

Review Article

Hepatitis B and C infection among dentists – Risk, prevention, and management

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ABSTRACT

Viral hepatitis (B and C) has become silent and life-threatening epidemic in recent years. Liver cirrhosis and liver carcinoma are primarily caused by this condition. In 2019, Hepatitis B resulted in an estimated 1.5 million new infections and 820,000 deaths mostly due to cirrhosis and hepatocellular carcinoma. There are “n” number of ways, in which infections can be triggered in a Dentists Chamber through direct or indirect contact with human blood, secretions, and aerosols. To reduce the hepatitis infection in their community, the aim of this research is to raise awareness among dental clinicians. Several elements connected with compliance to the hepatitis vaccination were not known by dentists, which placed them among the high-risk groups. Dental professionals can play a significant role in preventing hepatitis by recognizing that every patient has the potential to transmit the disease. For the prevention of this viral infection, sterilization, and prophylactic vaccination routine should be adhered properly. Our search keywords included hepatitis, dental, liver disease, and infection control from online databases such as ProQuest, PubMed, and Medline. In addition to online databases, we searched various journals and books by hand. The focus of this review was only on highly relevant English literature.

Keywords: Hepatitis, Infection, Dentist, Risk, Management, Prevention

INTRODUCTION

Despite its high prevalence, the hepatitis B virus (HBV) is still a matter of great public concern around the globe related to health.^[1] As estimated over 354 million individuals live with Hepatitis B or C worldwide, and around 400 million people are chronic carriers. Several studies have shown that HBV infection is the prime cause of hepatic failure and hepatocellular carcinomas.^[2-5] In addition, the hepatitis C virus (HCV) is now identified as a global issue.^[6] This affects more than 170 million people worldwide, and it can have similar consequences to HBV.^[7] Although the cases of HCV are much less than that of HBV, chronically infected individuals are higher; about 70% of them become carriers.^[8] HCV prevention is not currently available through a vaccine, and its development seems unlikely in the near future. Therefore, recognizing the route of transmission and removing them is the solitary way to the lower HCV infections.^[9-11]

Multiple unprotected sexual contact, exposure to viruses during dialysis and surgical procedures, accidental exposures such as needles prick injuries, and vertical exposure are all examples of intravenous drug use.

Transmission from mother to new born is the routes of spreading both hepatitis B and C.^[12-15] HBV and HCV infections are most prevalent liver disorders that affect all members of society.^[6,16] They are known to cause serious health problems all over the world. Despite the fact that HBV is a “vaccine-preventable” disease, neither safe nor efficient HBV vaccine has been developed yet.^[8] HBV is found in fewer than 1% of the population.^[17,18] According to the WHO, two million injuries result in around 65,000 cases of HBV and more than 16,500 cases of HCV. Infections with HBV and HCV have been documented in around 14.4% and 1.4% of health-care providers, with the highest among dental clinicians, nurses, and dialysis which care personnel, laboratory workers, and general practitioners.^[19]

Dental care providers are much more susceptible to various illnesses. Infection control strategies in health-care facilities such as dentistry clinics are ineffective.^[20,21] Special situations and chances exist in the dental setting that can result in the spread of such infective organisms to dental care providers and dental health-care students.^[5] Percutaneous transmission (needle prick injuries) and contact with human secretions such as saliva and blood of carriers are the most common

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modes of infection in the dental context. HBV spreads through oral secretions and gingival crevicular fluid have been proven, making dental health-care providers vulnerable to hepatitis infection.

MATERIALS AND METHODS

In electronic resources such as PubMed, Medline, and ProQuest, the phrases dentist, liver illness, hepatitis infection, and infection control were searched. A manual search of various related texts was also conducted. For the current review, only relevant works from relevant texts in English were chosen, and it did not include all of the articles retrieved during the search.

For foreign publications, the reviewers used PubMed and searched words like MeSH terms such as HBV, HCV, risks, spread, transmission, and dent* in combinations of these words), Cochrane database, and Google scholar, Scopus, and EMBASE/Excerpta medica.

