Laboratory investigation of liver disease:

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 factor drug metabolism, may be adversely affected.

Hepatitis, inflammation of the liver that results from a variety of causes, both infectious and noninfectious. Infectious agents that cause hepatitis include viruses and parasites. Noninfectious causes include certain drugs and toxic agents. In some instances hepatitis results from an autoimmune reaction directed against the liver cells of the body. 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.

Viral hepatitis is liver inflammation due to a viral infection. It may present in acute form as a recent infection with relatively rapid onset which is characterized by fever, malaise, and jaundice, but seldom causes death, or in chronic form 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 forcigarettes. The patient may have arthritis or rash involving distal joints.

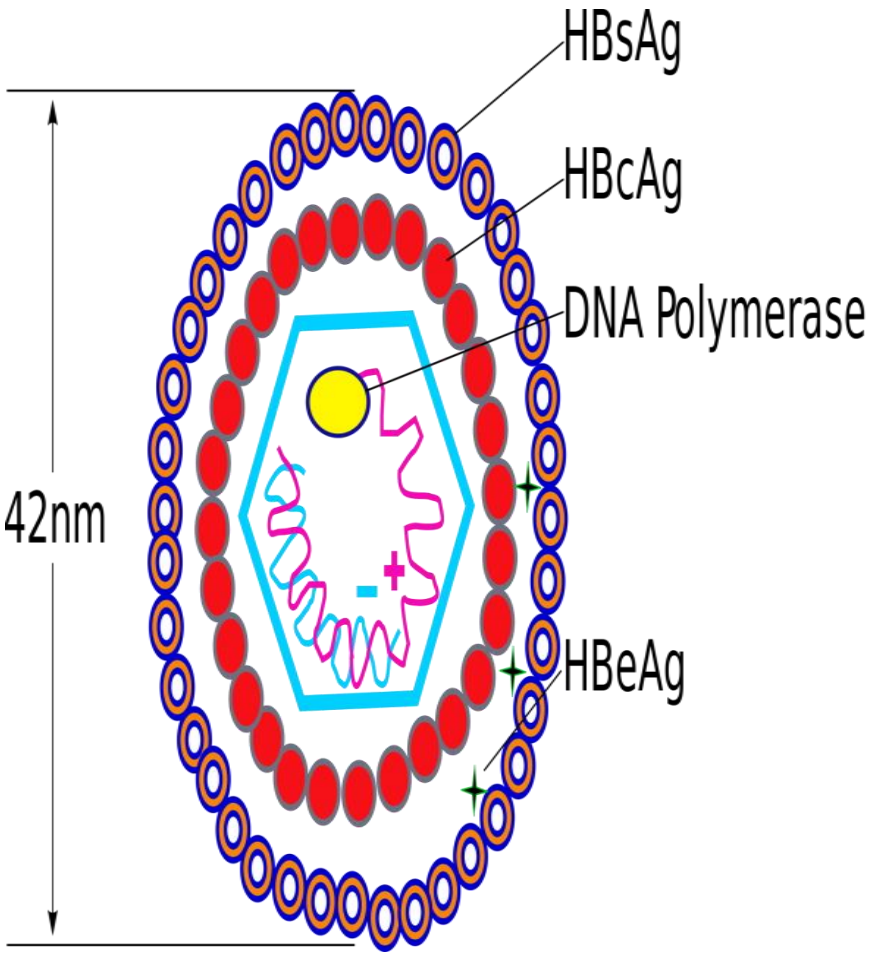
Types of viral hepatitis

1- Hepatitis A virus (HAV) infectious hepatitis 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

is present in the faeces of infected persons and is most often transmitted through consumption of contaminated water or food. Certain sex practices can also spread HAV. Infections are in many cases mild, with most people making a full recovery and remaining immune from further HAV infections. However, HAV infections can also be severe and life threatening. Most people in areas of the world with poor sanitation have been infected with this virus. Safe and effective vaccines are available to prevent HAV.

