Chapter-I
Introduction
Acquired Immunodeficiency Disease Syndrome (AIDS), which is a chronic life-threatening condition, refers to the collection of syndromes and infections, resulting from specific damage to the immune system caused by human immunodeficiency virus (HIV) in humans (NIH, 2007). In case of HIV, the causing virus is different from most other viruses since it attacks the immune system, which provides ability to fight infections in the human body. Human immunodeficiency virus interferes with the body ability to effectively fight off viruses, bacteria and fungi that cause diseases. This virus destroys a type of white blood cells (T cells or CD4 cells), which fight disease and are responsible for immunity in human body. When this immune system is infected, some other infections that are opportunistic in nature also start occurring.

Human immunodeficiency virus is usually transmitted through direct contact of blood stream mucous membrane with a bodily fluid containing HIV, such as blood, semen, vaginal fluid, pre-seminal fluid and breast milk (Division of HIV/AIDS Prevention, 2003). This transmission may also come through anal, vaginal, or oral sex, blood transfusion, contaminated needles and syringes, exchange between mother and baby during pregnancy, childbirth, breast-feeding, or other exposure to one of the above bodily fluids.

Acquired immunodeficiency disease syndrome is the most severe manifestation of infection with HIV. Human immunodeficiency virus is a retrovirus that primarily infects vital components of the immune system, such as CD4 cells (a subset of T cells), macro-phases and dendrite cells. It directly and indirectly destroys the CD4+T cells, which are essentially required for proper functioning of the immune system. When human immunodeficiency virus kills CD4+T cells, the cellular immunity is lost, leading to the condition known as AIDS, thus, an acute HIV infection progresses over time to a latent HIV infection, and then, to early symptomatic HIV infection and
later to AIDS, which is identified based on amount of CD4+T cells in the blood and the presence of certain infections.

**CDC Classification of HIV/AIDS**

The Center for Disease Control and Prevention (CDC) originally classified AIDS as GRID, which stood for Gay Related Immune Disease but it was later determined that AIDS may not be isolated from homosexual people, hence, the name was changed to the neutral/AIDS. As already mentioned in 1993, CDC expanded the definition of AIDS to include all HIV positive people with a CD4+T cells count below 200 per µL of blood or 14% of all lymphocytes (CDC, 1993). For majority of the new AIDS cases, the developed countries now use either this definition or the pre-1993 CDC definition.

**Difference between HIV and AIDS**

A blood test can determine HIV, if the person is infected, however, if the person’s test is positive for HIV, it does not necessarily mean that the person has AIDS. A person with HIV may receive an AIDS diagnosis after developing one of the CDC defined AIDS indicator illness or based on certain blood tests (CD4 counts) and may not have experienced any serious illness. CD4 level lower than 200 means, the person has developed AIDS. Acquired immunodeficiency disease syndrome is a term made by a healthcare professional based on specific criteria established by the CDC.

In the absence of antiretroviral therapy, the median time of progression of HIV infection to AIDS is nine to ten years, and the median survival time after developing AIDS is only 9.2 months (Morgan, Mahe, Mayanja, Okongo, Lubega and Whitworth, 2002). By some other writer, the median time of initial infection to the full-blown AIDS has been estimated to range from 7.3 to 10 years or more. However, the rate of clinical disease progression between individuals varies widely from two weeks up to 20 years. Many factors affect the rate of progression. These include factors that influence the body’s ability to defend a person against HIV such as the infected person’s general immune function (Clerici, 1996). Older people have weaker immune system, and therefore, have a greatest risk of rapid disease progression than the younger ones. Poor access to health care and the existence of coexisting infections such as tuberculosis may also predispose the people to faster disease progression.
The genetic inheritance of infected people plays an important role, as some people are resistant to certain strains of HIV (Tang and Kaslow, 2003). It was found that people with CCRS-Δ32 mutations are resistant to infection with certain strains of HIV. Human immunodeficiency virus is genetically variable and exists as different strains, which cause different rates of clinical disease progression (Kaleebu, French, Mahe, Yirrell, Watera, Lyagoba, Nakiyingi, Rutebemberwa, Morgan, Weber, Gilks and Whitworth, 2002). Although most people with AIDS die within one year of diagnosis but as many as 15% survive only 5 years or longer.

Incidence and Prevalence (Global HIV/AIDS Estimates)

At the beginning of 1986, India had no reported case of HIV or AIDS (Ghose, 1986) despite over 20,000 AIDS cases worldwide. There was recognition, though, that this would not be the case for long, and concerns were about how India would cope once HIV and AIDS cases started to emerge. In 1987, a National AIDS Control Programme was launched to coordinate national responses. Its activities covered surveillance, blood screening and health education. By the end of 1987, out of 52,907, around 135 people were found to be HIV positive and 14 had AIDS. At the beginning of 1990s, as the infection rate was continuous to rise, the responses were strengthened. In 1992, the government set up NACO (the National AIDS Control Organization) to oversee the formulation of policies, prevention work and control programmes related to HIV and AIDS. In the same year, a strategic plan was launched, in which AIDS bodies in 25 states and 7 Union Territories were set up. It was able to make a number of important improvements in HIV prevention such as improving blood safety (NACO, 2006).

Most researchers believe that HIV originated in sub-Saharan Africa during 20th century (Gao, Bailes, Robertson, Chen, Rodenbury, Michael, Cummins, Arthur, Peterson, Shaw, Sharp and Hahn, 1999). By that stage, the cases of HIV infections had been reported in every state of the country (Kaker and Kaker, 2001). In the United States as on 31st December 2001, a total of 807,075 adults and adolescents had been reported having AIDS, with current estimates suggested around one million of these 462,653 (57%) have died. At the end of 2002, 42 million people were
estimated infected with HIV/AIDS worldwide, with an estimated 5 million people acquiring infection in 2002 and an estimated 20 million individuals have died from HIV worldwide. This shows the pace of increase in the sufferers every year. In 2005, more than 4 million people were newly infected with HIV and 25 million have died due to AIDS since the epidemic began. Acquired immunodeficiency disease syndrome has replaced malaria and tuberculosis (the world's deadliest infectious disease among adults), and that is why, it is claimed to be the fourth leading cause of death worldwide. Over 13 million children have been orphaned by the epidemic.

Human immunodeficiency virus had now spread extensively throughout the country. A 2004 NACO report revealed that the total number of people living with HIV had increased from 0.2 million in 1990 to 3.86 million in 2000, and by 2003, 5.1 million infections had been reported (NACO, 2004).

As on January 2006, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and WHO estimated that AIDS has killed more than 25 million people since it was first recognized on 5th June 1981, making it one of the most destructive epidemics in recorded history. In 2005 alone, AIDS claimed an estimated 2.4-3.3 million lives, of which more than 570,000 were children (UNAIDS, 2006). By the end of 2006, the United Nations Organization dealing with AIDS (UNAIDS) estimates that there are 39.5 million people worldwide living with HIV infection or AIDS, of these 2.3 million are children. The adult people living with HIV/AIDS are 37.2 million, women with HIV/AIDS 7.7 million, people newly infected 4.3 million and AIDS deaths 2.9 million in 2006. At the end of 2006, women accounted for 48% of all adult living with HIV worldwide and for 59% in sub-Saharan Africa. Young people (15-24 years old) account for half of all new HIV infections worldwide, around 6000 became infected with HIV every day.

One third of the deaths are occurring in sub-Saharan Africa, retarding economic growth and destroying human capital. Antiretroviral treatment reduces both the mortality and the morbidity of HIV-infection but routine access to antiretroviral medication is not available in all the countries (Palella, Delaney, Moorman, Loveless, Fuherer, Satten, Aschman and Holmbe, 1998). HIV/AIDS stigma is more severe than that associated with other life-threatening conditions and extends beyond the disease
itself to provide and even volunteers involved with the care of people living with HIV.

Global summary of AIDS epidemics 2010 reported that 34 million people are living with HIV, including 30.1 million adults (with 16.8 million women) and 3.4 million children below the age of 15. People who are newly infected with HIV are 2.7 millions including 2.3 million adults and children below the age of 15 are 3,90,000. Total 1.8 million deaths have been reported due to AIDS, out of which, 1.5 millions were adults and 250000 children below the age of 15 years.

