Review Article

"Hepatitis" – Prevention and management in dental practice

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ABSTRACT

Today, viral hepatitis has become a silent epidemic worldwide. It is the major cause of liver cirrhosis and liver carcinoma. In a dental office, infections can be expedited through several routes, including direct or indirect contact with blood, oral fluids, droplet splatter, aerosols, 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. Electronic databases like PubMed, Medline, ProQuest, etc. were searched using the keywords hepatitis, dentist, liver disease, and infection control. Manual search of various journals and books was also carried out. Only highly relevant articles from English literature were considered for the present review. 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. A dentist can play a major role in the prevention of hepatitis by considering each and every patient as a potential carrier of hepatitis. Proper infection control, sterilization, and prophylactic vaccination protocols should be followed in order to reduce the risk of hepatitis.

Key words: Dentist, hepatitis, infection control, liver disease

INTRODUCTION

Pervasive increases in serious transmissible diseases over the last few decades have created global concern and affected the treatment approach of all health care practitioners.[1] Patients with liver disorders are of significant interest to the dentist because liver plays a vital role in metabolic functions, including the secretion of bile needed for fat absorption, conversion of sugar to glycogen, and excretion of bilirubin, a waste product of hemoglobin metabolism. Impairment of liver function can lead to abnormalities of the metabolism of amino acids, proteins, carbohydrates, and lipids. Many biochemical functions performed by the liver, such as synthesis of coagulation factors and drug metabolism, may be adversely affected.[2]

Dental health care professionals are said to be at a risk of infections caused by various microorganisms including *Mycobacterium tuberculosis*, hepatitis B and hepatitis C viruses (HBV and HCV, respectively), streptococci, staphylococci, herpes simplex virus type 1, HIV, mumps, influenza, and rubella.[3] HBV and HCV infections are the major causes of liver disease worldwide and the health policy makers with their strategies try to control these infections in the communities.[4,5]

Most investigators believe that dentists acquire the virus through a cut in the fingers contaminated by the patient's blood or saliva. Because nasopharyngeal secretions carry the virus, the possibility that infection may be acquired by aerosol, although remote, still exists.[6] Dental surgeons have a great risk of exposure to hepatitis because of their numerous encounters involving the use and disposal of sharp

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instruments. Every health care specialty that involves contact with mucosa, blood, or blood contaminated with body fluids should have the goal of ensuring compliance with standard precautions and other methods to minimize infection risks.

Electronic databases like PubMed, Medline, ProQuest, etc. were searched using the keywords hepatitis, dentist, liver disease, and infection control. Manual search of various journals and books was also carried out. Not all the searched articles were included, but only highly relevant articles from English literature were considered for the present review.

GENERAL PICTURE OF TYPES OF VIRAL HEPATITIS

Viral hepatitis is almost always caused by one of the specific hepatitis viruses. All these viruses give rise to illnesses which are similar in their clinical and pathological features and are frequently anicteric or asymptomatic.[7]

The term "viral hepatitis" is usually applied to the acute stage of the disease which is characterized by fever, malaise, and jaundice, but seldom causes death. Chronic manifestations of the disease are classified either as chronic hepatitis or massive liver necrosis. In mild forms of the disease, the patient has flu-like symptoms of nausea and vomiting and a smoker may develop distaste for cigarettes. The patient may have arthritis or rash involving distal joints.[8]

Infectious hepatitis (hepatitis A) was thought to be orally acquired, with a short incubation period of about 50 days and tending to occur primarily in children and young adults, sporadically and in epidemics. The course runs from 6 to 8 weeks and the disease normally resolves with no sequelae.[6]

Serum hepatitis (hepatitis B) was thought to be parenterally transmitted, with an incubation period of 50–100 days. It occurs sporadically in any age group, but older individuals are more affected.[7]

HCV was identified as the causative agent of 95% of cases of non-A non-B hepatitis in 1989.[9] The exact mechanisms by which the HCV causes liver damage are not completely understood. However, it appears that a person's own immunological response to the HCV contributes significantly to this process. The incubation period is variable, ranging from 3 to 20 weeks, with a mean of 7 weeks. Most infected individuals have a transient alanine aminotransferase (ALT) level elevated greater than tenfold before the symptoms develop.[10]

Chronic hepatitis caused by HBV and HCV is a major health care problem with an estimated worldwide prevalence of hepatitis B being 2–8% and of hepatitis C being around 3%.[11]

Hepatitis D virus (HDV) is an RNA defective virus which has no independent existence. It requires HBV for replication and has the same sources and modes of spread as HBV. It can infect simultaneously with HBV or it can superinfect those who are already chronic carriers of HBV.[7] Thus, prevention of HDV infection is similar to prevention for HBV and relies strongly on HBV vaccination.

