“STUDY OF LIPID PROFILE IN HIV/AIDS PATIENTS ON ANTIRETROVIRAL THERAPY ”

By

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Dissertation submitted to BLDE University, Vijayapur

In partial fulfilment of the requirements for the degree of

MD

in

General Medicine

Under the guidance of

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2015

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I hereby declare that this dissertation/thesis entitled **"STUDY OF LIPID PROFILE IN HIV/AIDS PATIENTS ON ANTIRETROVIRAL THERAPY "** is a bonafide and genuine research work carried out by me under the guidance of **Dr.S.N.Bentoor**, **M.D.**, Professor, Department of Medicine, Shri B.M. Patil Medical College, Vijayapur

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Dr. SAURABH G. SADEKAR

ABSTRACT

Background :

The introduction of effective highly active antiretroviral therapy(HAART) in the mid 1990s led to a marked reduction in the morbidity and mortality of HIV infection. Side effects of HAART such as dyslipidemia were soon described after its introduction. It becomes very important to identify dyslipidemia in HIV patients on antiretroviral therapy for the early detection and prevention of premature coronary vascular events in such patients.

Objectives :

To study lipid profile in HIV/AIDS patients on antiretroviral therapy.

Methodology :

The peripheral blood samples of 120 patients who were confirmed by ELISA method admitted to BLDEU's Shri B M Patil's medical college hospital and research centre, Vijayapur. Age of patient is more than 18 years.

Results :

120 patients are studied for period of 18 months. 66.7% patients have hypercholesterolemia and 33.3% have in the normal range. 80% of the patients have HDL below the normal range and 20% have in the normal range. 70% of the patients have hypertriglyceridemia had 30% have within the normal range. 60% of patients have LDL above the normal range and 40% have it within the normal range. 5.8% of the patients have VLDL within then abnormal range and 94.2% have it within the normal range. Males are more commonly affected than females. Patients in the age group 20-35 - 71.4% had hypertrilyceridemia, 71.4% have hypercholesterolemia, 85.7% have low levels of HDL cholesterol. Thus patients in the young age group were

More affected than patients in the older age groups.

Conclusion :

The presence of dyslipidemia in young patients makes them more susceptible to subclinical coronary atherosclerosis makes them more susceptible to sudden grave consequences. The lack of an alternative to antiretyroviral therapy makes it more difficult to protect these pateints from dyslipidemia. After initiation f antiretroviral therapy it becomes a must to perform a fasting lipid profile at least once every year.

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INTRODUCTION

The introduction of effective highly active antiretroviral therapy (HAART) in the mid 1990s lead to the marked reduction in the morbidity and mortality from human immunodeficiency virus(HIV) infection. Increasing life expectancy , an aging population , and high rates of smoking have lead to concerns of the health of HIV infected individuals in the long run. Metabolic effects of HIV infection such as hypertriglyceridemia are well defined and side effects of HAART such as dyslipidemia and were described soon after its introdution[1].

Initial concerns of the increased rates of myocardial infarction arising as a result of dyslipidemia in HIV infected patients on antiretrovirals (ARV) have been confirmed by studies such as the D.A.D study,a large , mutlicohort study that showed association between exposure to antiretroviral therapy and an increased risk of myocardial infarction.[2]

Endothelial function is also found to be abnormal in HIV infected patients . Changes in platlet reactivity among HIV infected patients also reported, and increased rates of insulin resistance and diabetes is a well described side effect of exposure to some of the ARV. All of these factors act in combination with dyslipidemia to increase overall cardiovascular risk of HIV infected patients on ARV..[3]

Hence the "STUDY OF LIPID PROFILE IN HIV/AIDS PATIENTS ON ANTIRETROVIRAL THERAPY" is undertaken to know the magnitude of the problem, of progression and severity of disease, and guide to therapy particularly in resource limited settings.

OBJECTIVES

1. To study Lipid profile in HIV affected individuals on antiretroviral therapy.

REVIEW OF LITERATURE

A. HISTORICAL REVIEW:

At the beginning of the eighties an innocuous seeming report appeared in the New England Journal of Medicine, Homosexuals in New York and San Fransisco were succumbing to a rare form of cancer called kaposi sarcoma, and what normally was an easily curable pneumonia caused by a germ called pneumocystitis carinii. All the fight had gone out of the victims bodies as they succumbed to diseases which are minor hassles in normal times. The disease was given the name AIDS.[5]

Only 2 years after AIDS was first described in USA, scientiests in France isolated the causative agent, which they called lymphadenopathy - associated virus (LAV). The virus was independently isolated by two groups of research workers in USA who called it human - T - lymphotrophic virus type III (HTLV-III) and AIDS related virus (ARV). The virus is now generally known as HIV.[6]

At the time the disease was restricted to male homosexuals, moralists got their chance to crow about sexual “deviation” that drew the wrath of the heavens, but to medical men this was a mere curiosity. It didn’t take a long time for curiosity to become a night mare. Thousands started succumbing to the disease. The disease cropped up in Intra venous drug abusers. Another punishment for sinful living, one could say, but it soon struck hemophiliacs, who had to have regular blood transfusions. Newborn babies and female prostitutes were found to have AIDS. The virus was found in several body fluids, tears, saliva, breast milk etc.

While back tracking the route of the disease, it became evident that it was pigs in Haiti, had passed it on to humans (men) who h ad passed it on to foreign visitors. Then

focus was shifted on to green monkey in Africa. A leading French researcher LUC MONTAGNIER of pasteur research institute. PARIS, the only animal model for AIDS is the chimpanzee. So it is likely that AIDS existed i n some African monkey species which is now extinct. According to another report AIDS was born when the virus which was ostensibly being designed for biological warfare escaped from a research lab in USA.

No one is sure about the history of AIDS, we can at best only guess where and when it came into existence. An intelligent estimates suggests that the disease appeared in Africa around the same time that it came to be recognized in America - the late 1970''s and early 1980's in African countries.

LATEST THEORY, however, is that AIDS virus, primarily an animal virus, was somehow transmitted to men in Africa and from t hen on, the disease spread across the region through inadequately sterilized needles. John scale and ZA Medvede explain in Journal of Royal Society of Medicine that this route of spread seems highly likely in Africa considering the fact that among the infected children, only half had infected mother. The child victims of AIDS, it was found, had twice as many infection as the non infected.

From historical perspective, the infection theory seems quite plausible. Three other viral diseases spread in Africa, borne by injection needles and created epidemics. These were lassa fever, marburg viruses and Ebola virus. Fortunately not being very infective the disease died off, Not AIDS. Injections are quite popular in Africa as probably in many third world countries and bulk of these injections are mainly vitamin injections.

As the researchers plunged into the medical problem, it became evident that the killer was a virus, that was transmitted through blood and blood products. On entering the body the virus attacked a particular type of white blood cell (CD4 (helper) lymphocytes). Gary Nabel and David Baltimore of the white Head Institute for Biomedical Research in Cambridge, Massachusettes explained why AIDS viruses preferentially kill CD4 lymphocytes as they have identified a protein produced only by activated (stimulated) T lymphocytes that turn on the AIDS virus genome thereby enabling the virus to reproduce in and kill infected CD4 cells.

It has been shown for some time that AIDS virus can persist in latent form in CD4 cells for many years and work of these scientists now provides evidence that the normal immune stimulation of CD4 cells, as may be caused b y trivial day to day viral or bacterial infection, may provide the trigger that releases the virus from latency in CD4 cells and leave the body defenseless with all its resistance gone, and succumbed to opportunistic infections.[5]

After reported the first case of AIDS from India, ten more cases surfaced within a year. The scenario is changing very fast HIV epidemic in India has evolved from pattern III (Introduction or extensive spread of HIV did not begin until the mid to late 1980s or the present, overall HIV prevalence continues to remain relatively low in most populations) to pattern II (Extensive spread of HIV began in the late 1970s or early 1980s. HIV transmission has been and continues to be predominantly sexual between men and women) as found in sub saharan Africa and latin America. to be more extensively disseminated than the benign endemic form reported in some parts of Africa. However 15 of the 16 cases of kaposi sarcoma reported in India so far were homosexuals

while one was heterosexual. This shows that HIV infected hetero sexual population is not immune to kaposi sarcoma.[7]

EPIDEMIOLOGY

WORLD SCENARIO

According to WHO estimates there are 35.3 million people living with HIV at the end of 2012.The highest density being in the sub-Saharan African countries which constitutes around 70%.Since the start of this epidemic around 75 million have become affected with nearly 25 million deaths. New HIV infections have fallen by 33% since 2001.AIDS related deaths have fallen by 30% since its peak in 2005.The UNAIDS in its Global Report 2013 publication on AIDS epidemic has noted a historic decline in AIDS-related deaths and new HIV infections [8].

INDIAN SCENARIO

According to the data released by NACO Annual Report 2012-2013, the revised estimate of people with HIV as of 2011 is 2.089 million (equivalent to 0.27 percent of the adult population) which is a steady decline from 0.41% in 2001 .The estimates highlight an overall reduction in adult HIV incidence (new infections) as well as AIDS related mortality in India which is similar to the global trend [9].

REGIONAL SCENARIO

The four high prevalence States of South India (Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu) account for 53% of all HIV infected population in the country. Nonetheless they have been showing declining trend of HIV prevalence.

ICTC data shows a declining trend in the adult HIV prevalence rate in Karnataka. According to sentinel surveillance in ANC population the prevalence has dropped from 0.84 in 2007 to 0.22 in 2012 [10]

ETIOLOGIC AGENT:

The aetiologic agent of AIDS is HIV, which belongs to the family of human retro viruses and the subfamily of lent i viruses. Non oncogenic lente viruses cause diseases in other animal species, including sheep, horses, goats, cattle, cats and monkeys. The four recognized human retro viruses belong to two distinct group; The HTLV-I and HTLV-II, which are transforming viruses; and the HIV-1 and HIV-2 which are cytopathic viruses. The most common cause of HIV disease throughout the world, and certainly in the USA is HIV-1. HIV-2 was first identified in 1986 west African patients and was originally confined to West Africa. However, a number of cases have been identified in Europe, South America, Canada and USA. HIV-2 is more closely related phylogenetically to the simian immunodeficiency virus (SIV) found in Sooty Mangabeys than it is to HIV-1. HIV-1 is more closely related to an SIV isolated from chimpanzees in 1990.[11]

Electron microscopy shows that the HIV virion is an icosa hedral structure containing numerous external spikes formed by the two major envelope proteins, the external group 120 and the transmembrane group 41. The virion buds from the surface of the infected cell and incorporates a variety of host protein including major histocompatibility complex (MHC) class I and II antigens into its lipid bilayer.

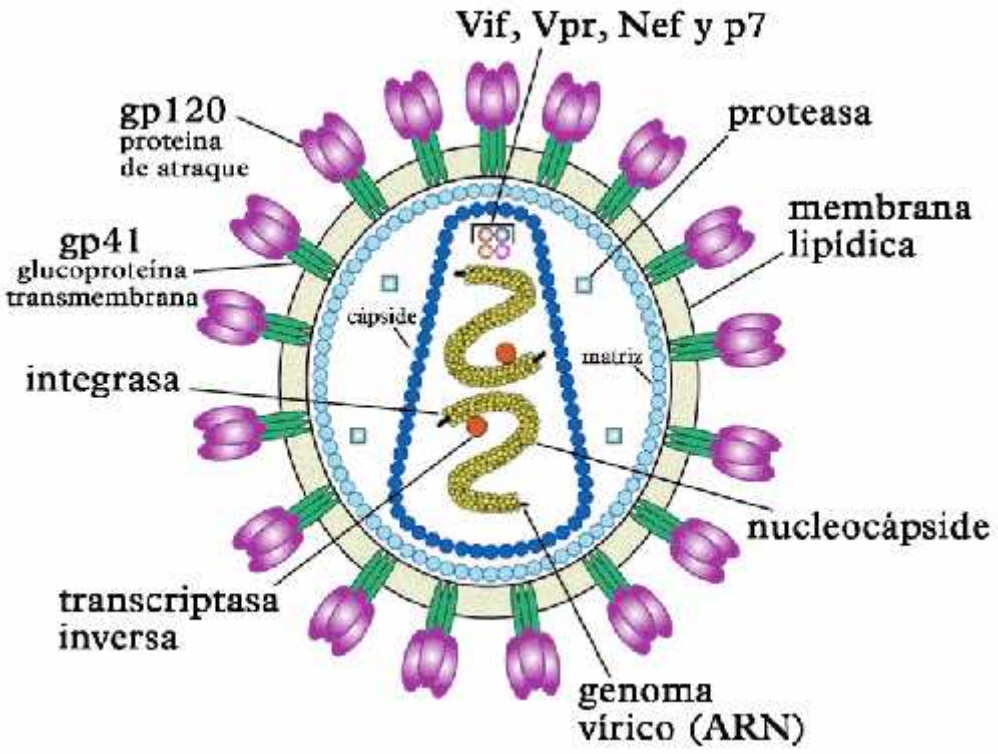


Fig 1: HIV virus structure

LIFE CYCLE OF HIV:

HIV is an RNA virus whose hallmark is the reverse transcription of its genomic RNA to DNA by the enzyme reverse transcriptase. The life cycle of HIV begins with the high affinity binding of the group 120 protein via a portion of its VI region near the N-terminus to its receptor on the host cell surface, the CD4 molecule. The CD4 molecule is a 55-KD protein found predominantly on a subset of T lymphocytes that are responsible for helper or inducer function in the immune system. It is also expressed on the surface of monocytes or macrophages and dendritic or langerhans cells. It has recently been demonstrated that the core receptor that must be present together with the CD4 molecule for fusion and entry of T cell- tropic strains of HIV-1 is a molecule termed CXCR4, while the co-receptor for macrophage - tropic strains of HIV-1 is the-chemokine receptor CCR5. Both receptor belong to the family of seven transmembrane domain G protein coupled cellular receptors. Following binding, fusion with the host cell membrane occurs via the group 41 molecule, and the HIV genomic RNA is uncoated and internalized into the target cell. The reverse transcriptase enzyme which is contained in the infecting virion, then catalyzes the reverse transcription of the genomic RNA into double stranded DNA. The DNA translocates to the nucleus, where it is integrated randomly into the host cell chromosomes through the action of another virally encoded enzyme, integrase. This provirus may remain transcriptionally inactive (latent), or it may manifest various levels of gene expression upto active production of virus.

