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Viral Hepatitis: Types, Symptoms, Treatment and Prevention: A Review

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Abstract: Viral hepatitis is an infectious liver disease caused by several viruses, primarily Hepatitis A, B, C, D, and E. These viruses lead to liver inflammation, with symptoms ranging from mild jaundice to severe liver damage. Hepatitis A is often transmitted via contaminated food or water, particularly affecting children, while Hepatitis B, C, and D spread through blood and bodily fluids, leading to chronic liver conditions. Hepatitis E, common in regions with poor sanitation, spreads through water contamination. Although there is no definitive cure for most types, vaccines are available for Hepatitis A and B, and preventive measures like safe hygiene and avoiding contaminated sources can reduce infection risks. The hepatitis B vaccine has been recommended for infants since 1991 and is typically administered in three doses. It generates immunity in 95% of vaccinated children, with protection declining slightly in older adults. Immunity remains long-lasting even if antibody levels fall below the protective threshold. For infants born to hepatitis B-infected mothers, vaccination combined with immune globulin is highly effective in preventing transmission. The vaccine is crucial for those at risk, such as healthcare workers and individuals in contact with infected persons.

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التهاب الكبد الفيروسي: الأنواع، الأعراض، العلاج والوقاية: مراجعة

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الخلاصة

التهاب الكبد الفيروسي هو مرض معدٍ يصيب الكبد، تسببه عدة فيروسات، أهمها فيروسات التهاب الكبد *A* و *B*و *C*و *D*و *E*. تؤدي هذه الفيروسات إلى التهاب في الكبد، وتتنوع الأعراض بين اليرقان الخفيف وتلف الكبد الشديد. ينتقل فيروس التهاب الكبد *A*عادة عبر الطعام أو الماء الملوث، ويصيب الأطفال بشكل خاص، في حين أن فيروسات التهاب الكبد *B* و *C*و *D*تنتقل عبر الدم وسوائل الجسم، مما يؤدي إلى حالات مزمنة تصيب الكبد. أما فيروس التهاب الكبد*E* ، الشائع في المناطق التي تفتقر إلى الصرف الصحي الجيد، فينتقل عبر تلوث المياه. ورغم عدم وجود علاج نهائي لمعظم أنواع التهاب الكبد، تتوفر لقاحات لفيروس التهاب الكبد *A* و*B*، كما أن التدابير الوقائية مثل الحفاظ على النظافة وتجنب مصادر التلوث يمكن أن تقلل من خطر العدوى. وقد تم التوصية بتطعيم الأطفال ضد التهاب الكبد *B* منذ عام 1991، وعادة ما يُعطى على ثلاث جرعات. يولد اللقاح مناعة لدى 95% من الأطفال المطعّمين، مع انخفاض طفيف في مستوى الحماية لدى البالغين الأكبر سناً. وتظل المناعة طويلة الأمد حتى لو انخفضت مستويات الأجسام المضادة إلى ما دون العتبة الوقائية. أما بالنسبة للرضع المولودين لأمهات مصابات بالتهاب الكبد *B*، فإن الجمع بين التطعيم والغلوبيولين المناعي يعد فعالاً للغاية في منع انتقال العدوى. ويعتبر اللقاح ضرورياً لأولئك المعرضين للخطر، مثل العاملين في مجال الرعاية الصحية والأشخاص الذين يتعاملون مع المصابين.

1. Introduction

Viral hepatitis, or epidemic hepatitis, is an infectious ailment induced by viruses that impair liver cells. This damage may be either transient or irreversible. The illness is marked by the infiltration of inflammatory cells in liver tissues, resulting in diverse clinical manifestations. One of the hallmark symptoms of viral hepatitis is jaundice, particularly common among children, where the skin and eyes take on a yellowish. There are five primary types of viral hepatitis: A, B, C, D, and E. In addition to these, there are other, less well-defined types, such as Hepatitis G, which are not as clearly linked to the disease. Some forms of hepatitis can be transmitted through sexual contact. Acute liver failure, a serious complication often leading to coma and death, is a common cause of mortality in patients with viral hepatitis (Murray, Rosenthal and Pfaller, 2019). Although children tend to experience less severe symptoms, the infection can later result in liver cirrhosis, tissue damage, or even liver failure. Currently, there is no specific treatment for viral hepatitis. When the liver is affected by viral hepatitis, the death of liver cells may result in various complications, such as repeated bleeding due to the liver's decreased production of clotting factors. Hepatitis A is primarily transmitted through contact with an infected person's feces, urine, or saliva. In contrast, hepatitis B, C, and D are mainly spread through blood transfusions and other blood-related procedures (Shepard, 2006).

