

## Occupational risk and Hepatitis B in Dentistry: Review

Dastagir S

### Abstract

*Health-care workers have an occupational risk of infection with hepatitis B virus (HBV). As dental healthcare professionals have numerous patients and they are very much exposed to blood, are likely to have the maximum risk. HBV is transmitted by skin prick with infected, contaminated needles and syringes or through accidental inoculation of minute quantities of blood during surgical and dental procedures. In a dental clinic infections can be expedited through several routes, including direct or indirect contact with blood, oral fluids, droplet splatter, etc. The aim of the present review is to increase the awareness among dental practitioners, so as to reduce the burden of hepatitis in their community. A meticulous review of the literature was carried out, which engaged most of the articles published in peer-reviewed journals relating to the subject of hepatitis B and occupational risk in dentistry. The review itself began with the search of relevant key words like hepatitis B, dentistry, occupational risk, and infection control in various search engines including PubMed, Medline. The results revealed that the dentists were among the high-risk groups for hepatitis, and they have little information on the factors associated with adherence to hepatitis B vaccination. HBV can be prevented by strict adherence to standard microbiological practices and techniques, and routine use of appropriate barrier precautions to prevent skin and mucous membrane exposure when handling blood and other body fluids of all dental patients and pre-exposure vaccines. .*

**Keywords:** Dentist, hepatitis, occupational risk, infection control.

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### Introduction

Hepatitis is a major public health problem worldwide.<sup>1</sup> Seven types of the hepatitis virus have been identified and are named as hepatitis A to G, of which; F is hypothetical.<sup>2</sup> Hepatitis B remains the most serious type with a high risk of death from liver cirrhosis and cancer.<sup>2</sup> Hepatitis B virus (HBV) is a DNA virus with a human, the only reservoir. About one-third of the world's population, which accounts to 2 billion people, have been infected with HBV.<sup>3</sup> This virus can survive outside the body for at least 7 days and the incubation period is about 21-135 days.<sup>4</sup> Overall, approximately 45% of the global population lives in areas of high chronic HBV prevalence.<sup>5</sup> In Sub-Saharan Africa, the Pacific, and particularly Asia, HBV infection is highly endemic, with the majority of individuals are infected during childhood only.<sup>6</sup>

The incubation period is 30-180 days. Chronic infection with HBV may be either asymptomatic or may be associated with a chronic inflammation of the liver (chronic hepatitis), leading to cirrhosis over a period of several years.<sup>7</sup>

At the beginning of the third millennium, hepatitis B virus (HBV) remains a major global public health problem. More than a third of people have been infected worldwide, and of these, 350–400 million are chronically infected<sup>2</sup>. In a study on the global challenge of HBV, the dental community had the highest risk of infection amongst all health care personnel. Based on Cottone's study<sup>3</sup> dentists and oral surgeons were in the first rank, nurses, dental hygienists and assistants were in the third rank, and dental students and dental laboratory technicians were in the sixth and seventh ranks, respectively.<sup>3</sup> A previous survey<sup>4</sup> in the prevaccination era showed that HBV infection of dentists was approximately 3–6 times greater than that of the general population. Nonetheless, despite extensive vaccination programs against HBV.

Since 1989, this infection has not yet been fully eradicated, and still is a major concern in dental fields.<sup>4</sup> Most investigators believe that dentists acquire the virus through a cut in the fingers contaminated by the patient's blood or saliva. Most dentists experience a needle stick or needle puncture of a finger at least once a week, mostly during recapping syringes and cleaning of instruments. Transmission of blood-borne pathogens following an exposure depends on the concentration of the virus in the

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**Address of Correspondence:** Dr. Shahana Dastagir Sunny, BDS, MPH (USA), MPhil (NIPSOM), Assoc. Professor & Head, Dept. of Dental Public Health, City Dental College, E-Mail: dastagirshahana@gmail.com

blood or body fluid, the volume of infective material inoculated, the loss of infectivity during transfer of the inoculated material and the port of entry. The annual cumulative HBV infection risk of routine treatment of patients whose seropositivity is undisclosed is nearly 60 times greater than of human immunodeficiency virus (HIV) and mortality risk of HBV infection is 1.7 times greater than of HIV. Hence, greater attempt to restrict HBV exposure is required.<sup>4</sup>