Cellular activation plays an important role in the life cycle of HIV and is critical to the pathogenesis of HIV disease, Following initial binding and internalization of virion into the target cell, incompletely reverse transcribed DNA intermediates are labile

in quiescent cells and will not integrate efficiently into the host cell genome unless cellular activation occurs shortly after infection. Further more activation of the host cell is required for the initiation of transcription of the integrated proviral DNA into either genomic RNA or mRNA. In this regard, activation of HIV expression from the latent state depends on the interaction of a number of cellular and viral factors. Following transcription, HIV mRNA is translated into protein that undergo modification through glycosylation myristylation, phosphorylation and cleavage. The viral core is formed by the assembly of HIV proteins, enzymes, and genomic RNA at the plasma membrane of the cells. Budding of the progeny virion occurs through the host cell membrane where the core acquires its external envelope. Each point in the life cycle of HIV is a real or potential target for therapeutic intervention. Thus far, the reverse transcriptase and protease enzymes have proven to be susceptible to pharmacologic disruption.[11]

1 Binding and Fusion: HIV begins its life cycle when it binds to a **CD4 receptor** and one of two **co-receptors** on the surface of a CD4+ **T-lymphocyte**. The virus then fuses with the host cell. After fusion, the virus releases RNA, its genetic material, into the host cell.

2 Reverse Transcription: An HIV enzyme called reverse transcriptase converts the single-stranded HIV RNA to double-stranded HIV DNA.

3 Integration: The newly formed HIV DNA enters the host cell's nucleus, where an HIV enzyme called integrase "hides" the HIV DNA within the host cell's own DNA. The integrated HIV DNA is called provirus. The provirus may remain inactive for several years, producing few or no new copies of HIV.

4 Transcription: When the host cell receives a signal to become active, the provirus uses a host enzyme called RNA polymerase to create copies of the HIV genomic material, as well as shorter strands of RNA called messenger RNA (mRNA). The mRNA is used as a blueprint to make long chains of HIV proteins.

5 Assembly: An HIV enzyme called protease cuts the long chains of HIV proteins into smaller individual proteins. As the smaller HIV proteins come together with copies of HIV's RNA genetic material, a new virus particle is assembled.

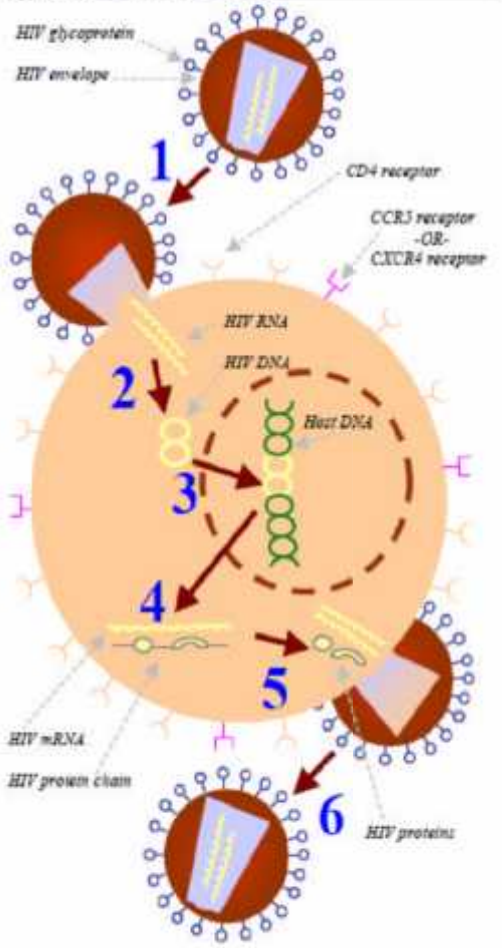
6 Budding: The newly assembled virus pushes out ("buds") from the host cell. During budding, the new virus steals part of the cell's outer envelope. This envelope, which acts as a covering, is studded with protein/sugar combinations called HIV glycoproteins. These HIV glycoproteins are necessary for the virus to bind CD4 and co-receptors. The new copies of HIV can now move on to infect other cells.

Terms Used in This Fact Sheet:

CD4 receptor: A protein present on the outside of infection-fighting white blood cells. CD4 receptors allow HIV to bind to and enter cells.

Co-receptor: In addition to binding a CD4 receptor, HIV must also bind either a CCR5 or CXCR4 co-receptor protein to get into a cell.

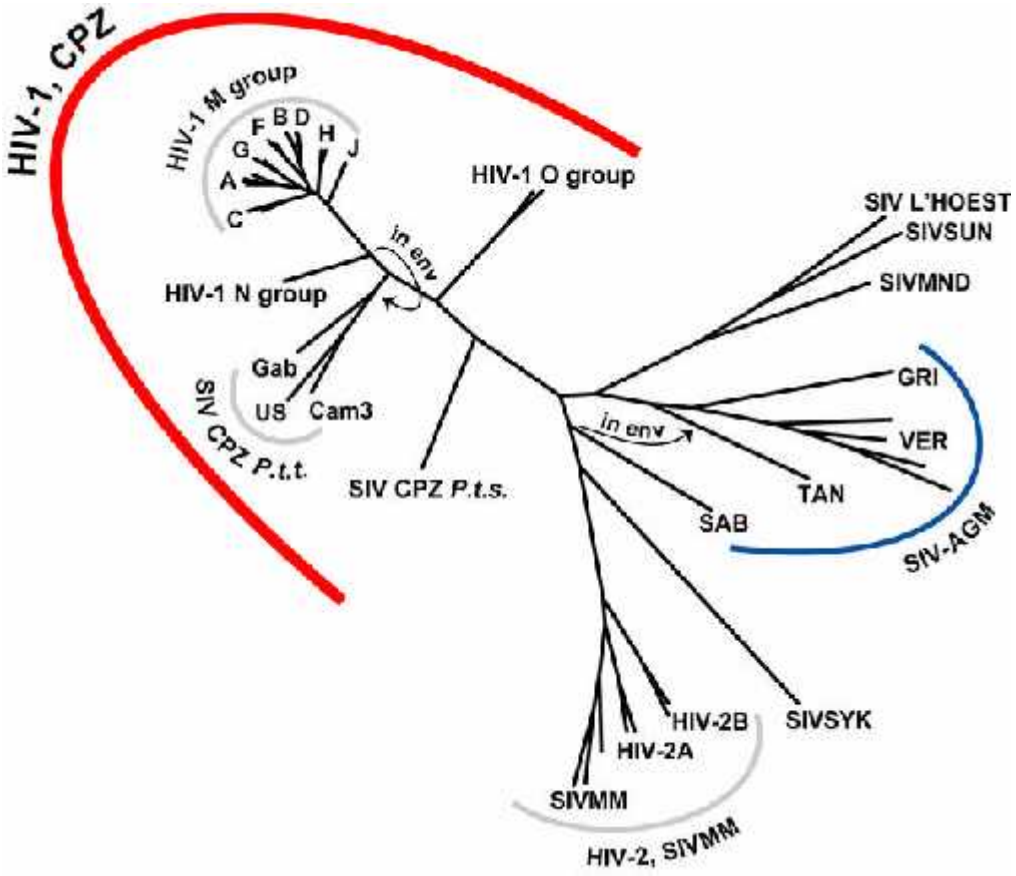
T-lymphocyte: A type of white blood cell that detects and fights foreign invaders of the body.



For more information:

Contact your doctor or an *AIDSinfo* Health Information Specialist at 1-800-448-0440 or http://aidsinfo.nih.gov.

[Fig. 2 : The HIV life cycle]



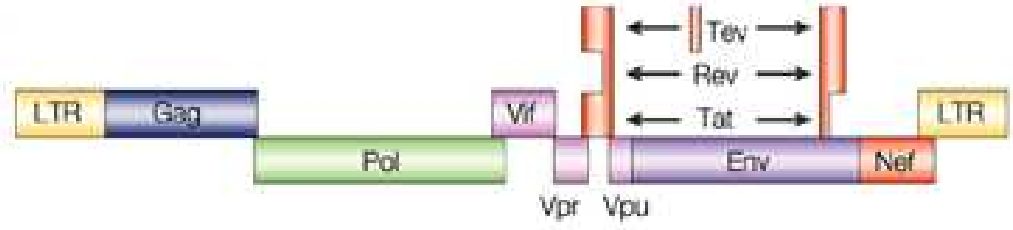
[Fig. 3 : Phylogenetic tree of HIV virus]

The global patterns of HIV-1 variation likely result from accidents of viral trafficking - subtype B viruses, which now differ by up to 17% in their ENV coding sequences, are uniformly seen in the united states it is thought that, purely by chance, this viral subtypes was seeded into the united states in the late 1970's. there by establishing an overwhelming founder effect. Subtypes A viruses (of the M group} appear to be the most common form worldwide; many countries have circulating viral subtypes that are giving mix to recombinant forms. The predominant subtypes in Europe and the Americans to subtype B. In Africa more than 75% of strains recovered to date have been of subtypes A, C, and D in Asia, HIV-1 isolates of subtypes E, C and B are found. Subtype E accounts for most infections in south East Asia, while subtypes C is prevalent in India. Sequence analysis of HIV-1 isolates from infected individuals indicate that recombination among viruses of different clades likely occurs as a result of infection of an individual with viruses of more than one clade particularly in geographic areas where clades over lap.

GENETIC DIVERSITY OF HIV & ITS IMPLICATIONS FOR INDIA:

As mentioned earlier HIV-1 can be classified into eight subtypes and HIV-2 has also been phylogenetically classified into subtypes though the number of sequenced isolate are limited, there have been very few investigation of HIV-1 strain in India available data indicates that subtype C is greater predominant in India. Subtypes A,B and E also co-exist. Genetic subtyping studies have revealed that majority of the C subtype were homologus to C3 genotype while remaining (34%) were closest to C2 genotype. Greater degree of divergence observed with in C2 genotpype as compared to C3

indicates earlier introduction of C2 in India. The C3 genotype may be a recent mutational variant of subtype C unique to India.



[Fig. 4 : HIV Genome]

As with diagnostic tests for HIV-1 most vaccine candidates are based on subtype B. It is known that vaccine efficacy is subtype specific. Hence evaluation of these candidate vaccine in areas where other subtypes predominate or where multiple subtypes are circulating like in India will pose considerable challenges.

TRANSMISSION:

Risk factors for HIV infection in Africa include multiple heterosexual sex partners, blood transmission; injections or treatment with unsterile needles, syringes or other skin piercing instruments; and mother to fetus or infant transmission before, during, or shortly after birth. Sexually transmitted diseases, in particular genital ulceration due to chancroid or herpes virus enhance the risk of sexual transmission of HIV. As noted previously, male homosexuality, intravenous drug use, and haemophilia appear to be much less important factors in HIV transmission in India and Africa than in the United States, Europe and Australia.

For adults, sexual contact appears to be by far the dominant mode of HIV transmission, followed by blood transfusion and exposure to needles, syringes, and skin

piercing instruments, for children, the dominant mode of transmission is perinatal, with a secondary yet important role for blood transmission.

Sexual transmission appears to be bidirectional, from infected women to their male partners and from infected men to their partners. As with other STD's prostitute are at great risk of HIV exposure. Sexual contact with prostitutes has been documented as an important risk factors for men in some areas genital ulcers appears to increase both the susceptibility to and the infectivity of HIV. A systemic factor that may influence infectivity during sexual contact is the clinical stage of HIV infection. Since the transmission rate to uninfected partners seems to be highest for patients with more advanced clinical disease and or lower levels of CD4 + cells.

HIV DOES NOT SPREAD BY:

- Drinking water from the same glass as an infected person.
- Swimming in pools used by people with HIV or AIDS.
- Bitten by a mosquito that has already bitten an infected person.
- Socializing or casually living with people with HIV/AIDS.
- Caring and looking after people with HIV/AIDS.
- Use of same toilets as AIDS patients or people infected with HIV.
- Shaking hands with people with AIDS/HIV.
- Hugging a person with HIV/AIDS.

Bedbugs, flies, lice, fleas and other insects and pests DO NOT spread HIV as known till today.

PATHOGENESIS

A. Overview of course of HIV Infection

The course of untreated HIV infection spans a decade. Stages include the primary infection, dissemination of virus to lymphoid organs, clinical latency, elevated HIV expression, clinical disease, and death.

Following primary infection, there is a 4 to 11 days period between mucosal infection and initial viremia. Virus is widely disseminated throughout the body during this time, and the lymphoid organs become seeded. An acute mononucleosis like syndrome develops in many patients, 3-6 weeks after primary infection. There is a significant drop in numbers of circulating CD4T cells at this early time. An immune response to HIV occurs 1 week to 3 months after infection, plasma viremia drops, and levels of CD 4T cells rebound. However, the immune response is unable to clear the infection completely, and HIV infected cells persist in the lymph nodes.

This period of clinical latency may last for as long as 10 years, during this time, there is a high level of ongoing viral replication. It is estimated that 10 billion HIV particles are produced and destroyed each day. The half-life of the virus in plasma is about 30 to 60 minutes, and the virus life cycle averages 2 days.

Eventually, the patient will develop constitutional symptoms and clinically apparent disease, such as opportunistic infections or neoplasms. Higher levels of virus are readily detectable in the plasma during the advanced stages of infection. HIV found in patients with late-stage disease is usually much more virulent and cytopathic than the strains of virus found early in infection.

B. Lymphoid Organs

Lymphoid organs play a central role in HIV infection. It is in the lymphoid organs that specific immune responses are generated. The network of follicular dendritic cells in the germinal centers of lymph nodes traps antigens and stimulates an immune response. Throughout the course of untreated infection-even during the stage of clinical latency HIV is actively replicating in lymphoid tissues. The microenvironment of the lymph node is ideal for the establishment and spread of HIV infection.The trapped virions serve as source of immune activation causing cytokine release, and activating a large pool of CD4 T cells that are highly susceptible to HIV infection.

