Essay

Human Immunodeficiency Virus (HIV)

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Abstract

For more than 35 years now, the global burden of HIV and AIDS has been increasing, creating an expansive discussion across the world, and triggering serious debates and research around its emergence, and future. All over the world, governments have invested significantly on enhanced research into the disease and the potential for a cure. However, these efforts have not achieved much success especially in the realm of effective treatment and vaccination. Nonetheless, what remains for the public is to appreciate the various facts that have been discovered and proved about the disease, including the modes of transmission, nature, and style of the disease development, as well as the preventive measures and management. The focus of this paper is to explore the disease, HIV from the perspectives of its infection and progression process, the transmission styles and modes, and the preventative measures that have been found to work in research. The paper, therefore, explores the background research about the disease and also the specific and essential information on the epidemiology and current information about the infection, its development and details about its management and prevention. From a research perspective, the paper aims to provide crucial information on what HIV is, the risk factors, the disease process, current research, facts about the condition, and the recommended treatment and management approaches with documented efficacy levels. The paper informs on the roles of individuals, society, and the authorities in eradicating HIV and reducing the disease burden associated with the condition.

Introduction

Human Immunodeficiency Virus (HIV)

Human Immunodeficiency Virus (HIV) is a virus that mainly affects immune cells, making them weak and unable to fight infections. The virulence of the infectious agent makes it spread across the body and become part of the major body fluids in the body, through which it can be transmitted to healthy individuals (Challacombe, 2020). According to the widely accepted timelines and history of the infection, HIV was first detected and described as an infection affecting homosexuals in the United States in 1981, many of whom had multiple partners.

The spread and the burden of the infection were therefore associated first with the particular sexual orientation, which was at the time widely opposed by conservative societies. As such, not many efforts were seen from the authorities, government, or even the research and educational institutes (Zerdali et al., 2023). Robust research was therefore done, and by the end of 1983, the infectious agent was already described, and the infection was termed HIV (Jin et al., 2021). The resultant disease was described as a syndrome in which an infected person lost most of their ability to fight diseases and suffered immunodeficiency, hence the acronym AIDS.

With research, it has since been identified that two lentiviruses, HIV-1 and HIV-2, are the primary causative agents for the infection (Wang et al., 2023). The two viruses have been traced to arise from multiple cross-species transmission of a related strain of immunodeficiency virus, affecting the Simian primates in the African rainforests. In 1996, the World Health Organization announced a breakthrough in developing anti-retroviral treatment, and drugs were now available to reduce immunodeficiency and control the spread of the infection in the body (WHO, 2023). Later, better treatment options have been developed, but none can eliminate the presence of HIV once a person is infected. Research around developing a potent vaccine has also been ongoing, with multiple tests and trials being done. However, nothing positive has been reported over the years, despite billions of dollars having been spent on the same (Wang et al., 2023). However, the medical field can still be proud of the ability to reduce infection through pre and post-exposure drugs that have since been developed with the hope of finding a cure or a vaccine shortly. The virus remains a major global issue and has claimed more than 40 million members of society (CDC, 2022).

The journey towards these targets was not accessible due to the stigma associated with the initial confirmed cases and denial from governments and agencies worldwide. However, in 1996, the World Health Organization announced a breakthrough in developing anti-retroviral treatment, and drugs were now available to reduce immunodeficiency and control the spread of the infection in the body (WHO, 2023). Later, better treatment options have been developed, but none can eliminate the presence of HIV once a person is infected. Research around developing a potent vaccine has also been ongoing, with multiple tests and trials being done. However, nothing positive has been reported over the years, despite

billions of dollars having been spent on the same (Wang et al., 2023).

Risk Factors

While dispelling the misconceptions that had been there about the infection risk for HIV, researchers have established that there is no genetic predisposition for the infection. In an infectious condition, one gets the infection from the exchange of infected body fluids with a viable virus (Zerdali et al., 2023). The sexual interactions associated with the infection range from vaginal, anal, and oral sex, provided there is no use of barrier-based protection (Jin et al., 2021). Having pre-existing sexually transmitted infections increases the risk of HIV due to the presence of open sores, blisters, and lesions that provide a ready portal of entry for the infectious particles. Besides sexual activities, prick wounds, especially for people who work closely with body fluids from other people, including healthcare workers, are a notable risk. This extends to the practice of drug abuse involving direct injection of drugs and sharing of needles and other paraphernalia. Other risk factors include mother-to-child transmission during pregnancy, birth, or breastfeeding (Zerdali et al., 2023). However, progress in the management of HIV has significantly reduced the risk of mother-to-child transmission through focused antenatal and perinatal care, which helps detect the infection in the mother early during pregnancy and provides the necessary care and support to help minimize the risks.