Review literature articles, case-control and investigative studies with “Intervention,” “Observational surveys,” and study reports on transmission of hepatitis B and C in dental chambers were all considered suitable for review. The results were limited to the time period from January 1, 1999, to February 20, 2021, although no language restrictions were applied if the abstract has sufficient data for research. The literature on epidemiology, risks, hepatitis markers, dentistry, and spread were gathered and all appurtenant material was evaluated.

The search yielded two types of literature articles:

- a) “Case-control studies comparing defined risk factors (dental treatments or associated phenomena) in a group of infected people to non-infected people,” and*
- b) “Articles reporting the rate of defined risk factors (dental treatments or associated phenomena) in infected people only”^[22]

GENERAL VIEW OF HEPATITIS

Hepatitis is usually caused by one of the various “hepatitis viruses.” Moreover, these viruses induce infections with similar clinical and pathological characteristics, and most of them are asymptomatic or anicteric.^[23] The phrase “viral hepatitis” is most commonly used to describe the “Initial stage” of the disease, which is marked by malaise, “fever, and jaundice” and can result in mortality. Long-standing hepatitis or severe liver necrosis is the two classifications for the disease’s chronic forms. In moderate cases, patients present with flu-like symptoms such as vomiting, nausea, and a smoker can develop an aversion to smoke. The patient may be suffering from arthritis or a rash affecting the distal joints. Parenterally transmitted hepatitis (hepatitis B) was assumed to have a 50–100 days incubation period. It can strike anyone at any age, but older people are more likely to be impacted.^[23] In 1989, HCV was discovered to be the cause of 95% of

“non-A and non-B” cases.^[24] These methods by which HCV damages the liver are never understood. Although, it is assumed that an individual’s own immune response to HCV plays an important role in this process. The incubation period varies between “3 and 20 weeks” and an average of 7 weeks. Before symptoms appear, most infected people possess a transiently increased liver enzyme (ALT) level of more than ten times.^[25]

“HBV and HCV” are a major public issue, with a calculated global rate of hepatitis B is 2–8% and hepatitis C is roughly 3%.^[26]

DENTAL TREATMENT RISK FACTOR FOR HBC, HBV

Hepatitis B infection is the main prevalent “Infectious occupational hazard” in the dental care field, according to research. A much greater incidence of hepatitis infection in dental personnel, according to several reports. According to several reports; there is higher incidence of hepatitis infection among dental personnel, particularly in endodontic, periodontal and oral maxillofacial surgeons. Oral and nasopharyngeal secretions are vectors of HBV infection in periodontal practice. The gingival sulcus contains the highest concentration of hepatitis B infection intraorally. Periodontal disease, severe bleeding, and poor oral hygiene are also linked to an increased risk of HBV.^[27]

Aerosols created by “dental equipment” such as an “ultrasonic scaler” or other high-speed equipment frequently contain oral secretions. “Ultrasonic scaling” is clearly linked to higher levels of air contamination, corroborating the findings of multiple earlier researches that suggest this practice is the primary source of airborne contaminants in dentistry.^[28]

When compared to non-rinsed controls, rinsing with an antimicrobial mouthwash reduced airborne pollutants by 94.1%. As a result, air pollution could be avoided with the use of “high-volume suction evacuators” and preprocedural “mouth washes.”^[29]

Patients with periodontal and gingival disease showed a higher detection rate of “HBV surface antigen (HBsAg), anti-HBc, “anti-HCV, or both (anti-HCV and anti-HBc) in total “unstimulated saliva.” There are no cases of HCV transmission through saliva. Nevertheless, it is feasible that alternative transmission channels exist. “HCV-RNA” has been discovered in the “saliva and salivary glands of patients with diagnosis of sialadenitis.” The majority of “Seventy-seven percent of HCV patients had higher HCV RNA levels in their gingival sulcus’ than in their saliva,” and “HCV-RNA” was seen in the tooth-brushes of HCV patients. It is probable that their family members will share these items, putting them at risk of infection.^[30]

