls and serum HDL cholesterol levels were decreased significantly ( $P < 0.01$ ) in HIV positive patients on ART as compared to controls. LDL/HDL ratios were significantly increased in HIV positive patients on ART as compared to controls. **Conclusion:** HIV infected patient exhibits multiple abnormalities in lipid metabolism. Highly active antiretroviral therapy (HAART) regimens have shown to cause, a metabolic syndrome such as lipodystrophy, lipoatrophy and dyslipidemia in a high proportion of HIV infected patients. **Keywords:** serum total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C) and triglyceride (TG).

## **INTRODUCTION**

HIV is the human immunodeficiency virus belonging to class of Retroviruses and sub family Lentiviridae. It is rapidly mutating virus. The acquired immunodeficiency syndrome (AIDS) is a fatal illness caused by a retrovirus known as the human immunodeficiency virus that breaks down the body's immune system, infects CD<sup>4+</sup> cells initially and progressively leads to AIDS. This disease is characterized by immunosuppression, secondary neoplasma and neurological manifestations [1].

HIV continues to be a major global public health issue. In 2016, an estimated 36.7 million people were living with HIV with a global HIV prevalence of 0.8% among adults [2,3]. Since the start of epidemic, an estimated 78 million people have become infected with HIV and 35 million people have died of AIDS related illnesses. In 2016, 1 million people died of AIDS related illnesses [4].

Acquired Immunodeficiency Syndrome (AIDS) has become the focus of much global concern and that is reaching epidemic proportions in some parts of the world [5].

Patients with human immunodeficiency virus / acquired immunodeficiency syndrome frequently present alternations in lipid metabolism due to infection with HIV itself, including elevated serum concentration of triglycerides and high levels of total cholesterol [6]. The introduction of antiretroviral therapy (ART) in the mid-1990s led to substantial improvement in the prognosis of HIV/AIDS patients, with a reduction in morbidity and mortality due to opportunistic diseases and consequent improvement of the patient's quality of life.[7,8]

In view of the high prevalence of dyslipidemia and the increased risk for cardiovascular diseases among patients with HIV/AIDS, which is a matter of concern for public health, the present study was aimed to describe the lipid profile of HIV infected patients in relation to use of ART.

## **MATERIALS AND METHODS**

Present study was conducted in the Department of Biochemistry, Dr. Vaishampayan Memorial Government Medical College Solapur and SCSM. General Hospital Solapur.

We performed a case control study of 80 clinically diagnosed HIV positive patients on ART in the age group 20-50 years and 41 normal subjects were recruited as control.

**Exclusion Criteria:** Patients suffering from myocardial infarction, other malignancies, liver or kidney disease, patients with acute viral disease hepatitis A, E, Herpes virus, Mycobacterium tuberculosis, fever, cold, loss of

appetite, loss of weight were excluded from this study.

In addition, a history of a familial dyslipidemia, patients receiving medications affecting lipid metabolism, such as lipid lowering drugs, were excluded from this study.

The Institutional Ethical Committee approved the study and Informed Consent was obtained from each participant in the study.

In the present study blood samples were collected under aseptic condition from control group and from HIV positive patients. Serum was separated and analyzed for total cholesterol by CHOD-POD enzymatic method [9], triglyceride by enzymatic method [10], high density lipoprotein cholesterol by direct enzymatic colorimetric method [11] and low density lipoprotein cholesterol by Friedewald formula [12].

The results were expressed as means  $\pm$  SD. Statistical analysis was done by using “Z test” and “Unpaired T test”.

