

**Review Article****A REVIEW ON: HIV AIDS**Kapila A^{1*}, Chaudhary S¹, Sharma RB¹, Vashist H¹, Sisodia SS², Gupta A^{1,2}¹L.R. Institute of Pharmacy, Solan (H.P.), India²Department of Pharmacy, B.N. University, Udaipur (Raj.), India**ARTICLE INFO:****Article history:**

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HIV/AIDS has always been one of the most thoroughly global of diseases. The human immunodeficiency virus (HIV) is a lent virus that causes HIV infection and AIDS. AIDS is a condition in humans in which progressive failure of the immune system allows life-threatening infections and cancers to thrive. Infection with HIV occurs by the transfer of blood, semen, vaginal fluid, breast milk. Within these bodily fluids, HIV is present as both free virus particles and virus within infected immune cells. HIV infects vital cells in the human immune system such as helper CD4 T cells, macrophages. HIV infection leads to low levels of T cells through a number of mechanisms, including pyroptosis of infected T cells. The symptoms of AIDS are primarily the result of conditions that do not normally develop in individuals with healthy immune systems. Most of these conditions are opportunistic infections caused by bacteria, viruses, fungi and parasites that are normally controlled by the elements of the immune system that HIV damages. When condoms are used consistently by a couple in which one person is infected, the rate of HIV infection is less than 1% per year. There is some evidence to suggest that female condoms may provide an equivalent level of protection.

Introduction

HIV stands for human immunodeficiency virus. AIDS stands for acquired immuno deficiency syndrome.

HIV

H-It infects only human beings and also transmitted between humans not from animals. It is not transmitted from bites of mosquitoes, bats or any other species.

I-The body has immune system whose function is to protect our body from germs, infections etc. But a person suffering from HIV has inability to fight against diseases. However, immune system becomes deficient.

V-Virus is a small, simplest thing which is in inactive form outside the body and becomes active when it goes inside human body.

AIDS

A-It is not inherited means it cannot be transmit from one generation to another. It is transmitted to healthy person by infected person.

I-It weakens the immune system.

D-Creates a deficiency of CD4+ cells in the immune system.

S-It is a collection of diseases.

HIV is a virus that causes AIDS. Normally, our body has immune system that attack viruses and bacteria. Immune system has white blood cells which protect us from infections. White blood cells contain CD4+ cells which is also known as helper cells or T cells. A person who is infected will be able to develop. These infections take advantage of body's immune system. These infections cause several health problems and even lead to death of a person. HIV has inability to protect against diseases and count of CD4 cells also decreases in HIV. There is no cure of AIDS but there are certain medicines which are use to slow down the diseases so you stay healthier for long time. There is no medicine to get rid of diseases [1].

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Structure of HIV Virus

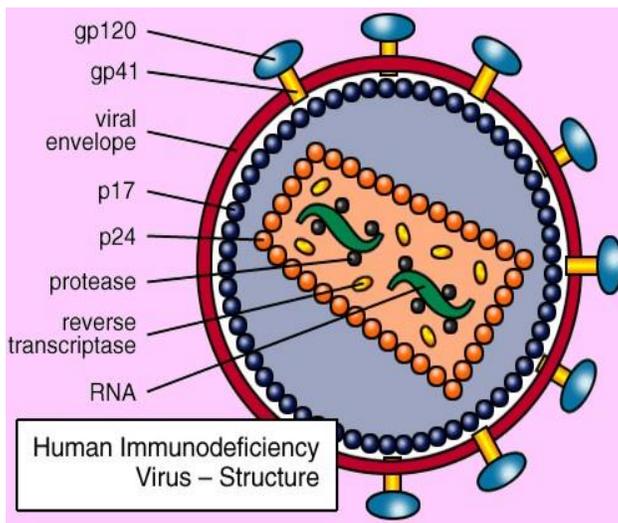


Fig.1: Structure of HIV Virus

Gp120

The 120 in its name comes from its molecular weight. It is essential for virus entry into the cells as it plays vital role in attachment to specific cell surface receptors.

GP41

It is a subunit of the envelope protein complex of retroviruses including human immuno deficiencies virus. It is family of enveloped viruses that replicate in host cell through process of reverse transcriptase. It targets a host cell.

Viral envelope

It is envelope through which virus binds.

P17

Viral core is made from protein. It is bullet shaped. Three enzymes required for HIV replication are reverse transcription, integrase and protease.

P24

P24 is component of HIV capsid.

Protease

It is a retroviral aspartyl protease that is essential for life cycle of HIV, the retrovirus that caused AIDS. This enzyme cleaves newly synthesized polyproteins at appropriate place to create nature protein components of infectious HIV virion.

Integrase

Enzyme produce by retrovirus that enables its genetic material to be integrated into the DNA of infected cell.

RNA

All organisms including most viruses store their genetic material on long strands of DNA. Retrovirus is exception because their genes are composed of RNA [2].

Causes

It is caused by sexual contact from one person to another person. HIV is a virus. When someone becomes infected with HIV the virus weakens and damages their body's defence

system (the immune system) so that it cannot fight off infections.

