

Discovering Human Immunodeficiency Virus (HIV)

Introduction

Human Immunodeficiency Virus (HIV) is a virus that targets and attacks the immune cells in the human body, which leads to a significant reduction in immunity and leaves infected individuals vulnerable to various infections, including Acquired Immunodeficiency Syndrome, commonly known as AIDS. Since its discovery in 1981, it has brought global awareness to healthcare advancement and sexual health, an impact that continues to resonate today. This paper will synthesize the findings of various studies to educate and spread awareness concerning HIV/AIDS.

Unlike common viruses, HIV does not spread through airborne or droplet transmission. HIV is often spread through sexual transmission where individuals can be exposed to certain body fluids of infected hosts, such as blood, semen, breast milk, and others. HIV must enter the bloodstream through mucous membranes, open wounds, or through direct injection to transmit the virus. Transmission of HIV can be both direct and indirect. Direct transmission involves physical contact with the host, while indirect transmission is often spread by intermediaries, for instance, a contaminated instrument. When individuals are infected, HIV attaches itself to CD4+T cells (Helper T cells), a type of white blood cell found in the immune system that recognizes and initiates responses towards foreign substances. HIV replicates itself by taking over the protein synthesis process of CD4+T cells to make proteins of their own, then, they rupture out of the cell, simultaneously destroying the original cell. In response, the CD4+T cells in the body decline over time as viruses replicate rapidly, outpacing the production of the CD4+T cells. Without CD4+T cells serving as a messenger, the immune cells' ability to defend the body

from foreign intruders decrease dramatically. Hence, the body is left with little to no defense, allowing opportunistic infection to enter easily. The replication cycle HIV undergoes is called a lytic cycle, whereas, in a lysogenic cycle, the virus tends to stay dormant after it is inserted into the host's DNA without causing any harm until certain activity triggers it.

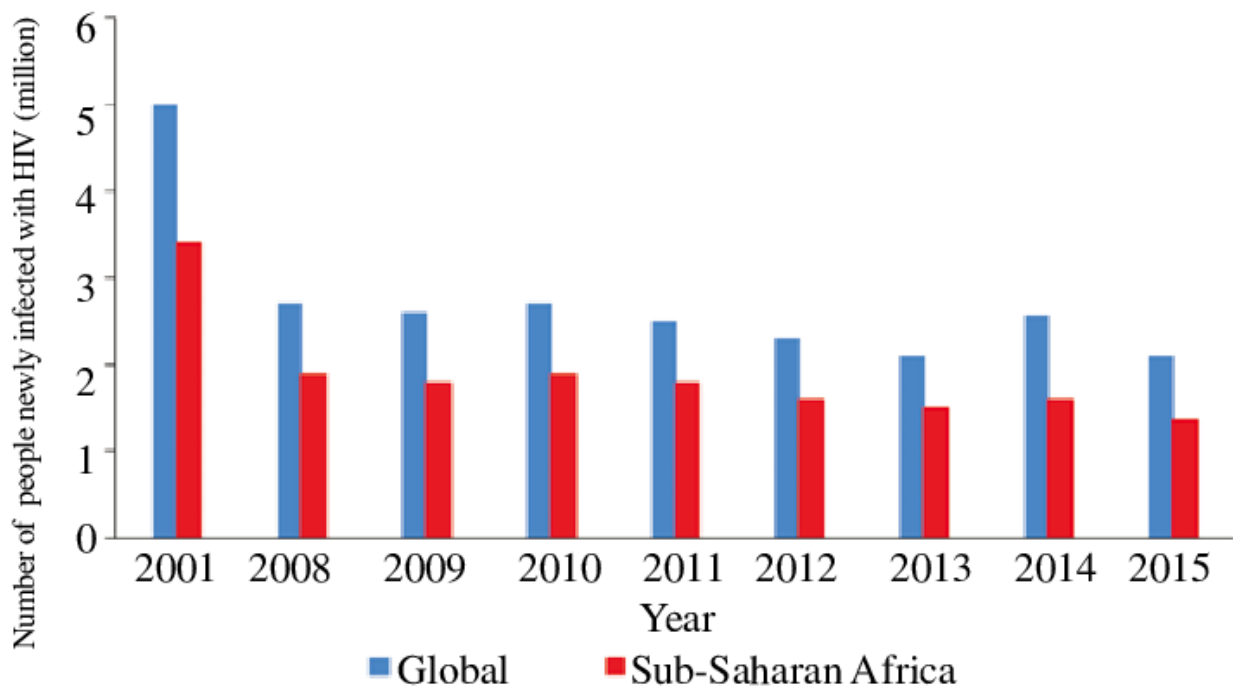
As there are no obvious symptoms upon acquiring HIV, many people do not realize they have gotten the virus. The virus progresses and ultimately leads to AIDS, a fatal disease for which a cure is still being sought. As of 2022, the World Health Organization (WHO) estimated that around 40.4 million people have died from HIV since it was first discovered. The virus negatively impacts patients' socioeconomic status, as more money is needed to be spent on healthcare, and unstable medical conditions contribute to difficulty in finding employment. Furthermore, HIV also causes an unstable economy within a country with increasing poverty rates, and less money stimulating the economy. HIV remains one of the leading causes of death today, with discrimination and negativity further hindering the problem, harming the patients physically and psychologically.