Hepatitis E virus (HEV) is an RNA virus which is excreted in the stools and spreads by the fecal–oral route. The clinical illness resembles acute Hepatitis A virus (HAV) infection and recovery is the rule. Chronic infection does not occur.[7]

Hepatitis G virus (HGV) is an RNA virus that rarely occurs as a solitary infection and usually appears as a co-infection with hepatitis A, B, or C. HGV is known to be transmitted through the blood and has frequently been associated with transfusions.[12]

HEPATITIS AND DENTAL PROFESSIONALS

In a dental office, infections can be expedited through several routes, including direct contact with blood, oral fluids, or other secretions; indirect contact with contaminated instruments, operatory equipment, or environmental surroundings; or contact with airborne contaminants present in either droplet splatter or aerosols of oral and respiratory fluids. HBV is the major causative agent of acute and chronic liver infection, cirrhosis, and primary hepatocellular carcinoma worldwide. There are more than 300 million carriers of the virus globally, and about 90% of these live in developing countries. Among the global carriers, 75% are from the Asian continent, where between 8% and 15% of the population carries the virus.[13]

It has been documented that HBV infection is the most important infectious occupational hazard in the dental profession.

A number of reports suggest the following:

- A significantly higher incidence of HBV infection among dental staff
- A higher rate of HBV infection especially among oral surgeons, periodontists, and endodontists.

Vectors of infection with HBV in periodontal practice are blood, saliva, and nasopharyngeal secretions. Intraorally, the greatest concentration of hepatitis B infection is in the gingival sulcus. Also, periodontal disease, severity of bleeding, and bad oral hygiene are said to be associated with the risk of HBV.[2]

Blood is very often found in the aerosols produced by the dental equipments such as an ultrasonic scaler or other high-speed equipments. Ultrasonic scaling is obviously associated with increased air contamination levels, confirming the results reported by several other studies showing that this procedure is the main executor of airborne contaminants in dentistry.[14]

Previous research demonstrated that rinsing with an antiseptic mouthwash produced a 94.1% reduction in

airborne contaminants, compared to the non-rinsed controls. Hence, high-volume suction evacuators and pre-procedural oral rinses would prevent the air contamination.[15]

Patients with periodontal disease showed higher detectability rate of surface antigen of HBV (HBsAg), anti-HBc, anti-HCV, or both anti-HCV and anti-HBc in whole unstimulated saliva than the controls. No undisputed case of HCV salivary transmission has been documented. However, the existence of other routes of transmission is possible. HCV-RNA has been detected in the saliva and salivary glands of patients with sialadenitis. Most HCV patients (77%) had higher HCV RNA levels in their gingival sulcus than in their saliva, and HCV-RNA was found in toothbrushes of hepatitis C patients. Sharing these objects by their household members could be a theoretical risk of infection.[16]

General surgery, dental procedure, and dilation and curettage are the factors more associated with HCV seropositivity, indicating unsafe medical procedures followed in Pakistan.[17]

PREVENTION AND MANAGEMENT OF HEPATITIS IN DENTAL CLINIC

To decrease the burden of hepatitis in dental health care workers, it is recommended that the dental professionals should receive immunization against hepatitis virus and should use individual protective equipments such as gloves, head caps, masks, etc.[18,19]

Despite the availability and recommendations on hepatitis B vaccination, the vaccination rate among dental professionals has remained consistently low in developing countries. A study reported that only 20% of dental surgeons had received three doses of hepatitis B vaccine in Benin city, Nigeria.[20] In another study among Brazilian dentists, 73.8% of dentists were reported to have three doses of hepatitis B vaccine.[21] It has been found that 5–10% of normal subjects do not produce the anti-hepatitis B surface antibody (anti-HBs) after receiving a standard course of HBV vaccine. Thus, a post-vaccination testing, 1–3 months following the third dose of vaccine, is recommended for health care workers who have contact with blood.[22]

Each dental health care facility should develop a comprehensive written program for preventing and managing occupational exposures. This should focus on the following:

- Dental health care provider should receive three doses of hepatitis B vaccination
- Describe the type of blood exposures that may place dental health care personnel (DHCP) at risk of infection.
- Outline the procedures for promptly reporting and evaluating such exposures
- Identify the health care professional who is qualified to provide counseling and perform all medical evaluations and procedures in accordance with the most current US Public Health Care Service (CDC) recommendations
- Resource should be available that permits rapid access of exposed DHCP to clinical care, testing, counseling, and post-exposure prophylaxis (PEP) and the testing and counseling of source patients.[23]

Exposure that might place a dentist at risk of hepatitis infection includes the following

- Percutaneous injuries (needlestick or cut with a sharp object)
- Contact with potentially infectious blood, tissues, or other body fluids
- Mucus membranes of the eye, nose, or mouth or non-intact skin (exposed skin that is chapped, abraded, or afflicted with dermatitis).