It is cause by:

- a. Sharing drug needles or syringes.
- b. Sexual contact including oral, vaginal or oral who is HIV positive.
- c. Having other sexually transmitted diseases such as syphilis, herpes, and gonorrhea seems to increase the risk of being infected by HIV during unprotected sexual contact with infected partner.
- d. Babies can be infected by an HIV-positive mother during pregnancy, birth and breast feeding.

Transmission

HIV is transmitted principally in three ways: By sexual contact, by blood through transfusion, blood products or contaminated needles or by passage from mother to child. Although homosexual contact remains a major source of HIV within the United States, "hetero sexual transmission is the most important means of HIV spread worldwide today." Treatment of blood products and donor screening has essentially eliminated the risk of HIV from contaminated blood products in developed countries, but its spread continues among intravenous drug users who share needles. In developing countries, contaminated blood and contaminated needles remain important means of infection. Thirteen to thirty-five percent of pregnant women infected with HIV will pass the infection on to their babies; transmission occurs before as well as during birth. Breast milk from infected mothers has been shown to contain high levels of the virus also.

HIV is not spread by the fecal-oral route; aerosols; insects; or casual contact, such as sharing household items or hugging. The risk to health care workers is primarily from direct inoculation by needle sticks. Although saliva can

contain small quantities of the virus, the virus cannot be spread by kissing.

HIV can be transmitted from an infected person to another through:

- Blood (including menstrual blood),
- Semen,
- Vaginal secretions,
- Breast milk.

Activities That Allow HIV Transmission

- Unprotected sexual contact
- Direct blood contact, including injection drug needles, blood transfusions, accidents in health care settings or certain health care products.
- Mother to baby (before or during birth) [2].

HIV is known to be transmitted only through:

- Contact of infected blood, semen, or vaginal and cervical secretions with mucous membranes.
- Injection of infected blood or blood products.
- Vertical transmission (that is, from infected mother to fetus) and from mother to infant via breast milk.

Contact of Sexual Fluids or Blood with Mucous Membranes:

The virus cannot pass through undamaged skin. HIV can enter the body through the mucous membranes that line the vagina, rectum, urethra, and possibly, on rare occasions, the mouth. Damage to a mucous membrane may increase the risk of transmission of HIV but is not necessary for transmission to occur.

Injection of Infected Blood:

HIV can be transmitted by infected blood getting directly into the bloodstream through intravenous, intramuscular, or subcutaneous injection.

Blood-to-blood transmission occurs in the following ways:-

- Transfusion of contaminated blood and blood products and other blood recipients.
- Sharing of unsterilized hypodermic needles and syringes.

The risk of HIV Transmission is dependent on:

- The concentration of HIV in the infected fluid.
- The QUANTITY of fluid introduced into the body.
- The ACCESS of the infected fluid to the t4 cells.

Fluid with high concentration of HIV:

- Semen,
- Blood and blood components,
- Menstrual flow,
- Vaginal secretions,
- Pre ejaculatory fluid,
- Breast milk.

Fluids with LOW Concentration of HIV

- Pus,
- Saliva,
- Tears,
- Urine,
- Feces,
- Vomiting,
- Nasal mucosa.

Symptoms

Many people who are living with HIV have no obvious signs and symptoms at all. Recent evidence shows that between 70% to 90% of people who become infected with HIV experience flu-like symptoms within a few weeks after infection. The most common symptoms are a fever, a rash and a severe sore throat all occurring at the same time. These symptoms in an otherwise healthy person may indicate recent HIV infection.

HIV infected patients may get yeast infections (oral or vaginal) that do not go away or that occur often. Frequent and severe herpes infections that cause mouth, genital, or anal sores are also common.

Herpes zoster (shingles) is more likely to occur in infected patients. Other pulmonary infections (pneumonia) or so-called atypical mycobacterial infections can be serious for your loved one. Women may get pelvic inflammatory disease that does not respond to treatment. The virus may attack the nervous system (nerves, spinal cord or brain) and produce a variety of symptoms ranging from tingling in the feet and trouble walking to memory disturbances [3].

Symptoms

- large lymph nodes or "swollen glands" that may be enlarged,
- for more than three months,
- frequent fevers and sweats skin rashes or flaky skin that does not go away,
- short-term memory loss,
- slow growth or frequent illness in children,
- cough and shortness of breath,
- seizures and lack of coordination,
- difficult or painful swallowing,
- confusion and forgetfulness nausea, cramps diarrhea or vomiting that do not go away,
- vision loss,
- Unexplained weight loss.