1.1. Types of Viral Hepatitis

1.1.1. Hepatitis A

It is highly contagious but rarely fatal. It is common among children, in densely populated areas, and during travel to regions where the virus is prevalent. The virus is found in the feces of infected individuals, and transmission usually occurs through contaminated food and water. It can also spread through raw or undercooked foods, such as shellfish, vegetables, and fruits, especially if washed with contaminated water (Murray, Rosenthal and Pfaller, 2019).

Symptoms

Common symptoms include body aches, dark urine (similar to tea), diarrhea, fever, weakness, nausea, vomiting, jaundice (yellowing of the skin and eyes), loss of appetite, and light-colored stools. The virus is often contracted through contaminated water, ice, raw seafood, and unwashed fruits and vegetables. Rarely, saliva, semen, vaginal fluids, or urine transmit the disease. Severe dehydration, confusion, extreme drowsiness, or loss of consciousness, along with swelling in the face, hands, and feet, water retention in the body, and bleeding from the nose, mouth, or under the skin, are key indicators of hepatitis A (Shepard, 2006).

Treatment

Physicians recommend a high-protein diet and advise patients to stay hydrated, especially during vomiting episodes. Drinking water, soups, and fruit juices is encouraged, while alcohol and liver-damaging medications should be avoided. Preventive measures, such as handwashing with hot water and soap after contact with the patient or their feces, are crucial. To avert infection, immune globulin (IG) may be injected within two weeks of potential exposure to the virus. However, the hepatitis A vaccine does not work once the infection is present. Symptoms typically subside within two weeks, during which time the patient's feces remain contagious. Hepatitis A is considered less dangerous than other types (Murray, Rosenthal and Pfaller, 2019).

1.1.2. Hepatitis B

Acute and chronic hepatic infections are caused by the highly contagious Hepatitis B virus (HBV). When they first get an illness, many people don't feel sick. However, for some, the symptoms may come on quickly and last for weeks. These may include nausea, vomiting, jaundice, lethargy, black urine, and stomach discomfort. From thirty to one hundred and eighty days is the incubation period. About 90% of people infected at birth develop chronic illness, but less than 10% of those infected after 5 years old do. Liver cirrhosis and cancer are long-term consequences that can occur in 15–25% of people with chronic liver disease, even though most people with this condition experience no symptoms at all (Seeger and Mason, 2000). Transmission of the virus occurs primarily through direct contact with infected blood or body fluids. In highly endemic areas, infection is commonly acquired during childbirth or early childhood through close contact with infected individuals. In low-endemic regions, The two most common ways that this virus can spread are through intravenous drug use and having sex without protection. Infections can also spread through healthcare settings, blood transfusions, hemodialysis, close contact with an infected individual, and visiting regions with a high infection rate (Liaw and Chu, 2009). In the 1980s, tattoos and acupuncture were significant transmission sources, though this has become less common due to improved sterilization techniques. Hepatitis B is not transmitted through casual contact such as handshakes, shared eating utensils, or breastfeeding. Since 1982, vaccination has played a crucial role in preventing hepatitis B infection. The World Health Organization recommends vaccination starting at birth, followed by two or three doses to ensure complete immunity. The vaccine is effective in approximately 95% of cases, and as of 2006, around 180 countries had implemented vaccination programs (*Weekly epidemiological record Relevé épidémiologique hebdomadaire*, 2009). Additional preventive measures include blood screening prior to transfusions and the use of condoms during sexual activity. Antiviral medications, such as Tenofovir or Interferon, are often prescribed for chronic infections but can be expensive. Liver transplantation remains the final treatment option for cirrhosis patients (Lampertico *et al.*, 2017). Globally, approximately one-third of the world's population has been infected with HBV at some point, with 240-350 million people suffering from chronic infections. In 2013, there were 129 million new infections, and annually, over 750,000 people die due to hepatitis B-related complications, such as liver cancer. The disease is highly endemic in East Asia and Sub-Saharan Africa, where 5-10% of the population is chronically infected. In contrast, infection rates are less than 1% in Europe and North America. Despite its global impact, efforts continue to improve treatments and develop oral vaccines to combat this viral threat. In summary, hepatitis B remains a significant global health issue, particularly in developing regions. Through vaccination and preventive healthcare measures, progress is being made to reduce its spread and the severe complications associated with chronic infection (Schweitzer *et al.*, 2015).