### Search strategy

The review itself began with the search of relevant key words like hepatitis B, dentistry, occupational risk, and infection control in various search engines including PubMed, Medline (published between January 2000 and December 2015). Manual search of various journals and books was also carried out. All the searched articles were not included, only highly relevant articles from English literature were considered for the present review.

### Epidemiology of Hepatitis B in Dental Practitioners:

Since 1989, extensive vaccination programs against HBV are going on, but this infection has not yet been fully eradicated. In the field of dentistry still it is a great concern.<sup>5</sup> The incidence of HBV infection began to decrease, in the past few years, because of the availability of HBV vaccine. But this incidence is still higher than in the general population.<sup>6</sup> There are two studies from Brazil discussed regarding HBV infection in dentistry. One study revealed that 10.8% of 474 dentists were seropositive for HBV infection. Three dentists (0.6%) were HBsAg positive, and 43 (9.1%) were anti-HBc/anti-HBs positive.<sup>7</sup> According to second study among 135 dentists, one dentist (0.7%) was positive for HBsAg. Eleven dentists (8.1%) had anti-HBs and anti-HBc in their serum samples.<sup>8</sup> According to several studies, the incidence of HBV infection increases with the length of clinical practice of dentists.<sup>9</sup> dentists age, irregular use of protective glasses and clothing<sup>9,10,11,12</sup> and presumed contact with infected blood.<sup>11</sup> In Canada and in USA, 101 dental anesthesiologists completed a questionnaire regarding percutaneous and mucocutaneous injuries. The calculated annual risk of acquiring HBV, HCV and HIV from percutaneous and mucocutaneous injuries was <0.2%. In Canada, the risk of acquiring HBV in nonimmune dental anesthesiologists was 150 times greater than the risk of acquiring HIV. In the USA, the risk of acquiring HBV in nonimmune dental anaesthesiologists was 50 times greater than the risk of acquiring HIV.<sup>13</sup> The evidence for viral transmission in dental offices is based on the results of seroprevalence studies, epidemiological investigations and case reports.

It should be mentioned that many cases of infection transmission are not documented, because approximately 50% of infections are subclinical, there is difficulty in linking isolated sporadic cases with a HCW and the variation in completeness of surveillance among jurisdictions.<sup>14</sup> It is a sad fact that HBV infection shows a higher prevalence in hospitalized dental patients than the general population.<sup>15</sup> There are still three problems that hinder decisions regarding HBV infection in dentistry. The first problem is that there is insufficient data on HBV infection incidence among dentists and related communities, for that reason it is currently difficult to make conclusions on its prevalence in these subjects.

The second problem is that existing studies are normally conducted with a blood sample from one venipuncture. It appears that dentists, who knew they were infected with HBV, did not participate in the survey.<sup>10</sup>

The third one is that, different methods have been used to evaluate rates of HBV infection, so it is difficult to compare the results in the various studies.<sup>16</sup>

### Recommended infection-control practices for Dentistry

A common set of infection-control strategies should be effective for preventing hepatitis B viruses.<sup>16,17</sup> The ability of hepatitis B virus to survive in the environment<sup>18</sup> and the high titers of virus in blood<sup>19</sup> make this virus a good model for infection-control practices to prevent transmission of a large number of other infectious agents by blood or saliva. Because all infected patients cannot be identified by history, physical examination, or readily available laboratory tests.<sup>17</sup> The following recommendations should be used routinely in the care of all patients in dental practices.

### Medical History

Always obtain a thorough medical history. Include specific questions about medications, current illnesses, hepatitis, recurrent illnesses, unintentional weight loss, lymphadenopathy, oral soft tissue lesions, or other infections. Medical consultation may be indicated when a history of active infection or systemic disease is elicited.