PREVENTION

Only 16% of dentists followed basic precautionary procedures, according to Hammond *et al.*^[31] The majority

of contaminated case exposures in dentistry are unavoidable and some can be avoided by following infection management standards. When contact is unavoidable, prompt immunization and proper conduct can effectively prevent illness and its associated adverse effects.^[32]

Necessity for further training might be supported by the fact that dental surgeons require a separate curriculum that covers both theoretical and practical information regarding patients with hepatitis B and C and other infectious diseases.^[33]

Cross-contamination can be prevented by wearing gloves. Careless dental instrument use can increase the danger of cross-contamination by rupturing or tearing the glove, or even cutting the hand.^[34]

Other probable transmission channels will be identified and eliminated, which will help to limit viral hepatitis.^[22] Infection with viral hepatitis in dentistry is a serious problem.^[35,36]

To reduce the hepatitis burden among “dental healthcare workers,” it is advised that “dental practitioners” be immunized against the hepatitis virus and wear personal protective equipment such as gloves, head caps, and masks.^[37,38]

A patient’s medical history should be taken down when he or she visits a dental clinic. As all individuals with a history of hepatitis are potentially infectious, they must be managed. Geographic, socioeconomic, immunologic, and genetic factors all influence whether or not someone becomes a “Chronic Carrier” of HBV. Patients with the following conditions have a high carrier rate:^[39]

- “Lepromatous leprosy”
- “Lymphoma”
- “Patients on chronic renal dialysis”
- “Down syndrome”
- “Patients receiving immunosuppressive drugs”
- “Drug abusers-having a history of hepatitis”

MANAGEMENT AND POST-EXPOSURE PROPHYLAXIS

Standard precautions such as proper hand hygiene and use of barriers such as “gloves, mask, gowns and face shields” can minimize mucocutaneous exposures. For preventing occupational injuries, manipulation of manual sharp instruments can be reduced, use of puncture resistant containers for sharp waste/objects disposal. During the procedures to avoid blood and saliva contact/contamination protective, eye wares and face mask or shields can be used. Dental instruments can be potential carriers of HBV and, hence, leads to indirect transmission of the disease. Thus, clinical students must be provided with the thorough knowledge regarding proper methods of sterilization. Hepatitis B vaccination is recommended for susceptible dentists, dental auxiliary staff, and for all the dental students before they start their clinical phase.^[40,41]

It is advised that policies should be implemented for vaccination and different courses in dental curriculum on

communicable diseases for all dental students in freshmen or sophomore year of dental colleges. Reinforcement of universal precautions and work practice management and should be done religiously.^[42]

For treating hepatitis patients, the following guidelines must be followed

For a patient with acute infection of viral hepatitis, only dental emergency treatment should be rendered.^[27]

Patients with a “Recent history” of viral hepatitis shall be treated for emergency dental problems only, because individuals can carry the virus for up to 3 months even after the symptoms subsided.^[39]

For patient with a previous history of viral hepatitis, the dentist should communicate with the patient’s physician to know the “type” of hepatitis, “course,” and “length/duration” of the disease, and any “chronic liver disease or viral carrier state.”^[43]

For a patient who has recently recovered from HBV, the dental surgeon must contact his/her physician and order the patient’s “HBsAg and HBs laboratory tests.” If HBV is suspected but “HBsAg and anti-HBs tests are negative,” order another “HBs determination.” Patients who are “HBsAg positive” are probably “The Chronic Carriers;” by HBsAg determination the “Degree of infectivity” can be measured.^[43] Patients who are “anti-HBs positive” and are “HBsAg negative” may be treated accordingly.^[43]

For treating patient with “active hepatitis” requiring emergency treatment the following precautions must be taken

Before any treatment the patient’s physician must be consulted regarding his/her status. All the staff whether clinical or non-clinical in contact with the patient must use “Full Barrier Technique,” including “masks, gloves, glasses or eye shields, and disposable gowns.” “Disposable covers” must be used for “covering headrest, light handles, drawer handles, bracket trays, etc.”^[43]

