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A REVIEW ON PREVENTION AND TREATMENT OF AIDS

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ABSTRACT

The retrovirus known as HIV is the cause of acquired immune deficiency syndrome (AIDS), a disorder in which a person's CD4+ cell count drops below 200 cells/µl and their immune system starts to malfunction, resulting in potentially fatal infections. The sexual transmission of HIV, which causes AIDS, is linked to numerous factors. Sexual contact, contact with bodily fluids or tissues that are infected, and vertical transmission—transmission from mother to child during pregnancy, delivery, or breastfeeding—are the three main ways that HIV is spread. HIV prevention and control initiatives must therefore heavily rely on AIDS and sexually transmitted disease (STD) preventive strategies. Conditions that do not typically arise in people with healthy immune systems are the main cause of AIDS symptoms. The majority of these illnesses are opportunistic infections brought on by bacteria, viruses, fungi, and parasites that are often managed by the immune system components that HIV compromises. Alternative medicine, opportunistic infections, and antiretroviral medication can all be used to manage AIDS. An update on HIV origins, HIV infection stages, transmission, diagnosis, prevention, and care is provided in this article.

KEYWORDS: AIDS; HIV CD4+; Vertical transmission; Antiretroviral therapy.

I. INTRODUCTION

AIDS is regarded as one of the most deadly and widespread diseases in the world, affecting a sizable portion of the population. It has a significant impact on society in ways such as illness, a source of prejudice, and people's financial situation. The most dangerous infectious disease that is currently ravaging humanity is called AIDS. Women and girls are particularly susceptible to HIV infection worldwide. In general, young women are at the higher risk of contracting HIV at an earlier age than young men. In certain places, the frequency of infection among women aged 15 to 24 is more than twice that of young males. Women in low-income nations are more vulnerable because of structural issues like violence, lack of education, gender inequality, and extreme poverty, which make it harder for them to obtain HIV-related resources and information and control health outcomes. Human immunodeficiency virus (HIV) or acquired immune deficiency syndrome (AIDS) is diseases caused by viral infections of the human immune system. When an HIV-positive individual has a CD4+ count of satisfies the criteria for AIDS or has fewer than 200 cells/µl. The CD4 cells in the body's immune system, which combat the infection, are targeted and killed by the HIV virus. The immune system finds it challenging to combat infections as a result of CD4 cell depletion. HIV damages the immune system by identifying and eliminating CD4 cells. HIV multiplies, or makes copies of itself, within the CD4 cell machinery and disperses throughout the body. A brief period of influenza-like symptoms may be experienced by the set to begin phase III clinical testing the person during the initial infection. There is a protracted period of time without symptoms. The immune system is increasingly compromised as the disease worsens, increasing the risk of infections, including opportunistic infections and malignancies. HIV can spread mostly by unprotected sexual contact (such as anal or even oral sex), tainted blood transfusions, hypodermic needles, and mother-to-child transmission during pregnancy, childbirth, or breastfeeding. Saliva and tears are two examples of body fluids that do not spread HIV. A near-normal life expectancy may result from preventing HIV infection, mainly through safe sex and needle exchange programs. This is a crucial tactic to stop the disease's spread. Antiretroviral therapy lowers the chance of death and disease-related complications; however, these drugs can have negative side effects and are costly. In order to affect the dynamics of transmission, behavioural interventions for HIV infection must result in change in a significant number of individuals over a enough period of time. Self-reported sexual risk behaviours can be

effectively reduced by behavioural treatments that target men who have sex with men who are sexually infected, heterosexual African Americans, adolescents who have had sex in the United States, and individuals living with HIV. In certain developed countries, antiviral medications have helped to control HIV/AIDS, and a number of vaccine the burden of morbidity and mortality from HIV will undoubtedly continue to be quite high. Better vaccinations and antiviral drugs will result from defining the principles that underlie the evolution of HIV. The current study provides information on HIV's history, discovery, symptoms, and phases of infection, transmission, diagnosis, prevention, and treatment.