**Table No. 1** Serum lipid profile levels in HIV positive patients and control group.

Sr.No.	Lipid Profile	Mean	$\pm$ SD	T value	P value
1	Total Cholesterol			11.67	P <0.01
	HIV Positive	234.65	$\pm$ 28.85		
	Control	165.29	$\pm$ 13.37		
2	Triglycerides			17.81	P <0.01
	HIV Positive	170.33	$\pm$ 22.56		
	Control	98.39	$\pm$ 16.30		
3	HDL			8.18	P <0.01
	HIV Positive	39.76	$\pm$ 7.32		
	Control	50.39	$\pm$ 5.07		
4	LDL			11.45	P <0.01
	HIV Positive	159.51	$\pm$ 21.60		
	Control	116.90	$\pm$ 13.94		
5	LDL/ HDL Ratio			12.11	P <0.01
	HIV Positive	4.10	$\pm$ 0.89		
	Control	2.32	$\pm$ 0.34		

**P <0.01 Significant ( Z Test & Paired t test)**

## RESULTS AND DISCUSSION

The present study was focused on estimation of lipid profile includes total cholesterol

(TC), triglyceride (TG), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and LDL/HDL ratio in HIV positive patients and healthy controls.

This study showed that some lipid profiles were altered in HIV positive patients compared to the controls (Table no 1). Serum total cholesterol (TC), triglyceride (TG), LDL - cholesterol and VLDL-cholesterol levels were significantly increased in HIV positive patients on ART as compared to controls ( $P < 0.01$ ) and the HDL-cholesterol levels of HIV positive patients were significantly lower than those of the controls ( $P < 0.01$ ). LDL/HDL ratios were significantly increased in HIV positive patients on ART as compared to controls (Table no 1).

Most HIV infected patients develop multiple metabolic abnormalities including insulin resistance, lipodystrophy and dyslipidaemia. Insulin is known to inhibit lipolysis in adipose tissue by inhibiting hormone sensitive lipase. Thus, insulin resistance that occurs in HIV infection will lead to increased lipolysis in adipose tissue and consequently an increase in free fatty acids, triglycerides and cholesterol in plasma [13].

HIV infection has been shown to affect several key processes regulating the levels of lipids. Increased tumour necrosis factor (TNF) and other cytokines which occur during infection increases lipolysis and insulin resistance [1]. As insulin sensitivity decrease in HIV infected patients with reduction in CD<sub>4</sub> counts, uptake of glucose into skeletal muscle tissue and other cells are reduced leading to increased free fatty acid in circulation and reduced storage of triglycerides in adipose tissues. These free fatty acids return to the liver where they are sent back into circulation as triglycerides. Thus significantly higher triglyceride levels seen amongst HIV positive patients as compared to control. Our findings were also supported by the study of Floris-Moore et al.[ 14] .

HIV/AIDS is characterized by high prevalence of hypertriglyceridaemia and hypercholesterolaemia is usually associated with elevated levels of cytokines [15]. Cholesterol containing lipoprotein in both AIDS and HIV infection precede the appearance of hypertriglyceridaemia. It could be possible that with the development of AIDS, subsequent increase in interferon IFN may have contributed to increase in plasma TG levels by decreasing the clearance of plasma TG. Findings of Grunfeld et al. [16] shows that INF and interleukin increased plasma TG levels by stimulating hepatic lipogenesis.

VLDLs are composed predominantly of triglycerides. This explains why VLDL is also elevated when the levels of triglycerides is increased among the HIV positive patients. Most LDL particles are derived from VLDL [17]. This is seen in the concomitant increase in LDL-C in HIV positive patients.

Significantly lower HDL-C was found in HIV positive patients as compared to control. Our study shows that HDL-C level decreased as the disease progressed signified by the decrease in CD<sub>4</sub> count. HIV infection can lead to malnutrition [18]. Various infections, which occur as a result of weakened immune system in HIV infection, can affect appetite and ability to eat. Diarrhoea could lead to malabsorption of fat from food. HDL-C which is mainly supplied by fat from food will therefore be reduced as the disease progresses. Our study is supported by Khiangte L & et al. 2007 [19]

In conclusion atherogenic lipids; LDL-C, VLDL-C and TG have been found to increase in HIV-positive patients. Levels of good cholesterol (HDL-C) reduce significantly as the disease progresses. Lipid profile can therefore be a good index of disease progression in HIV / AIDs patients. There is need for proper check on lipid levels as the CD<sub>4</sub><sup>+</sup> count reduces in HIV infected patients. This will help the clinicians to decide on the type of antiretroviral therapy to administer to the patients as certain combinations of these drugs to decrease the levels of these atherogenic lipids.

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