C. Neural Cells

Neurologic abnormalities are common in late stages of infection and are an AIDS defining condition. Central nervous system disease occurs in 40-90% of patients. These include HIV encephalopathy and peripheral neuropathies, both direct and indirect pathogenic mechanisms explain the neuropsychiatric manifestations.

The predominant cell types that are infected are monocytes and macrophages. Virus may enter the brain through infected monocytes and release cytokines that are toxic to neurons as well as chemotactic factors that lead to infiltration of the brain with inflammatory cells.

CLINICAL MANIFESTATIONS

The clinical features of HIV infection have been classified into the following categories:

1. Acute HIV Syndrome

2. Asymptomatic stage- Clinical Latency

3. Symptomatic Disease

4. AIDS

1. Acute HIV Syndrome

Around 50–70% of individuals with HIV infection experience an acute clinical syndrome 3–6 weeks after primary infection. The typical clinical findings in the acute HIV syndrome include fever, pharyngitis, lymphadenopathy, headache, arthralgia, anorexia, nausea, vomiting, and diarrhea. It has been reported that these symptoms occur less frequently in those infected by injection drug use compared with those infected by sexual contact. The syndrome is typical of an acute viral syndrome and has been likened to acute infectious mononucleosis. Symptoms usually persist for one to several weeks and gradually subside as an immune response to HIV develops and the levels of plasma viremia decrease. In most patients, primary infection with or without the acute syndrome is followed by a prolonged period of clinical latency or smoldering low disease activity. A small percentage of HIV-infected individuals treated with antiretroviral drugs during acute infection may revert to a negative EIA test during the time they remain on therapy. They rapidly re-seroconvert with the discontinuation of treatment.

2. Asymptomatic stage- Clinical Latency

There is a lot of variation between the initial infection and onset of clinical disease, the median time is considered to be around 10 years. HIV disease with active virus replication is ongoing and progressive during this asymptomatic period. The rate of disease progression is directly correlated with HIV RNA levels. Some patients referred to as long-term nonprogressors show little if any decline in CD4+ T cell counts over extended periods of time. These patients generally have extremely low levels of HIV

RNA; a subset, referred to as elite nonprogressors, exhibits HIV RNA levels <50 copies per milliliter. Certain other patients remain entirely asymptomatic despite the fact that their CD4+ T cell counts show a steady progressive decline to extremely low levels. In these patients, the appearance of an opportunistic disease may be the first manifestation of HIV infection.

3. Symptomatic Disease

As mentioned above HIV is asymptomatic in its initial stages and symptoms start appearing with the decline in CD4+ count. The more severe and life-threatening complications of HIV infection occur in patients with CD4+ T cell counts <200/ L.

The virus affects the immune system of the body rendering it susceptible to opportunistic infections. While the causative agents of the secondary infections are characteristically opportunistic organisms such as P. jiroveci, atypical mycobacteria, CMV, and other organisms that do not ordinarily cause disease in the absence of a compromised immune system, they also include common bacterial and mycobacterial pathogens. Following the widespread use of cART and implementation of guidelines for the prevention of opportunistic infections, the incidence of these secondary infections has decreased dramatically.

Overall, the clinical spectrum of HIV disease is constantly changing as patients live longer and new and better approaches to treatment and prophylaxis are developed. In addition to the classic AIDS-defining illnesses, patients with HIV infection also have an increase in serious non-AIDS illnesses, including non-AIDS related cancers and, cardiovascular, renal and hepatic disease.

Non-AIDS events dominate the disease burden for patients with HIV infection receiving cART. Fewer than 50% of deaths among AIDS patients are as a direct result of an AIDS-defining illness. The physician providing care to a patient with HIV infection must be well versed in general internal medicine as well as HIV-related opportunistic diseases.

In general, it should be stressed that a key element of treatment of symptomatic complications of HIV disease, whether they are primary or secondary, is achieving good control of HIV replication through the use of cART and instituting primary and secondary prophylaxis for opportunistic infections as indicated.

4. AIDS

AIDS is the end-stage of HIV infection. Acquired Immune Deficiency Syndrome(AIDS) diagnosis is made in anyone with HIV infection with a CD4+ T cell count <200/ L and in anyone with HIV infection who develops one of the HIV-associated diseases considered to be indicative of a severe defect in cell-mediated immunity. A number of opportunistic infections commonly occur at this stage and or cancers that occur in people with otherwise unexplained defects in immunity. Death is due to uncontrolled or untreatable infection. Tuberculosis and Kaposi sarcoma are usually seen relatively early. Serious fungal infections such as Candida oesophagitis, Cryptococcus meningitis and Penicillosis, and parasitic infections such as Pneumocystis carinii pneumonia or Toxoplasma gondii encephalitis tend to occur, when T-helper cell count has dropped to around 100. People whose counts are below 50 have the late opportunistic infections such as cytomegalovirus retinitis.

WHO CASE DEFINITION FOR HIV INFECTION [12]

Adults and children 18 months or older

HIV infection is diagnosed based on: positive HIV antibody testing (rapid or laboratory-based enzyme immunoassay). This is confirmed by a second HIV antibody test (rapid or laboratory-based enzyme immunoassay) relying on different antigens or of different operating characteristics; and/or; positive virological test for HIV or its components (HIV-RNA or HIV-DNA or ultrasensitive HIV p24 antigen) confirmed by a second virological test obtained from a separate determination.

Children younger than 18 months:

HIV infection is diagnosed based on: positive virological test for HIV or its components (HIV-RNA or HIV-DNA or ultrasensitive HIV p24 antigen) confirmed by a second virological test obtained from a separate determination taken more than four weeks after birth. Positive HIV antibody testing is not recommended for definitive or confirmatory diagnosis of HIV infection in children until 18 months of age.

Table 1: WHO immunological classification for established HIV infection

HIV-associated immunodeficiency	**Age-related CD4 values**			
	<11 months (%CD4+)	12–35 months (%CD4+)	36 –59 months (%CD4+)	>5 years (absolute Number per mm3 or %CD4+)
None or not significant	>35	>30	>25	> 500
Mild	30–35	25–30	20–25	350−499
Advanced	25–29	20–24	15−19	200−349
Severe	<25	<20	<15	<200 or <15%

Table 2 : WHO clinical staging of HIV/AIDS for adults and adolescents with confirmed HIV infection

Clinical stage 1	Asymptomatic Persistent generalized lymphadenopathy
Clinical stage 2	Moderate unexplained weight loss (<10% of presumed or measured body weight)I Recurrent respiratory tract infections sinusitis, tonsillitis, otitis media and pharyngitis) Herpes zoster Angular cheilitis Recurrent oral ulceration Papular pruritic eruptions Seborrhoeic dermatitis

	Fungal nail infections
Clinical stage 3	Unexplained severe weight loss (>10% of presumed or measured body weight) Unexplained chronic diarrhoea for longer than one month Unexplained persistent fever (above 37.6°C intermittent or constant, for longer than one month) Persistent oral candidiasis Oral hairy leukoplakia Pulmonary tuberculosis (current) Severe bacterial infections (such as pneumonia, empyema, pyomyositis, bone or joint infection, meningitis or bacteraemia) Acute necrotizing ulcerative stomatitis, gingivitis or periodontitis Unexplained anaemia (<8 g/dl), neutropaenia (<0.5 × 109 per litre) or chronic thrombocytopaenia (<50 × 109 per litre)
Clinical stage 4	HIV wasting syndrome Pneumocystis pneumonia Recurrent severe bacterial pneumonia Chronic herpes simplex infection (orolabial, genital or anorectal of more than one month's duration or visceral at any site) Oesophageal candidiasis (or candidiasis of trachea, bronchi or

	lungs) Extra-pulmonary tuberculosis Kaposi's sarcoma Cytomegalovirus infection (retinitis or infection of other organs) Central nervous system toxoplasmosis HIV encephalopathy Extra-pulmonary cryptococcosis including meningitis Disseminated non-tuberculous mycobacterial infection Progressive multifocal leukoencephalopathy Chronic cryptosporidiosis (with diarrhoea) Chronic isosporiasis Disseminated mycosis (coccidiomycosis or histoplasmosis) Recurrent non-typhoidal Salmonella bacteraemia Lymphoma (cerebral or B-cell non-Hodgkin) or other solid HIV-associated tumours Invasive cervical carcinoma Atypical disseminated leishmaniasis Symptomatic HIV-associated nephropathy or symptomatic HIV-associated cardiomyopathy

WHO case definition for AIDS surveillance [13]

For the purposes of AIDS surveillance an adult or adolescent (> 12 years of age) is considered to have AIDS if at least 2 of the following major signs are present in combination with at least I of the minor signs listed below, and if these signs are not known to be due to a condition unrelated to HIV infection.

Table 3 : Major and Minor signs of AIDS

Major signs • Weight loss ≥ 10% of body weight • Chronic diarrhea for-more than 1 month • Prolonged fever for more than I month (intermittent or constant) Minor signs • Persistent cough for more than 1 month. • Generalized pruritic dermatitis • History of herpes zoster. • Oropharyngeal candidiasis • Chronic progressive or disseminated herpes simplex infection. • Generalized lymphadenopathy.
The presence of either generalized Kaposi Sarcoma or cryptococcal meningitis is sufficient for the diagnosis of AIDS for surveillance purposes.

LABORATORY INVESTIGATIONS

Screening tests: As antibodies to HIV are far easier to detect than the virus itself, their presence or absence in blood stream is the basis for the most widely used test of HIV infection. A person whose blood contains HIV antibodies is said to be HIV positive, or seropositive. There is now a wide range of screening tests based on detection of HIV antibodies. [14]

Table 4 : Laboratory findings with HIV infection

Test	Significance
HIV enzyme linked immunosorbent assay (ELISA)	Screening test for HIV infection. Sensitivity> 99.9%; to avoid false positive results, repeatedly reactive results must be confirmed with Western Blot.
Western Blot	Confirmatory test for HIV. Specificity when combined with ELISA >99.99%. Indeterminate results with early HIV infection, HIV-2 infection, autoimmune disease, pregnancy and recent tetanus toxoid administration.
Complete Blood Count	Anemia, neutropenia, and thrombocytopenia common with advanced HIV infection
Absolute CD4 lymphocyte count	Most widely used predictor of HIV progression. Risk of progression to an AIDS opportunistic infection or malignancy is high with CD4 <200 cel1s/µL.
CD4 lymphocyte percentage	Percentage may be more reliable than the CD4 count. Risk of progression to an AIDS, opportunistic infection or malignancy is high with percentage < 20%.
HIV viral load tests	These tests measure the amount of actively replicating HIV virus. Correlates with disease progression and response to antiretroviral

	drugs.
B-Microglobulin	Cell surface protein indicative of macrophage. Monocyte stimulation levels>*3.5* mg/dl associated with rapid progression of disease.
p24 antigen	Indicates active HIV replication. Tends to be positive prior to seroconversion and with advanced disease.

Table 5: TREATMENT :[10]

Antiretroviral drugs :

Drug	**Dose**	**Common side effects**	**Special monitoring**
Nucleoside reverse transcriptase inhibitors			
Zidovudine (AZT)	600 mg orally daily in two divided doses	Anemia, neutropenia, nausea, malaise, headache, insomnia, myopathy	No special Monitoring, triglycerides
Didanosine (ddl)	400 mg orally daily (enteric-coated capsule) for persons 60 kg	Peripheral neuropathy, pancreatitis, dry months, hepatitis	Bimontly neurologic questionnaire for neuropathy, K^+, amylase, bilirubin, triglycerides
Zalcitabine (ddC)	0.375-0.75 mg orally three times daily	Peripheral neuropathy, aphthous ulcers, hepatitis	Monthly neurologic questionnaire for neuropathy

Stavudine (D4T)	40 mg orally twice daily for persons 60 kg	Peripheral neuropathy, hepatitis, pancreatitis	Monthly neurologic questionnaire for neuropathy, amylase, cholesterol triglycerides
Lamivudine (3TC)	150 mg orally twice daily	Rash, peripheral neuropathy	No special Monitoring
Emtricitabine	200 mg orally once Daily	Skin discoloration palms/soles (mild)	No special Monitoring
Abacavir	300 mg orally twice daily	Rash, fever-if occur, rechallenge may be fatal	No special Monitoring
Nucleotide reverse transcriptase inhibitors			
Tenofovir Protease inhibitors	300 mg orally once daily	Gastrointestinal distress	Renal function
Saquinavir hard gel	1000 mg orally twice daily with 100 mg ritonavir orally twice daily	Gastrointestinal distress	Cholesterol, Triglycerides
Ritonavir	600 mg orally twice daily or in lower doses (eg, 100 mg orally once or twice daily) for boosting other PIs	Gastrointestinal distress, peripheral paresthesias	Cholesterol, Triglycerides
Indinavir	800 mg orally three times daily	Kidney stones	Cholesterol, triglycerides, billirubin level
Nelfinavir	750 mg orally there times daily or 1250 mg twice daily	Kidney stones	Cholesterol, triglycerides

Amprenavir	1200 mg orally twice daily	Gastrointestinal, Rash	Cholesterol, triglycerides
Fosamprenavir	1400 mg orally twice daily or 1400 mg orally once daily with ritonavir 200 mg orally once	Same as amprenavir	Same as amprenavir
Lopinavir/ritonavir	400 mg/100 mg orally twice daily	Diarrhea	Cholesterol, triglycerides
Atazanavir	400 mg orally once daily	Hyperbillirubinemia	Billirubin level; when used with ritonavir: cholesterol and triglycerides
Tipranavir/ritonavir	500 mg of tipranavir and 200 mg of ritonavir orally twice daily	Gastrointestinal, Rash	Cholesterol, Triglycerides
Darunavir/ritonavir	600 mg of darunavir and 100 mg of ritonavir orally twice daily	Rash	Cholesterol, Triglycerides
Nonnucleoside reverse transcriptase inhibitors (NNRTIs)			
Nevirapine	200 mg orally daily For 2 weeks, then 300 mg orally twice daily	Rash	cholesterol
Delavirdine	400 mg orally three times daily	Rash	No special Monitoring
Efavirenz	600 mg orally daily	Neurologic disturbances	No special Monitoring

Table 6: WHO recommendations for initiating antiretroviral therapy in adults and adolescents (2006) [15]:

WHO clinical stage	CD_4 testing not Available	CD4 testing available
1	Do not start ART	Start ART if CD4 is < 200/mm3
2	Do not start ART	
3	Start ART	Consider starting ART if CD4 < 350/mm^3, starting before it drops to < 200/mm^3 Recommended for all HIV + pregnant women if CD4 < 350/mm^3
4	Start ART	Start all irrespective if CD4

Table 7: WHO recommendations for initiating antiretroviral treatment in infants and children :

	Criteria to start ART in infants and children			
Age	**Infants < 12 months**	**12 months through 35**	**36 months through 59**	**5 years or over**
% CD4	All	< 20	< 20	< 15
Absolute CD4*		< 750 mm^3	< 350 mm^3	As in adults (<

*Absolute CD4 count is naturally less constant and more age-dependent than % CD4; it is not therefore appropriate to define a single threshold.