In Africa, the number of MTCT and the prevalence of AIDS are being started to reverse decades of steady progress in child survival. Not only in Africa but also all over the world to meet HIV/AIDS, there are voluntary counseling and testing centers (VCTC), Prevention of Mother to Child Transmission (PMTCT) or Prevention of Parents to child transmission (PPTCT), antenatal care (ANC) services and for distribution of antiretroviral therapy, there are ART centers.

HIV/AIDS Statistics in India
The picture of HIV in India is equally worse. It has a population of the one billion, around half of whom are adults in the sexually active age group. The first case of HIV was detected in 1986, and until now, it is gradually increasing. Now, HIV infection has been reported in all states and union territories. The spread of HIV in India has been diverse, with much of India having a low rate of infection and the epidemic being extreme in the Southern half of the country and in the Far North East. The highest HIV prevalence tests are found in Maharashtra in the west, Andhra Pradesh and Karnataka in the South and Manipur and Nagaland in the northeast (NACO, 2006).

The rate of HIV infection is 21 per thousand and the total number of AIDS cases reported as on August 31st 1997 was 4846 (NACO, 1997), whereas, by 2005, the total number of AIDS cases are 24 lacs and 70 thousand (NACO, 2006). The Indian National AIDS Control Organization (NACO) estimates that 5.21 million people were living with HIV in 2005, giving adults prevalence of 0.9%. This represents a slight increase from the 2004 estimation and a substantial increase from
According to UNAIDS/WHO, between 2,70,000 and 6,80,000 Indians died due to AIDS in 2005 (UNAIDS/WHO, 2006).

As on July 2005, 92% all nationally reported AIDS cases have been found in 10 of the 38 states and union territories. The infection was mostly due to heterosexual contact, while infection was mainly found amongst injecting drug users in Manipur and Nagaland (NACO, 2005).

According to the HIV estimations 2012, the estimated number of people living with HIV/AIDS in India was 20.89 lakhs, with an estimated adult (age group 15-49 years) HIV prevalence of 0.27% in 2011. Children less than 15 years of age account for 7% (1.45 lakh) of all infections and 86% in the age group of 15-49 years. Of all HIV infections, 39% (8.16 lakh) are among women. The estimated number of PLHIV (People living with HIV/AIDS) in India maintains a steady declining trend from 23.2 lakh in 2006 to 20.9 lakh in 2011.

Diagnosis
Since 5 June 1981, so many definitions such as the Bengui definition and the 1994 expanded World Health Organization AIDS case definition have been developed for epidemiological surveillance. However, the clinical staging of patients was not an intended use for these systems since they are neither sensitive nor specific. In developing countries, the World Health Organization staging system for HIV infection and disease, the clinical and laboratory data are used, and in developed countries, the CDC classification system is used.

WHO Disease Staging System for HIV Infection and AIDS
In 1990, the World Health Organization grouped these infections and conditions together by introducing a staging system patient infected with HIV-1 (WHO, 1990), and an update took place in September 2005. Most of these conditions that are generally easily treatable in healthy people are opportunistic infections. The stages and conditions of HIV infections are given as under:

- **Stage 1**: Human immunodeficiency virus disease is asymptomatic, and hence, may not be categorized as AIDS.
- The stage of chronic asymptomatic infection (meaning a long duration of infection without symptoms) lasts an average of eight to ten years.

- The stage symptomatic infection, in which the body immune or defense system is suppressed and complications are developed, is known as the acquired immune deficiency syndrome. The symptoms are caused by the complications of acquired immune deficiency syndrome, which include one or more unusual infections or cancers, severe loss of weight and intellectual deterioration (called dementia).

Window Period
Antibodies to HIV typically develop within several weeks of infection. During this interval, the patient has the virus in his/her body but the standard antibody test gives negative report. This period is known as the window period, which is a term used to describe the period between HIV infection and the production of antibodies. During this period, an antibody test may give false negative result, which means, the test will be negative even when the individual is infected with HIV. To avoid false negative result, the antibody test is recommended three months after potential exposure to HIV infection. A negative test at three months will usually mean that the person is not infected with HIV. If the individual’s test is still negative at six months and has not been at risk of HIV infection in the meantime, it means, the person is not infected with HIV. However, it is important to note that if a person is infected with HIV, the person can still transmit the virus to others during the window period.

Transmission and Prevention
The human immune virus can enter in several possible ways. The chief transmission routes of HIV are sexual contact, exposure to infected body fluids or tissues and from mother to fetus or child during prenatal period (Markowitz, 2007).

Sexual
The risk of HIV transmission from exposure to saliva is considerably smaller than the risk from exposure to semen. Contrary to this popular belief, one has to swallow gallons of saliva from a carrier to run a significant risk of becoming infected (Mastro and Vincenzi, 1996). Now, it is well proved that human immunodeficiency virus is
also found in the saliva, tears and urine of the infected individuals, but due to very low concentration of virus in these biological body fluids, the risk is thought to be negligible. Rough sex also appears to increase the risk (Klimas, Koneru and Fletcher, 2008). Worldwide, approximately 30% of the women report that their first sexual experience was forced or coerced. It makes sexual violence a key driver of the HIV/AIDS pandemic. Sexual assault greatly increases the risk of HIV transmission as protection is rarely employed and physical trauma to the vaginal cavity that facilitates transmission of HIV (Koeing, Judd and Grech, 2004). In case of sexual assault, the chances of physical trauma to the vagina or rectum are higher, and hence, there may be a greater risk of concurrent sexually transmitted infections.

In high-income countries, the risk of HIV transmission from female to male is 0.04% per act and male to female 0.08% per act, whereas, in low-income countries, these rates are 4 to 10 times higher with transmission rates from female to male 0.38% per act and male to female 0.30% per act because of various reasons. The risk of HIV transmission from anal intercourse is 1.7% per act (Boily, Baggaley, Wang, Masse, White, Hayes and Alary, 2009), while it is less through oral sex but it is still present.

The most common way to acquire HIV infection is unprotected sexual relations where one partner has HIV. The virus can enter the body through the lining of vagina, vulva, penis, rectum, or mouth during vaginal, anal, or oral sex. Worldwide, the sexual contact between members of the opposite sex rather than between members of the same sex results in most cases of transmission. In the United States, most of the sexual transmission occurred in men who have sex with men (Markowitz and Kyrpides, 2007).

Sexual transmission occurs with the contact between sexual secretions of one partner with the rectal, genital, or oral mucous membranes of another. Unprotected receptive sexual acts are more jeopardy than unprotected insertive sexual acts with the risk for transmitting HIV from an infected partner to an uninfected partner through unprotected insertive anal intercourse and greater than the risk of transmission through vaginal intercourse or oral sex. Oral sex is also not without its risk since HIV is transmissible through both insertive and receptive oral sex (Rothenberg, Potterat, Woodhouse, Muth, Darrow and Klovdahl, 1998).
Human immunodeficiency virus itself is also a sexually transmitted infection (STI). On the other hand, sexually transmitted infection increases the risk of HIV transmission and infection since it causes genital ulceration and/or micro-ulceration, which provides entry point to HIV. Genital ulcers increase the risk approximately 5 folds (Boily, Baggaley, Wang, Masse, White, Hayes and Alary, 2009). Epidemiological studies from sub-Saharan Africa, Europe and North America have suggested that there is approximately a 4 times greater risk of becoming infected with HIV in the presence of a genital ulcer such as those caused by syphilis and/or chancroid. Studies show an increased risk in the presence of STIs such as gonorrhea, chlamydial infection and trichomoniasis, which cause local accumulations of lymphocytes and macrophages (Laga, Nzila and Goeman, 1991). Women are more susceptible to HIV-1 infection due to normal changes, vaginal microbial ecology and physiology and a higher prevalence of sexually transmitted disease (Sagar, Lavreys, Baeten, Richardson, Manaliya, Ndinya,Achola, Kresis and Overbaugh, 2004).