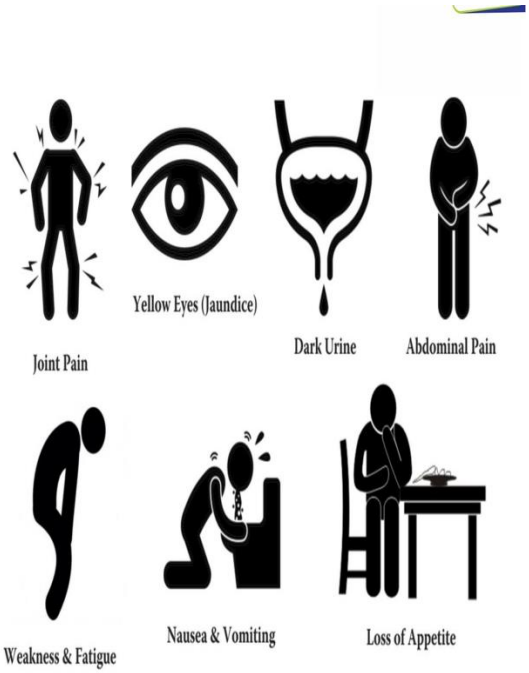
2- Hepatitis B virus (HBV) Serum hepatitis was thought to be parenterally transmitted, with an incubation period of 50-100 days. It occurs sporadically in any age group, but older individuals are more affected.

is transmitted through exposure to infective blood, semen, and other body fluids. HBV can be transmitted from infected mothers to infants at the time of birth or from family member to infant in early childhood. Transmission may also occur through transfusions of HBV-contaminated blood and blood products, contaminated injections during medical procedures, and through injection drug use. HBV also poses a risk to healthcare workers who sustain accidental needle stick injuries while caring for infected-HBV patients. Safe and effective vaccines are available to prevent HBV.



Hepatitis B signs and symptoms may include:

- Abdominal pain
- Dark urine
- Fever
- Joint pain
- Loss of appetite
- Nausea and vomiting
- Weakness and fatigue
- Yellowing of your skin and the whites of your eyes (jaundice)



Acute hepatitis B can be either symptomatic or asymptomatic. Symptomatic hepatitis B infection is rare in the perinatal setting but is relatively common in adult-acquired infection.

Chronic hepatitis B occurs when infection with the hepatitis B virus persists and is marked by ongoing serological evidence of infection and variable liver inflammation. Persistence of HBsAg (surface antigen) for longer than 6 months has traditionally defined chronic hepatitis B.

Tests of Hepatitis B infection

Hepatitis B surface antigen (HBsAg):

A protein on the surface of the hepatitis B virus (HBV); it can be detected in high levels in serum during acute or chronic HBV infection. The presence of HBsAg indicates that the person is infectious. The body normally produces antibodies to HBsAg as part of the normal immune response to infection. HBsAg is the antigen used to make Hepatitis B vaccine

Hepatitis B surface antibody(anti-HBs):

The presence of anti-HBs is generally interpreted as indicating recovery and immunity from HBV infection. Anti-HBs also develops in a person who has been successfully vaccinated against hepatitis B.

Total hepatitis B core antibody (anti-HBc):

Appears at the onset of symptoms in acute hepatitis B infection and persists for life. The presence of anti-HBc indicates previous or ongoing infection with HBV in an undefined time frame.

IgM antibody to hepatitis B core antigen (IgM anti-HBc):

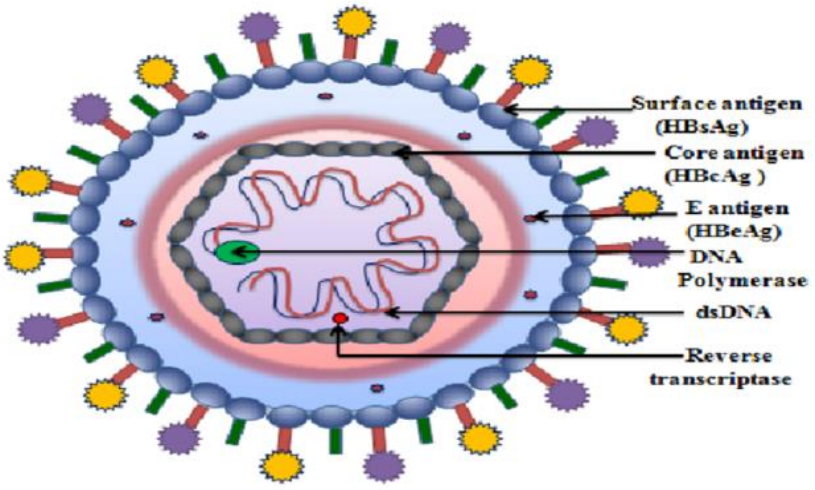
Positivity indicates recent infection with HBV (<6 months). Its presence usually indicates acute infection

Hepatitis B e antigen (HBeAg):

A secreted product of the nucleocapsid gene of the hepatitis B vims that is found in serum during acute and chronic hepatitis B infection.