Table 8: Summary of WHO preferred antiretroviral treatment recommendation for infants, children and adults[15] :

Patient group	Preferred first line regimen	Preferred second line regime n
INFANTS		
Infant not exposed to ARY	NVP + 2 NRTI	LPV/r + 2 NRTI
Infant exposed to NVP	Boosted PI + 2NRTI	NNRTI + 2 NRTI
Infant with unknown ARV exposure	NVP + 2 NRTI	LPV/r + 2 NRTI
CHILDREN		
Children e years or over	NNRTI + 2NRTI	Boosted PI + 2 NRTI
ADULT OR ADOLESCENTS		
Adult or adolescent	NVP + 2NRTI	Boosted PI + 2 NRTI
Woman starting ART in Pregnancy	NVP + 2 NRTI	Doesn't apply
6women starting ART within 6 months of single dose NVP	NVP + 2 NRTI or 3 NRTI	Doesn't apply

Concomitant conditions		
Child, adolescent or adult with severe anaemia	NVP + 2 NRTI (avoid	Boosted PI + 2 NRTI
Child, adolescent or adult with TB	EFV + 2 NRTI or 3 NRTI	Boosted PI* + 2 NRTI
Adult or adolescent with hepatitis B Adult or adolescent with Hepatitis C	TDF + 3TC + NNRTI ETV + 2 NRTI	Boosted PI + 2 NRTI** Boosted PI + 2 NRTI
IDU	NNRTI + 2 NRTI	Boosted PI + 2 NRTI
HIV-2 or dual infection	3 NRTI	Boosted PI + 2 NRTI

*If using RMP in the TB regimen, LPV/r + extra dose of RTV is the recommended PI option, based on pK interactions. If RFB or an alternative TB regimen without RMP is used, any bPI at its conventional dosage can be used.

**If long term anti- HBV therapy is still needed consider maintaining 3TC and/or TDF, in addition to the new 2 NRTI backbone.

NNRTI = Non nucleoside reverse transcriptase inhibitor, NRTI = nucleoside / nucleotide reverse transcriptase inhibitor, PI = Protease inhibitor, IDU = Injecting drug user, AZT = Zidovudine, EFV = Elavirenz, NVP = Nevirapine, LPV = Lopinavir/r = booster dose ritonavir, RTV = Ritonavir, TDF = Tenofovir, 3TC = Lamivudine, RMP = Rifampicin, RFB = Rifabutin, HBV = Hepatitis B virus.

Table9: Recommended first line combination antiretroviral treatment regimens for pregnant women[15] :

Mother	
Ante-partum	AZT + 3TC + NVP twice daily
Intra-partum	AZT + 3TC + NVP twice daily
Post-partum	AZT + 3TC + NVP twice daily

Table 10: Recommended antiretroviral regimens for prophylaxis in pregnant women not yet eligible for ART.

Mother	
Ante-partum	AZT starting at 28 weeks of pregnancy or as soon as feasible thereafter
Intra-partum	Sd-NVP + AZT/3TC
Postpartum	AZT/3TC x 7 days

Table 11: Recommended antiretroviral regimens for prophylaxis in infants

> 4 weeks maternal ART or ARV	Sd-NVP + AZT x 7 days
< 4 weeks maternal ART or ARV	Sd-NVP + AZT x 4 weeks

Occupational post-exposure prophylaxis (PEP) :[16]

Post-exposure prophylaxis (PEP) is a necessary secondary prevention measure in health care settings, since there will always be rare instances in which primary prevention fail and healthcare workers or patients may be accidentally or through unsafe procedures be exposed to the risk of HIV transmission.

PEP for HIV consists of a comprehensive set of services to prevent infection developing in an exposed person, including : first aid care; counseling and risk assessment; HIV testing and counseling; and depending on the risk assessment, the short term (28-day) provision of antiretroviral drugs, with support and follow up.

Occupational PEP should also be available to all other workers who could be exposed while performing their duties (e.g., social workers, police or military personnel, rescue workers, and refuse collectors). There should be appropriate training for service providers to ensure the effective management and follow up of PEP. ARVs for PEP should be initiated as soon as possible after exposure within the first few hours and no later than 72 hours. ARV drugs for PEP should not be prescribed to people already known to have been injected with HIV prior to the exposure incident. HIV testing is recommended. The administration of ARV drugs for PEP should never be delayed because of testing procedures. If the first test is negative it should be repeated after three and six months. Who recommends that the PEP ARV regimen contain two NRTI drugs. If drug resistance is suspected the addition of a protease inhibitor (PI) may be considered. ARVs for PEP should be administered for a duration of 28 days.

Any occupational exposure to HIV should lead to an evaluation of the working environment and procedures and, when appropriate, improvement of working condition and safety precautions.

IMMUNOLOGICAL TESTS :

The hallmark of immunodeficiency in AIDS patients is a qualitative and quantitative defect of CD4 + cells. Nearly all AIDS patients have cutaneous anergy, a decreased number (<500 for mm3) of T-helper cells (CD4 +), a decreased T-helper to T-suppressor cell ratio (CD4 + : CD8 + < 0.9), and e vidence of polyclonal B-cell activation with mainly IgA and IgG, besides immunological abnormalities. The technique for determining lymphocytic sub populations is difficult and expensive. However, when available, the total number of T- helper cells and the percentage of T.

Helper cells are very useful prognostic markers. Patients are at risk of developing opportunistic infections if their T-helper cells is below 20%. T-helper cell levels are also increasingly used to decide, whether antiretroviral therapy should he initiated in asymptomatic patients with HIV injection or whether prophylactic treatment (Eg. against pneumocytitis carinii pneumonia) should be started.

LIPODYSTROPHY SYNDROME:

The HIV associated metabolic complications and altered fat distribution is a possible side effect of the antiretroviral therapy. The metabolic abnormalities harbor the possibilities of developing cardiovascular disease. The term lipodystrophy syndrome was used to describe a complex medical condition including an apparent abnormal fat redistribution and metabolic disturbances in HIV patients receving Protease Inhibitor

therapy.[17] The loss of subcutaneous fat lipoatrophy is most commonly seen in the periorbital regions temporal regions limbs and buttocks , peripheral fat loss can be accompanied by a gain of the visceral fat and truncal fat. .[18] These changes are most commonly found in patients receving thymidine analogues and protease inhibitors. Stavudine is the nucleoside analogue most commonly linked with lipodysrophy. Peripheral and hepatic insulin resistance, impaired glucose tolerance , type 2 diabetes, hypertriglyceridemia, increased free fatty acids, decreased high density lipoprotein are included in the abnormalities. In patients with HIV on ART hypertriglyceridemia along with hypercholesterolemia along with or without body fat abnormalities may be seen .Atazanavir and darunavir appear to be less frequently associated with dyslipidemia and insulin resistence. In contrast , ritonavir often results in hypertriglyceridemia correlating with results. Lopinavir leads to an approximate 18% mean increase in total cholesterol and 40% increase in patients on first line therapy.[19] Detailed characterization showed that increase in apolipoprotein B, CIII, E, lipoprotein (a) has been described in patients on protease inhibitor therapy. HIV infection leads to an increased concentration of cytokines like TNF alfa, IFN gamma and thus lead to an impaired post prandial triglyceride clearance.[20].

NRTIs AND DYSLIPIDEMIA:

Decreased peripheral fat loss is the major symptom observed in NRTI therapy particularly stavudine and zidovudine and some studies showed increase in intrabdominal fat which is less than that of protease inhibitors. Post prandially elevated FFA in patients have led to the conclusion that these drugs can impair fatty acid binding

proteins..[21] Use of the NRTI stavudine has been associated with a worst lipid profile as compared to tenofovir with significantly larger increases in total cholesterol triglycerides and low density lipoprotein. Similar effects were seen when tenofovir was compared to zidovudine with significantly smaller increases in total cholesterol and low density lipoprotein observed with tenofovir use. It is for reasons of toxicitites that drugs such as tenofovir and abacavir are now the preferred first line therapy compared to zidovudine and stavudine.[22] For Recent data from the ACTG 5202 study in which abacavir containing group was compared to tenofovir containg group it showed that abacavir use was associated with significantly greater increases in triglycerides(25mg/dl vs 3mg/dl) and total cholesterol (34mg/dl vs 26mg/dl) than tenofovir at 48 weeks. Similar results were observed in HEAT study which also compared abacavir and tenofovir containing regimens, those on abacvir had greater increases in triglycerides (64mg/dl) vs 38mg/dl) and total cholesterol (32mg/dl vs 23mg/dl) at 48 weeks though the difference between the arms was less at 96 weeks.[23.]

NNRTIs AND DYSLIPIDEMIA:

NNRTI in general show the best lipid profile of all anti HIV drugs as they are associated with an increase in HDL and a significant reduction in total cholesterol and LDL. The use of these drugs has been associated with a lower risk of myocardial infarction. At least for nevirapine the mechanism of HDL increase seems to be increase in production of apolipoprotein A1 as it also significant decreases in triglycerides and a significant reduction in total cholesterol.

It has been shown that efavirenz one of the commonly used NNRTI has a

deleterious effect on lipids when compared to the other drugs such as nevirapine. The 2NN study compared HAART comprising of efavirenz, nevirapine or both in combination with 2 NRTI (stavudine and lamivudine) and demonstrated greater increases in triglycerides in the efavirenz arm 49% versus 20% at 48 weeks.[24]

In the Swiss HIV cohort , triglycerides tend to decrease in those patients treated with nevirapine but increase with efavirenz. Overall these data point significant potential for efavirenz induced dyslipidemia, with increase in total cholesterol similar to some protease inhibitors, but less than that observed with such drugs.

PROTEASE INHIBITORS(PI) AND DYSLIPDEMIA :

PI induced endoplasmic reticulum stress and subsequent activation of the unfolded protein response may represent a mechanism of PI induced dyslipidemia . According to this hypothsis , proteasome inhibition and differential glucose transport blockage by PI is a key event eliciting an endoplasmic reticulum stress response .[25]

In vitro studies conducted in cultured hepatocytes have shown that PI therapy reduces degradation by proteasomes of intracellular apolipoprotein B, which may increase the secretion of apolipoprotein b containing lipoproteins. The expression of LDL receptors has been described to be reduced in patients with lipodystrophy thus increasing LDL levels. Sterol regulatory element binding protein (SREBP 1and 2) are adipocyte master genes and transcription factors that sense liver cholesterol concentrations. Reduced degradation of SREBP and thus nuclear accumulation has been described in animals treated with PI.[26] This may induce an increase in cholesterol and triglycerides by induction of lipogenetic genes such as fatty acid synthase

. Recently the potential role of farnesoid X receptor in PI related dyslipidemia has been described. Farnesoid X receptor acts as a bile acid sensor and regulates the acid synthesis and excretion.It is also a member of the nuclear receptor super family of ligand associated expression of genes in fatty synthesis. [27]

MECHANISMS INVOLVED IN ANTIRETROVIRAL THERAPY RELATED DYSLIPIDEMIA-

- Increased VLDL production.
- Reduction in the catabolism of VLDL
- Impaired catabolism of free fatty acids.
- Increased liver triglycerides synthesis.
- Increased secretion of apolipoprotein Bcontaining lipoproteins
- Reduced expression of LDL receptors.
- Reduced degradation of SREBP
- Reduction in FXR activity.

Use of PIs has been associated with hypertriglyceridemia and hypercholesterolemia. Ritonavir a potent PI is a inhibitor of cytochrome p4503A4. When used at a dose of 100 mg twice daily ritonavir causes increased triglycerides by 26% and LDL by 16% after only two weeks of therapy. When combined with other protease inhibitors such as Lopinavir, serum triglycerides increased by 835, free fatty acids by 30% and VLDL by 33%.Atazanavir is an azapeptide PI with relatively few effects on serum lipids while other newer PI such as Darunavir have also been shown t induce less dyslipidemia.[28,29]

DIRECT EFFECT OF PI :

PIs affect different tissues to cause dyslipidemia. The effect of PI is different in adipose tissue unlike liver. In adipocytes PI inhibit lipolysis by impairement of LPL activity, which impairs TG uptake into adipocytes, which may contribute to elevated plasma TG levels.