Keeping free of other STIs will help in reducing the risk of HIV infection but this alone will not protect from infection, hence, it is always important to use condoms. During a sexual act, only male or female condoms can reduce the risk of HIV transmission and other STIs, and simultaneously, the chances of becoming pregnant. Typically, the use of condom reduces the risk of heterosexual HIV transmission by approximately 80% over the long term, though the benefit is likely to be higher if condom is used correctly on every occasion (Cayley, 2004). The female condom made of polyurethane is also an alternative to the male condom, which allows it to be used in the presence of oil-based lubricants. However, at present, the availability of female condom is very less as compared to male condom, and also, the price of female condom is comparatively high, which remains prohibitive for many women.

The male latex condom, if used correctly and consistently without oil-based lubricants, is the single most effective available technology to reduce the sexual transmission of HIV and other sexually transmitted infections. It is advisable not to use the oil-based lubricants such as jelly, butter and lard with latex condom since they weaken the latex and make the condom porous. If necessary, the manufacturers may
recommend water-based lubricants (Durex, 2006). Studies based on discordant couples (where one partner is HIV infected and other one is non-reactive to HIV) show that with consistent condom use, HIV infection rate for the uninfected partner is below 1% per year (WHO, 2003).

The United States government and health organizations both endorse the ABC approach to lower the risk of acquiring HIV infection during sex. Abstinence or delay of sexual activity (especially for youth): being faithful: (especially for those are in committed relationship): condom use (for those who engage in risky behaviours). This approach has been successful in Uganda where HIV prevalence has decreased from 15 to 5%. However, criticism of the ABC approach is widespread because a faithful partner of an unfaithful partner is at risk of contracting HIV and that discrimination against women and girls is so great that they are without voice in almost every area of their lives (NIAID, 2006).

**Blood and Blood Products**

The second most frequent mode of HIV transmission is via blood and its products. This transmission route is particularly relevant to intravenous drug users (IDU), hemophiliacs and recipients of blood transfusions and blood products. This route can also affect the people who give tattoos and piercing. Health care workers are also at risk, although rarely. Universal precautions are recommended everywhere but are frequently not followed in both Sub-Saharan Africa and much of the Asia because of shortage of supplies and inadequate training. It is estimated that approximately 2.5% of all HIV infections in Sub-Saharan Africa are transmitted through unsafe health care injections (WHO, 2001). Because of this, the United National General Assembly, supported by universal medical opinion on the matter has urged the nations of the world to implement universal precaution to prevent HIV transmission in health care setting.

Sharing and reusing syringes and needles contaminated with HIV infected blood represent a major risk of infection with not only HIV but also of hepatitis B and hepatitis C. Needle sharing is the cause of one third of all new HIV infections and 50% of hepatitis C infections in Northern America, China and Eastern Europe. The risk of being infected with HIV from a single prick with a needle, which has been
used on an HIV infected person, is thought to be about 1 in 150. Post-exposure prophylaxis (PEP) with anti-HIV drugs can further reduce that small risk (Fan, 2005). In every medical setting, following universal precaution such as wearing latex gloves while giving injections and during operations and washing hands frequently after every medical procedure can also help in preventing HIV infection.

The risk from sharing a needle during drug injection is from 0.63 to 2.4% (average 0.8%), whereas, the chances of infection transmission during blood transfusions with infected blood is 93% (Baggaley, Boily, White and Alary, 2006). The risk of acquiring HIV via needle stick from HIV-infected person is about 0.3% and the risk following mucus membrane exposure to infected blood is 0.09% (Kripke, 2007). In the United States, intravenous drug user made up 12% of all new cases of HIV in 2009, and in some areas, more than 80% of people who inject drugs are HIV positive.

In developed countries, the risk of acquiring HIV from a blood transfusion is extremely low (less than one in half a million) due to improved donor selection and HIV screening of donated blood. However, according to WHO, the overwhelming majority of the world’s population does not have access to safe blood and between 5 and 10%, HIV infection worldwide is transmitted through transfusion of infected blood and blood products (WHO, 2001). The significant risks are also associated with invasive procedures, assisted delivery and dental care in this area of the world.

All AIDS prevention organizations advise the drug users not to share needles or syringes and even cotton balls, water for diluting the drug, straws, the spoon, crack pipes, etc. It is very important that either new syringe and needle or properly sterilized syringes and needles should be used. Even in some countries, clean-needles are available free of cost at injection site.

Human immunodeficiency virus can also spread via transfusion of contaminated blood or its components but very rarely all the blood products are tested to minimize this risk. If tissues or organs from an infected person are transplanted, the recipient may acquire HIV, hence, donors are now tested for HIV to minimize this risk.

Mother to child transmission
The transmission of virus from mother to child can occur during pregnancy, during delivery and after delivery via breastfeeding. It is the 3rd most common way by which HIV is transmitted globally. In the absence of treatment, the risk of transmission before or during birth is around 20% and 35% in those who also breastfed. However, when the mother has access to antiretroviral therapy and gives birth to a child by caesarian section, the rate of transmission is just 1% (Coovadia, 2004). In 90% of the children, vertical transmission is the main route of infection. With appropriate treatment, this risk can be reduced to 1%. A number of factors influence the risk of infection, particularly the viral load of the mother at the time of birth. The higher the viral load more will be the risk of transmitting HIV. The risk due to breast-feeding depends on clinical factors and may vary according to the pattern and duration of breast-feeding. Breast-feeding increases the risk of transmission by 10 to 15%.

Antiretroviral drugs, caesarean delivery and formula feeding reduce the chances of HIV transmission from mother to child (Sperling, Shapiro, Coombs, Todd, Herman, McSherry, O'Sullivan, Van-Dyke, Jamenez, Rouzioux, Flynn and Sullivan, 1996) but this is also important to know that to feed or not to feed a child is entirely a mother's decision. Current recommendations state that when replacement feeding is acceptable, affordable, sustainable, feasible and safe, the mother having HIV infection should avoid breast-feeding to her infant. If exclusive top feed is not possible then exclusive breast-feeding is recommended during first months of life and should be discontinued as soon as possible. In 2005, around 7 lac children under 15 contracted HIV, mainly through MTCT, with 6.3 lac of these infections occurring in Africa. It is estimated that 2.3 million children currently living with HIV, 2 million (almost 90%) live in sub-Saharan Africa (UNAIDS, 2006).

The viral load and CD4 count have a negative correlation. As the viral load increases, the CD4 count gets decreased. The viral load of an infected person is important both in heterosexual and vertical transmission. During first 2.5 months of an HIV infection, a person's infectiousness is 12 folds higher due to this high viral load (Dosekun and Fox, 2010).

The virus does not spread through casual contact such as preparing food, sharing towels and bedding, or swimming pools, telephones, toilet seats, hand
shaking, etc. The virus is also unlikely to be spread by contact with saliva, unless it is contaminated with blood, however, the virus does not spread through mosquito bite.

Complications and Symptoms of HIV/AIDS

Acquired immune deficiency syndrome is a collection of symptoms and infections resulting from the specific damage to the immune system caused by human immunodeficiency virus (Marx, 1982). A person living with HIV/AIDS (PLHA) often has systemic symptoms of infections like fevers, sweats particularly at night, swollen glands, chills, weakness, and weight loss (Goss, 1994). The late stage of conditions leaves an individual prone to opportunistic infection and tumors. The symptoms of AIDS are primarily the result of conditions that do not normally develop in individual with healthy immune system. The symptoms associated with AIDS are caused by bacteria, fungi, viruses and parasites that are normally controlled by the elements of immune system since in case of HIV infection, this normal immune system becomes damaged, and that is why, fails to fight with these infections and person becomes ill. Opportunistic infections are common in people with AIDS (Holmes, Losina, Walensky, Yazdan-Panah and Freedberg, 2003). A person who is HIV infected and yet not having AIDS, has no symptoms. The white blood cells are required to fight infection. As the count of white blood cells falls to dangerous levels, numerous infections and diseases emerge. At this point, a person is said to have AIDS. Some people experience signs and symptoms of HIV as soon as they become infected, while others do not. When the infection occurs, early signs and symptoms are often mistaken for the flu or a mild viral infection. As soon as HIV damaged the immune system, a person becomes infected with different opportunistic infections. Human immunodeficiency virus affects nearly every organ. According to the CDC, as with an initial HIV infection, one cannot rely on these signs and symptoms to establish a diagnosis of AIDS because the symptoms of AIDS are similar to the symptoms of many other illnesses.

