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Review

A comprehensive analysis of the risk variables linked to HIV infection

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	Abstract
Published on: 11 Feb 2025	<p>The current review on factors that makes HIV more likely. Human immunodeficiency is caused by an immunodeficiency virus that targets the host's T cells. An advanced stage of HIV infection causes AIDS. HIV is a major public health challenge. These review discuss the risk factors for HIV infection, such as frequent sexual partners, unprotected sex, and high-risk sexual behaviours such condom-less anal intercourse. , HIV can be passed from mother to infant during pregnancy and delivery and sharing contaminated needles, syringes, and other injecting equipment, or drug solutions when injecting drugs and connected to transfusion Errors in blood bank procedures, such as contamination during blood collection, processing, or storage, can potentially result in HIV infection. Inflammation of the genital mucosa and the presence of other STIs make women more susceptible to HIV infection through heterosexual vaginal relationships. Getting another STI, such as syphilis, herpes, chlamydia, gonorrhoea, or bacterial vaginosis. And receiving medical procedures that involve unsterile cutting or piercing; or unintentional needle stick injuries, including among healthcare professionals. Another risk factor for HIV infection is socioeconomic status of public.</p>
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	<p>Keywords: immunodeficiency, intercourse, contamination, equipment, transfusion, inflammation, heterosexual, vaginosis, chlamydia, gonorrhoea, syphilis.</p>

INTRODUCTION

The virus known as the human immunodeficiency virus (HIV) attacks the immune system. When an illness is at its worst, acquired immunodeficiency syndrome, or AIDS, develops. By targeting the body's white blood cells, HIV impairs immunity. This increases the risk of contracting infections, certain types of cancer, and diseases like tuberculosis.

HIV transmitted by Blood, breast milk, semen, and vaginal secretions are among the bodily fluids from HIV-positive individuals that can be shared. Additionally, HIV cannot be transmitted by routine daily contact, such as sharing food, water, or personal items, kissing, hugging, or handshaking. Sexual partners will not get HIV from HIV-positive individuals on antiretroviral treatment (ART) and with an undetectable viral load.

Sexual activity-related risk

India has the highest HIV prevalence in Asia and ranks third globally in terms of the number of HIV-positive individuals. The architecture of HIV prevention in India is predicated on the idea that high-risk groups primarily commercial sex workers and men who have sex with men—are the main causes of the pandemic, spreading the virus to a male bridge population. The transmission is spread to their female sexual partner and from them to their offspring by this bridge population, which primarily consists of truckers and migrants. Therefore, preventative efforts have focused on the bridge and high-risk populations to break the transmission cycle.

According to the studies of women who have ever been married, the prevalence of HIV is higher than the national average. Ever-married women, including widowed and divorced women, should be the primary target of prevention efforts since most of the HIV transmission in women occurs within marriage. The low number of married men who use condoms with their spouses and other sexual partners was validated by our study. Bereaved women's greater risk for HIV may be caused by their husbands' HIV infection. It is also possible that widowed women had extra sexual partners after their spouses passed away.

In India, HIV risk reduction initiatives often do not target married couples, in contrast to sex workers and STI clinic patients. These ladies were probably infected by their husbands because, for most of the married women, having sex with their husbands is the only risk factor.

In one study conducted in Manipur, Panda and Chatterjee demonstrated that male injecting drug users (IDUs) were passing HIV on to their wives who were not affected. Reaching out to women who are married to IDUs is urgently needed, according to Kumar and Virk. According to one study conducted in Mumbai, a sizable percentage of men who visit STI clinics are bisexual (having sex with both women and men) and participate in risky sexual behaviours. IDUs and males who have sex with men have become major HIV carriers in India, according to NACO.

Most women who suffered violence after the age of 14 had been abused by their current spouse. Violence and threats of violence are linked to a higher risk of HIV infection through sexual contact. Abused women were more likely to be HIV-positive, had been the victims of unprotected anal intercourse, and were substantially less likely to have used condoms with their intimate relationships. research validates that women who are sexually abused by their husbands are at a higher risk of contracting HIV. Therefore, it is necessary to provide interventions that enable women to defend themselves against sexual violence, particularly from close partners. Results support the strong correlation between HIV infection and having several partners. There were notable correlations between both models and women having multiple sexual partners. HIV infection among women who are currently married was also found to be substantially correlated with husbands who have other wives or relationships.