PI also inhibit SREBP 1 nuclear localization in adipocytes which leads to decreased adipocyte differentiation and which may also inhibit the ability of adipose tissue to store lipids removed from the circulation. In adipocytes PI have also been shown to reduce expression of peroxisome proliferator activated receptor gamma (PPAR gamma) an nuclear receptor important for adipocyte differentiation As PPAR gamma is a transcriptional target of SREBP1 impaired nuclear localization of SREBP 1 in adipose tissue may contribute to reduced PPAR gamma activity.[30]

INDIRECT EFFECT OF PI: As well as their effects on lipid profile PI also affect adipose tissue. PI can accumulate in adipocytes and ritonavir , lopinavir and saquinavir inhibit adipocyte differentiation. This effect is not seen with atazanavir,.a PI associated with less dyslipidemia . Nelfinavir has also been associated adipocyte apoptosis. [31]

The ultimate result of abnormally functioning subcutaneous adipose tissue is reduced storage capacity for circulating lipids resulting in increased circulating free fatty acids, reduced adiponectin secretion and lipid accumulation in non adipose tissues such as liver (hepatic steatosis and hepatic triglyceride accumulation) . This combined with the effects of PI on lipid metabolism as mentioned in the previous segments likely underlie

the hypertriglyceridemia and hypercholesterolemia observed in patients affected with HIV and on antiretroviral therapy.[32]

It is proved that a combination of PI with NRTI are a greater risk for the dyslipidemia and lipodystrophy as compared to PI alone.It remains unclear whether impaired insulin action eventually leads to dyslipidemia or whether hyperlipidemia is responsible for reduced insulin function and insulin resistence in the periphery. Presumably both mechanisms are important given that some PI as indinavir has been showing to cause insulin resistance without much alerations in lipid profile whereas ritonavir is known to cause hypertriglyceridemia without any change in glucose metabolism.[33]

INTEGRASE INHIBITORS:

Raltegravir (RAL) is the drug in this new class and shows a remarkable lack of relevant adverse effects. Raltegravir was studied in HIV patient in comparison to efavirenz ,both in combination with with TDF/FTC, in STARTMRK study.[34] Patients treated with RAL presented with a significantly less dyslipidemia. At week 48, mean changes from baseline in TC, LDL, HDLand TG concentrations were smaller in the RAL group than the efavirenz group. A small decline in TG concentration from the baseline was noted in RAL group. Raltegravir has also been evaluated as switching therapy for patients treated with protease inhibitor. The SPIRAL study demonstrated that patients with sustained viral suppression on protease inhibitor have better lipd profile at 48 weeks than continuing protease inhibitor without lack of efficacy[35].

CHEMOKINE RECEPTOR 5 ANTAGONISTS:

Maraviroc (MVC) binds to chemokine receptor 5 (CCR5) which also serves as a co receptor for a major phenotype of HIV , R5 tropic virus. Maraviroc was compared with EFV , both with ZDV/3TC. This study showed that MVC has a very favourable safety profile .No characteristic adverse effect of MVC has been identified. MVC was associated with non significant changes in TC, LDL, HDL, HDL, and TG, whereas EFV recepients showed moderate increases in all lipid parameters [36]

HIV INFECTION

Hypertriglyceridemia in untreated patients maybe a resonse to a systemic inflammatory response against persistant viral infection . TG concentrations and TG clearance time in untreated HIV infected patients have been shown to correlate with serum interferon alpha(IFN alfa).[37] In the untreated patients the activity of lipoprotein lipase (LPL)and hepatic lipase which are both involved in TG clearance from the circulation are decreased compared to controls . Treatment of hepatocytes in vitro with IFN alfa and other cytokines such as IL 1 causes increase in lipogenesis and hepatic lipogenesis in vivo is higher[38].

ATHEROSCLEROSIS IN HIV PATIENTS :

HIV patients are at more risk of atherosclerosis. The aetiology of atherosclerosis is low density lipoproteins particles trapped within the walls of blod vessels, where they undergo oxidation and subsequently attract monocytes. The monocytes engulf the LDL particles and become macrophages. Macrophages help to form fatty streaks which gradually become atherosclerotic plaques.. Imparirment of reverse cholesterol transport

leads to further accumulation of lipids within the vessel wall. Unstable plaques may rupture and cause intravascular thrombosis and obstruction of blood perfusion[39] The main contributing factor to this is dyslipidemia which can be mutltifactorial like presence of traditional cardiac risk factors age, gender HAART , disease drug interactions, disease related inflammation, creation of insulin resistance by HAART, fat redistribution , altering lipoprotein metabolism and HIV infection of the heart tissue.

METHODOLOGY

Source of data:

Patients admitted in B.L.D.E.U's Shri B M Patil's medical college hospital and research centre, Vijayapur, Karnataka, India during a period of 18 months.

Method of collection of data :

Patients admitted in Shri B M Patil's medical college during 18 months duration (2013 and 2015) was included in the study after fulfilling inclusion and exclusion criteria. A predetermined pretested performa is used to record the details of history, physical examination and investigations.

Inclusion criteria :

The patients diagnosed HIV positive as per NACO guidelines using three spot tests COOMBS AIDS, TRILINE, QUALPRO test.

Exclusion criteria:

1. Patients with a history of cardiovascular diseases like congenital heart diseases.
2. Patients with type II Diabetes mellitus.

After a detailed history and thorough clinical examination patients will be subjected to fasting lipid profile.

Investigations :

1) Fasting lipid profile

STATISTICAL ANALYSIS :

1) Cross sectional study design

2) Mean = number of value $= \frac{\text{Sum of value} \quad \sum X}{n}$

3) Standard deviation = $\frac{\sum (X - x)^2}{(n - 1)}$

4) Anova study(Analysis of variance)

5) F - value (Anova test value)

6) p-value (probability)

RESULTS

Table 1: Percent Distribution of TG

TG	N	Percent
Normal	36	30
Abnormal	84	70
Total	120	100

Figure 1: Percent Distribution of TG

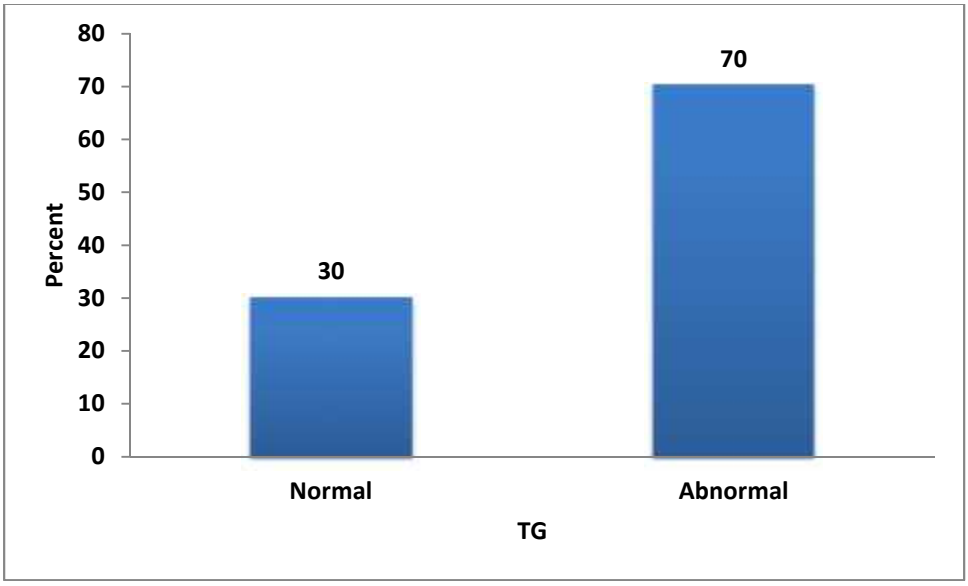


Table 2: Percent Distribution of TC

TC	N	Percent
Normal	40	33.3
Abnormal	80	66.7
Total	120	100

Figure 2: Percent Distribution of TC

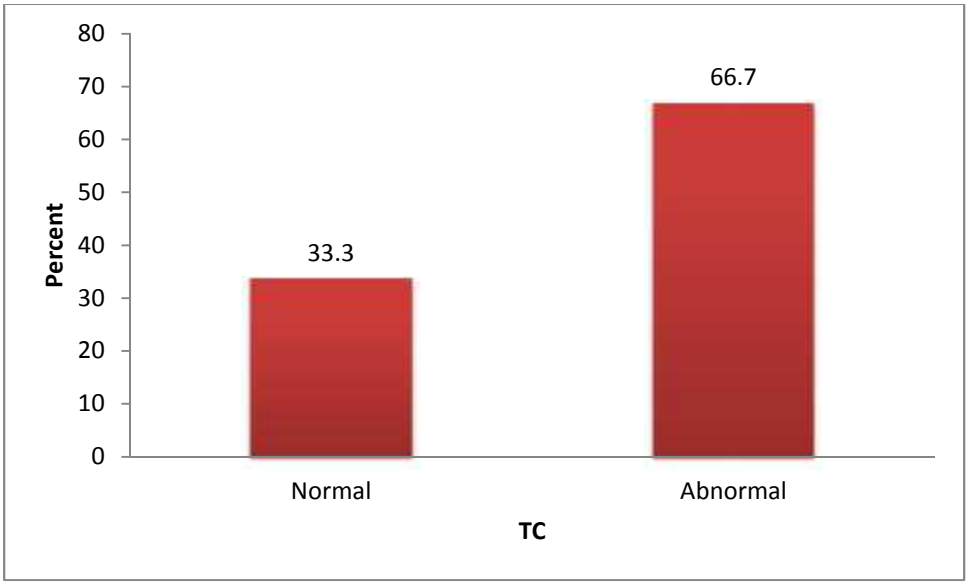


Table 3: Percent Distribution of HDL

HDL	N	Percent
Normal	24	20
Abnormal	96	80
Total	120	100

Figure 3: Percent Distribution of HDL

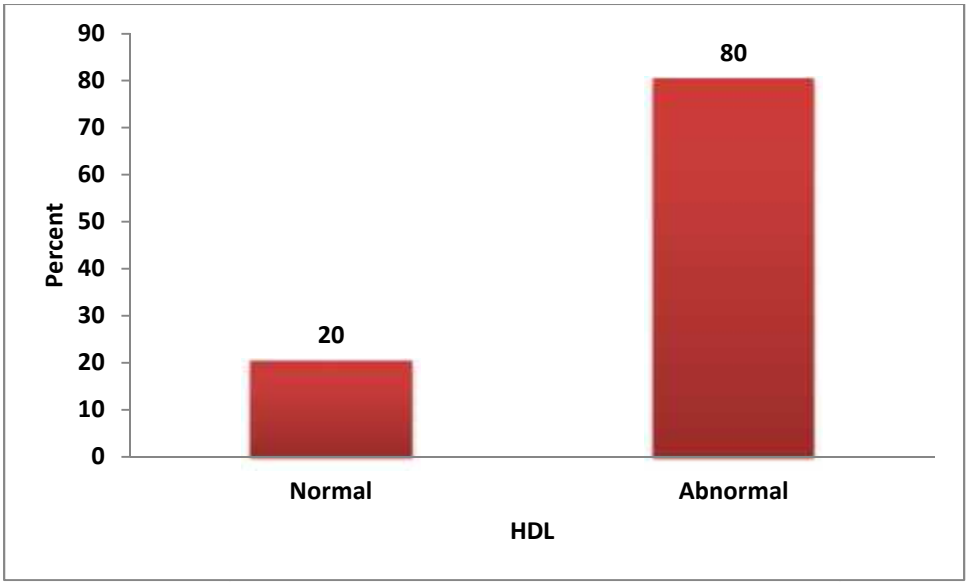


Table 4: Percent Distribution of LDL

LDL	N	Percent
Normal	48	40
Abnormal	72	60
Total	120	100

Figure 4: Percent Distribution of LDL

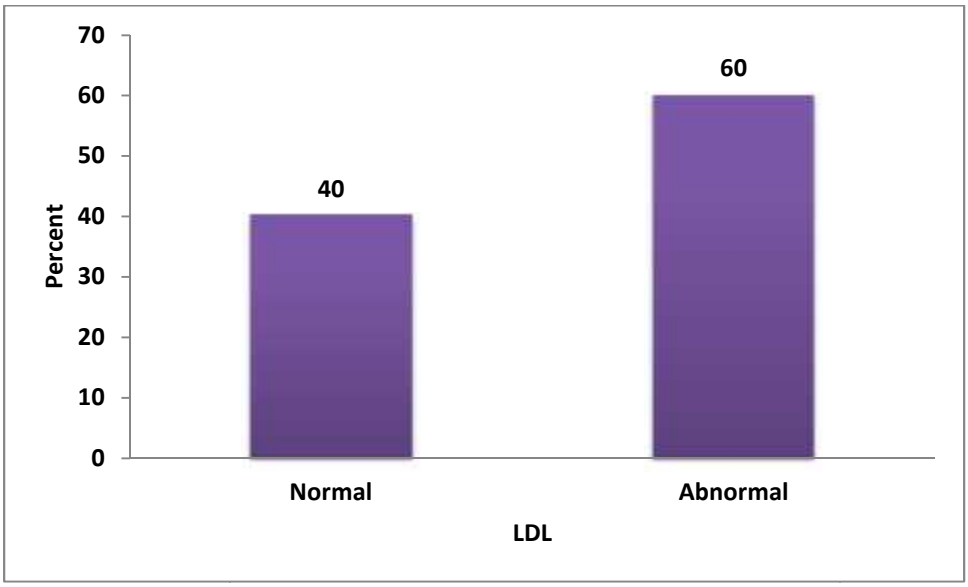


Table 5: Percent Distribution of VLDL

VLDL	N	Percent
Normal	113	94.2
Abnormal	7	5.8
Total	120	100

Figure 5: Percent Distribution of VLDL

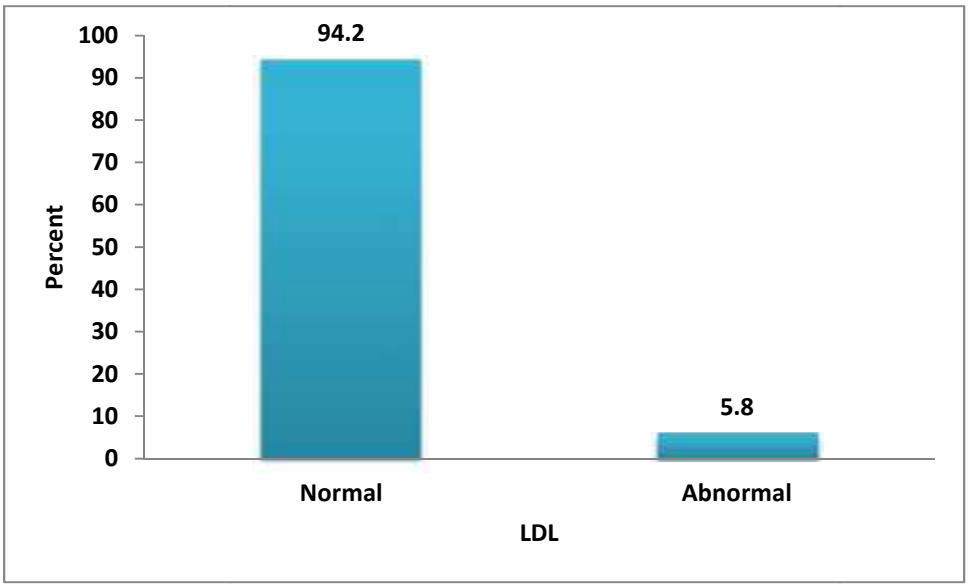


Table 6: Comparison of mean parameters by Gender

Parameters	Male		Female		p value
	Mean	SD	Mean	SD	
TG	170.0	38.2	163.1	49.8	0.408
TC	206.8	45.2	211.0	46.0	0.648
HDL	29.6	7.0	30.3	6.3	0.604
LDL	122.3	30.5	113.8	37.1	0.192
VLDL	29.4	10.2	28.9	9.7	0.792