Gastrointestinal illness related to HIV/AIDS

In 2004, the World Health Organization identified HIV/AIDS as the world’s most urgent public health challenge since AIDS represents the greatest lethal epidemic in recent history. In the case of HIV infection, gastrointestinal (GI) tract is a major site
of this disease. Almost half of the HIV-infected patients report the symptoms of gastrointestinal illness, and in almost all patients, gastrointestinal complications such as weight loss, anorexia, abdominal pain and diarrhea, are very common and usually non-specific. The diagnostic test of choice for most HIV-associated GI diseases is Endoscopy.

**Cancers related to HIV/AIDS**

People with AIDS also have an increased risk of developing various cancers such as Kaposi’s sarcoma, cervical cancer and cancers of the immune system known as lymphomas. There is no any worth explaining connection between HIV/AIDS and certain cancers but weakened immune system may be a reason. Another reason of these malignant cancers is co-infection with an organic DNA virus, especially herpes virus (KSHV) and human papilloma virus- HPV (Boshoff and Weiss, 2002). Most types of cancer begin when normal cells change and grow uncontrollably, forming a mass called a tumor. A tumor can be benign (non-cancerous) or malignant (can spread to other parts of the body). Some people with several risk factors never develop cancer, while others with no known risk factors do.

*Kaposi sarcoma* in people with HIV is often called epidemic Kaposi sarcoma and is the most common tumor in HIV infected patients. HIV/AIDS-related Kaposi sarcoma causes lesions to arise in more than one area of the body, including skin, lymph nodes and organs such as the liver, spleen, lungs and digestive tract. The appearance of this tumor in young homosexual men in 1981 was one of the first signals of AIDS epidemic. Kaposi sarcoma is a type of skin cancer that has traditionally occurred in older men of Jewish or Mediterranean descent, young men in Africa, or people who have had organ transplantation. It is estimated that a person with an HIV infection is 20,000 times more likely to develop Kaposi sarcoma as compared to a person without HIV infection. Kaposi sarcoma caused by a gamma herpes virus is called Kaposi’s sarcoma associated herpes virus (KSHV).

*Non-Hodgkin lymphoma* (NHL) is a cancer of the lymph system. Lymphoma begins when cells in the lymph system change and grow uncontrollably, which may form a tumor. The lymph system’s job is to fight infection. The lymph system carries lymphocytes fighting germs in the body. There are many different subtypes of NHL.
The most common subtypes of NHL in people with HIV/AIDS are primary central nervous system lymphoma (affecting the brain and spinal fluid), primary effusion lymphoma (causing fluid to build up around the lungs or in the abdomen), or intermediate and high-grade lymphoma. These particular cancers often foreshadow a poor prognosis.

*Cervical cancer* starts in a woman's cervix, which is lower narrow part of the uterus. Women with HIV/AIDS have a higher risk of developing cervical intraepithelial neoplasia (CIN), a precancerous growth of cells in the cervix, which is associated with human papillomavirus (HPV) infection. High-grade CIN can turn into invasive cervical cancer, which is also known as cancer of the cervix.

For people with HIV, these three cancers are often called *AIDS-defining conditions*, meaning that if a person with HIV infection has one of these cancers, he/she can signify the development of AIDS. The other less common types of cancer that may develop in people with HIV/AIDS are anal cancer, liver cancer, mouth cancer, throat cancer, lung cancer, testicular cancer, colorectal cancer and types of skin cancer including basal cell carcinoma, squamous cell carcinoma and melanoma. However, the incidence of many common cancers such as breast cancer or colon cancer does not increase in HIV infected patients. The areas where HAART is used extensively to treat AIDS, the incidence of many AIDS related malignancies has decreased, but at the same time, the malignant cancers overall have become the most common cause of death of HIV infected patients (Bonnet, lewden, May, Heripret, Jouglia, Bevilacqua, Costagliola, Salmon, Chene and Morlat, 2004).

**Common Opportunistic Infections**

People with advanced HIV infection are vulnerable to infections and malignancies that are called *opportunistic infections* since they take advantage of opportunity offered by a weakened immune system. Acquired immunodeficiency disease syndromes patient often develop opportunistic infections that present with non-specific symptoms, especially low-grade fevers and weight loss. These include mycobacterium avium-intracellulare and cytomegalovirus (CMU). Cytomegalovirus can cause colitis as described above and CMV retinitis can cause blindness and penicilliosis due to *penicillium*. Marneffeii is now the third most common
opportunistic infection (after extra pulmonary tuberculosis and cryptococcosis) in HIV-positive individuals within the epidemic area of Southeast Asia (Skoulidis, Morgan and Macleod, 2004). Different conditions typically occur at different stages of HIV infection. In early HIV disease, people can develop tuberculosis, malaria, bacterial pneumonia, herpes zoster, staphylococcal skin infections and septicemia. There are diseases that the people with normal immune systems can also get, but with HIV, these occur at a much higher rate. It also takes longer for a person with HIV to recover than it takes for someone with a healthy immune system.

When the immune system is very weak due to advanced HIV disease or AIDS, opportunistic infections such as PCP, toxoplasmosis and Cryptococcus develop. The infections that can spread to a number of different organs are known as disseminated or systemic disease. Many of the opportunistic infections that occur at this late stage can be fatal. Children with AIDS tend to get common childhood infections like conjunctivitis and tonsillitis but they experience symptoms much worse than the infection usually causes.

Excessive weight loss or wasting syndrome is a problem for approximately 20% of the people who have HIV infection. It is associated with an unexplained loss of 10% or more of normal body weight plus chronic diarrhea (30 days or more) or chronic weakness with fever (30 days or more). Unexplained chronic diarrhea in HIV infection is due to many possible reasons including common bacterial and parasitic infections. In some cases, diarrhea may be a side effect of several drugs used to treat HIV, or it may simply accompany HIV infection, particularly during primary HIV infection. It may also be a side effect of antibiotics used to treat bacterial causes of diarrhea. In later stages of HIV infection, diarrhea is thought to be a reflection of changes in the way the intestinal tract absorbs nutrients and may be an important component of HIV-related wasting (Guerrant, Hughes, Lima and Crane, 1990).

The rate of clinical disease progression varies widely between individuals and has been shown to be affected by many factors such as host susceptibility and immune function (Tany and Kaslow, 2003), health care and co-infections (Morgan, Mahe, Mayanja, Okongo, Lubega and Whitworth, 2002), as well as factors rating to the viral
strain. The specific opportunistic infections that AIDS patients develop depend in part on the prevalence of these infections in a geographic area in which the patient lives.

**HIV and TB Coordination**

Tuberculosis (TB) is the most common opportunistic infection in HIV infected patients. Since it is transmissible to immune competent people via respiratory route, it may occur in early stage of HIV disease. The Japanese research survey revealed that 0.37% of active TB patients were estimated to be HIV-positive. Over 60% of the HIV-infected patients with TB disease were diagnosed as having TB and being HIV-positive almost simultaneously. Tuberculosis is easily treatable once identified and is preventable with drugs therapy even though its incidence has declined because of the use of directly observed therapy (DOT) and other improved practices in Western countries. This is not in case of developing countries where HIV is most prevalent. All HIV-infected patients with diagnosed active TB should be started on TB treatment immediately and active TB patients but not yet on antiretroviral therapy (ART) should be treated with ART within 2 to 8 weeks of starting TB treatment depending on CD4 status. All HIV-infected persons are recommended to receive the test for LTBI and active TB disease could be prevented by application of World Health Organization.

In early stage of HIV infection, TB typically presents as a pulmonary disease. In advanced HIV infection, tuberculosis often presents typically with extra pulmonary disease. Symptoms are normally constitutional and can not localized to one particular site, often affecting bone marrow, bone, liver, regional lymph nodes, urinary and gastrointestinal tract and the central nervous system (Decker and Lazarus, 2002). Alternatively, the symptoms may relate more to the site of extra pulmonary involvement.