Its presence indicates that the virus is replicating and the infected person has high levels of HBV.

Hepatitis B e antibody (HBeAb or anti-HBe): Produced by the immune system temporarily during acute HBV infection or consistently during or after a burst in viral replication. Spontaneous conversion from e antigen to e antibody (a change known as seroconversion) is a predictor of long-term clearance of HBV in patients undergoing antiviral therapy and indicates lower levels of HBV.



Interpretation of Individual Test Results in the Diagnosis of Acute and Chronic Viral Hepatitis

HAV	
HAV IgM	Presence indicates current or recent infection. A negative result indicates absence of infection.
HAV total Ab	Presence of total (IgM and IgG) HAV antibody in the absence of HAV IgM antibody indicates immunity against HAV infection.
HBV	
HBsAg	Presence indicates that a person has HBV infection and is infectious.
HBcAb, total	Presence indicates past or current HBV infection.
HBcAbIgM	Presence usually indicates HBV infection within the preceding 4 to 6 months (ie, acute infection).
HBeAb	Presence indicates resolving infection or response to therapy.
HBeAg	Presence indicates active viral replication and high infectivity
HBsAb	Presence indicates resolution and immunity against HBV infection or response to vaccination.
HBV DNA	Presence indicates current infection.
HDV	
HDV Ab, total	Presence coincident with the presence of HBsAg indicates past or current HBV/HDV coinfection or superinfection.
HDV IgM	Presence coincident with the presence of HBsAg indicates past or current HBV/HDV coinfection or superinfection. A negative result coincident with the presence of HDV total antibody indicates resolved infection.
HCV	
HCV Ab	Presence (with detectable HCV RNA) indicates current infection. A positive result coincident with a negative HCV RNA test may indicate a resolved infection or a false-positive antibody screening test.
HCV RNA	Presence indicates current infection. A negative result indicates absence of current infection.

Is Hepatitis B contagious?

Hepatitis B is highly contagious. It spreads through contact with infected blood and certain other bodily fluids. Although the vims can be found in saliva, it's not spread through sharing utensils or kissing. It also doesn't spread through sneezing, coughing, or breastfeeding. Symptoms of hepatitis B may not appear for 3 months after exposure and can last for 2-12.

Hepatitis C virus (HCV) HCV 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.

is mostly transmitted through exposure to infective blood. This may happen through transfusions of HCV-contaminated blood and blood products, contaminated injections during medical procedures, and through injection drug use. Sexual transmission is also possible, but is much less common. There is no vaccine for HCV.

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. Thus, prevention of HDV infection is similar to prevention for HBV and relies strongly on HBV vaccination.

infections occur only in those who are infected with HBV. The dual infection of HDV and HBV can result in a more serious disease and worse outcome. Hepatitis B vaccines provide protection from HDV infection.

Hepatitis E virus (HEV) is mostly transmitted through consumption of contaminated water or food. HEV is a common cause of hepatitis outbreaks in developing parts of the world and is increasingly recognized as an important cause of disease in developed countries. Safe and effective vaccines to prevent HEV infection have been developed but are not widely available.

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, an 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.

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,

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. In another study among Brazilian dentists, 73.8% of dentists were reported to have three doses of hepatitis B vaccine. It has been found that 5-10% of nomal 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.

POST-EXPOSURE PROPHYLAXIS

PEP is the guideline given by the World Health Organization for prevention of infection if there was a 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 as

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
- 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),
- Type and amount of fluid or material a person was exposed to), Does the source of potentially infectious material have HBV, HCV, or HIV infection?

It is necessary to record the details of the exposed person (HBV vaccination, the response to vaccination, other medical conditions and medications used.

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, 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.

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.

Hepatitis B vaccination and immune globulin

Talk to your doctor immediately if you think you have been exposed to hepatitis B within the last 24 hours. If you have not been vaccinated, it may be possible to prevent infection by receiving the hepatitis B vaccine and an injection of HBV immune globulin. This is a solution of antibodies that work against HBV.

Step six: Control monitoring

If any of medical staff was exposed to hepatitis, it would be necessary to do control testing for HBV. 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.