Percutaneous injuries pose a greater risk of transmission. The majority of exposures in dentistry are preventable, and methods to reduce the risk of blood contacts have included use of standard precautions and engineering controls and modifications of work practice. These approaches might have contributed to the decrease in percutaneous injuries among dentists during recent years. However, needlesticks and other blood contacts continue to occur, which is a concern because percutaneous injuries pose the greatest risk of transmission.

When a patient enters a dental clinic, his/her medical history should be recorded. All patients with a history of hepatitis must be managed as they are potentially infectious. Whether or not an individual becomes a chronic carrier of hepatitis B depends on geographic, socioeconomic, immunologic, and genetic factors. A high carrier rate is found among patients with the following:[6]

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

The following are the guidelines for treating hepatitis patients

- No dental treatment other than urgent care should be rendered for a patient with acute viral hepatitis[2]
- Hepatitis B is of primary concern to the dentist. Individuals still carry the virus up to 3 months after the symptoms have disappeared, so any patient with a recent history of hepatitis B should be treated for dental emergency problems only[6]
- For patient with a past history of hepatitis, consult the physician to determine the type of hepatitis, course and length of the disease, mode of transmission, and any chronic liver disease or viral carrier state
- For recovered HAV or HEV, perform routine periodontal care
- For recovered HBV and HDV, consult with the physician and order HBsAg and HBs laboratory tests.

- If HBsAg and anti-HBs tests are negative but HBV is suspected, order another HBs determination
- Patients who are HBsAg positive are probably infective (chronic carriers); the degree of infectivity is measured by an HBsAg determination
- Patients who are anti-HBs positive may be treated routinely
- Patients who are HBsAg negative may be treated routinely.

If a patient with active hepatitis, positive-HBsAg (HBV carrier) status, or positive HCV status requires emergency treatment, use the following precautions

- Consult the patient's physician regarding status
- If bleeding is likely during or after treatment, measure prothrombin time (PT) and bleeding time. Hepatitis may alter coagulation; change treatment accordingly
- All personnel in clinical contact with the patient should use full barrier technique, including masks, gloves, glasses or eye shields, and disposable gowns
- Use as many disposable covers as possible, covering light handles, drawer handles, and bracket trays. Headrest covers should also be used
- All disposable items (e.g., gauze, floss, saliva ejectors, masks, gowns, gloves) should be placed in a lined wastebasket. After treatment, these items and all disposable covers should be bagged, labeled, and disposed of, following proper guidelines for bio-hazardous waste
- Aseptic techniques should be followed at all times. Minimize aerosol production by not using ultrasonic instrumentation, air syringe, or high-speed handpieces. Remember that saliva contains a distillate of the virus. Pre-rinsing with chlorhexidine gluconate for 30 s is highly recommended
- When the procedure is complete, all equipments should be scrubbed and sterilized. If an item cannot be sterilized or disposed of, it should not be used
- All working surfaces and environmental surfaces should be wiped with 2% activated glutaraldehyde (Cidex).[6]

Work practice controls are an important adjunct for preventing blood exposures. They are as follows:[23]

- Using a one-handed scoop technique, a mechanical device designed for holding the needle cap to facilitate one-handed recapping, or an engineered sharp injury protection device (e.g., needles with re-sheathing mechanisms) for recapping needles between uses and before disposal
- Not bending or breaking needles before disposal
- Avoid passing a syringe with an unsheathed needle
- Removing burs before disassembling the handpiece from the dental unit
- Using instruments rather than fingers to grasp needles, retract tissue, and load/unload needles and scalpels
- Placing used disposable syringes and needles, scalpel blades, and other sharp items in appropriate puncture-resistant containers located as close as feasible to where the items were used
- Giving verbal announcements when passing sharps.

POST-EXPOSURE PROPHYLAXIS

PEP is the guideline given by the World Health Organization for prevention of infection if there was risk of contact with potentially hazardous materials. To avoid the risk of possible infection, the World Health Organization introduced guidelines for prevention of possible infection caused by hepatotropic viruses and HIV. Mandatory protocol PEP is implemented in six steps discussed below.[24]

Step one: Treatment of the site of exposure

The site of exposure to potentially infectious fluids should be washed as soon as possible using soap and water only, while the exposed mucus membranes should be washed with water only. Eyes should be flushed with water and saline solution (if there was contact with potentially infectious fluids). Do not use caustics and do not rinse the wound with antiseptics and disinfectants.