Current trends

After the devastating HIV epidemic, people around the globe began to take precautions to reduce the spread of HIV viruses. According to HIV.gov, the HIV cases worldwide have dropped by 59% in 2022 compared to the number of infected patients in 1995. Not just that, in Sub-Saharan Africa, where most cases of HIV infections are located, experienced a decrease in infected patients by 33% since 2005. By educating the population about the disease, countries achieved a significant decline in the number of infections. Furthermore, the treatment called Antiretroviral therapy (ART) was introduced to most developed countries in 1996, and a bit later

in 2003 for developing countries. The treatment suppresses the patient's viral loads, also known as viral suppression where patients have less than 200 copies of HIV in milliter of blood. This treatment allows patients to live a healthy live indistinguishable from HIV negative individuals, but ART cannot completely cure the patient from HIV, meaning the medications could not be stopped, or else the virus may rebound. The treatment is proven to reduce transmission of HIV by 96%, and the survival rate was around 76%.

In Eswatini, a country located in southern Africa, they have the highest HIV rate amongst all the countries with a percentage of 19.58%, followed by Lesotho, with 18.72%. Globally, around 36.8 million people are infected with HIV, and 25.5 million of those infected individuals lives in Sub-Saharan Africa, where access to medications are very limited.



With this graph, we are able to see the comparison of number of people infected with HIV between Sub-Saharan Africa and the global world. With the blue bar representing global and red representing Sub-Saharan Africa, we can conclude that the HIV cases in Sub-Saharan

Africa is very similar to the global number, not to mention, it is only one continent out of six. Most countries in Sub-Saharan Africa are least developed countries, they mostly rely on agriculture for economics which could barely afford their living cost. Public services like health care and education are rare and expensive, not many people can afford them, which leaves the population vulnerable for disease.

HIV is commonly diagnosed in teenagers and young adults around ages of 13-29, where they are most sexually active. According to CDC, age 13-29 makes up 23% of the U.S. population, yet, they account for 40% of diagnosed HIV infections. Oftentimes, individuals around this age do not have enough knowledge on preventing the disease, which is why there has been an increase in sexual health education in school. In 2018, a study has shown that 81% of the infected patients were males who have gotten HIV through male to male contact, with heterozygous contact coming in second, with only 10%. Moreover, the study also shows that 39% of those males are Black or African American, with Hispanic/Latino second with 29%, and White at 26%.

Though the data above only shows the population in the United States, it represents that HIV infects mostly those that are economically disadvantaged, or those that lack education regarding sexual health. To prevent the transmission of HIV, it is advised to wear condoms during sexual activity, and to limit the sexual partners to those that have been tested negative for STDs. If you experienced symptoms of HIV, advise the doctors immediately. Do not wait until the symptoms worsen as it generates a higher risk for AIDS. With the help of treatments, HIV can be controlled. As long as you stay on the treatment, a long and healthy life is more than possible.

Etiology

As mentioned above, HIV is transmitted by sexual activity or the exchanging of body fluids with infected individuals. HIV can also be spread from mother to offspring. For example, a baby can be infected by contact with the mother's cervical mucus or blood during delivery, or during breastfeeding when they ingest breast milk. The virus is not passed down genetically but rather acquired after birth.

