**UNDERSTANDING HIV: A REVIEW OF EPIDEMIOLOGY, PATHOGENESIS, AND THERAPEUTICS**

**ABSTRACT:**

HIV has always been a serious health issue among the people worldwide. The human immuno deficiency virus leads to AIDS. AIDS mainly targets the immune system of the body thereby weakening the person. The infection usually occurs during the transfer of blood, breast milk , semen , vaginal secretions. The virus infects the CD4 cells T cells and macrophages. HIV virus lowers the level of T cell in a human body. The symptoms that is shown by the body during HIV infection are not generally seen an a people in healthy immune system. It has been found that the use of condoms by the couples can reduce the chances of HIV. There is no particular vaccine available to prevent the infection that is caused by the Human immuno deficiency virus.

**INTRODUCTION:**

HIV leads to “Human Immunodeficiency Virus”. It is usually a sexually transmitted infection that usually occurs during intimation, blood transfusion, transfer of semen and vaginal fluids. The diagnosis as well as testing of HIV is very crucial as the diagnostic strategies need to be continuously revised according to any new discoveries on replication as well as pathogenic mechanism of the infection. There are mainly two types of HIV virus grouped so far, namely- HIV -1 and HIV – 2, out of which the main agent of AIDS is HIV (Emanuele et.al.,2010). HIV belongs to the *Retroviridae* family. Although the basic structure of HIV-1 & HIV-2 is same but they differ in the organization of their genome (Emanuele et.al.,2010). This virus usually omit the central nervous system. Although disease of the central nervous system is more frequent in HIV-2, both the viruses potentially cause AIDS (Lucus et.al.,1993). HIV-2 is less virulent as compared to HIV-1 and takes longer time to progress to AIDS (Whittle H et.al., 1994). Our immune system has white blood cells that contain CD4+ cells. A person infected with HIV virus show several health problems and the virus also affects the body's immune system and count of CD4+ also decreases in HIV.

**STRUCTURE AND COMPOSITION OF HIV VIRUS:**

* Envelope: It is a spherical, enveloped virus which is around 90-120 nm in size. The nucleocapsid has an outer icosahedral shell and an inner cone-shaped core which encloses the ribonucleoprotein.
* Genome: The genome is composed of two identical single stranded, positive-sense RNA copies, with the reverse transcriptase enzyme. During infection, the viral RNA is converted into first single-stranded and then into double-stranded DNA (provirus) through transcription and then integrated into the host cell chromosome. This provirus influences the function of host cell by remaining latent for a long period.
* Lipoprotein envelope: During viral replication, the buds out virus acquires a lipoprotein envelope. The virus coding envelope proteins are knob-like spikes that remains on the surface which in turn anchors the transmembrane pedicles. The spikes binds to the CD4 receptors on host cells. Cell fusion is caused by the transmembrane pedicles.

**TRANSMISSION OF HIV VIRUS:**

The transmission of HIV virus occurs mainly by three possible ways: by sexual contact, by blood transfusion and from mother to her child. Another means by which HIV can be transmitted is by sharing the same needle between two persons [17-20]. Spread of HIV through contaminated blood products remains the most important means of infection in developing countries (Kapila A et.al.,2016). Transmission of HIV from infected mother to child occurs during breastfeeding, and the milk is found to contain high levels of the virus. The virus can also be transmitted before the birth of the child (Kapila A et.al.,2016). Health care workers are at high risk of getting infected by needle stick injury.

HIV can be transmitted from infected person to healthy ones by:

* Sexual contact without protection.
* Contaminated blood products i.e., by blood transfusion, sharing of same needle among drug users and also by some health care products.
* Mother to baby (both before and during birth) (Kapila A et.al.,2016)
* Through body fluids such as Semen, blood, vaginal secretions, breast milk, pre ejaculatory fluid.

The concentration of HIV is high in fluids like – semen, blood components, vaginal secretions, breast milk, pre ejaculatory fluids whereas fluids like pus, saliva, tears, urine, feces, vomiting and nasal mucosa contains low concentration of HIV (Kapila A et.al.,2016).