Creating awareness about these risk factors and helping the community members understand their role in screening, testing, and management helps prevent the spread. Over the years, governments and non-governmental agencies have invested heavily in community education to reduce the likelihood of infection (Tian et al., 2023). Regular and free screening services have been made available worldwide to help in the screening and testing; currently, self-test home kits are available in many countries. These help to regularize HIV testing and help people make the right decisions, especially concerning their choice of sexual partners and behaviors.

Etiology and Pathophysiology

Exchange of body fluids from an infected person to a healthy person is the primary mode of infection transfer for HIV. These body fluids include blood, semen, anal and virginal fluids, and breast milk. HIV can be transmitted through infected individuals, even without signs (Jin et al., 2021). Transmisison of HIV is primarily through sexual contact, sharing sharp objects such as needles, breastfeeding children while infected, and sharing contaminated blood through blood transfusion (Wang et al., 2023). Another method involves transmission through the sharing of needles during drug use, as the virus can be present in blood fluids.

The disease process in HIV starts with the introduction of the virus inside the bloodstream of a healthy

individual. The virus escapes from its protective cap and infects the cells, primarily targeting the CD4 cells, which are part of the crucial immunological pathways in the body (Maartens et al., 2014). The entry of the virus inside these cells is through the interaction of the viral envelope and the receptors on the surface of these cells, which facilitates the connection and release of the viral particles inside the cell cytoplasm, where they travel to the cell nucleus and interact with the host genetic materials. The disease progresses to a point where the viral particles hijack the cellular machinery in these cells and interfere with the immune response of the cells, while also working to covert the cell function towards producing more viral particles (Zerdali et al., 2023). These are then released into the cytoplasm and enveloped before being shed into the bloodstream to infect other healthy CD4 cells.

As the virus replicates in the body, it destroys the CD4 cells, weakening the immune system and leading to a decline in the body's ability to fight infections. The continued loss of the immune capacity of the body is the main problem associated with HIV, and its development into AIDS is a factor of a severely weakened immune system which makes all infections get to clinical stages hence creating a syndrome of extreme immunodeficiency (Wang et al., 2023).

Diagnosis of HIV

HIV is diagnosed through testing a client's blood for the presence of viral particles and related antibodies. Rapid testing helps to look for antigen-antibody reactions and is the recommended practice across different healthcare settings (WHO, nd). Other more complicated tests are also done to assess the extent of infection, with some, such as the ELISA test, being able to detect the presence of the infection long before symptoms appear. According to the Centers for Disease Control and Prevention (CDC) and other relevant agencies, regular testing, especially for the at-risk population, couples, pregnant women and even the general population, is recommended in order to help mitigate the effects of the disease, control infection and provide the necessary social and medical support to the patients and families. Today, governmental and non-governmental-sponsored voluntary counselling and testing (VCT) centres are available across the world in almost every healthcare facility. In hospitals, provider-initiated testing and counselling (PITC) is done in order to help mitigate the spread and manage the condition.

Stages of Infection

HIV acute infection is the early stage of the virus in the body and lasts two to four weeks after the day spreading. Initially, the virus attacks the immune cells and may not result in significant symptoms as the body is healthy and strong enough to fight off early infections. However, as the cells become overwhelmed because the virus makes them produce more viral particles, the symptoms are more likely to appear (Tian et al., 2023). The initial scene is associated with flu-like symptoms, where the virus multiplies and extends

through the body. The virus attacks the CD4 cells in the immune system, and the blood level becomes high. The high blood pressure and the fight in the cell increase the chances for transmission, requiring individuals to start ART (Antiretroviral therapy) during this stage. The asymptomatic stage is the period after the seroconversion, where most people feel fine and do not experience any symptoms, even though the virus is rapidly multiplying inside their bodies. This asymptomatic stage can take several years to progress, depending on the overall health status of the individual (WHO, 2023). The virus persists in causing harm to cells and impairs the immune system's capacity to defend against opportunistic diseases. Advanced HIV disease is characterized by CD4 counts falling below 200 cells/mm (stage 3 or 4).