Life Cycle of HIV AIDS

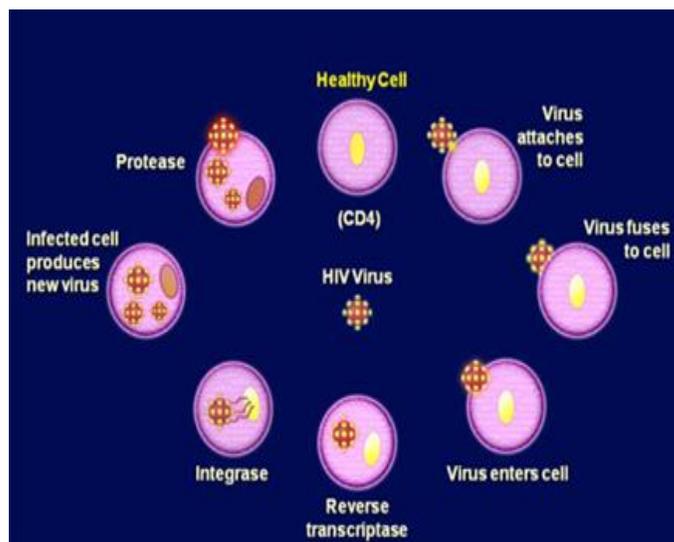


Fig. 2: Life cycle of HIV AIDS

Entry to human cells

HIV is the only viruses which make new copies of itself inside the human cells. This process begins when this virus enters into cell that carries on its surface a protein that is cd4. The HIV virus stick to the cd4 receptor and allow them to fuse. HIV mainly infect immune cells i.e. T-helper cells that forms the body immune system. HIV infects more cells, therefore immune system becomes weak.

Reverse transcription

There is an enzyme reverse transcriptase which helps in reverse Transcription. The main function of reverse transcriptase is conversion of viral RNA into DNA. After that DNA is transported to cell's nucleus where insertion of DNA is done by enzyme integrase.

Transcription and translation

Now, transcription takes place. HIV virus converts HIV virus into messenger RNA.

Assembly, budding and maturation

Copies of HIV gather together with newly made HIV protein and enzymes to form new viral particle which are then bud off from the original CD4 cell. The enzyme protease break the long chains of HIV protein into smaller pieces. These newly virus has ability to target and infect other CD4 cells [4].

Diagnosis

HIV is most commonly diagnosed by testing your blood or saliva for antibodies to the virus. Unfortunately it takes time for your body to develop these antibodies-usually up to 12 week. A newer type of test that checks for HIV antigen, a

protein produced by the virus immediately after infection, can quickly confirm a diagnosis soon after infection [5].

Following are the tests for detection of HIV AIDS:

Home Test

A Food and Drug Administration-approved home test. To do the test, you swab fluid from your upper and lower gums. If the test is positive, you need to see your doctor to confirm the diagnosis. If the test is negative, it needs to be repeated in three months to confirm the results.

Tests To Tailor Treatment

If you receive a diagnosis of HIV/AIDS, several types of tests can be done. These tests include:

- **CD4 count**

CD4 cells are a type of white blood cell that's specifically targeted and destroyed by HIV.

- **Viral load**

This test measures the amount of virus in your blood. Studies have shown that people with higher viral loads generally fare more poorly than do those with a lower viral load.

- **Drug resistance**

This blood test determines whether the strain of HIV you have will be resistant to certain anti-HIV medications [6].

Treatment

Antiretroviral drugs are used to treat HIV. These are the drugs active against human immunodeficiency virus (HIV) which is a retrovirus. They are useful in prolonging and improving a quality of life. Antiretroviral drugs are classified as following:

Nucleoside reverse transcriptase inhibitors (NRTIs):
Zidovudine (AZT), Didanosine, Lamivudine, Tenofovir.

Nonnucleoside reverse transcriptase inhibitors:
Nevirapine, Delavirdine, Efavirenz.

Protease inhibitors:

Indinavir, Nelfinavir, Amprenavir, Lopinavir, Atazanavir.

Nucleoside analogue reverse transcriptase inhibitors (NRTIs) were the first type of drug available to treat HIV infection in 1987. When HIV infects a cell, it copies its own genetic code into the cell's DNA, and the cell is then programmed to create new copies of HIV.

To reproduce, HIV must first convert its RNA into DNA using the enzyme reverse transcriptase.

These inhibitors act like false building blocks and compete with the cell's nucleosides, thereby preventing DNA synthesis.

Non nucleoside reverse transcriptase inhibitors (NNRTIs) started to be approved in 1997. These also interfere with HIV's ability to infect cells by targeting reverse transcriptase. In contrast to nucleoside analogue reverse transcriptase inhibitors, non nucleosides bind directly to the enzyme [7].

HAART

It is highly active antiretroviral therapy. HIV can also be treated by HAART. It is a combination of three drugs.

Conclusion

Historically, HIV prevention programs have focused primarily on developing risk reduction interventions for those at high risk for becoming infected with HIV. In 1999, a review of 55 state and city applications to the CDC for funds for HIV prevention programs demonstrated that only 18 (32.7%) listed HIV-infected individuals as a priority population for HIV prevention programs. Although there are millions of people in the United States at "behavioral risk" for HIV infection, transmission can occur only from people who are infected with the virus. As the number of individuals

with HIV continues to increase because of ART, so does the urgency for lifelong prevention strategies customized for them.

Conflict of interest: We declare that we have no conflict of interest.

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