THE ERA OF HIV DISEASES: A REVIEW

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ABSTRACT

HIV/AIDS has historically been one of the world's most widespread diseases. HIV infection and AIDS are caused by the human immunodeficiency virus (HIV), which is a lent virus. AIDS is a human disease in which the immune system gradually fails, allowing life-threatening infections and malignancies to proliferate. HIV infection is spread by the transmission of blood, sperm, vaginal fluid, and breast milk. HIV is present in these body fluids as free virus particles as well as virus within infected immune cells. HIV infects important immune cells such as helper CD4 T cells and macrophages. Through a variety of methods, including pyroptosis of infected T cells, HIV infection causes low numbers of T cells. The symptoms of AIDS are generally caused by diseases that do not occur in people who have a sound immune system. The majority of these infections are caused by bacteria, viruses, fungi, and parasites that are ordinarily regulated by immune system elements that HIV destroys.

Introduction

Human immunodeficiency virus (HIV) stands for human immunodeficiency virus. Acute immunodeficiency syndrome, or AIDS, is a disease that affects the immune system.

HIV

Exclusively people are infected by

H- It and it is only transmitted between humans as opposed to animals. It is not spread by mosquito bites, bat bites, or other animal bites.
I- Our immune system protects us from bacteria, illnesses, and other harmful substances. HIV-positive individuals, on the other hand, are unable to fight sickness. The immune system, on the other hand, suffers from a breakdown (1)
V- Virus is a small, basic organism that is inert outside the human body and becomes active once inside.
AIDS
A- It is not inherited, which means it cannot be passed down from generation to generation. It is spread from an infected person to a healthy person.
I- It causes the immune system to deteriorate.
D- Induces a CD4+ cell deficit in the immunological system.
S- It is a group of illnesses.

Our bodies normally have an immune system that fights viruses and germs. White blood cells in the immune system defend us from infections. CD4+ cells, commonly known as helper cells or T cells, are
found in white blood cells. A person who has been infected has the ability to grow. These pathogens take advantage of the immune system of the human body. These infections cause a variety of health issues and can even result in death. HIV is unable to guard against sickness, and the number of CD4 cells in the body falls as a result. Although there is no cure for AIDS, there are medications that can help to delay the progression of the disease and keep you healthier for longer. (2, 3)

Structure of HIV Virus

![Fig.1: Structure of HIV Virus](image)

**gp120**
It gets its name from its molecular weight, which are 120. It is required for virus entrance into cells because it aids in the attachment of viruses to certain cell surface receptors.

**gp41**
It's a component of retroviruses' envelope protein complex, which includes the human immunodeficiency virus. It's a group of enveloped viruses that employ reverse transcriptase to replicate in their host cells. It goes after a host cell.

**Viral Envelope**
It is the envelope that the virus binds to.

**P17**
Protein makes up the viral core. It's in the shape of a bullet. Reverse transcription, integrase, and protease are three enzymes necessary for HIV replication.

**P24**
P24 is a part of the HIV capsid.

**Protease**
It is a retroviral aspartyl protease that is required for HIV, the retrovirus that causes AIDS, to complete its life cycle. This enzyme cleaves newly generated polyproteins at the proper sites to produce the natural protein components of the HIV virus. (4)
Integrase
Integrase is a retrovirus-produced enzyme that allows the retrovirus' genetic material to be integrated into the DNA of infected cells.

RNA
Long strands of DNA are used by all species, including most viruses, to store their genetic material. Retroviruses are unique in that their genes are made up of RNA.

Causes
It is brought about by sexual interaction between two people. HIV is a type of virus. When a person contracts HIV, the virus weakens and damages their body's defense mechanism (the immune system), rendering it incapable of fighting diseases.

It is caused by:

a) Sexual contact with someone who is HIV positive, whether it is oral, vaginal, or oral.
b) Sharing drug needles or syringes is one of the causes.
c) Other sexually transmitted diseases such syphilis, herpes, and gonorrhoea appear to enhance the risk of HIV infection during unprotected sexual contact with an HIV-positive partner.
d) Babies can be infected by an HIV-positive mother during pregnancy, birth and breast feeding.

Transmission
HIV is spread mostly through sexual contact, blood transfusions, blood products, and contaminated needles, and transmission from mother to child. Despite the fact that gay interaction is still a major cause of HIV infection in the United States, "heterosexual sexual transmission is the most important way of HIV transmission worldwide today." In developed countries, treatment of blood products and donor screening has practically eliminated the risk of HIV transmission through tainted blood products, but the virus continues to spread among intravenous drug users who share needles. Infected blood and contaminated needles continue to be major sources of infection in underdeveloped countries. Thirteen to thirty-five percent of HIV-positive pregnant women will pass the virus on to their offspring; transmission occurs both before and after birth. Infected moms' breast milk has also been shown to contain high quantities of the virus. (1, 5, 6)

The fecal-oral route, aerosols, insects, or casual touch, such as sharing household objects or hugging, do not transfer HIV. Direct inoculation by needle sticks is the main source of danger for health care personnel. Although minute amounts of the virus can be found in saliva, the virus cannot be transmitted through kissing.