**Clinical personality patterns/Accompanying Psychological/Psychiatric Symptoms**

This ghastly disease does not only attack immune system but physiological, psychiatric, and psychological problems also occur as accompanists of HIV/AIDS. As with cancer or other life-threatening illness patient with HIV, the infection must adapt to a set of disease specific psychological, social and medical factors as well as general
threat to death. The impact of these factors on AIDS often leads to psychiatric symptoms such as anxiety, depression and even confessional states (Chandra and Ravi, 1995; Lyketsos, Hutton and Fishman, 1996; Perry, 1990).

Neurologists described several central nervous system (CNS) syndromes. Psychiatrists and other mental health professionals initially focussed on grief loss and supportive psychotherapy but soon recognized some specific psychiatric conditions or clinical patterns, including AIDS dementia, AIDS Mania, increased rates of major depression and psychiatric consequences of CNS involvement with HIV opportunistic infections. The other nervous system complications that occur as a result of the disease or the drugs used to treat it include pain, seizures, shingles, spinal cord problems, fever, lack of coordination, painful swallowing, anxiety disorder, depression, loss of vision, destruction of brain tissue and coma. These symptoms may be mild in early stages of AIDS but may become progressively severe. The basic clinical patterns, which are dealing neuroses, involve conditioned fear, which renders the individual particularly vulnerable to stresses to which the most people can cope with effectively. This vulnerability, in turn, leads to a causal chain of stress-anxiety-avoidance-reinforcement. In this way, the neurotic avoidance behaviour tends to be self-defeating and perpetuating. There are so many specific clinical or neurotic patterns like anxiety neurosis, phobic neurosis, obsessive-compulsive neurosis, hysterical neurosis, hypochondriacal neurosis, neurasthenic neurosis and depressive neurosis to discuss. It may be noted that specific neurotic patterns may vary from time to time and those aspects of different patterns may be combined in a given case.

The symptoms of anxiety and depression are commonly encountered in patients with AIDS, and they often represent an individual difficulty in adjusting the stressors of confrontation with illness, disability dependency, or death (Perry and Tross, 1984). In India, higher rates of anxiety and depression have been reported and are probably related to lack of awareness regarding disease and inadequate counseling facilities (Brown, Rundell and Mcmamis, 1992; Madan, Singh and Golecha, 1997). As with cancer or other life-threatening illness patient with HIV, the infection must adapt to a set of disease specific psychological, social and medical factors as well as general threat to death. The impact of these factors on AIDS often leads to psychiatric
symptoms such as anxiety, depression and even confessional states (Chandra and Ravi, 1995; Lyketsos, Hutton and Fishman, 1996; Perry, 1990).

Depression is a significant problem among persons with HIV/AIDS. A recent meta-analysis of 10 studies comparing HIV positive and HIV negative patients found a two folds increase in the prevalence of major depression in patients infected with HIV (Ciesla and Roberts, 2001). Major depression in HIV infected population is seen 5.8% and is similar to that seen in other chronic medical conditions (Perkins, Stein and Golden, 1994). During the course of illness, changes may occur in rates of depression. A two years follow up study has revealed that 10 to 25% of sero-positive men report depression during the course of illness (Catalan, Klimes and Day, 1992).

High prevalence rates of suicide have been reported among HIV infected patients (Cournos, Empfield and Horwath, 1991; Grassi, 1996; Pugh, O'Donnell and Catalan, 1993; Weinharat and Carey, 1995). HIV infection carries such enormous emotional upheavals in an infected individual's life that suicide has been considered natural concomitant (Bellini and Brushi, 1996; Pergami, Gala and Burgers, 1994; Perry, 1990; Strance, 1993).

The prevalence of mania has been found to increase in patients with AIDS when compared with the general population (Holahan and Moos, 1987; Kieburtz, Zettelmaier and Ketonen, 1991). Another study among patients revealed a 29 months prevalence of secondary mania in 1.2% with HIV and 4.3% in those with AIDS (Ellen, Judd and Mijch, 1999). Mania has also been associated with HIV infection itself and has also been seen in individuals in cognitive disturbances (Schmidt and Miller, 1988). According to different studies, the prevalence rate of psychosis is 0.1-5% and is most often found in the late stages of illness. Usually, presented as acute psychosis, the clinical picture is characterized by hallucinations, delusions and thought disorder. However, associated effective symptoms in the form of anxiety and depression are common (Sewell, Jeste, Atkinson, Heaton, Hesselink, Wiley, Thal, Chandler, Grant and HNRC Group, 1994).
By virtue of its relationship with risk behaviour, the social stigma associated with it and the malignant course that it usually follows, HIV infection has following psychological ramifications:

- Firstly, the patient’s background and premorbid personalities are important in determining risk behaviours, and psychopathology may actually precede seroconversion in these groups.

- Secondly, the patients infected with HIV may manifest a number of psychiatric syndromes because of the neurotropicity of the virus and by its effect on brain tissues.

- Thirdly, the HIV infection carries with it tremendous emotional issues such as stigmatization, issues related to terminality and frequent infections leading to psychiatric syndromes, which will need effective intervention, and finally, the patients suffering with psychiatric disorders, might be prone to acquire HIV infection because of their faulty judgment.

Therefore, the psychological factors not only lead to psychological and psychiatric disorders but also affect the brain by following ways:

- By directing neural damage

- By opportunistic infections of the brain occurring due to immuno-suppression

  (Anders, Guerra and Tomiyasu, 1986; Gray, Gherardi and Scaravilli, 1988)

1. Direct neuronal Damage

Human immunodeficiency virus has been recovered from the CSF of patients at any stage after infection, and a number of studies have reported isolating the HIV virus from the brain in autopsies (Anders, Guerra and Tomiyasu, 1986; Masliah and Achim, 1992). Central nervous system infection by the HIV viruses mainly leads to subcortical damage (Goethe, Mitchell and Marshall, 1989). However, recent work has also shown the presence of cortical atrophy (Goethe, Mitchell and Marshall, 1989; Wilkie, Eisdorfer and Morgan, 1990). In sub-cortical area, there is evidence of inflammatory changes with sever vacuolation and gliosis, and in deeper regions, perivascular inflammatory cells are noted along with multinucleated giant cells
(MNGCs), which are pathognomonic of HIV encephalitis. In cortex, there is a significant loss of large cortical neurons within neocortex and hippocampus, and the post-synaptic dendritic spines show evidence of vacuolation. The latter is possibly the reason for the effect of HIV on cognitive functions occurring due to its influence on neurotransmission (Wilkie, Eisdorfer and Morgan, 1990).

Human immunodeficiency virus does not enter the CNS as a viral particle and can not infect directly since the CNS do not have a CD4 viral receptor, instead, the virus enters the CNS in latent form inside a monocyte, commonly known as the Trojan horse mechanism. A monocyte on entering the CNS differentiates into a macrophage, which is a productively infected cell (Chrysikopoulos, 1996). The virus does not affect the nerve cells directly but it affects their health and function. The resulting inflammation may damage the brain and spinal cord and cause symptoms such as confusion and forgetfulness, behavioral changes, headaches, progressive weakness, and loss of sensation in the arms and legs. Cognitive motor impairment or damage to the peripheral nerves is also common.

The CNS infection usually occurs late in the course of HIV infection, though some changes are visible even in the early stages, which might account for cognitive difficulties even in the asymptomatic stage (Ketzler, Weis, Haug and Budka, 1990).

2. Brain damage because of opportunistic infections and tumors

Majority of the CNS damage, which includes infections such as Cryptococcus meningitis, toxoplasmosis and opportunistic viral infections, is caused by opportunistic infections. The brain in this immuno-compromised state is likely to be infected by a number of other innocuous organisms and fungi. Therefore, it is important to keep a few important issues in mind when discussing these syndromes:

- Firstly, a number of HIV infected individual might have preexisting psychiatric morbidity. This is particularly so in individuals indulging in high-risk behavior. Many of the groups at high risk of HIV infection may be elevated risk for psychopathology, which preceded sero-conversion.

- Secondly, the various psychotic syndromes or minor forms of psychological disturbance, which may vary from one to another stage, can be seen at various
points of HIV infection and. There are several critical phases during the course of infection when psychiatric morbidity is more common (Atkinson, Grant and Kennedy, 1988; Dew, Ragni and Nimorwicz, 1990). These phases are related to testing, sero-conversion, the asymptomatic phase and once the clinical manifestation starts.