Aseptic techniques must be followed. Minimum aerosol production by avoiding use of “high speed handpieces, air syringe, and ultrasonic instruments” because saliva contains a distillate of virus, to minimize the contamination pre-rinsing with chlorhexidine gluconate for around 30–35 s, which is highly advisable.^[43]

For preventing blood exposure, “One-handed Scoop Technique” for recapping needles between uses, avoid passing a syringe with unsheathed needle, and giving verbal announcements while exchanging any sharp instruments, neither bending nor breaking the needles before disposal, removing burs (using tweezers, etc.) before disassembling the handpiece from dental unit. Instead of fingers “instruments must be used to retract tissue, grasp needle, and load/unload needles and scalpels.”^[44]

Puncture resistant containers must be used to dispose sharp objects such as needles and scalpel blades; also, these

containers must be located at an appropriate safe place and near to where the procedure is being carried out.^[44]

After completion of procedure, all working surfaces and surfaces adjacent to it must be sterilized with 2% activated glutaraldehyde, that is, Cidex.^[39] All utilized equipment should be scrubbed and sterilized judiciously. Non-sterilizable items (e.g., gauze-pieces, tooth-floss, saliva-ejectors, face-masks, gowns, and hand gloves) should be placed in a lined wastebasket and along with all disposable covers; it should be appropriately bagged, properly labeled, and cautiously disposed through following the guidelines for bio-hazardous waste.^[43]

POST-EXPOSURE PROPHYLAXIS

The World Health Organization introduced PEP guidelines to prevent and to minimize the risk of infection with any kind of exposure to potentially hazardous materials carrying hepatotropic viruses. The six steps PEP Mandatory protocol has been discussed below.^[45]

Step one: Treat the site of exposure to potentially infectious secretions and fluids

- It must be washed immediately
 - Bare skin – Use soap and water
 - Mucus membrane – Must be washed properly with “Water” only
 - Eyes – Rinsed with water and following with the saline solution
 - Wounds – Avoid squeezing (milking) the site and use of caustics, antiseptics and disinfectants. Use plain water and soap.

Step two: Report and documentation of the occupational exposure

The incident and the details of how the exposure occurred must be reported immediately after the exposure.

You should include the following in your documentation:

1. Time and date of exposure
2. Procedure detail (what, how, and where with what device exposure happened)
3. Exposure details (which body site/sites, whether associated with sharp instruments-type and brand, fluid type whether blood, bloody fluid, etc., also its amount/duration of contact, and severity of injury)
4. Details regarding the source person or source of the infection.

The following must be checked;

- Examination of the potentially infectious material/suspect for HBV, HCV.
- If a person is the source of infection, then investigate whether HBV/HCV positive, its status, the number of infectious particles in blood also history regarding vaccination and resistance (if any) must be determined.

- Record the details of the exposed individual such as – hepatitis B vaccination status and response to it, any comorbidity and respective medications taken, whether pregnant or lactating.

Step three: Evaluation of exposure

Evaluation of HBV and HCV transmission should be based on the following:

1. “The type of infective material”
2. “The site of entry of material into the body of the exposed person”
3. “The severity of exposure.”

Body fluids with high risk of spread of pathogen which requires compulsory evaluation are as follows: “Blood, bloody fluid, semen, vaginal secretions, CSF, synovial, pleural, peritoneal, pericardial, and amniotic fluid.”

Body fluids that have low/do not present the risk of transmitting the virus, unless they clearly contain blood are “urine, sputum, saliva, feces, vomit, nasal secretions, tears, and sweat.”