II. THE ORIGIN OF HIV

The finding that closely related viruses known as simian immunodeficiency viruses (SIVs) were found in a wide range of African monkeys was the catalyst for the development of HIV. SIVs have been identified in over 20 African primate species, and HIV and SIV together make up the primate lent viruses. There have been no reports of SIVs causing illness in their hosts, with the exception of infections of Asian macaque monkeys linked to laboratories. According to the evolutionary history of HIV-1 and HIV-2, the two human viruses have distinct evolutionary histories since they are related to distinct SIVs. The closest relative of HIV-1 is SIVcpz, which is present in some chimpanzee subspecies (Pantroglodytes and Pantroglodytes schweinfurthii), which live in equatorial Western and Central Africa, respectively. The prevalent HIV-1 M group is most closely linked to SIV cpz from Pan troglodytes. Geographic range is in Africa, which has the most genetic variety of HIV-1-containing groups M, N, and O. If this was the first location of HIV-1's emergence, then this distribution is to be expected. SIVsm, on the other hand, is more widespread in West African regions where HIV-2 is most prevalent and is most closely related to the virus. It is found in sooty mangabeys. The mixing of the HIV and SIV lineages has resulted in several cross-species transmissions to humans, according to molecular phylogenies.

III. STRUCTURE OF HIV

Gp 120

Its name's 120 represents its molecular weight. Due to its critical involvement in attaching to particular cell surface receptors, it is necessary for virus entrance into the cells.

GP41

It is a component of retroviruses' envelope protein complex, which includes the human immune deficit virus. This family of enveloped viruses employs reverse transcriptase to replicate within their host cell. A host cell is its target.

Viral Envelope

It is the envelope that the virus attaches to.

P17

Protein makes up the viral core. It has a bullet-like form. The three enzymes integrase, protease and reverse transcription are necessary for hiv replication.

P24

A part of HIV capsid is P24.

The protease

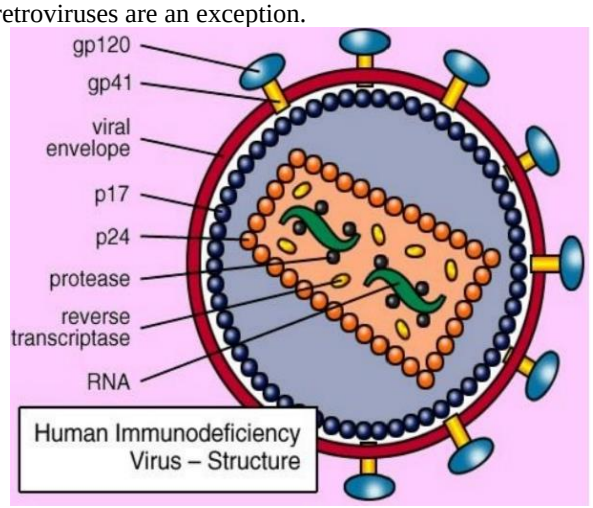
This retroviral aspartyl protease is essential to the life cycle of HIV, the retrovirus that causes AIDS.. The natural protein components of the contagious HIV virus are produced by this enzyme by appropriately cleaving newly synthesised polyproteins.

Integrase

Retroviruses create an enzyme that allows their genetic material to be incorporated into the infected cell's DNA.

RNA

Long DNA strands are used by all living things, including the majority of viruses, to store their genetic material. Because their genes are made of RNA, retroviruses are an exception.