Table 7: Percent Distribution of Age

Age	N	Percent
20-35	49	40.8
36-50	56	46.7
51-70	15	12.5
Total	120	100

Figure 7: Percent Distribution of Age

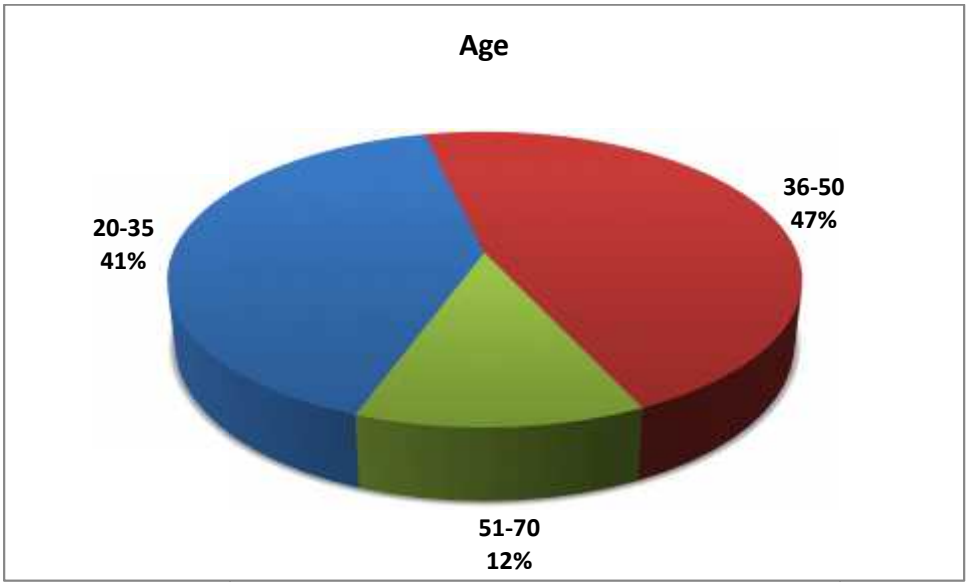


Table 8: Percent Distribution of Gender

Gender	N	Percent
Male	83	69.2
Female	37	30.8
Total	120	100

Figure 8: Percent Distribution of Gender

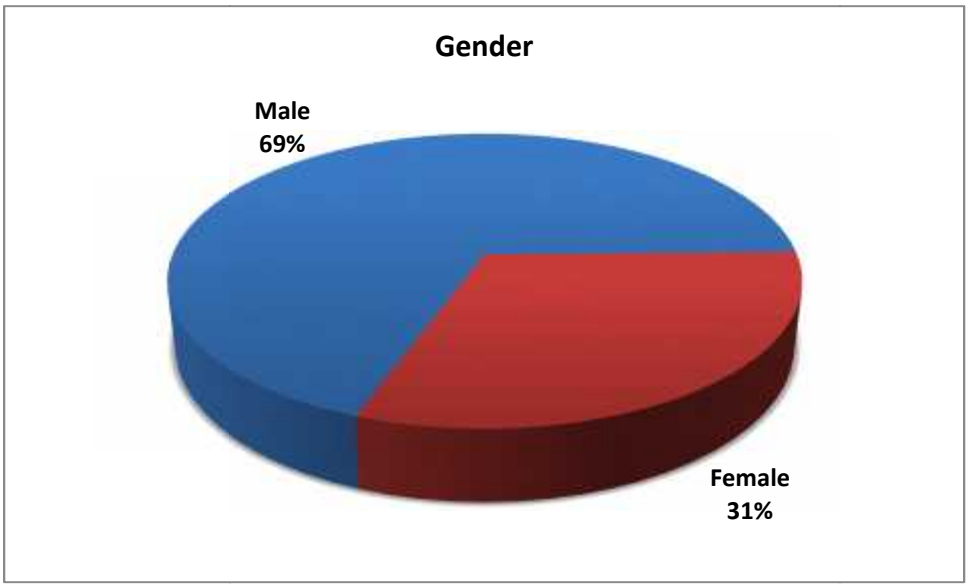


Table 9: Association of Age and VLDL

Age	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
20-35	47	95.9	2	4.1	49	0.043*
36-50	54	96.4	2	3.6	56	
51-70	12	80	3	20	15	

*significant, $p<0.05$

Table 10: Association of Age and LDL

Age	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
20-35	20	40.8	29	59.2	49	0.221
36-50	25	44.6	31	55.4	56	
51-70	3	20	12	80	15	

Table 11: Association of Age and HDL

Age	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
20-35	7	14.3	42	85.7	49	0.254
36-50	12	21.4	44	78.6	56	
51-70	5	33.3	10	66.7	15	

Table 12: Association of Age and TC

Age	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
20-35	14	28.6	35	71.4	49	0.429
36-50	22	39.3	34	60.7	56	
51-70	4	26.7	11	73.3	15	

Table 13: Association of Age and TG

Age	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
20-35	14	28.6	35	71.4	49	0.665
36-50	16	28.6	40	71.4	56	
51-70	6	40	9	60	15	

Table 14: Association of Gender and VLDL

SEX	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
Male	78	94	5	6	83	0.894
Female	35	94.6	2	5.4	37	

Table 15: Association of Gender and LDL

SEX	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
Male	30	36.1	53	63.9	83	0.197
Female	18	48.6	19	51.4	37	

Table 16: Association of Gender and HDL

SEX	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
Male	17	20.5	66	79.5	83	0.843
Female	7	18.9	30	81.1	37	

Table 17: Association of Gender and TC

SEX	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
Male	29	34.9	54	65.1	83	0.576
Female	11	29.7	26	70.3	37	

Table 18: Association of Gender and TG

SEX	Normal		Abnormal		Total	p value
	N	Percent	N	Percent		
Male	21	25.3	62	74.7	83	0.093
Female	15	40.5	22	59.5	37	