Step four: Source evaluation

If the source of infection causing material is known, it is necessary to:

- “Test the patient for anti-HBsAg and HCV antibodies”
- “Evaluation of “viral load” is NOT recommended for routine control of a patient source”
- “After the primary test of the exposed person, if he/she is NOT infected with either of the viruses, further, control monitoring is not required”
- “If the patient’s source of infection is unknown, the probability and the level of risk of exposure should be evaluated. The probability of transmission of infection of these viruses to the patient who were under the possible circumstances of exposure should be considered (Examine the following such as – rate of infected people in the community, whether the clinic where the exposure was encountered treats high number of the infected or high-risk patients). Avoid testing the “Wasted needles” for the virus as the reliability of results procured is unknown.”

Step five: Specific prophylaxis

After the exposure to potentially infectious fluids, primary testing for HBV and HCV of the infected patient is must. Antiviral treatment rather than prophylaxis must be administered to the patient having a previous infection of these viruses and was unaware of it.

Step six: Control monitoring

In case any medical personnel gets exposed to viral hepatitis, it is very important to do “control testing for HBV and HCV.”

1. Control testing after exposure to HBV includes:

- “Testing for anti-HBs antibodies” – 1–2 months after the last dose of vaccine (after the administration of “anti-HBs immunoglobulin [HBIG]” due to the possibility of “False-positive results” anti-HBs antibodies cannot be tested for 6–8 weeks).
 - “The person exposed should be advised to avoid participation in any kind of donation, donation such of as blood, plasma, any organ, tissue, and semen/sperm, to abstain from risky consequences.”
 - “Psychological counseling must be offered if required.”
2. Control testing after exposure to “Hepatitis C Virus (HCV)” includes the following:
- Repeat the test for anti-HCV antibodies and ALT at the earliest, that is, 4–6 months after exposure.
 - To avoid the possibility of false-positive results in the procedure of early diagnosis, do the test for “HCV-RNA” for 4–6 weeks.
 - During the testing period, the exposed person must avoid donating “blood, plasma, organs, tissue, or sperm/semen” as it may serve as a potential carrier for transmission of the pathogen.
 - Exposed individual should refrain from sexual activity, withhold pregnancy, breastfeeding, and avoid social activities until recovered.
 - Mandatory counseling offered.

CONCLUSION

Even though awareness regarding hepatitis is increasing worldwide, dental institutes must emphasize its importance of infection control in regular practices. Most of the studies have highlighted that dental treatment may pose a risk of hepatitis infection though not strong, but there is risk of “HBV and HCV infection” during dental procedures. In developing countries, the rate of hepatitis cases is high. It may be due to economic limitations the clinicians fail to abide by the precautionary methods and due to cultural issues, the patients hide their disease. Efforts should be made on improving the knowledge of general people. Dental healthcare workers must not only be educated about the infection risk of dental procedures, its transmission, and prevention by planning and executing various workshops and programs but also about monitoring hospitals infection control systems and implementing infection prevention systems. All the dentists/dental healthcare workers must be vaccinated with the HBV vaccine. Furthermore, the infection status must be checked time to time or when required and for infected ones special strategies should be considered.

On July 28 simply celebrating, “World Hepatitis Day” is not enough for creating awareness among the general population. Initiatives must be taken by the health policy makers and the media in partnership with doctors such as “hepatologists, general, and dental surgeons,” medical centers

for public, informative, and knowledge sharing, also finding more favorable approaches for control of hepatitis B and C virus infections in their communities is crucial.

Dentists must consider every patient as a potential risk for carrying viral hepatitis and recording proper medical history which can give information about patients which will help to identify potential carriers. And to reduce the risk of infection, “Proper infection control and sterilization protocols” must be followed as dental surgeons are more prone to infection than any other medical specialists as they deal with ultrasonic devices which lead to aerosols production and hence more chance of infection.

Attention should be given on proper implementation of infection control strategies and every dental chamber should have a protocol written for “instrument reprocessing, operative cleanup, and management of injuries.” Proper treatment plan needs to be adopted to maximize management of patients in accordance with their present medical condition. Strictly adhering to the standard precautionary protocols, the risk of infection can be easily eliminated.

Declaration of patient consent

Patient’s consent not required as there are no patients in this study.

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Conflicts of interest

Author Dr. Jaishree Chahande is on the Editorial Board of the journal.

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