- Thirdly, the psychiatric symptoms are occurring as a reaction to the illness and the coexisting problems, or a part of the neurological insult caused by the virus, opportunistic infections, tumors, or metabolic disturbances because of coexisting infections. Human immunodeficiency virus cytopathic effects may occur during early infection, leading to psychiatric morbidity even before the appearance of full-blown AIDS syndrome like secondary mania, occurring because of the medical complication of HIV, or pharmacological treatment can emerge anytime during HIV infection (Goodwin and Jasmison, 1990). Psychiatric syndrome can also occur as a side effect of drugs being used to treat the infection.

- In the United States, neurological complications are seen in more than 50% of the adults having AIDS. Nervous system complications in children may include developmental delays, loss of previously achieved milestones, brain lesions, nerve-pain, eye problems, skull-size smaller than normal, slow growth and recurring bacterial infections.

Progressive multifocal leukoencephalopathy (PML) is a demyelinating disease in which gradual destruction of Myelin sheath covering the axons of nerve cells impairs the transmission of nerve impulses. It is caused by a virus JC virus, which accrue in 70% of the population in latent form, causing disease only when the immune system has been severely weakened as in the case of AIDS patients. It progresses rapidly, usually causing death within month of diagnosis (Sadler and Nelson, 1997).

Toxoplasmosis is a disease caused by the single parasite (Toxoplasma gondii), which usually infects the brain causing toxoplasma encephalitis but it can also infect and cause disease in the eye and lungs (Luft and Chua, 2000).
These psychiatric symptoms and other complications are not only a problem on its own but also lead to many other problems that cause resistance to the treatment. HIV infected patients with psychiatric illness may have great difficulty in modifying risk behaviour. Psychiatric disorder can also adversely affect the treatment of HIV infection primarily through undermining adherence and taking medications, thus, the same psychiatric disorders that prevent the patients from reducing their risk prevent them from obtaining benefit of the treatment. Not only this but the psychiatric morbidity has become a leading cause to an increased potential for the spread of HIV epidemics as untreated patients with high viral loads are more infectious (Niccolo and Glenn, 2005)

Studies have shown that depression has a negative effect on patients' adherence (Dimatteo, Lepper and Croghan, 2000) and quality of life (Lenz and Demal, 2000). The response of highly active antiretroviral treatment (HAART) is impaired by poor adherence, a substantial component of which is related to mental illness and substance use disorder. Some studies show that the clinical personality patterns negatively affect the treatment of AIDS since major depression has a profound impact on adherence. These patients show a decreased interest in overall self-care, and specifically, they ignore symptoms and medical problems. In particular, ART compliance has been shown markedly decreased among patients infected with HIV and depression.

All this indicates that there is a need of psychiatric evaluation and treatment interventions for these clinical personality patterns. In psychology besides the medical treatment, importance is laid on the factors like coping. In other words, it is important to look for better coping style/strategy so that these problems can be minimized.

Treatment
Recently, clinical scientists have developed powerful new combinations of drugs that seem to suppress the virus in those infected with HIV, thereby delaying the onset of AIDS. However, there is no vaccine or cure for HIV/AIDS. Once a person gets HIV infection, he or she will be a patient of AIDS eventually. The only way of prevention is to avoid the exposure of HIV. In case of needle prick injury for medical practitioners or professionals, an antiretroviral treatment directly after a highly significant exposure, called Post-exposure Prophylaxis (PEP) is available. Post-
exposure Prophylaxis drugs have a very demanding 4 weeks schedule of dosage. It also has a number of unpleasant side effects including diarrhea, malaise, nausea and fatigue.

In current scenario, HIV infection consists of Highly Active Antiretroviral Therapy- HAART. This has been highly beneficial to many HIV infected individuals since its introduction in 1996 when the protease inhibitor-based HAART initially became available. Current HAART option consists of at least three drugs belonging to at least two classes of antiretroviral agents. Typical regimens consist of two nucleoside analogue reverse transcriptase inhibitors (NNRTI). Since HIV disease progression in children is more rapid than in adults and laboratory parameters are less predictive of risk for disease progression, particularly for young infants, the treatment recommendations are more aggressive for children than for adults. HAART allows the stabilization of the patient’s symptoms and viremia but it neither cures the HIV patients nor alleviates the symptoms and high levels of HIV-1, often HAART resistant, return once the treatment is stopped (Dybul, Fauci, Bartlett, Kaplan and Pau, 2002). Moreover, it would take more than the lifetime of an individual to be cleared of HIV infection using HAART (Blankson, Persaud and Siliciano, 2002). In developed countries where HAART is available, doctors assess the viral load, rapidity in CD4 decline and patient’s readiness while deciding when to recommend initiating treatment.

The use of highly active antiretroviral therapy prolongs both the median time of progression to AIDS and the median survival time. Though there is a hopeful development, it does not seem to cure since the most recent evidence suggests that the virus is seldom if ever eliminated but rather lies in reduced numbers.

The current average survival time with antiretroviral therapy is estimated to be more than five years (Schneider, Gange, Williams, Anastos, Greenblatt, Kingsley, Detels and Munoz, 2005). However, since new treatments continue to be developed and HIV continues to evolve resistance to treatments, the estimates of survival time are likely to continue to vary. Without antiretroviral therapy, death normally occurs within a year. Most patients die from opportunistic infection or malignancies associated with the progressive failure of the immune system (Lawn, 2004).
The anti-retroviral drugs are expensive, and majority of the world’s infected individuals do not have access to medication and treatment for HIV and AIDS. Research to improve current treatments includes decreasing side effects of current drugs, further simplifying the drug regimen to improve adherence and determining the best sequence of regimens to manage drug resistance. Only a vaccine is postulated to be able to halt the pandemic. This is because a vaccine would possibly cost less, thus, being affordable for developing countries and would not require daily treatment. However, after over 20 years of research, HIV-1 has been remained a difficult target for a vaccine (Ferrantelli, Cafaro and Ensoli, 2004).

In the absence of HAART, progression from HIV infection to AIDS occurs at a median of 9-10 years, and the median survival time after developing AIDS is only 9.2 months. In approximately more than 50% cases, HAART achieves far less than optimal result. This is due to a variety of reasons such as medication intolerance or side effects, prior ineffective antiretroviral therapy and infection with a drug-resistant strain of HIV. However, non-adherence and non-persistence with ART is the main reason, the most individuals fail to get any benefit from and develop resistance to HAART (Becker, Dezii, Burcet, Kawabata and Hodder, 2002).

The development of HAART as effective therapy for HIV infection and AIDS has substantially reduced the death rate from this disease in those areas where it is widely available. This has created the misperception that the disease has gone away. In fact, as the life expectancy of persons with AIDS has increased in countries where HAART is widely used, the number of persons living with AIDS has increased substantially. In the United States, the number of persons with AIDS increased from about 35,000 in 1988 to over 220,000 in 1996 (CDC, 1996).

A number of studies have shown that the measures to prevent opportunistic infections can be beneficial when treating with HIV infection or AIDS. Vaccination for hepatitis A and B is advised for patients who are not infected with these viruses and are at risk of becoming infected. Intake of multivitamins daily has been found to reduce HIV disease progression among men and women. This could become our important low-cost intervention provided during early HIV disease to prolong the
time before antiretroviral therapy is required (Fawzi, Msamanga, Spiegelman and Hunter, 2005).

When HIV grows (that is by reproducing itself), it acquires the ability to change (mutate) its own structure. This mutation enables the virus to become resistant to previously effective therapy. The goals of drug therapy are to prevent damage to the immune system by the virus and to halt or delay the progress of infection to symptomatic disease. Therapy for HIV includes combinations of drugs that decrease the virus growth to such an extent that the treatment prevents or markedly delays the development of viral resistance to the drugs. The best combination of drugs for HIV has not yet been defined but one of the most important factors is that the combination should be well tolerated so that it can be followed consistently without missing doses.

The main problem related to highly active antiretroviral therapy (HAART) is non-adherence and non-persistence to HAART due to varied and overlapping reasons. The major psychological issues such as poor access to medical care, psychiatric disease, inadequate social support and drug abuse contribute to non-adherence. Another negative aspect related to HAART is its complexity and it is due to pill numbers, dosing frequency, meal restrictions, or other issues along with side effects that create international non-adherence also has a hefty impact. The side effect includes lipodystrophy, dyslipidaemia, insulin resistance, an increase in cardiovascular risks and birth defects (Saitoh, Hull, Franklin and Spector, 2005).