Our study underscores that husband-related risk factors increase the vulnerability of Indian women to HIV infection. The sociodemographic characteristics and other underlying variables linked to HIV transmission among Indian women are currently the subject of little study. This study aimed to look at these factors in Indian women who have had sex. We utilised data from the National Family Health Survey 3 (NFHS-3), which comprised 52,853 HIV-positive women and 27,556 husband-wife pairs. The following were significant risk factors for married women as well as all women: Insufficient income (AORs = 1.57 and 1.79), having several sexual partners (AORs = 5.95 and 5.15), experiencing a genital sore within the last 12 months (AORs = 3.16 and 3.01), and being between the ages of 26 and 35 (adjusted odds ratios [AORs] = 3.65 and 2.53, respectively) were connected to this danger. AOR = 3.40 indicates that males have other spouses, and husbands are suffering AORs = 0.43 for men with at least a secondary degree and 2.63 for sexual violence in husband-wife partnerships. Women in their twenties and thirties who live in impoverished urban areas and have experienced sexual assault at the hands of their spouses and are enrolled in various rehabilitation programs in India should concentrate on their relationships. Empowering women is essential to preventing HIV/AIDS in India.

Risk of co-infections

Inflammation of the genital mucosa and the presence of other STIs make women more susceptible to HIV infection through heterosexual vaginal relationships. A common illness called herpes simplex virus 2 (HSV-2) is a co-factor that increases the risk of HIV infection in the female vaginal tract. Women often must put up with their husbands' violence, cruelty, and adultery. They are unable to negotiate safer sex practices when they have sex because they are ignorant about their regular partners' sexual health, their sexual health, and the ongoing culture of silence. This study's specific goal was to ascertain the risk of HIV infection in India for married women who are currently living with their husbands as well as for all women.

Socioeconomic determinants and risk factors contributing to HIV vulnerability

The term "socioeconomic status" describes a person's social and financial standing in society.¹⁷ While economic indicators include income, wages, home ownership, asset possession, family income, and the percentage of people who did not receive medical treatment because they were unable to pay for it, social indicators include things like education, health, employment status, housing conditions, and access to services (such as water, sewerage, and electricity).

Individuals from low-income households and those with less education are more likely to get HIV. Compared to unaffected families, households with HIV/AIDS are more likely to be poor. The capacity of those who are already impoverished to afford their fundamental requirements, such as food, may be threatened by additional income loss. People living in poverty are also forced to make decisions that increase their risk of contracting HIV. Studies show that impoverished women are less able to demand the use of condoms and are compelled to engage in sex work and perform sexual favours in exchange for cash.

In an AIDS-affected home, women and children suffer the most. There are 15 million HIV/AIDS orphaned children in the globe who are more vulnerable to sexual exploitation, abuse, disease, and malnourishment. After an AIDS-related death in the family, households put their children's education at risk and pushed them to work early to pay for household expenditures. There is proof that married women are socially shunned and blamed. Loss of education and employment are caused by social stigma. For fear of losing their employment, many persons living with HIV/AIDS do not reveal their status because of stigma and prejudice at work. Numerous accounts of violent incidents and discriminatory treatment of adults and children with HIV have surfaced, indicating the widespread stigmatisation of HIV-positive people in our community. Five Patients' poor self-esteem is a result of stigma and marginalisation.

Risk factors for HIV transmission associated with syringes

To make medicine, use a syringe filled with tainted blood from someone else. Donate the water that was used to rinse the needle and syringe. Make use of heating and dissolving containers, filters, or reusable spoons.

Use the same filter that was previously applied.

Additional details on the risk factors for HIV infection by syringe may be found here:

- Sharing syringes or needles: This is the most prevalent way that injectable drug usage spreads HIV. HIV-transmitting tiny blood traces may still be present in a cleaned needle or syringe.
- Sharing more injection supplies: This contains everything used to produce drugs, such as water, filters, and cookers. Additionally, the blood of an infected individual may contaminate these objects.

Reusing syringes or needles: Using syringes or needles again, even after cleaning, raises the risk of contracting HIV.

- Increasing the frequency or length of medication injections: Your risk of contracting HIV increases with the frequency of your medication injections.
- Possessing additional STIs: Individuals who have STIs may have open wounds or sores, which might raise the risk of HIV transmission.