IV. DISCOVERY OF AIDS

In the United States, the discovery of HIV/AIDS was initially acknowledged on June 5, 1981. Five homosexual men in Los Angeles were found to have uncommon clusters of Pneumocystis pneumonia (PCP), a rare opportunistic infection brought on by a strain of Pneumocystis carinii (now known as Pneumocystis jirovecii). In cities across the nation, PCP clusters were discovered in healthy males together with other opportunistic illnesses such chronic generalised lymphadenopathy and Kapsi's sarcoma. In 1982, there were reports of a possible etiological agent being a sexually transmitted infectious pathogen among gay men in Southern California. GRID, or gay-related immune deficiency, was the initial name given to the illness. Health officials discovered that some individuals with the illness were not gay men. The among haemophiliacs and heterosexual intravenous drug users, the same opportunistic infections were discovered. By August of 1982, the CDC had dubbed the illness AIDS.Luc

Montagnier's team at the Pasteur Institute in France discovered a novel retrovirus from lymphoid ganglions in May 1983. The virus was thought to be the source of AIDS. The virus was eventually dubbed lymphadenopathy-associated virus (LAV). The United States' Robert Gallo et al. acknowledged the virus's discovery, but in May 1984 they dubbed it human T-lymphotropic virus type III (HTLV-III). The International Committee on Taxonomy of Viruses named the virus HIV (human immunodeficiency virus) in May 1986. Montagnier and Francoise Barre Sinoussi's research on the human immunodeficiency virus earned them the 2008 Nobel Prize in Physiology or Medicine.

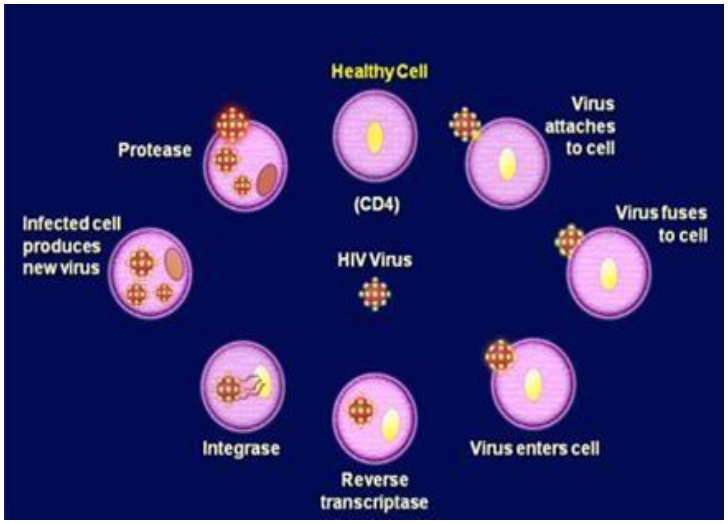
V. SYMPTOMS

Many HIV-positive individuals don't exhibit any overt symptoms at all. According to recent data, after a few weeks of contracting HIV, between 70% and 90% of infected individuals develop flu-like symptoms. The most typical symptoms include a fever, rash, and an extremely painful throat that all appear at the same time. Even in otherwise healthy individuals, these symptoms could be signs of a recent HIV infection. Patients with HIV may experience frequent or persistent yeast infections, either vaginal or oral. Anal, vaginal, or oral sores are also frequently caused by severe and frequent herpes infections. Patients who are infected have a higher risk of developing herpes zoster, also known as shingles. Your loved one may have dangerous atypical mycobacterial infections or other lung infections (pneumonia). Pelvic inflammatory illness in women can occur and is not treatable. From tingling in the feet and difficulty walking to memory problems, the virus may target the neurological system, which includes the brain, spinal cord, or nerves.

Symptoms include

- The possibility of enlarged lymph node or "swollen glands"
- For longer than three months;
- Frequent fevers and sweats;
- Skin sores or persistently dry skin;
- Short-term memory loss, slow growth or frequent illness in children;
- shortness of breath and coughing; convulsions and inability to coordinate;
- Difficult or painful swallowing;
- Confusion and forgetfulness;
- Nausea, cramps, diarrhoea, or vomiting that doesn't go away;
- Loss of vision; and
- Inexplicable weight loss.

VI. LIFE CYCLE OF HIV AIDS



Getting to the human cell

The only virus that can replicate itself inside human cells is HIV. This process starts when the virus infiltrates a cell that has the CD4 protein on its surface. The HIV virus may merge with the CD4 receptor when it binds to it. HIV primarily infects T-helper cells, which are immunological cells that make up the body's immune system. HIV weakens the immune system by infecting additional cells.