The discussion in the above section has manifested that the HIV/AIDS is an incurable disease, which is actually fatal. The disease is prevalent throughout the world including India. It is accompanied by many other physiological/biological opportunistic infections, multiplying the poor health conditions of the patients many folds. Central nervous system of neurological infections also looks for the opportunity to attack and often succeed. The story does not end up here. The psychological problems of dealing with stigma, disease related fears, the process of managing the disease, adherence, etc. all bring many clinical patterns and behaviours in the personality of an individual. Need not to say that the condition is physically, mentally and emotionally painful and is severe source of stress, hence, it needs a planned coping.
Coping Strategies

Each individual with HIV infection is unique like any other individual and will have different problems. In the same manner, each individual suffering from HIV/AIDS adopts a different style and strategy to cope up. Most of the health experts believe that the overwhelming majority will go on to develop AIDS. Thus, a person who is HIV infected lives with a majority of threatening events coupled with substantial uncertainty fear and appears to be a short-term increase in psychological distress. There has been a recent growth of research dealing with coping strategies. This research provides a large amount of evidence that helps in explaining the strategies by which people cope with stress (Lazarus and Folkman, 1984). Stress has been associated with many diseases such as cancer, cardiovascular disease and substance abuse. The coping strategies refer to the specific efforts, both behavioural and psychological that the people employ to master, tolerate, reduce, or minimize stressful events. It is a general propensity to deal with stressful events in a particular way (Folkman and Lazarus, 1980). While stress has been defined in many ways, all of the definitions involve an environmental demand to which the person must react and where the stress is perceived as at least Racial Identity Development and Psychology potentially exceeding the person’s ability or resources to meet the challenges (Belgrave and Allison, 2010).

According to Belgrave and Allison (2010), coping refers to the efforts to master environmental demands when a previous response is unavailable or ineffective. This is similar to the definition, which is proposed by Utsey and Ponterotto (2000). Stress and coping responses are linked with cognitive appraisal of the stressor and the internal or external resources of the person. Cognitive appraisal refers to the significance and meaning attached to a stressor. Internal resources refer to individual factors, personality traits, racial identification, social class and cultural beliefs, and the external resources refer to the family or social ties, work relationships and church affiliations. The model then is one where the stressor(s), an appraisal of the stressor(s) and the person’s internal or external resources in turn produce a coping response that leads to an adaptive or distressful outcome (Belgrave and Allison, 2010).
Lazarus and Folkman (1984) defined coping as *constantly changing cognitive and behavioural efforts to manage, reduce, or tolerate external and/or internal demands that are appraised as taxing or exceeding resources of the person.* Accordingly, it seems convincing as highlighted by Lazarus (1966) that coping is a process that depends on the situational context in which it occurs, which is employed every day. One engages in coping when one feels under stress or wants to manage a taxing situation (Lazarus, 1991). While defining coping in this way, Lazarus and Folkman (1984) argued that coping (i) is process-oriented rather than trait based, (ii) should not be confounded with outcomes of these efforts to manage stress and (iii) should not be confounded with successful environment mastery because it focuses mostly on those attempts to master the environment. Anyder and Dinoff (1999) defined coping as a response aimed at diminishing the physical, emotional and psychological burden, which is linked to stressful life events and daily hassles. They further explained that effectiveness of coping modes is linked to their dual ability to reduce psychosocial distress and ultimately to foster long-term psychological wellbeing.

Coping resources can be drawn from the person or the environment and include at least 5 categories, *i.e.*, health/energy/moral, problem solving skills, social networks, utilitarian resources (*e.g.*, money and social agencies) and both general and specific beliefs. Maddi and Kobasa (1984) divided coping strategies into two forms transformational strategy where altering the events is involved so that they are less stressful, and regressive strategy wherein one thinks about the events pessimistically and acts evasively in order to avoid contact with them. According to Matheney, Aycock, Pugh, Curlette and Silva-Canella (1986), there are two main categories of coping efforts, *i.e.*, preventive coping and combating coping.

**Preventive Coping:** In preventive coping, people try to prevent stressors from appearing through cognitive restructuring that alters the perception of demand or through increasing resistance to the effects of stressors. The skill involved in preventive coping may involve changing habitual behaviour patterns, such as sedentary life-style, increasing optimism and self efficacy that requires long-term efforts and may be difficult to achieve.

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Combating Coping: In combating coping, a stressor triggers a defensive counterstrike, in which attempt is made to subdue or defeat the stressor in some fashion. The strategy is essentially reactive. It includes progressive muscle relaxation, stress monitoring, problem solving, assertiveness training, etc.

An additional distinction, which is often made in the coping literature, is between active and avoidant coping strategies. *Active coping* strategies are either behavioral or psychological responses designed to change the nature of stressor itself or how one thinks about it, whereas, *avoidant coping* strategies lead the people into activities (such as alcohol use) or mental states (such as withdrawal) that keep them from directly addressing stressful events. Generally speaking, active coping strategies, whether behavioral or emotional, are thought to be better ways to deal with stressful events, and avoidant coping strategies appear to be a psychological risk factor or marker for adverse responses to stressful life events (Holahan and Moos, 1987).

There are many ways of coping with stress. Their effectiveness depends on the type of stressor, the particular individual and the circumstances, e.g., if one thinks about the way how the other friends deal with stressors like exams, there will be a range of different coping responses. There is widespread conviction among health care professionals that coping affects emotion. Yet theory and research have traditionally emphasized the effects of emotion on coping, whereas, coping was associated with changes in emotions, with some forms of coping associated with increases in positive emotions and other forms associated with increases in negative emotions (Folkman and Lazarus, 1988). Another conceptual distinction has been suggested between *assimilative* and *accommodative* coping, the former aiming at an alteration of the environment to oneself and the latter aiming at an alteration of oneself to the environment (Brandtstadter, 1992). This pair has also been coined *mastery versus meaning* (Taylor, 1983) or *primary control versus secondary control* (Rothbaum, Weisz and Snyder, 1982). These coping preferences may occur in a certain time order, e.g., when individuals try first to alter the demands that are at stake, and after failing, turn inward to reinterpret their plight and find subjective meaning in it.
Coping has also a temporal aspect. One can cope before a stressful event takes place, while it is happening, e.g., during the progress of a disease, or afterwards. Beehr and McGrath (1996) distinguished five situations that create a particular temporal context, viz. (i) Preventive coping: long before the stressful event occurs or might occur, e.g., a smoker might quit well in time to avoid the risk of lung cancer, (ii) Anticipatory coping: when the event is anticipated soon, e.g., someone might take a tranquillizer while waiting for surgery, (iii) Dynamic coping: while it is ongoing, e.g., diverting attention to reduce chronic pain, (iv) Reactive coping: after it has happened, e.g., changing one's life after losing a limb, and (v) Residual coping: long afterward, by contending with long-run effects, e.g., controlling one's intrusive thoughts years after a traumatic accident has happened.

There are varieties of more specific coping strategies such as moving with, moving toward, moving against and moving away. Therefore, it is clear that many researchers have classified the coping strategies differently and there seems no clear understanding about the classification of coping strategies but all the researchers have agreed on one point that coping serves one of the two functions, i.e., (i) problem solving and (ii) emotional regulation (Hamburg, Coelho and Adams, 1974; Lazarus, 1975). Lazarus and Folkman (1984) have also suggested that based on functions, coping strategies can be classified as (i) problem focussed coping and (ii) emotion focussed coping.

The structure of coping was examined in three studies by means of Wherry's approach to hierarchical factor analysis. A hierarchical model with three levels was identified that included eight primary factors, four secondary factors and two tertiary factors. The eight primary factors (problem solving, cognitive restructuring, emotional expression, social support, problem avoidance, wishful thinking, self-criticism and social withdrawal) identified dimensions of coping found in previous empirical research and theoretical writing. The emergence of four secondary and two tertiary factors provided empirical support for two theoretical hypotheses concerning the structure of coping. Support for the constructs of problem- and emotion-focussed coping hypothesized by Lazarus was obtained at secondary level, and support for the constructs of approach and avoidance coping hypothesized by many theorists was
obtained at tertiary level. These findings suggest that both the formulations may describe the structure of coping, albeit at different levels of analysis (David, Kenneth, Russ and Joan, 1989).