Treatment and Management

For the first more than ten years after the discovery and first diagnosis of HIV infections, there was no way of treating or even reducing the health impacts of the disease. However, since 1996, research has provided the medical sector with options for medicines to help control the spread of infections within a patient's body. The use of antiretroviral therapy (ART) has been a breakthrough that has increased the life expectancy of people living with HIV from just a few months or years after diagnosis to up to 30 or more years with controlled growth of the virus in their bodies as well as enhanced health of the CD4 cells and improved immunity (Wang et al., 2023).

Today, the available versions of ART drugs are well-tolerated in the body, have improved pharmacokinetics and pharmacodynamics that reduce the adverse and side effects, and are hence not as repulsive as they were years ago. Drugs such as tenofovir and abacavir are commonly used today to reduce viral load and help patients lead healthier lives (Challacombe, 2020). Their combinations and improvements have continued to augment the antiretroviral effects, helping to improve the treatment of the disease. Further, research has also presented to the medical fraternity options for injectable HIV drugs that are still under development, which will help to promote adherence and compliance to the life-long therapy that is required.

Prevention and Community Health Practice

The most crucial aspect in the prevention of HIV infection is understanding the etiology and modes of transmission. From the already done research, it is evident that HIV is transmitted through the exchange of body fluids from an infected person to a healthy individual. More than 80% of this transmission is through sexual interactions, which makes the condition considered a sexually transmitted infection (Jin et al., 2021). In addition, using barrier methods such as condoms helps to prevent the exchange of body fluids during sexual interactions. However, these methods do not directly work with oral and anal sex, which means that extra caution and direct prevention of infection must be practised across the board. Eventually,

being tested and screened for the infection regularly helps one to understand their risks and hence take action to stay safe and keep those around them safe (Tian et al., 2023). Besides these practices, pre-exposure prophylaxis is now available for people who are considered high-risk in society, and post-exposure therapy is also available for individuals who are exposed to HIV infections in the course of their lives and professional practice or emergencies (Wang et al., 2023). These modalities, which have been enabled by extensive research around HIV, have helped reduce the infection rates across the world.

There is also a need to address the social stigma associated with the diagnosis and management of HIV in the community. Prejudice and other discriminatory behaviours tend to affect adherence to medication and compliance with the overall therapy and management of the patients. With such kind of discrimination and stigma, some infected persons, both in developed and developing countries hide and cannot reveal their status, posing a risk for the continued spread of the infection (Wang et al., 2023). Without the proper counselling and care, they also become more susceptible to opportunistic diseases, hence ending up with a morbidity state that reduces their overall productivity and impact on society (Sullivan et al., 2021). There is a need, therefore, to address the management of HIV from the perspective of creating a supportive environment which allows individuals to feel that they are members of society and, hence, are able to adopt the necessary treatment and management measures and to protect others from infection.

The research around the development of a potent and viable vaccine for HIV is still ongoing, and significant strides have been made towards that. However, with the long-term disease process enabled by the development of effective ARVs, the findings and political goodwill towards this process have significantly reduced over the years (Maartens et al., 2014). This has meant that the speed of the discovery and research on the available prototypes has become slow in the recent past, with more emphasis being shifted to medical conditions that are more life-threatening and whose social and economic burden is almost instant.

Conclusion

The world must unite and come together to fight the HIV and AIDS pandemic. There is an urgent and pressing need to create increased awareness among community members in order to reduce the rate of new infections and to enhance control of the already infected to a level where communities can manage the disease at their lowest levels (Beyrer et al., 2021). Further, education and awareness will also prevent stigmatization in the community and discrimination towards people with the condition (Beyrer et al., 2021). With deliberate efforts towards reducing the infection and its effects and funding positive research processes, it is possible to reach greater heights in treating and possibly eradicating this pandemic.

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