Reverse Transcription

The Reverse transcriptase enzyme facilitates Reverse transcription. Reverse transcriptase's primary job is to transform viral RNA into DNA. he enzyme integrase then transport thr DNA to cell's nucleuss,where it gets inserted.

Transcription and translation

The transcription process now begins. The HIV virus as the ability to transform itself into messenger RNA.

Assembly, budding and maturation

HIV copies combine with freshly produced HIV protein and enzymes to create new viral particles, which are subsequently split off from the parent CD4 cell. The lengthy chains of HIV protein are broken up into smaller bits by the enzyme protease. Other CD4 cells can be targeted and infected by these novel viruses.

VII. DIAGNOSIS

The most frequent method of diagnosing HIV is to look for antibodies to the virus in your saliva or blood. Regretfully, your body takes a while to produce these antibodies—typically up to 12 weeks. A diagnosis can be promptly confirmed shortly after infection with a more recent test that looks for HIV antigen, a protein the virus produces right after infection. The tests for HIV/AIDS detection are as follows:

Test at Home

Is a home test authorised by the Food and Drug Administration. The test requires you to sample fluid from both your upper and lower gumsYou must visit your physician to confirm the diagnosis if the test results are positive. To confirm the results, the test must be conducted again in three months if it comes out negative.

Tests to customise care

If you are diagnosed with HIV/AIDS, a number of test was conducted if possible. Among these tests are:

The CD4 count

One subset of white blood cells known as CD4 cells is particularly HIV targets and destroys.

The burden of viruses

The amount of virus in your blood is determined by this test. Research studies demonstrated that those with greater viral loads typically do worse than people who have a lower viral burden. Resistance to drugs this blood test establishes if the HIV strain you will not respond well to several anti-HIV drugs.

VIII. TRANSMISSION

There are three main ways that HIV can spread: through intercourse, blood transfusions, contaminated needles, or mother-to-child transmission. "Heterosexual transmission is the most important means of HIV spread worldwide today," despite the fact that homosexual interaction is still a major source of HIV in the US. Although the risk of HIV from tainted blood products has virtually been eradicated in developed nations due to donor screening and blood product treatment, the virus still spreads among intravenous drug users who share needles. Contaminated needles and blood continue to be major sources of infection in developing nations. Between 13 and 35 percent of pregnant women with HIV will infect their unborn children; transmission happens both before and during delivery. . It has also been demonstrated that large concentrations of the virus are present in breast milk from infected moms. HIV cannot be transmitted through the faecal-oral route, aerosols, insects, or informal contact like hugging or sharing household objects. The main source of danger for healthcare professionals is direct needle stick inoculation. Kissing cannot spread the virus, even if saliva may contain trace amounts of it.

An infected individual can spread HIV to another person through:

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

Activities That Make HIV Transmission Possible

- Sexual interaction without protection
- Direct blood contact, such as via injection needles, blood transfusions, mishaps in medical facilities, or specific medical supplies.
- Mother to child (prenatal or postpartum) .

HIV is known to be transmitted only through

- Interaction of contaminated blood, semen, or cervical and vaginal fluids that have mucous membranes.
- Contaminated blood products or blood that has been injected
- Vertical transmission (between the sick mother and the foetus) and through breast milk from mother to child.

Interaction of Blood or Sexual Fluids with Mucous Membranes

A virus cannot infiltrate skin that is not damaged. Occasionally, HIV enters through the mucous membranes lining the mouth, vagina,rectum and urethra . Mucous membrane damage could raise the risk of HIV transmission but is not required for it to occur Will happens.

Infected Blood Injection

HIV can be spread by intravenous, intramuscular, or subcutaneous injections of infected blood that enter the bloodstream directly. There are several ways that blood-to-blood transmission can happen:

- Contaiminated blood being transferred to another recipient of blood products
- The sharing of unsterilized syringes and hypodermic needles.