It is crucial to remember that sharing needles does not always carry a 100% risk of HIV transmission. It is still a big risk, though, so it is best to stay away from it completely.

The risk of receiving blood transfusions

HIV was a threat to the blood supply in the early years of the pandemic because it may be transmitted through bodily fluids like blood. Over 90% of recipients who get blood transfusions tested positive for HIV at follow-up, making blood transfusion-associated HIV infection the most common risk exposure due to the much higher proportion of HIV present in blood compared to other routes of infection. In Sub-Saharan Africa, for instance, 5–10% of all HIV infections were caused by improper blood transfusions. Blood transfusions increased the prevalence of HIV along with advancements in surgical methods or new treatments for blood-borne infections. Therefore, as reports of HIV transmission by blood grew, steps were taken to improve the blood supply and guarantee transfusion safety. We have come a long way from the early days of the epidemic in terms of understanding and reducing the risk of HIV. Measures to prevent HIV infection include hospital-based programs, worldwide and national recommendations for effective blood screening, and stringent donor selection criteria, such as checking each unit of blood for antibodies and interviewing donors about HIV risk behaviours.

To increase public biosafety and lower the risk of HIV transmission, donor education programs that encourage voluntary blood donations, test confidentiality, and screening of high-risk populations have been put into place worldwide. Given that millions of individuals get blood transfusions or blood products annually across the world, this is especially crucial.

There are ongoing issues with HIV infection screening for transfusion-transmitted illnesses. For example, if the donor is infectious but has not yet developed HIV antibodies that would provide a positive test result, blood may be donated shortly after the term "window period" refers to this time range. Even if the serological test is negative, the receiver may still get the virus within this serological window period.

Furthermore, the behavioural and structural barriers such as proper staff training, proper interpretation and complete implementation of guidelines, and proper usage and availability of technologies and techniques remain important factors that might contribute to blood-borne illness outbreaks. In this overview, we outline the history and purpose of HIV blood screening as well as the ongoing problems with safe blood donation, transfusions, and the blood supply. Along with suggestions from the Chinese viewpoint, the present global trends are also covered.

Since regular antibody testing of all donations and risk screening of donors began, transfusion-related HIV transmission has decreased in upper- and upper-middle-income countries. The risk of HIV transmission through transfusions has continued to decline because of ongoing improvements in donor recruiting procedures, donor education, donor screening, and blood testing. According to reports, a significant portion of low-income nations, especially those in Africa and Southeast Asia, have national blood transfusion policies and strategic plans, demonstrating the governments' dedication in those two areas. To address the demands and difficulties of those living with HIV, the Chinese government has been making constant adjustments to its HIV management guidelines. HIV transmission can be decreased by offering free countrywide testing and ART treatment. Nonetheless, there are still issues with tracking and assessing blood screening for biosafety reasons worldwide.

To ensure the health and biosafety of persons battling HIV, proper training and enhanced operating protocols are crucial. Furthermore, in many nations, there is still a pressing need to improve control of screening and testing practices and create long-lasting quality systems. One such tactic that can assist in lowering residual risk and advancing blood safety is the creation of a national donor database to stop repeat donations by individuals living with HIV [18]. Simplified testing protocols and better technical training for employees might benefit individuals who are delivering care while facilitating effective HIV screening.

Mother to baby transmission of HIV: Risks and prevention

In the absence of antiviral therapy, the risk of HIV transmission from infected women to their offspring is around 15–30% throughout pregnancy and childbirth, with an extra 10–20% risk associated with prolonged breastfeeding. It is uncommon for HIV-2 to be passed from mother to kid. Mothers with advanced HIV illness and/or high viral loads are at a higher risk of transmission. 15–30% of newborns with vertical infection pass away within the first year of life if antiretroviral therapy (ART) is not administered. The development of resistance and side effects are two issues that impede the long-term management of children on ART. Effective MTCT prevention continues to be the primary goal from a paediatric standpoint.

HIV transmission from an infected woman to her child during pregnancy, childbirth, or after giving birth is known as mother-to-child transmission (MTCT). Mother-to-child transmission of HIV-1 infection is common, whereas HIV-2 transmission is uncommon. Rarely do infected children exhibit HIV symptoms or indicators at birth; instead, they often acquire them over the course of the following several months. While formula feeding necessitates access to clean water and health information.

Avoiding breastfeeding minimises HIV transmission after delivery. The many advantages of breastfeeding must be weighed against the possibility of HIV transmission from breastfeeding.