**Problem-focused coping:** It is a coping style in which the individual faces the problem head on, i.e., the person actively takes action to fix or resolve the problem. PFC is an action that has the goal of removing or circumventing the source of stress. This coping strategy includes cognitions and behaviours that are directed at analyzing and solving the problem. It may include *chunking* or *breaking* a problem into more manageable pieces. Sometimes, delaying and suppressing action is seen as a separate problem solving strategy. Delaying action of decisions may be used in health circumstances in which people are waiting for the outcome of tests, and suppression action may be useful in avoiding actions that may make a problem worse, such as acting in anger.

**Emotion-focused Coping:** A coping style in which the individual tries to diminish his or her negative emotions resulting from stress and is an attempt to reduce or eliminate the emotional distress associated with or cued by the stressful situation. People use behavioural and cognitive strategies to manage their emotional reaction to stress. Behavioural strategies include seeking out others who offer social support, using alcohol or other psychoactive drugs, of keeping their self busy to distract attention to the problem. Cognitive strategies involved changing how a stressor is appraised or denying unpleasant information. People tend to rely in emotion focussed coping when they believe little or nothing can be done to alter stressful situation or when they believe that their coping resources or skills are insufficient to meet demands of the stressful situation.

It is important to know the nature of emotion-focused coping. Past theorists have applied this label to a wide range of coping responses, e.g., Billings and Moos (1984) used it to refer to responses as diverse as *told myself things that helped me feel better* and *tried to reduce tension by drinking more*. Similarly, Folkman and Lazarus (1985) considered wishful thinking, self-blame, tension reduction and self-isolation all to represent emotion-focused coping, but according to Michael, Jagdish and Charles (1986), it is a serious oversimplification to treat these various strategies solely
in terms of their relevance to emotions. Each strategy serves functions other than dealing with emotions, and these separate functions diverge in their implications for successful coping, e.g., to make a positive reinterpretation, or to look at things in a better light, seems likely to induce a redirection of attention to more problem-focussed coping strategies. On the other hand, an action involving disengagement is more likely to remove a person from continued efforts at problem-focussed coping, which may ultimately be dysfunctional. Folkman and Lazarus (1985) believed that emotion focussed coping can either facilitate or impede problem-focussed coping and coping as a process often occurs over an extended period. However, one can go beyond that statement, suggesting that it is important to examine each type of emotion-focussed coping in terms of its other function or functions.

Folkman, Lazarus, Gruen and DeLongis (1986) have elucidated a variety of more specific coping styles. According to them, the problem focussed coping involves three distinct coping styles, i.e., (i) confrontative coping, which is characterized by aggressive efforts to change the situation, (ii) seeking social support, which is characterized by efforts to obtain emotional comfort and information from others and (iii) painful problem solving, which describes deliberate problem focussed efforts to solve the situation.

Usually, five strategies are employed in emotion-focussed coping, i.e., (i) self control, meaning deliberate efforts to regulate one's feelings, (ii) distancing, meaning efforts to detach oneself from the stressful situations, (iii) positive appraisal, which involves characterized efforts to find positive meaning in the experience by focusing on personal growth, (iv) accepting responsibility, which involves acknowledge one's role in the problem and (v) escape/avoidance, meaning described wishful thinking or efforts to escape or avoid the situation by eating, drinking, etc. Research indicates that people use both types of strategy to combat most stressful events. The predominance of one type of strategy over another is determined, in part, by personal style (e.g., some people cope up more actively than the others may) and by the type of stressful event. Actually, it is the belief of patients about the control of disease and related factors that determine the coping style of the patients.
Problem-focussed and emotion-focussed coping can occur together in the same coping context. The predominance of one type of strategy over another is determined, in part, by personal style (e.g., some people cope more actively than the others do) and also by the type of stressful event. Problem-focussed coping is generally more likely in situations where people believe that something constructive can be done about the stressor. Emotion-focussed coping is more likely when people believe that the situation is one that must be endured, e.g., people typically employ problem-focussed coping to deal with potential controllable problems such as work-related problems and family-related problems, whereas, the stressors perceived as less controllable, such as certain kinds of physical health problems, prompt more emotion-focussed coping (Folkman and Lazarus, 1980; McCrae, 1984). It is well discussed that coping, whether problem-focussed or emotion-focussed, will eventually ameliorate the stress, however, attempts to cope with difficult circumstances are not always successful. If people find that they cannot remove or even reduce the threat, they may give up their efforts to attain the goals that are impeded by the stressor (Carver and Scheier, 1985). Such a giving-up response or disengagement though not a central element of Lazarus's model seem inconsistent with it.

There are many studies, which differentiate between the comparative effectiveness of these two strategies, and at the same time, it has been reported that these two strategies can be used simultaneously and can be supplementary to each other. Joseph and Hurrell, 1995) and McQueeney, Stanton and Signon, (1997) reported that both of these strategies are used either simultaneously or interchangeably in dealing with stress and chronic illness. However, Park, Folkman and Basstrom (2001) found the problem focussed coping to be more effective than emotion focussed coping in dealing with various diseases, e.g., AIDS, mental health, etc. Usually, active problem-focussed coping strategies have been encouraged since they are considered more beneficial than passive emotion-focussed strategies. Such strategies could be adaptive in a society with scarce resources (Dageld and Duckert, 2008). Emotional focussed coping tends to be associated with poorer adjustment outcomes with HIV/AIDS (Endler, Parker and Summerfeldt, 1998; Park, Folkman and Basstrom, 2001). Sometimes, it has also been reported that both problem focussed
and emotion focussed coping strategies are equally effective and no one is better than other coping strategy (Kramer, 1993).

Although there are many reports of high level of psychological distress and psychiatric morbidity in people living with HIV/AIDS, but still, there are limited poles of intervention studies. Less work is found on the relationship of coping strategies and clinical personality patterns in HIV/AIDS patients.

Nilson and Ross (1999) found that low level of psychological distress in HIV infection was associated with the use of problem solving, positive reappraisal and information-seeking coping strategies. The use of wishful thinking, avoidance, isolation and fanaticism was associated with decreased distress and lower level of well being. Chan, Au, Li, Chung, Lee and Yu, 2006) examined the relationship among illness related factors, stress coping strategies and psychological distress in HIV infected persons. Results show that positive thinking was inversely related to psychological distress, and avoidance was associated with higher level of anxiety. However, the use of problem solving was found inversely related to anxiety. Olley, Gxamza, Seedat, Theron, Taljaard, Reid, Reuter and Stein (2003) compared psychiatric morbidity, coping responses and disability in male and female outpatients recently diagnosed with HIV/AIDS and found that women were more likely to use coping strategies of planning and religion to deal with illness.

Sonawat (1998) identified the psychosocial problems faced by 30 HIV/AIDS patients and the mechanisms they adopt to cope with the situation. Most patients show constructive coping with positive reinterpretation and growth and an active participation in their health programme. About 40% had accepted the problem, seeking advice and information regarding the disease and ventilating their feeling. However, two persons showed all the nine identified constructive coping mechanisms, and destructive coping was also observed. Mental and behavioral disengagement and denial were observed in many cases. Some continued with their alcohol/tobacco intake. Again, only one person exhibited the entire one identified destructive coping mechanisms. Commerford, Orr, Gular, Rezhikoff and O’Dowd (2006) studied the relationship between coping strategies and anxiety and depression in 29 women patients with HIV/AIDS, and found that coping strategies of self-blaming denial,
wish-fulfilling fantasy, emotional expression and threat minimization were significantly related to greater anxiety and depression. However, none of the coping strategies employed appeared to be associated with less anxiety or depression.

Due to individual differences, every person adopts a different style to cope with the same problem, according to his/her need and convenience but if it can be cleared that which coping strategy is more effective in dealing with stressors regarding HIV/AIDS, it will become easy to make and impart the mental health management programmes. With this background, we can now proceed to the review of literature.