The following factors affect the risk of HIV transmission

- The amount of HIV present in the contaminated fluid.
- The volume of fluid administered intravenously.
- The t4 cells' access to the contaminated fluid. Semen, blood and blood components, menstrual flow, vaginal secretions, pre-ejaculatory fluid, and breast milk are among the fluids that contain HIV.

Fluids with a Low Level of HIV

- Urine
- Faeces
- Vomiting
- respiratory mucosa
- pus
- saliva

- tears.

IX. PREVENTION OF AIDS

Sexual Contact

Condoms for both men and women are useful in halting HIV transmission through sexual contact. Over time, regular condom use lowers the risk of HIV transmission by about 80%. The annual rate of HIV infection is less than 1% when a couple with one infected member consistently uses condoms. Female condoms offer partners the same degree of protection. According to research, applying a tenofovir-containing vaginal gel right before intercourse appears to lower infection rates in African women by about 40%. In 2007, the WHO and UNAIDS advised male circumcision as a means of limiting HIV transmission from female to male. To reduce high-risk behaviour, schools should offer comprehensive sexual education.

Pre exposure prophylaxis

96% of their partners who have a CD4 count of 350 cells/μL in their blood are protected against infection by antiretroviral therapy. Patients' risk of transmission is reduced by roughly ten to twenty times. Males who have sex with males in partnerships where one partner has HIV and young heterosexuals in Africa are among the categories for which preexposure prophylaxis (PrEP) with a daily dose of the drugs tenofovir with or without emtricitabine is effective. Taking universal measures in the healthcare setting is an effective way to reduce the risk of HIV. Opoid replacement therapy and needle exchange programs may be useful in reducing the spread of HIV among intravenous drug users.

Post exposure prophylaxis

When an antiretroviral medication course is given within 48 to 72 hours of coming into contact with HIV-positive blood or vaginal secretions, it is referred to as postexposure prophylaxis (PEP).After a needlestick injury, zidovudinereduces risk of HIV infection fivefoldThree drugs, including tenofovir, emtricitabine, and raltegravir, make up the recommended preventative regimen in the US. Treatment typically lasts four weeks and is often accompanied by side effects.

Mother to child

Using a combination of antiretroviral drugs during pregnancy and after delivery in the newborn, as well as maybe bottle-feeding instead of breastfeeding, reduces the vertical transmission of HIV. Mothers should refrain from nursing if replacement feeding is safe, practicable, economical, sustainable, and agreeable. Giving the newborn prolonged antiretroviral treatment reduces the risk of transmission if exclusive breastfeeding is practiced.

Practical solutions to stop transfer from mother to child[40]

1. Preventing infection acquisition in women who are fertile

a. immediate and long-lasting behavioural changes

2. Preventing HIV-positive women from passing the virus on to their children
a. Provide counselling and voluntary testing.
b. Finding uninfected women
c. Does it lower child mortality?

3. Reducing mothers' peripheral viral burden
a. Antiretroviral medication during pregnancy, childbirth, or the postpartum period;
b. Individual or combination medication

4. Preventing contact with tainted maternal secrets
a. An optional delivery component
b. Birth canal cleaning;
c. Adjusting baby feeding habits

5. Strengthening the defence of the host
a. Supplementing with micronutrients
b. Immune treatment, either active or passive.

Vaccination

Natural (or vaccine-induced) immune responses are correlated with protection against infection or disease in the majority of vaccine-preventable diseases. On the other hand, although the majority of HIV-positive individuals experience a variety of immunological reactions to the virus, these reactions do not eradicate the infection or stop the development of AIDS. The two main categories of immunological responses—humoral and cell-mediated immunity—are the focus of ongoing HIV vaccine development initiatives, which also include methods to elicit both. The 2009 publication of a single study of the vaccine RV 144 revealed a nearly 30% partial decrease in the probability of transmission, giving the scientific community some hope that a really effective vaccine will be developed.