- Breastfeeding is closely linked to lower newborn morbidity and higher child survival in nations with limited resources. while maintaining some of the advantages linked to HIV, altered breastfeeding methods may lower the risk of HIV transmission.
- Modified breastfeeding techniques could be the best option in situations when formula feeding is not practical (no clean water, inadequate health knowledge, or strong cultural obstacles).
- Compared to formula, mixed feeding, or prolonged breastfeeding, early breast feeding with weaning at age 4-6 months may give an HIV-free survival benefit. In some situations, expressed breast milk treated with heat or microbicidal may be beneficial.

Elective caesarean delivery at 38 weeks may lower vertical transmission rates.

- The potential advantages of this technique must be weighed against the high expense, practicality concerns, and elevated risk of problems related to surgery. In environments with limited resources, these restrictions are especially pertinent.

HIV-1 MTCT risk is not decreased by immunotherapy using HIV hyperimmune globulin or immunoglobulin without HIV antibody. There is no proof that vaginal microbicides lower the risk of HIV-1 MTCT. Supplementing with vitamin A or multivitamins does not appear to lower the incidence of HIV-1 MTCT or neonatal death

Occupational exposure (Health care workers)

Occupational exposure risk factors for HIV refer to situations where individuals working in certain professions may come into contact with materials or situations that could potentially expose them to HIV. The primary concern is transmission through blood or bodily fluids. Here are some common risk factors in various occupational settings:

Healthcare Workers

- **Needle stick injuries:** Accidental pricks from needles or other sharp instruments that may be contaminated with HIV-infected blood.
- **Blood or bodily fluid splashes:** Contact with infected blood, semen, vaginal fluids, or other bodily fluids during procedures such as surgery, dental work, or childbirth.
- **Exposure to contaminated medical instruments:** If equipment isn't properly sterilized, there may be a risk of transmission.

- **Handling contaminated linens or waste:** In hospitals or clinics, workers may be at risk when dealing with used medical linens or waste that could be contaminated.

Emergency Responders (e.g., paramedics, police, firemen)

- **Direct exposure to blood or body fluids** during emergency situations (such as accidents, violent incidents, or medical emergencies).
- **Injury with contaminated equipment** (e.g., broken glass, sharp objects).

Laboratory Workers

- **Handling samples:** Risk may exist when handling blood, tissues, or fluids that could contain HIV.
- **Accidental spills or leaks** from containers or lab equipment.

Social Workers and Caregivers (in healthcare or community settings)

- **Exposure to blood or bodily fluids** when assisting individuals with personal care, such as changing bandages or administering medication.
- **Caring for individuals with HIV:** While HIV is not transmitted through casual contact, exposure may occur if blood or body fluids are involved in direct care.

Sex Workers and their Clients

- **Sexual contact:** The most common occupational risk for sex workers is unprotected sex with individuals who may be HIV-positive, especially if there are cuts or sores involved.

Correctional Facility Workers

- **Exposure to bodily fluids:** Inmates may have HIV, and guards, medical personnel, and staff may be exposed during interactions or emergency situations.
- **Injury during altercations:** Fights or violent incidents could lead to blood exposure

CONCLUSION

On conclusion ART play an important role during pregnancy of infected women. the architecture of HIV prevention in India is predicated on the idea that high-risk groups primarily commercial sex workers and men who have sex with men are the main causes of the pandemic, spreading the virus to a male bridge population. Biomarkers in blood and blood products for HIV infection and screening blood donors using behavioural risk assessments are important measures for protecting blood safety and reducing the possible window period of HIV infection. the risk of HIV transmission from mother to foetus has significantly decreased in recent decades due to improved medical care and maternal combination antiretroviral medication, elective caesarean sections, when necessary, baby prophylaxis, and formula feeding, MTCT still Happens. youths are among the most vulnerable groups to HIV infection, they are also the most promising agents of behaviour change. Young men and women are vulnerable to HIV infection because they begin sexual activity at an increasingly younger age, tend to have multiple partners and have restricted access to information on safer sexual practices. In addition, the interplay of a wide range of factors - war and instability, the loss of appeal in agriculture as a profession, economic hardship and the absence of income-generating opportunities, the increase in drop-out school rates and alcohol/drug abuse - have contributed to the creation of a high-risk environment for rural young men and women.

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