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REVIEW ARTICLE

TRANSMISSION OF AIDS

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AIDS (Acquired Immune Deficiency Syndrome) was first reported in June 1981 by Centre of Disease Control, United States. The epidemic of AIDS which originated in United States has been exported so effectively that the rest of the world is only a bit behind.[1] In United States alone more than half a million people are already infected with Human T-cell Iymphotropic virus Type III/Lymphadenopathy associated virus (HTLV-III/LAV) now called Human Immunodeficiency Virus (HIV). Today no country of the world can claim to be free from its deadly clutches.

The routes of transmission of AIDS were established well before the causative virus was isolated. It was first described in homosexuals in June 1981.[2] It was recognized in intra-venous drug abusers and Haitains[3] the following year and by 1983 in recipients of blood and blood products,[4] infants born to mothers at risk,[5] heterosexual partners of patients with AIDS[6] and in Africans.[7] These population groups have been included in so-called "risk groups".[8]

The mode of transmission[9] is presented in Table-I.

Table-I: Mode of Transmission of AIDS

I. Known routes of transmission of ADDS
   - A. Inoculation of blood
     - a. Transfusion of blood and blood products.
     - b. Injection with unsterilized needle.
     - c. Exposure in health care workers' to contaminated needles, open wounds and mucous membranes.
   - B. Sexual
     - a. Homosexual.
     - b. Heterosexual.
   - C. Perinatal
     - a. Intrauterine.
     - b. Peripartum.

II. Routes not shown to be involved in transmission.
   - A. Close personal contact.
     - a. House hold.
     - b. Health care workers without exposure to blood.
   - B. Insects.

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Transmission by Blood and its Products

Transmission of HIV by this route constitutes a small but important portion of patients. In United State 2% adults and 12% children have been infected by this route.[10]

This method of transmission has the following characteristics:

1. Infection present in the donor is transferred to the recipient. This has provided important clue for infectious nature of the syndrome.
2. The infection can be transmitted by blood, blood cellular components, plasma and clotting factors. In France, 50.5% of haemophiliacs have been found to be seropositive for HIV.[11] Transmission by blood and its products has provided important insight into transmission in other risk groups such as intra-venous drug abusers.
3. This route of transmission has shown that infection can occur with a single inoculation.
4. The median incubation period ranges from 27.5 months to 4.5 years, as described by the various studies.[12]
5. The most important factor in HIV spread is a prolonged asymptomatic but infectious state.

The minimum dose or inoculum of virus that causes infection is unknown. In one study the infection rate from donor to recipient was 66%.[13] The infection in the recipient is more likely if the donor becomes symptomatic soon after donation.

It is possible to completely eliminate transmission of AIDS by transfusion. This can be done by screening of donated blood for antibody to HIV. The screening began in April, 1985. To further reduce the risk of transmission to haemophiliac patients, heat treatment of clotting factor concentrate is now being done. In the past transmission of AIDS by seronegative blood has occurred.[14] There is maximum false negative rate of 3% with the ELISA (Enzyme linked Immuno-sorbent assay) technique for identification of antibody to HIV. During seroconversion to HIV a period of low sensitivity to ELISA has been documented.[15] At present after screening the risk of infection from transfused blood is 1 in 100,000.

Accidental Parenteral Inoculation in Health Care Workers

If a large dose of blood containing HIV is given by intravenous route, there is a very high risk of infection but it is reassuring that inoculation by other parenteral routes have relatively low risk. This has been documented from studies of accidental needle-stick inoculation in health care workers.[16] The total risk of acquiring infection through this route is 1.3 to 3.9 per 1000 health care workers with parenteral exposure.[17]

Transmission by Intravenous Drug Abuse

Transmission of HIV infection by this route is important in United

States and Europe. Twenty-five per cent of all cases of AIDS in United States are intravenous drug abusers.[10] This group of intravenous drug abusers occupies an important position, because it further disseminates the infection to other adult population by heterosexual transmission and to children by perinatal transmission. HIV infection among intravenous drug abusers occur by repeated exposure to small doses of infected blood through sharing of contaminated injection equipment. The intravenous drug abusers are the largest pool of HIV infected heterosexuals in USA and Europe.[18]