Step two: Report and documentation

Occupational exposure should be reported immediately. Details regarding the circumstances under which the exposure happened and the employee was administered prophylaxis should be recorded in the employee's medical record. The documentation should include: Date and time of exposure, details of the accident (where and how the exposure happened, what was the site or sites of exposure on the body, if the exposure was associated with a sharps – type and brand of sharp), details of exposure accident (type and amount of fluid or material a person was exposed to), severity of injury (or different kind of exposure), and details about the source of infectious material. The following should be checked:

- Does the source of potentially infectious material have HBV, HCV, or HIV infection?
- If a patient, the source of material, is HIV positive, the stage of disease or the level of infectious particles in the blood should be determined
- It is important to note the history of taking antiretroviral therapy, or antiretroviral resistance (if known)
- It is necessary to record the details of the exposed person (HBV vaccination, the response to vaccination, other medical conditions and medications used, existence of pregnancy or lactation).

Step three: Evaluation of exposure

The potential for spreading the infection of HBV, HCV, or HIV should be evaluated based on the type of infective material, the site of entry of material into the body of the exposed person, and the severity of exposure. Significant exposure may be a risk for further transmission of pathogens by blood and requires further evaluation of body fluids: Blood, sperm, vaginal secretions, cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluid. Body fluids that do not present the risk of transmitting infectious agents of

this type, unless they clearly contain blood, are urine, sputum, saliva, stool, vomit, nasal excrete, tears, and sweat.

Step four: Evaluation of sources

When the patient source of infectious material is known, it is necessary to follow these:

- Test the patient for anti-HBsAg, HCV and HIV antibodies
- Evaluation of "viral load" (the level of infectious particles in the blood) for routine control of a patient source is NOT recommended
- Test the patient by rapid HIV test.

If the patient is NOT infected with either of these viruses, after primary test of the exposed person, further control monitoring is not required.

When the patient source is not known, it is necessary to evaluate the possibility and the level of risk of exposure. To consider the possibility of infection by these viruses in patients, who were connected to the circumstances of exposure (e.g., What is the rate of infected people in the community? Does the clinic, where the exposure happened, treat a great number of infected or high-risk patients?). do not test the wasted needles for these pathogens because the reliability of obtained results is not known.

Step five: Specific prophylaxis

Primary testing of all exposed persons to HBV, HCV, and HIV should be done after each exposure to potentially infectious fluids. If the exposed person had previous infection caused by any of those viruses and did not know about it, he/she should receive the antiviral treatment rather than prophylaxis.

Step six: Control monitoring

If any of medical staff was exposed to hepatitis, it would be necessary to do control testing for HBV, including mandatory counseling. This considers the following:

- Testing for anti-HBs antibodies 1–2 months after the last dose of vaccine [anti-HBs antibodies cannot be tested 6–8 weeks after the administration of anti-HBs immunoglobulin (HBIG) because of the possibility for false-positive results]
- Advising the exposed person not to donate blood, plasma, organs, tissue, sperm, and to abstain from risky behavior
- Offering the psychological counseling if needed.

Control testing and advising after exposure to HCV include the following

- Repeat the test for anti-HCV antibodies and ALT at the earliest 4–6 months after exposure
- Do the test for HCV RNA for 4–6 weeks for early diagnosis (caution due to the possibility of obtaining false-positive results)
- During the testing period, the exposed person must not donate blood, plasma, organs, tissue, or sperm
- Exposed person should abstain from changes in sexual activity, pregnancy, breastfeeding, or professional activities
- Counseling services should be offered.

CONCLUSION

Merely celebrating World Hepatitis Day on 28 July is not sufficient for increasing awareness in the community. It is an opportunity for the people and health policy makers globally for more knowledge sharing and finding better approaches for control of HBV and HCV infections in their communities. The role of media in collaboration with gastroenterologists, hepatologists, general and dental surgeons, and infectious centers for generation of massive public informative and educational materials is very critical.

The role that a dentist can play in prevention of hepatitis is by considering each and every patient as a potential carrier of hepatitis. Proper infection control and sterilization protocols should be followed in order to reduce the risk of infection. Dental surgeons are at a greater risk of exposure than the other specialists in the medical fields because of their exposure to aerosols during ultrasonic scaling. So, they should lay special emphasis on prevention and protection against hepatitis.

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