Figure 9: Distribution of Age by VLDL

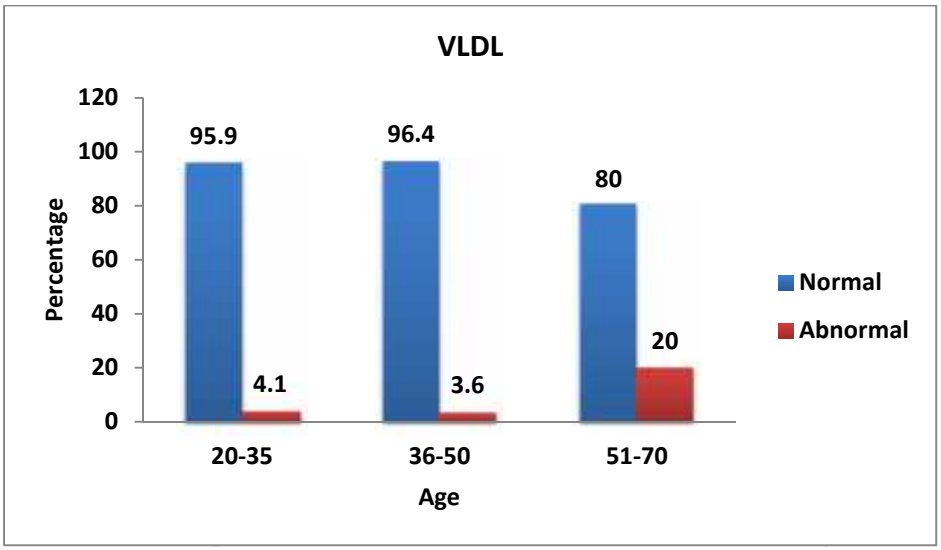


Figure 10: Distribution of Age by LDL

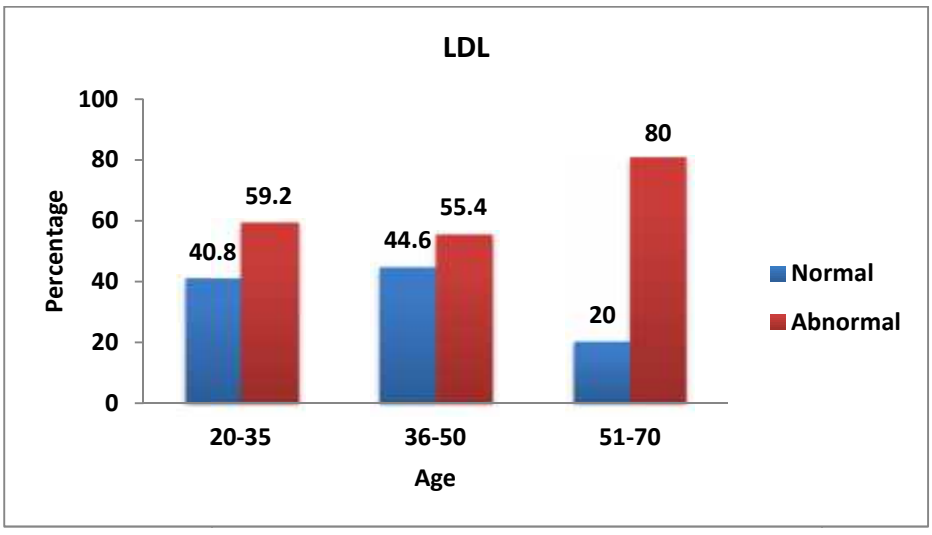


Figure 11: Distribution of Age by HDL

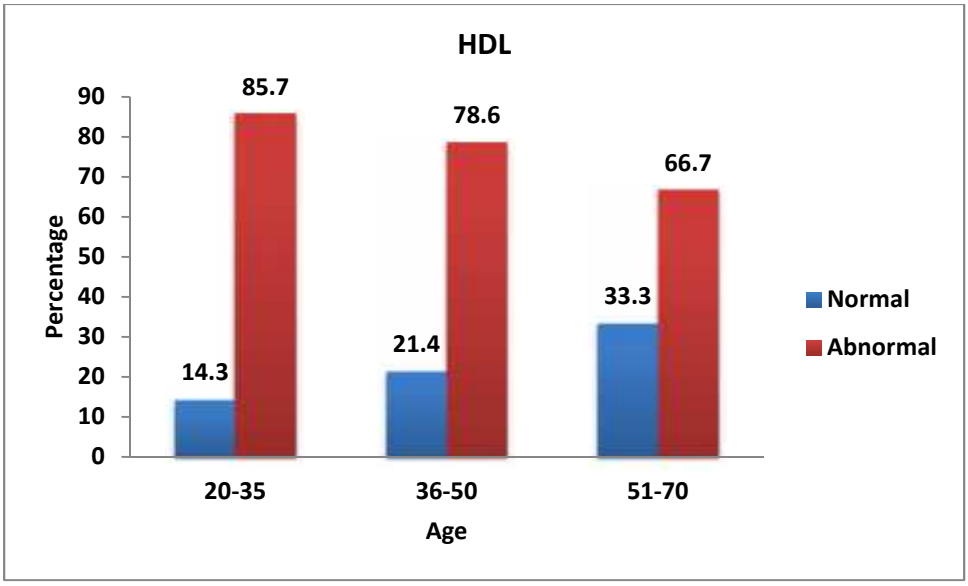


Figure 12: Distribution of Age by TC

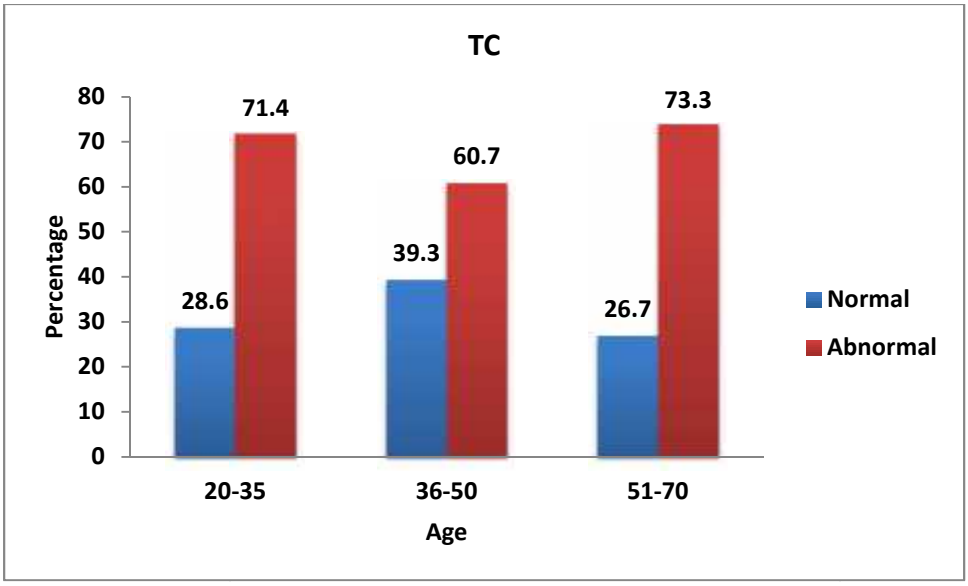


Figure 13: Distribution of Age by TG

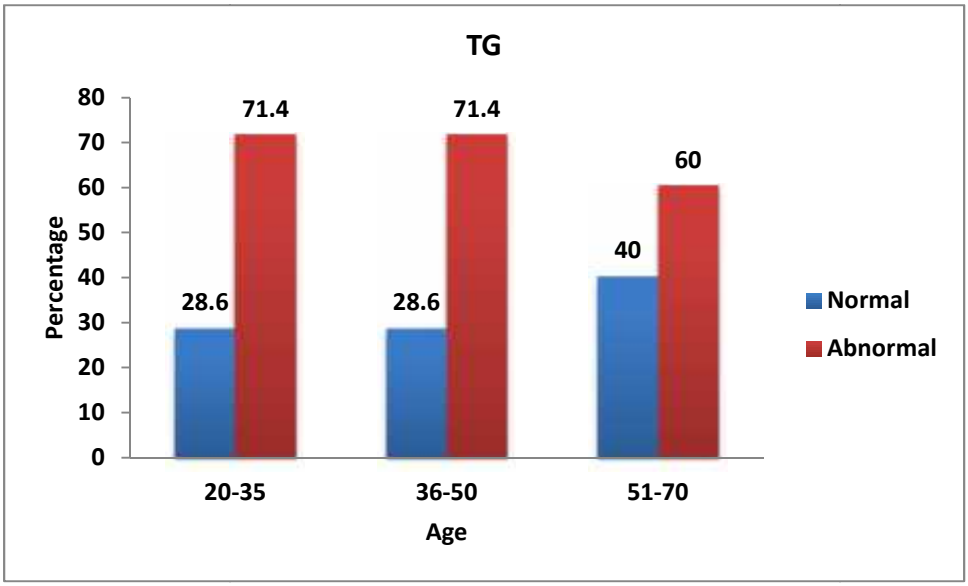


Figure 14: Distribution of Gender by VLDL

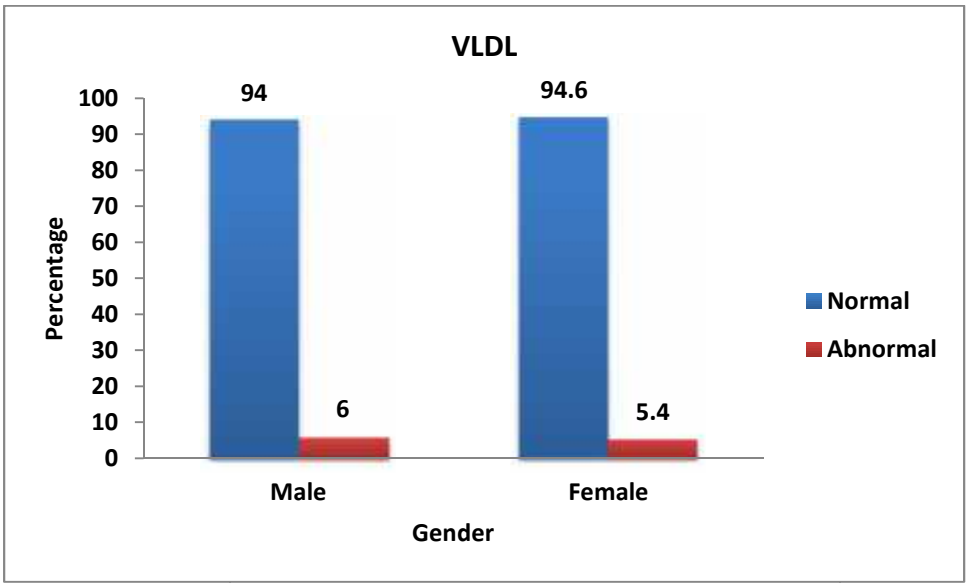


Figure 15: Distribution of Gender by LDL

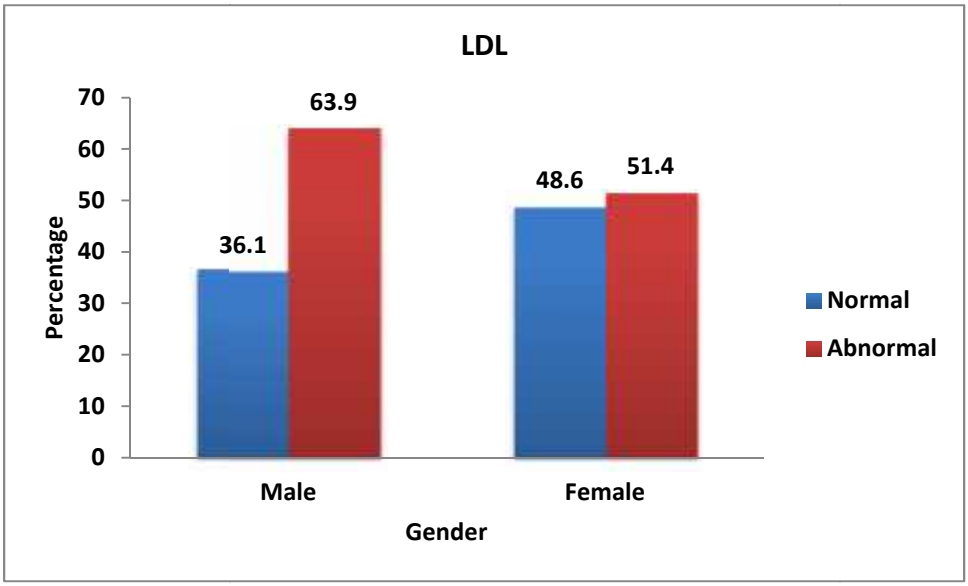


Figure 16: Distribution of Gender by HDL

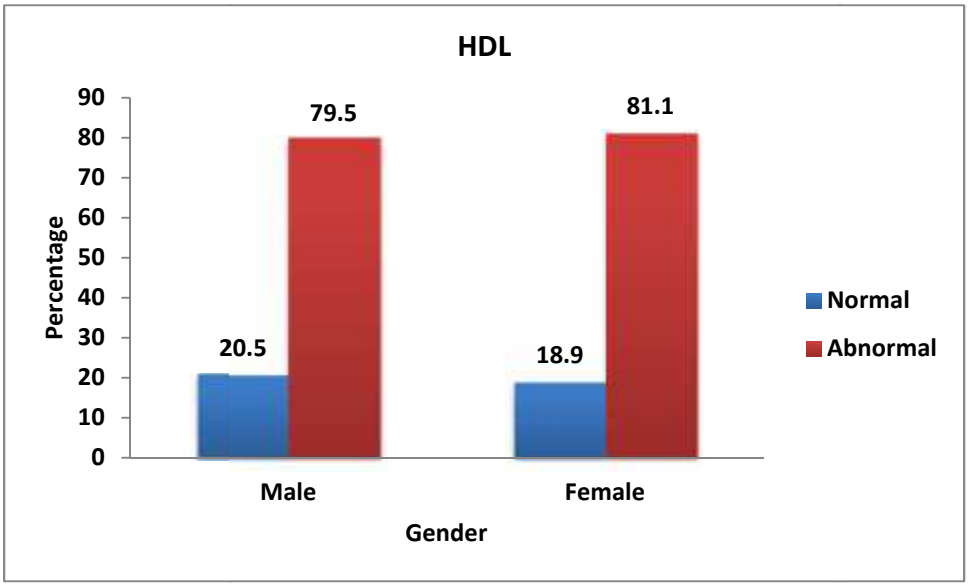


Figure 17: Distribution of Gender by TC

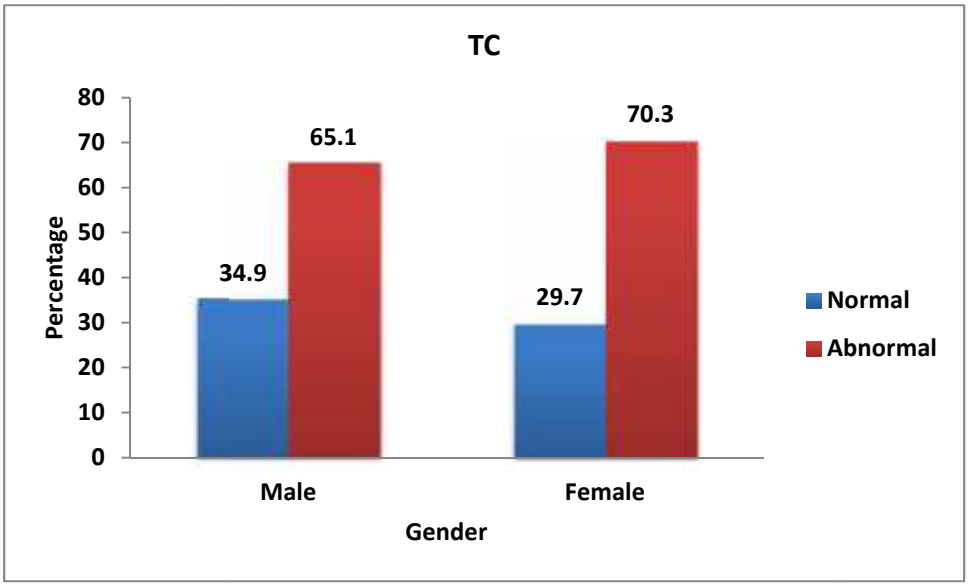
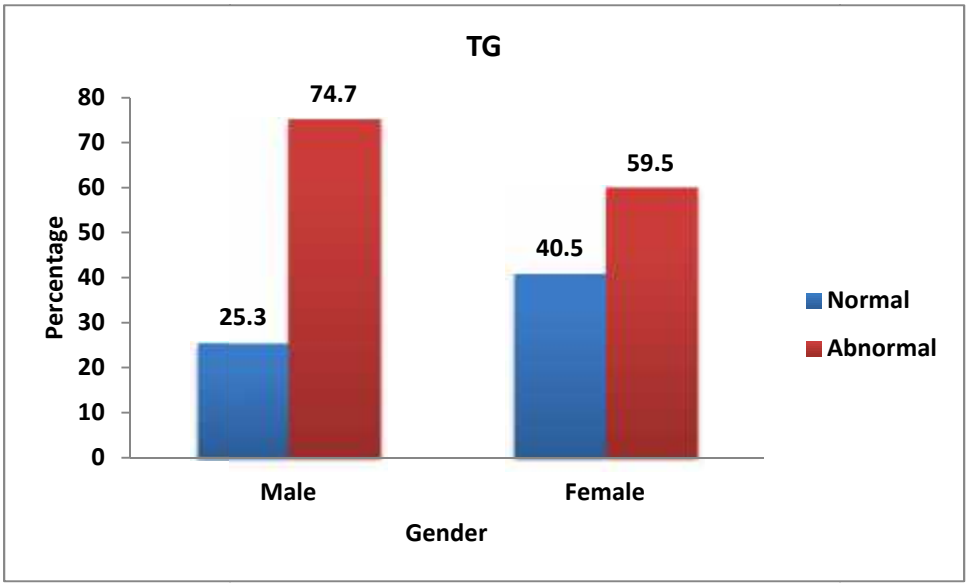


Figure 18: Distribution of Gender by TG



DISCUSSION

These observations made in 120 patients of HIV positive as per NACO guidelines admitted in BLDEU's Shri B M Patil's medical college hospital and research centre, Bijapur. During a period of 18 months from nov2013 to june 2015

1) Age

: Among the 120 patients taken for this study ,maximum patients were in the young age group.

Age group	**20-35**	**36-50**	**51-70**
Number	49	56	15

2) Sex :

In my study out of 120 patients 83 cases are males and 37 cases are females. So males are more commonly affected than females

Sex	**Percentage**	**Number**
Male	70%	83
Female	30%	37

3) Hypertriglyceridemia : (Cases out of 120)

Level	**Cavin Epie Bekolo et al[40]**	**Present study**	**Present study**
Normal	48%	36	30%
Abnormal	52%	84	70%

In my study out of 120 patients 84 patients had triglycerides above the normal range and 36 patients had in the normal range.So 70% patients had hypertriglyceridemia..

4) Hypercholesterolemia In number of cases out of 120

Level	**Cavin Epie Bekolo et al[40]**	**Present study**	**Present study**
Normal	70%	40	33.3%
Abnormal	30%	80	66.7%

In my study out of 120 patients 80 patients have cholesterol above the normal levels and 40 patients had within the normal range. So 66.7% have hypercholesterolemia.

5) High density lipoprotein cholesterol:

Level	**Cavin Epie Bekolo et al[40]**	**Present study**	**Present study**
Normal	27%	24	20%
Abnormal	73%	96	80%

In my study among 120 patients 96 had HDL levels below the normal range and 24 patients had HDL within the normal range. So 80% of patients had abnormal HDL levels. In the Cavin Epie Bekolo et al study 73% of patients had HDL below the normal levels.

6) High low density lipoprotein levels. :

Level	**Cavin Epie Bekolo et al [40]**	**Present study**	**Present study**
Normal	46.7%	48	40%
Abnormal	53.3%	72	60%

My study has shown that 60% of patients have high low density lipoprotein cholesterol levels is also in accordance with the Cavin Epie Bekolo et al study where 53.3% of patients had high levels.

7) Very low density liporpotein

In my study 113 patients have VLDL within the normal range and 7 patients have above the normal range . So 94.2% of patients have a normal range of VLDL.