HIV can be passed from one person to another through the following routes:

- Blood (including menstrual blood
- Sperm,
- Vaginal fluids,
Breast milk.

HIV Transmission-Promoting Activities

- Sexual interaction without protection
- Direct blood contact, such as with injection drug needles, blood transfusions, health-care-related mishaps, or specific health-care goods.
- From mother to child (before or during birth)

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)

**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

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

Symptoms

Many persons living with HIV show no visible signs or symptoms at all. According to recent research, 70 percent to 90 percent of patients infected with HIV have flu-like symptoms within a few weeks of infection. Fever, rash, and a severe sore throat are the most typical symptoms, which all appear at the same time. These symptoms in a person who is otherwise healthy could suggest that they have just been infected with HIV.

Yeast infections (oral or vaginal) that do not go away or occur frequently are common in HIV patients. Herpes infections, which can cause sores in the mouth, vaginal area, or anal region, are also common. Infected patients are more likely to get herpes zoster (shingles). Other pulmonary infections (pneumonia) or atypical mycobacterial infections can be life-threatening for your loved one. Pelvic inflammatory illness, which does not respond to treatment, can affect women. The virus can damage the neurological system (nerves, spinal cord, or brain) and cause a wide range of symptoms, including tingling in the feet and difficulty walking, as well as memory problems.

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.

Life Cycle of HIV

![Life cycle of HIV Virus](image)

Fig.2: Life cycle of HIV Virus
Entry to human cells

HIV is the only virus capable of replicating itself within human cells. This process starts when the virus infects a cell that has the cd4 protein on its surface. The HIV virus binds to the cd4 receptor, allowing it to merge with it. HIV primarily affects immunological cells, such as T-helper cells, which make up the body's immune system. As HIV infects more cells, the immune system weakens.

Reverse transcription
Reverse transcription is aided by the enzyme reverse transcriptase. Reverse transcriptase is responsible for converting viral RNA into DNA. After that, DNA is carried to the nucleus of the cell, where it is inserted by the enzyme integrase.

Transcription and translation
The transcription process is now underway. The HIV virus transforms itself into messenger RNA.

Assembly, budding and maturation
Copies of HIV combine with newly synthesised HIV protein and enzymes to produce new viral particles that bud out from the original CD4 cell. Protease is an enzyme that breaks down large chains of HIV protein into smaller chunks. The newly discovered virus has the potential to infect and target other CD4 cells.

Diagnosis

HIV is most usually diagnosed by looking for antibodies to the virus in your blood or saliva. Unfortunately, your body needs time to create these antibodies, which can take up to 12 weeks. A recent type of test that looks for HIV antigen, a protein produced by the virus shortly after infection, can help confirm a diagnosis swiftly.

Following are the tests for detection of HIV AIDS:

Home Test
You swab fluid from your upper and lower gums to perform the test. If the test results are positive, you should see your doctor to have the diagnosis confirmed. If the test is negative, the results must be repeated in three months to be certain.

Tests to Tailor Treatment
If you are diagnosed with HIV/AIDS, you can undergo a variety of testing. These tests include the following:
  - **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.
Treatment

HIV is treated with antiretroviral medications. These are antiretroviral medications that work against the human immunodeficiency virus (HIV). They can help you live longer and have a better quality of life. The following are the antiretroviral medication classifications:

**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.

**HAART**

In resource-constrained areas, the transformation of AIDS into a chronic disease has yet to be accomplished. Access to HAART is an absolute humanitarian imperative for preventing mortality among people who are critical to their countries' long-term survival. Despite limited health infrastructure and a wide range of co-morbidities, these locations have demonstrated extraordinary therapeutic success rates, with adherence rates that are at least comparable to those reported in developed countries. In resource-constrained situations, WHO and UNAIDS treatment recommendations recommend an uniform first-line regimen followed by a set of more expensive second-line options, as well as the adoption of standardised decision-making stages (e.g., when to start, to substitute for side-effects, to switch for virological failure). Treatment options in many countries are limited not just by the costs of HAART, but also by restrictive licensing rules, with current estimates estimating that 80 percent of HIV-1 infected patients with a clinical need for treatment do not currently have access to antiretroviral medications. Antiretroviral therapy is also an effective preventative strategy, thus efforts and measures to expand treatment access are critical.

**Conclusion**

Historically, HIV prevention initiatives have mostly focused on developing risk reduction measures for people who are at high risk of contracting the virus. Only 18 (32.7 percent) of 55 state and city applications to the CDC for money for HIV prevention programmes named HIV-infected individuals as a target demographic for HIV prevention initiatives, according to a 1999 assessment. Despite the fact that millions of people in the United States are at "behavioural risk" for HIV
infection, the virus can only be transmitted between infected persons. As the number of people living with HIV continues to rise as a result of antiretroviral therapy (ART), so does the need for lifetime preventive programmes tailored to them.

References


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