**SIGNS AND SYMPTOMS OF HIV INFECTION/AIDS:**

People with HIV infection are usually seen to show flu-like symptoms like fever, sore throat and fatigue. Yeast infections are also seen in HIV infected people. Herpes zoster is also seen to occur in infected people. The virus also attack the nervous system and produces symptoms like tingling in feet and trouble in walking to memory loss (Downs et.al.,1996).

Symptoms usually include:

* Frequent fevers
* Swollen glands
* Growth becomes slow in children
* Cough and shortness in breath
* Nausea
* Cramps
* Diarrhea
* Vomiting
* Weightloss.

**LIFE CYCLE:**

The life cycle of HIV AIDS occurs in four steps- Entry to human cells, reverse transcription, transcription and translation, assembly budding and maturation (Kapila A et.al.,2016).

HIV virus makes copies of itself when it enters into the human cells. This virus contain CD4 cells on its surface which is protein in nature. HIV virus remains stick to the surface of CD4 cells and allows them to fuse. This virus mainly attacks the immune cells thereby weakening the immune system. After their entry into the cells there occurs reverse transcription which is done by an enzyme called reverse transcriptase. This enzyme converts viral RNA into DNA. This DNA gets transported to the nucleus of cell and the insertion of DNA is done by an enzyme integrase. After transcription HIV virus converts itself into messenger RNA (Kapila A et.al.,2016).

The viral particle is formed by the gathering of copies of HIV with the newly made HIV protein and enzyme and the viral particle gets separated from the original CD4 cell through a process called budding. The HIV protein is broken down into smaller particles by the enzyme protease and this newly formed virus becomes able to target and infect CD4 cells (Amborzia J and Lavy J A et.al.,1998).

**LABORATORY DIAGNOSIS OF HIV/AIDS:**

The most common method of diagnosis of HIV is by testing the blood and saliva sample of a person as the antibody to that virus remains present there. But the procedure takes quite longer time as the body takes around 12 weeks to produce these antibodies.

Tests that are performed for the detection of HIV/AIDS:

Home Test:

This test is known as Food and Drug Administration – approved test. For the test swab sample is taken from the upper and lower gums. If the test becomes positive then further diagnosis is performed and if the test becomes negative then the process is repeated after three months for the confirmation of the results (Kapila A et.al.,2016).

Diagnosis of HIV/AIDS is performed by the following tests:

* CD4 Count: CD4 cells are targeted and destroyed by HIV virus during infection.
* Viral load: This test is performed to measure the presence of amount of virus in patient's blood.
* Drug resistance: This test is performed to observe the resistance to drugs by the body that is provided during HIV infection (Pope M et.al.,2003).

Treatment of HIV/AIDS:

HIV are treated with antiretroviral drugs. The classification of antiretroviral drugs are as follows:

* Nucleoside reverse transcriptase inhibitors:

Zidovudine, Didanosine, Lamivudine, Tenofovir.

* Nonnucleoside reverse transcriptase inhibitors:

Nevirapine, Delavirdine, Efavirenz.

* Protease inhibitors:

Indinavir, Nelfinavir, Amprenavir, Lopinavir, Atazanavir (Kapila A et.al.,2016).

The very first drug that was used for the treatment of HIV virus was Nucleoside Analogue Reverse Transcriptase inhibitors (NARTIs). It was first used in the year 1987. Non nucleoside reverse transcriptase inhibitors was also approved in 1997 (Tripathi K.D. et.al., ).

Another active antiretroviral therapy is HAART. This drug is also used for the treatment of HIV infection (Kapila A et.al.,2016).

There is no effective vaccine released yet for HIV infection. Although a vaccine composed of poxvirus have been made trial with but that provided only 30% protection.

**CONCLUSION:**

HIV is a virus that primarily leads to AIDS. AIDS weakens the immune system. As it is a sexually transmitted infection, care and precautions should be taken during intimation by the couple. It has been reported that use of condoms reduces the chance of infection by less than 1%. Various screening test and drugs are used during the treatment of HIV infection. People are made aware for this infection through ICTC. There is no vaccine made available yet for the prevention of HIV. Proper protection and awareness can prevent the spread of HIV among people.

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