Sexual Transmission

The transmission of HIV is basically via sexual contact, homosexual or heterosexual. Presently a large number of AIDS patients (74%) in the United States are homosexual or bisexuals.[5] The first report of homosexual transmission came in 1981 and that of heterosexual transmission in 1983.[2] Many different studies have shown that this disease is more rampant in persons who have a large number of sexual partners as compared to their controls.[19]

The dominant mode of sexual transmission in the United States uptil now has been homosexual, however the statistics show that presently of all the "at risk groups", the heterosexuals are acquiring the virus at a rapid rate.[20] Furthermore heterosexual transmissions is of greater importance in Africans, Carribeans and other Third World countries.[21]

Presently the main problem in prevention of AIDS is its sexual transmission. This could be achieved by public education about the disease, a decrease in number of sexual partners, eliminating homosexuality and use of condoms. It has been shown that the use of condoms prevents transmission of sexual diseases like syphilis, gonorrhoea, herpes simplex, cytomegalovirus and also HIV.[22]

Perinatal Transmission

Perinatal transmission can occur via 3 routes: —

1. In utero to the fetus, through feto-maternal circulation.[23]
2. At the time of delivery by inoculation or ingestion of blood and other fluids.
3. Postnatally, through breast feeding.[24]

A recent study has shown HIV seroprevalence of 2.1 per 1000 in childbearing women as indicated by seropositivity of their newborns.[25] It has been reported that HIV might cause a dysmorphic syndrome, in utero, in which there is a characteristic facial malformation. Facial development occurs between 12th to 16th week of pregnancy and this might be the period when the infection is transmitted.[26] HIV has also been isolated from breast milk of three healthy carriers. The acquisition of HIV in the female is mainly through heterosexual contact and intravenous drug abuse.

Routes not Shown to be Involved in Transmission

Insects

Three aspects emphasise the concept that insect borne transmission of HIV does not occur.

1. Most cases of AIDS occur in persons aged 20-50 years (age risk group for sexually transmitted disease). Insects do not discriminate between different age groups when biting. This aspect! provides important evidence against insect borne transmission.
2. The persons infected with HIV in geographical areas where the incidence of infection is highest have well defined other risk factors (sexual activity and intravenous drug abuse).[27]
3. There is no biological evidence of HIV presence in insects.

Close Personal Non-Sexual House Hold Contact

A number of studies have indicated that house hold contacts who are not sexual partners of or born to, patients with AIDS 'are at minimal or no risk of infection with HIV.[28] Of the total number of cases of AIDS reported so far in United States and Europe none have occurred in family members unless the family members have other risk factors.

Body Fluids in Transmission of AIDS

HIV has been isolated from blood, semen,[29] saliva,[30] vaginal secretions,[31] breast milk,[24] tears,[32] urines,[33] serum[34] and cerebrospinal fluid.[35]

The most important means of transmission is by blood and semen. Transmission by vaginal secretions and breast milk has occurred in some cases.

Transmission by saliva is of concern to the public but so far there is no evidence of transmission to dental workers who are continuously exposed to saliva.[36]

Conclusion

The given facts strongly support the conclusion that AIDS virus is spread sexually, by the injection of contaminated blood and vertically from mother to fetus. Other modes of transmission is rare. It is not easy to believe that a virus which causes such harsh, fearful and deadly disease is not easily transmitted.

The available data point out that the virus is very inefficient in a single exposure unless one receives a large dose. The widespread dissemination of HIV has probably occurred through repeated exposures ds in sexual activity and intravenous drug abuse.

The keys to preventing transmission of HIV are: —

1. Abstinence from sexual promiscuity.
2. Abstinence from intravenous drug abuse.
3. Public education about the disease.
4. Screening blood and its products before use.
5. Precautions for health care workers.

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