### Use of Protective Attire and Barrier Techniques

1. For protection of personnel and patients, gloves must always be worn when touching blood, saliva or mucous membranes.<sup>20,21</sup> Gloves must be worn when examining all oral lesions. All work must be completed on one patient, where possible and the hands must be washed and regloved before performing procedures on another patient. Repeated use of a single pair of gloves is not recommended,

since such use is likely to produce defects in the glove material, which will diminish its value as an effective barrier.

2. Surgical masks and protective eyewear or chin-length plastic face shields must be worn when splashing or spattering of blood or other body fluids is likely, as is common in dentistry.<sup>22,23</sup>

3. Reusable or disposable gowns, laboratory coats, or uniforms must be worn when clothing is likely to be soiled with blood or other body fluids. If reusable gowns are worn, they may be washed, using a normal laundry cycle. Gowns should be changed at least daily or when visibly soiled with blood.<sup>24</sup>

### **Handwashing And Care of Hands**

Hands must always be washed between patient treatments contacts (following removal of gloves), after touching inanimate objects likely to be contaminated by blood or saliva from other patients, and before leaving the operatory. The rationale for hand washing after gloves have been worn is that gloves become perforated, knowingly or unknowingly, during use and allow bacteria to enter beneath the glove material and multiply rapidly. For many routine dental procedures, such as examinations and nonsurgical techniques, hand washing with plain soap appears to be adequate, since soap and water will remove transient microorganisms acquired directly or indirectly from patient contact.<sup>22</sup> For surgical procedures, an antimicrobial surgical handscrub should be used.<sup>23</sup>

### **Use And Care of Sharp Instruments and Needles**

1. Sharp items (needles, scalpel blades, and other sharp instruments) should be considered as potentially infective and must be handled with extraordinary care to prevent unintentional injuries.

2. Disposable syringes and needles, scalpel blades, and other sharp items must be placed into puncture-resistant containers located as close as practical to the area in which they were used. To prevent needle stick injuries, disposable needles should not be recapped; purposefully bent or broken; removed from disposable syringes; or otherwise manipulated by hand after use.

3. Recapping of a needle increases the risk of unintentional needle stick injury. There is no evidence to suggest that reusable aspirating-type syringes used in dentistry should be handled differently from other syringes. Needles of these devices should not be recapped, bent, or broken before disposal.

4. Because certain dental procedures on an individual patient may require multiple injections of anesthetic or

other medications from a single syringe, it would be more prudent to place the unsheathed needle into a “sterile field” between injections rather than to recap the needle between injections. A new (sterile) syringe and a fresh solution should be used for each patient.

### **Use And Care of Ultrasonic Scalers, Handpieces and Dental Units**

Routine sterilization of hand pieces between patients is desirable; however, not all hand pieces can be sterilized. After use, the hand piece should be flushed, then thoroughly scrubbed with a detergent and water to remove adherent material. It should then be thoroughly wiped with absorbent material saturated with a chemical germicide that is registered with the EPA as a “hospital disinfectant” and is mycobactericidal at use-dilution.<sup>24</sup> The disinfecting solution should remain in contact with the hand piece for a time specified by the disinfectant’s manufacturer. Ultrasonic scalers and air/water syringes should be treated in a similar manner between patients. Following disinfection, any chemical residue should be removed by rinsing with sterile water.

### **Disposal of Waste Materials**

All sharp items (especially needles), tissues or blood should be considered potentially infective and should be handled and disposed of with special precautions. Disposable needles, scalpels, or other sharp items should be placed intact into puncture-resistant containers before disposal. Blood, suctioned fluids or other liquid waste may be carefully poured into a drain connected to a sanitary sewer system. Other solid waste contaminated with blood or other body fluids should be placed in sealed, sturdy impervious bags to prevent leakage of the contained items. Such contained solid wastes can then be disposed of according to requirements established by local or state environmental regulatory agencies and published recommendations.<sup>21,23</sup>

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