ORIGINAL ARTICLE

Occupational Exposure to HBV or HIV: which is more significant?

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Abstract

Needle stick injuries are dangerous hidden occupational hazards in dental practice, which are unreported and forgotten most of the time. Dental surgeons are at risk of Hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). HBV is of prime concern for the dentist and their staff because Hepatitis B is more contagious than HIV; it is about 100 to 1000 times more contagious. HBV is smaller than HIV, there are more particles of it in the same amount of human blood, and HBV can survive up to 7 days in dried blood on clothing or expose surfaces. HIV is inactivated as soon as the fluid it lives inside is dried up. Both HIV and HVB carriers are often asymptomatic and are capable to transmit. An effort is made through existing published literature to find out which is a prime concern to the dental surgeons.


Key words: Occupational Exposure to HBV and HIV + Dental Practice

Introduction

Science has been arranging, classifying, methodizing & simplifying everything except itself. Scientific men are only recently realizing that the principles which apply to success on a large scale to general staff, work to apply to them also.1 Dentistry in the present era has definitely achieved the status of a valuable profession. The technological advances, discovery of the newer materials & super fine techniques have revolutionized dental care systems. This has identified the super specialty aspect of dentistry & has definitely given quality care to the patients. The dentist & sometimes with his team members are exposed to a number of hazards peculiar to this profession. This leads to various ailments specific to the profession that develop & may intensify in the subsequent years.

Dentists because of their small operating field, variety of sharp instruments used, proximity to patient’s oral cavity and frequent patient movements predisposes to needle stick injuries during their practice2. A dentist including their staff is more prone to needle-prick injury and may thus...
fall prey to infections of blood borne viruses (BBV) carried in blood, oral fluids and tissues. Hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) which are major concern to the dentist and their staff. Hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) infections have been recognized as occupational hazards with the risk of transmission from patient to the health care personnel as HCV (3%), HBV (30%) and HIV (0.3%).

Occupational exposures are only considered significant if there is a potential for infection. Significant exposure to HBV, HCV, or HIV occurs when a type of body fluid capable of transmitting the virus comes into contact with:

- Tissue under the skin (e.g., through a needle stick or a cut). This is called a percutaneous exposure.
- Mucous membranes (e.g., through a splash to the eyes, nose, or mouth) This is called a mucocutaneous exposure.
- Non-intact skin (e.g., when the skin is chapped, scraped, or afflicted with dermatitis).

Both HIV and HBV carriers are often asymptomatic and can transmit the disease. Both the infections can be acquired and transmitted in the dental environment. Keeping all the above mentioned points in view, an attempt was made to review the various available literatures on occupational transmission of AIDS and Hepatitis B and along with their significance in dentistry.

**Discussion**

Recent reports of the transmission of human immunodeficiency virus (HIV) in health care settings have caused considerable public health concern. HIV as well as hepatitis B virus (HBV) and other blood borne pathogens constitute infectious hazards in dental settings. Transmission has been reported from patient to patient, patient to health care workers, and rarely, from health care worker to patient. Although the risk of transmission is largely preventable, it may occur due to the use of infected blood for transfusion, the use of improperly sterilized medical or dental equipment, and accidental punctures with contaminated instruments. The risk of transmission of bloodborne pathogens is dependent on a number of factors and is greater for HBV than for HIV.

Both Hepatitis B and HIV/AIDS pose more risk in occupational health and safety. They are contagious disease which have impacted differently on the welfare of the workforce and hence influence occupational hazard and safety. Both are viral disease which means they are highly contagious and difficult to cure. They can lead to decreased productivity of the workforce especially when most workers have contacted both diseases. This become more serious in healthcare industry where workers are exposed to body fluids like blood and other with risk of needle sticks which can become major transmitters of these infections.

The Dentists are at more risk to HBV than HIV infections because:

1. HBV is more common in general population and its ability to establish chronicity in a significant proportion of cases. So a dentist is more likely to be in contact with a HBV carrier than a HIV in his dental practice. The average estimated carrier rate of hepatitis B virus (HBV) is 4%, placing India in the intermediate range for hepatitis B endemicity and giving an approximate total of 36 million carriers.