Level	Cavin Epie Bekolo et al[40]	Present study	Present study
Normal	90%	94.2%	113
Abnormal	10%	5.8%	7

CONCLUSION

By this it was concluded that,

1. The prevalence of dyslipidemia in HIV patients on antiretroviral therapy is very high.
2. Males are affected more than females.
3. Patients in the young age group (25-35) are having maximum dyslipidemia.
4. In the above age group the prevalence of hypertriglyceridemia is 71.4%, that of hypercholesterolemia is 71.4%, and that of low HDL is 85.7%.
5. The presence of an atherogenic lipid pofile in HIV patients on antiretroviral. Therapy makes these patients more susceptible to cardiovascular events .
6. A longer duration of antiretroviral therapy is associated with greater chances of coronary artery stenosis due to dyslipidemia and due to the metabolic effects of HIV infection
7. This has lead to increased concerns of myocardial infarction in HIV patients..
8. The presence of dyslipidemia in young patients makes them susceptible to subclinical coronary atherosclerosis is a major concern as lack of suspicion of coronary artery disease makes them prone to sudden grave consequences.
9. The lack of an alternative to antiretroviral therapy makes it more difficult to protect and prevent these patients from dyslipidemia and thus future cardiac events

After initiation of antiretroviral therapy of fasting lipid profile is a must for HIV patients.

SUMMARY

120 cases of HIV diagnosed by ELISA method, admitted in BLDEU's Shri B M Patil's medical college hospital and research centre, Bijapur. During a period of 18 months from Nov 2013 to June 2015.

1. Of the 120 cases, 70 % of cases had hypertriglyceridemia and 30% in the normal range.
2. 66.7% of patients have hypercholesterolemia and 33.3% have in the normal range.
3. 80% of patients have HDL below the normal range and 20% have within the normal have range.
4. 60% of patients have LDL above the normal range and 40% have in the norrmal range.
5. 5.8% of patients have VLDL within the abnormal range and 94.2% patients have in the normal range.
6. Patients in the age group 20-35 , 71.4% have hypertriglyceridemia, 71.4% have hypercholesterolemia, 85.7% have low levels of HDL.
7. Thus patients in the young age group were more affected as compared to patients in the older age group.
8. Males are affected more than females.
9. Age wise associations of the various age groups to VLDL is 0.043which is significant.
10. Patients in the age group of 50-70 are having maximum LDL -80%

Finally my study proves that significant dyslipidemia is present in HIV patients on antiretroviral therapy just as reported in the various other similar studies. The study has further strengthened the relation between existence of coronary artery diseases in patients on antiretroviral therapy.

"It will help to encourage further studies to evaluate the role of individual antiretroviral drugs in causing dyslipidemia and also make clinicians aware to evaluate patients for dyslipidemia once they are initiated on antiretroviral therapy".

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ANNEXURE I

B.L.D.E. UNIVERSITY'S
SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103
INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 13-11-2013 at 3-30pm to scrutinize the Synopsis of Postgraduate Students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis has been accorded Ethical Clearance.

Title "Study of lipid profile in HIV/AIDS patients on anti retroviral therapy"

—x—x—x—

Name of P.G. student Dr. Saurabh G. Sadekar.
Department of Medicine

Name of Guide/Co-investigator Dr Dr Sanjeev N. Bentoor.
Professor of Medicine

DR.TEJASWINI. VALLABHA
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.

Following documents were placed before E.C. for Scrutinization
1) Copy of Synopsis/Research project.
2) Copy of informed consent form
3) Any other relevant documents.

INFORMED CONSENT FORM

I ..... exercising free power of choice hereby give my written consent to be included as a subject in the study **" STUDY OF LIPID PROFILE OF HIV/AIDS PATIENTS ON ANTIRETROVIARL THERAPY"** conducted by **Dr. Saurabh G. Sadekar** and undergo the necessary investigations required for this study and I fully consent for the same.

I am over 18 years of age and i have been explained to my satisfaction by the attending physician, in the language I understand about the purpose of the study. I have also understood that the investigator will maintain confidentiality regarding my identity.

Signature of docter

Name of the docter

Dr. Saurabh G. Sadekar

Date:

Signature of patient/relative

Name of patient/relative

Relationship(if relative)

PROFORMA

"STUDY OF LIPID PROFILE IN HIV PATIENTS"

Name:	CASE NO:
Age:	IP NO:
Sex:	DOA:
Religion:	DOD:
Occupation:	Residence:

Presenting complaints with duration:

History of present complaints:

Past History:

Personal History:

Diet Habits:

Alcohol :

Smoking :

Treatment History :

General Physical Examination

Height :

Weight :

Body Mass Index :

Vitals

PR:

BP:

SYSTEMIC EXAMINATION.

• Respiratory System

• Cardiovascular System

- Central Nervous System
- Per abdomen

INVESTIGATIONS

FASTING LIPID PROFILE

TRIGLYCERIDES(TG)	
TOTAL CHOLESTEROL(TC)	
HIGH DENSITY LIPOPROTEIN(LDL)	
LOW DENSITY LIPOPROTEIN(LDL)	
VERY LOW DENSITY LIPOPROTEIN(VLDL)	

MASTER CHART

NO.	NAME	AGE	SEX	IP.NO.	DOA	TG	TC	HDL	LDL	VLDL
1	pandu	35	M	27954	12/7/2013	170	209	21	104	35
2	ashwini	22	F	28347	12/8/2013	168	159	29	75	54
3	shivanagouda	35	M	28042	12/10/2013	138	129	32	76	20
4	shankarayya	42	M	28468	12/13/2013	173	155	30	111	18
5	ramesh	40	M	2484	28-Nov	180	236	24	56	13
6	basavraj	30	M	1378	12/2/2013	186	224	24	89	55
7	ningondappa	39	M	1410	12/12/2013	141	220	40	82	17
8	kashinath	45	M	4918	12/20/2013	201	245	21	52	34
9	laxmibai	38	F	3793	12/12/2013	211	220	28	119	24
10	durgawwa	36	F	3519	12/10/2013	121	231	27	96	15
11	laxmibai	37	F	3230	12/22/2013	208	232	38	59	35
12	shreedevi	30	F	15079	5/12/2015	168	240	35	100	40
13	jaysingh	48	M	4723	12/23/2013	133	230	36	136	29
14	shridhar	30	M	847	1/8/2014	201	244	23	93	35
15	rajshekhar	28	M	3038	1/31/2014	159	222	32	103	19
16	sangamesh	46	M	2464	1/25/2014	145	220	21	52	52
17	somu	35	M	1504	1/16/2014	139	236	30	85	15
18	somanna	50	M	4280	2/13/2014	208	240	28	78	12
19	indrawwa	55	F	5906	3/1/2014	183	241	39	140	25
20	yamanappa	30	M	5909	3/1/2014	173	250	28	59	38
21	berappa	30	M	8934	3/30/2014	99	226	24	135	37
22	ramesh	40	M	9671	4/5/2014	186	130	20	96	30
23	babu	40	M	3196	2/3/2014	221	109	37	140	28
24	shila	44	F	14241	17-May	133	130	25	90	38
25	bhimappa	35	M	14998	5/25/2014	190	228	36	75	39
26	mamallappa	45	M	16479	5/25/2014	178	238	33	136	37
27	dyamanna	41	M	16091	6/3/2014	146	231	27	138	19
28	suresh	38	M	16588	5/25/2015	198	220	26	145	28
29	prabhugouda	35	M	5375	2/26/2014	168	221	27	140	38
30	devanna	25	M	1702	1/16/2014	204	231	27	141	40
31	afajalghani	55	M	3893	2/8/2014	136	153	38	136	18
32	annapoorna	40	F	9545	4/5/2014	130	232	49	92	28
33	shrishail	45	M	5249	2/26/2014	166	162	39	75	37
34	shivappa	30	M	3115	6/1/2014	175	240	26	148	40
35	abzal	46	M	521	1/5/2014	207	179	38	109	22
36	vilas	24	M	1055	1/10/2014	228	244	30	140	17
37	renuka	40	F	1538	11/22/2013	192	238	33	152	37

38	anasubai	35	F	1568	1/18/2014	138	236	26	138	36
39	suresh	51	M	2620	1/27/2014	188	230	51	139	21
40	sadashiv	28	M	4815	2/18/2014	165	251	24	151	20
41	basavraj	28	M	5937	3/4/2014	173	126	20	148	39
42	parsuram	38	M	16891	6/10/2014	184	221	26	106	40
43	basappa	50	M	12844	5/5/2014	185	157	33	137	17
44	radhabai	60	F	11898	4/26/2014	140	237	29	136	18
45	harish	29	M	19442	4/20/2014	193	151	41	90	28
46	rajashree	35	F	12723	5/3/2014	158	227	29	148	19
47	raju	25	M	11233	4/21/2014	132	240	40	94	29
48	shivgangawa	48	F	11404	1/27/2014	112	241	39	144	38
49	babu	40	M	3196	2/2/2014	180	250	30	143	37
50	ramesh	40	M	9671	4/6/2014	169	251	20	140	40
51	farooq	40	M	18096	7/12/2014	130	162	40	130	28
52	mahesh	35	M	12081	6/20/2014	128	110	28	106	19
53	kulesh	34	M	21935	7/26/2014	178	204	41	130	39
54	mahadevi	35	F	22868	8/4/2014	170	230	25	136	40
55	savitri	40	F	21468	6/11/2014	193	224	31	70	29
56	ishwar	33	M	17735	6/18/2014	169	230	39	131	38
57	anasuya	55	F	22390	7/30/2014	377	232	26	53	39
58	shrishail	32	M	17261	6/14/2014	108	233	27	132	27
59	ishwar	34	M	16306	5/22/2015	171	245	28	140	41
60	sidram	56	M	15916	5/19/2015	174	241	35	141	21
61	narasappa	59	M	15221	5/13/2015	130	240	29	143	20
62	pundalik	45	M	14826	5/16/2015	128	256	20	130	36
63	radhabai	48	F	9166	4/1/2014	99	227	30	132	19
64	sharadabai	30	F	9149	4/6/2014	169	110	37	60	29
65	premabai	40	F	30925	10/14/2014	158	139	23	91	36
66	jairabai	48	F	30870	10/10/2014	177	280	33	134	37
67	shilabai	22	F	2122	1/19/2015	162	259	35	39	38
68	shivakumar	40	M	2064	1/20/2015	169	158	32	136	40
69	bealagali	46	M	1637	1/15/2015	202	222	36	140	41
70	sachin	21	M	39079	12/25/2014	217	230	35	87	30
71	shivamma	65	F	15081	5/12/2015	208	236	41	146	19
72	indrabai	35	F	1533	1/15/2015	140	233	30	88	18
73	sanjeev	35	M	1091	1/9/2015	166	88	25	137	28
74	panchayya	48	M	2147	1/20/2015	158	139	21	142	27
75	chidanand	39	M	3209	1/29/2015	212	229	33	73	40
76	neelamma	35	F	3497	2/1/2015	126	239	27	143	38
77	bouramma	35	F	4259	2/9/2015	123	221	22	136	39

78	basavraj	35	M	4102	2/8/2015	171	117	37	134	40
79	laxmibai	32	F	3132	2/4/2015	200	241	25	144	18
80	ashok	40	M	3874	2/5/2015	195	250	20	151	19
81	lokesh	60	M	5123	2/15/2015	168	237	21	152	22
82	chandrak	45	M	4898	2/21/2015	165	239	28	157	24
83	sanganagouda	20	M	1591	1/15/2015	154	164	30	115	19
84	umesh	30	M	3422	3/2/2015	106	222	24	160	28
85	lalitabai	45	F	6179	2/26/2015	123	231	33	35	38
86	ramesh	40	M	6629	2/28/2015	178	230	26	138	39
87	paruthayya	47	M	6865	3/24/2015	194	93	24	48	42
88	ramesh	34	M	7119	3/5/2015	193	225	25	144	25
89	shivanand	42	M	7616	3/8/2015	186	99	29	135	26
90	gururaj	28	M	7692	3/9/2015	135	224	28	145	27
91	shruti	20	F	8670	3/17/2015	156	220	26	150	18
92	subash	40	M	8136	3/14/2015	159	222	28	114	37
93	boramma	45	F	9312	3/24/2015	128	140	25	73	38
94	bhimappa	62	M	9535	3/26/2015	208	120	31	149	12
95	ahmedsha	68	M	8225	3/26/2015	101	202	51	139	18
96	davalmalik	45	M	8271	3/17/2015	195	222	24	160	38
97	malingaray	51	M	7952	3/24/2015	134	236	28	100	39
98	sharanappa	45	M	13114	4/27/2015	152	224	38	158	40
99	yallappa	38	M	13743	4/30/2015	259	230	41	149	18
100	shridevi	30	F	13752	4/30/2015	174	231	27	150	19
101	kasturibai	49	F	11739	4/14/2015	98	233	23	154	27
102	siddappa	42	M	10812	4/6/2015	162	242	38	154	37
103	vijayalakshmi	32	F	10579	4/4/2015	122	230	23	98	21
104	yamanwwa	48	F	11896	4/15/2015	194	68	29	159	20
105	mahadevi	50	F	12434	4/20/2015	186	180	35	124	18
106	ravi	33	M	12548	4/20/2015	241	244	28	139	16
107	manjula	34	F	12292	4/18/2015	201	156	19	96	22
108	raju	30	M	11892	4/15/2015	160	227	26	140	38
109	yalagond	56	M	11629	4/13/2015	79	229	25	141	39
110	nagappa	42	M	12350	4/19/2015	158	230	25	139	40
111	basappa	38	M	12659	4/21/2015	89	220	37	82	39
112	guranna	35	M	12774	4/22/2015	162	221	20	170	18
113	rajendra	55	M	12595	4/21/2015	173	232	26	74	19
114	shrishail	34	M	11871	4/15/2015	206	242	27	162	37
115	yankangonda	42	M	12115	4/17/2015	68	237	28	103	16
116	vishvanath	36	M	12303	4/18/2015	201	159	21	145	14
117	mallikarjun	45	M	12885	4/23/2015	304	236	28	137	38

118	dasarat	58	M	12020	4/16/2015	193	156	25	139	12
119	nagamma	35	F	12130	4/17/2015	91	160	38	150	21
120	shailaja	40	F	13518	4/28/2015	196	221	33	161	22