The health of the immune system correlates directly to an individual's diet. Studies shown from HIV.gov emphasize the importance of diet to HIV patients. Eating a healthy diet can provide the immune system the energy to fight off the infection, and it can help the body better absorb medications. It is recommended to eat food low in saturated fat, sodium, sugar, and low-fat source of protein. A healthy diet should include a variety of vegetables, fruits, and whole grains. It is important for HIV-infected individuals to be cautious about their diet. Because of the weakened immune system, it is best to avoid food that has a high risk of generating infection. Food that HIV-positive patients should avoid includes raw eggs, meat, seafood, and unpasteurized milk. Patients should always consult with a professional healthcare provider to ensure the best dietary options for them.

When it comes to exercise, it is the same for everyone. Though exercising does not provide direct benefits to improving HIV, it does have a lasting impact on your physical and mental strength. Studies have shown that exercise can help reduce stress and anxiety, and help improve sleeping conditions. In the physical activity guidelines health.gov has published, it mentioned that there are two types of exercises, aerobic activity and muscle strengthening activity. An average adult is recommended to have at least 150 minutes worth of aerobic activity with at least 2 days of muscle-strengthening activity per week.

A healthy lifestyle is beneficial to everyone, but especially HIV patients. The health effects of smoking are extremely harmful to HIV-positive individuals. Smoking increases the risk of infections that could be fatal, it also increases the chance of obtaining serious illnesses like COPD, heart disease, or cancer. Not just that, smoking also increases the amount of viral load in the blood, worsening the condition of HIV and could cause the virus to advance to AIDS early. A study in 2017 showed that smokers with HIV are 13 times more likely to die from smoking, and smoking is the cause of death for 61.5% of HIV patients. Smoking is the biggest threat to a healthy lifestyle, it is advised for patients to seek professional help in order to quit smoking.

Diagnosis and Treatment

The most common way to detect HIV is through an Antibody test, where they test the saliva or blood of the individuals and determine if they are HIV positive or not based on the amount of antibodies present. Antibodies are created as a response to fight off HIV in the immune system, and it usually shows during the test after an individual has been infected for several weeks. Some other tests include the nucleic acid test (NAT) and antigen/antibody test. All of the diagnoses require several weeks to detect HIV after the first infection. It is recommended to get a test out if individuals have been experiencing symptoms of HIV like fever, muscle pain, sore throat, thrush, and Diarrhea.

Treatments have been developed to restrict the growth of HIV, but no treatments have been found to cure AIDS. The present treatment developed for HIV is called Antiretroviral therapy (ART), it has proven to be able to suppress symptoms of HIV and help patients live a normal and healthy life. This medication requires consistent use of the medicines, it suppresses the symptoms but does not mean HIV is completely cured.

The National HIV/AIDS strategy for the United States (2022-2025) was proposed by President Biden in late 2021, and it sets a goal to end the epidemic by 2030. The proposal aims to prevent new HIV infections and improve the conditions of those living with HIV by increasing financial support and allocating resources to the priority groups. With this, they aim to provide treatments to those who are in need of financial support and educate and spread awareness of the virus to prevent further infections.

Conclusion

HIV has caused tremendous damage to infected patients and their loved ones. It is very important to learn prevention and treatment of the virus to stop the spread of the epidemic. In summary, if you suspect having symptoms of HIV, seek help from medical professionals, get diagnostic tests, and go on the treatments provided if needed. Precautions like condoms and STD tests during sexual activity are essential to prevent the spread of HIV. A healthy lifestyle could improve the symptoms of HIV-positive patients, helping them to get back on track. The current trends of HIV have drastically decreased compared to when it was first discovered, and it is our responsibility to stop and prevent future infections.

Currently, scientists around the world have been trying to find a cure for HIV, hoping for a way to completely eliminate the virus. But so far, the search has been unsuccessful. Still, researchers believe that a cure is possible, and they will not give up until a cure is found for HIV. Many pharmaceutical companies have dedicated lots of resources and time in hopes of searching for a cure. We believe that a cure will be found in no time, and we will finally be able to end this HIV epidemic and the suffering it brought.

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