2. Although AIDS has been feared more than Hepatitis B, research evidence shows that Hepatitis B poses more risk than HIV/AIDS. This is due to the fact that Hepatitis B is 1000 times contagious compared to HIV/AIDS as in Hepatitis B there are over 100 million viral particles per mm of blood where as in AIDS there are only 100 viruses /ml of blood. The risk of transmission of bloodborne pathogens appears to be highest from direct percutaneous exposures to infectious material with greater infectivity from pathogens such as HBV, rather than HIV.

3. HBV virus is much smaller than HIV so there are likely to be more particles of the virus in a given amount of blood.
4. Recent studies have estimated the risk of HIV infection after percutaneous exposure to HIV infected blood to be 0.3% and after mucous membrane exposure to be 0.09%, whereas the risk of Hepatitis B infection is 20 to 30 %.

5. In addition, HBV can survive for more than seven days in dried blood even when exposed to surfaces. Comparatively, HIV virus is immediately deactivated once it is out of body fluid which means once the body fluid in which the virus survive is dried up, the virus also dies. Since HBV virus can survive for a longer time outside the body fluid environment, so it will infect more people compared to HIV virus which is inactivated once exposed to the surface.

6. Experimental studies have proved that HBV can be transmitted even by means of a splash of infected material on to the mucous membrane, a claim which has yet to be proved in case of HIV infection. Current evidence indicates that hepatitis B can spread parenterally and non parenterally by salivary contaminations. In AIDS this is not the case as the human saliva can inhibit HIV infection of normal human peripheral lymphocytes. So the risk of salivary transmission of HIV is less. Hence The occupational transmission of HBV is significant to dentists.

7. The hepatitis B virus is 50 to 100 times more infectious than HIV.

Owing to its high concentration in blood, Hepatitis B becomes more contagious. This means that a person who is exposed to Hepatitis B virus has a higher risk of infection 30 percent more risk of getting sick compared to a person who has been exposed to HIV virus. There are many practices in the workplace which can lead to infection with Hepatitis B and this risk is higher compared to HIV/AIDS. Like HIV virus, Hepatitis B is transmitted through direct contact with infected body fluid in workplace. However, it is known to spread much faster and frequently when compared to HIV/AIDS through sexual intercourse or through injection, especially among drug users. Like HIV, Hepatitis B is also passed from the mother to the unborn child. In this case, the risk is also higher as 90 percent of children born of a Hepatitis B mother will progress to develop chronic Hepatitis B. In addition, Hepatitis B can also be caused by other conditions like sharing of brushes or nail clippers which may be common in the workplace.

The two however differs in terms of their progression. HIV/AIDS is known to progress slowly from infection to the time the CD4 count falls down to allow for opportunistic infection. This may take years depending on lifestyle of the infected person. However, Hepatitis B progress much fast and is known to cause serious liver damage and death in some cases. Life threatening risk of Hepatitis B comes from inflammation of the liver. This may be more serious because at the beginning, Hepatitis B does not show any manifestation symptoms. Initial symptoms may be similar to those of other disease since they include fever, headaches, loss of appetite, fatigue, and others. With time, other symptoms like gastrointestinal disorders like nausea becomes apparent. This is followed by infection of liver which is manifested as Jaundice or yellowing of the skin and eyes due to accumulation of bilirubin.

These occupational hazards impose an obligation on Dental Surgeons and their staff to take measures to minimize its transmission. By prudent infection control methods, it is possible to eliminate cross infection in dental settings, finally all dental surgeons should be protected from hepatitis B virus (HBV) infection by immunization. Dental Council or Indian Dental Association should take initiatives to monitor the vaccination schedules.

Dentists who have received hepatitis B vaccine have developed immunity to the virus are at virtually no risk for infection. For an unvaccinated person, the risk from a single needlestick or a cut exposure to HBV-infected blood ranges from 6%–30% and depends on the hepatitis B antigen (HBeAg) status of the source individual.

**Conclusion:**

Hepatitis B remains a serious threat to Dental Surgeons and their staff. Prudent infection control procedures, personal protective equipment,
routine HBV Vaccination and access to HIV Post exposure prophylaxis among Dental Surgeons are necessary to eliminate the hazards of HBV and HIV infections. And finally the use of universal precautions and safety devices is necessary to prevent these injuries in dental practice.

References