X. TREATMENT

To cure HIV, antiretroviral medications are utilised. These medications are effective against the retrovirus known as the HIV virus. They help to extend and enhance one's quality of life. Antiretroviral medications are categorised as follows:

NRTIs, or nucleoside reverse transcriptase inhibitors, include didanosine, tenofovir, lamivudine, and zidovudine (AZT). Nevirapine, Delavirdine, and Efavirenz are examples of non-nucleoside reverse transcriptase inhibitors. Protease inhibitors include Atazanavir, Lopinavir, Amprenavir, Nelfinavir, and Indinavir.

Nucleoside analogue reverse transcriptase inhibitors (NRTIs)

The first class of medication to treat HIV infection was introduced in 1987 and was called nucleoside analogue reverse transcriptase inhibitors (NRTIs). The virus instructs the infected cell to make more HIV by inserting

its genetic code into the cell's DNA.The reverse transcriptase enzyme is required for HIV to first transform its RNA into DNA in order to multiply. By competing with the cell's nucleosides, these inhibitors function as fake building blocks and stop DNA synthesis.

Non-nucleoside reverse transcriptase inhibitors (NNRTIs)

In 1997, non-nucleoside reverse transcriptase inhibitors (NNRTIs) were first authorised. By specifically targeting reverse transcriptase, these also impede HIV's capacity to infect cells. Unlike reverse transcriptase inhibitors that are analogues of nucleosides, non-nucleosides bind directly to the enzyme.[7]

HAART

This antiretroviral treatment is quite effective. HAART is another treatment option for HIV. It is a mix of three medications.

XI. FIXED DOSAGE COMBINATIONS (FDCs) AND COMBINATION THERAPY

Several antiretroviral medications bundled into one pill are known as fixed dosage combos. By limiting HIV replication as much as possible, antiretroviral combination therapy prevents resistance by lowering the probable pool of spontaneous resistance mutations. Antiretroviral combinations prevent HIV replication in several ways, limiting the number of progeny and lowering the chance of a superior mutation. The other medications continue to prevent the reproduction of that mutation if a mutation that confers resistance to one of the medications is discovered.

XII. Opportunistic Infections of AIDS

In the absence of adequate antiretroviral therapy, HIV gradually weakens the patient's immune system and increases susceptibility to opportunistic infections. Consequently, substantial morbidity exists in both wealthy and underdeveloped nations. Opportunistic infections' typical symptoms with AIDS include stupor, coughing, dyspnoea, and excruciating weight; fever; cramping in the abdomen; disorientation; nausea; swallowing diarrhoea; loss; etc. Antiretroviral therapy decreases the possibility of getting more opportunistic infections. It is recommended to receive the hepatitis A and hepatitis B vaccines prior to or following the patient. It is advised to use trimethoprim for prophylactic sulfamethoxazole for four to six weeks of anger and stop breastfeeding for babies whose moms have HIV.

XIII. Alternative Medicine for AIDS

The patient's health has improved by following a healthy diet and taking vitamin supplements. Supplementing youngsters with vitamin A has certain benefits, such as lowering mortality and promoting growth. When a multivitamin supplement is administered to nursing women, their health improves. There is some preliminary evidence of benefit along with data supporting selenium supplementation. The World Health Organisation advises persons living with HIV to consume micronutrients at RDA levels. The WHO adds that a number of studies show that vitamin A, zinc, and iron supplements may have negative effects on persons with HIV. The use of medicinal cannabis to try to boost appetite or weight gain is not supported by enough research.

XIV. CONCLUSION

HIV/AIDS and other sexually transmitted illnesses are leading causes of morbidity and mortality worldwide. Since AIDS is a potentially fatal illness for which there is now no cure, HIV/AIDS is one of the most significant issues that the medical community has struggled to understand. The most severe form of HIV infection is AIDS.HIV treatment with antiretroviral therapy (ART) is advised. To suppress the infection, antiretroviral therapy (ART) entails taking three or more anti-HIV drugs from at least two distinct pharmacological classes daily. Preventive measures and raising public knowledge of AIDS are better ways to control the disease.

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