Prevention

Since 1991, the United States has recommended that infants receive the hepatitis B vaccine. Most of these vaccines are given in three doses over a period of months. The presence of anti-HBs antibodies in the blood serum of a vaccinated person, at a concentration of 10 mIU/ml or higher, indicates a positive response to the vaccine, meaning the recipient has developed immunity against hepatitis B virus. The hepatitis B vaccine is highly effective in generating immunity in children, with 95% of vaccinated children developing sufficient antibodies to protect them from the virus. However, the level of protection decreases with age, with 90% efficacy in individuals around 40 years old and 75%

efficacy in those 60 years or older. The protection provided by the vaccine is long-lasting, and immunity remains even if anti-HBs antibody levels drop below 10 mIU/ml. Vaccination at birth is particularly important for infants if the mother is infected with hepatitis B. A combination of hepatitis B immune globulin and emergency doses of the hepatitis B vaccine can prevent mother-to-child transmission during birth, with a success rate of 86% to 99%. It is essential for individuals who may need blood or fluid transfusions to be vaccinated against hepatitis B if they have not already done so. Certain tests can determine whether a person has developed effective immunity against the hepatitis B virus, and additional doses of the vaccine may be administered if the person does not have adequate protection (Weekly epidemiological record Relevé épidémiologique hebdomadaire, 2009). In cases involving assisted reproductive technologies, there is no need for sperm washing if the male partner is infected with hepatitis B, as long as the female partner has been properly vaccinated. The risk of viral transmission from an infected mother to a child conceived through assisted reproductive technologies is the same as the risk of transmission during natural pregnancy. There are specific tests for individuals at high risk of contracting hepatitis B, and effective treatment is available for those infected. These tests are particularly necessary for individuals who have not been vaccinated (Liaw and Chu, 2009).

Vaccine Duration

studies conducted over a period of 10 to 22 years, no cases of hepatitis B infection were reported among individuals with a normal immune system who had received the full course of vaccination. However, rare cases of chronic infection have been documented (Weekly epidemiological record Relevé épidémiologique hebdomadaire, 2009).

Treatment

Acute hepatitis B generally does not require treatment, as the infection often resolves spontaneously in adults. Early antiviral treatment is only needed in rare cases—less than 1% of those who contract a severe infection (fulminant hepatitis) or those with compromised immune systems. On the other hand, treating chronic infections is crucial to reduce the risk of cirrhosis and liver cancer. Patients with chronic hepatitis B who show persistent elevation of alanine aminotransferase (ALT) levels, indicating liver damage, and high HBV-DNA levels are candidates for treatment. Treatment duration ranges from six months to a year, depending on the therapy and the patient's genetic makeup (Lampertico *et al.*, 2017). Although no available treatments can completely eradicate the infection, they can stop viral replication, reducing liver damage. As of 2008, seven antiviral drugs have been approved in the United States to treat chronic hepatitis B. Remivudine, entecavir, telbivudine, tenofovir, and adefovir are antiviral medications that fall under this category. Two more immune system modulators are pegylated interferon-alpha 2A and interferon-alpha 2A itself. As a first line of defence against cirrhosis, the World Health Organisation suggests tenofovir and entecavir (Lampertico *et al.*, 2017). Interferon treatment requires daily or thrice-weekly injections but has largely been replaced by pegylated interferon, which is typically administered once weekly. Response to treatment varies between individuals, possibly due to genetic factors, the viral genotype, or the patient's own genetic makeup. Treatment helps reduce viral replication in the liver, lowering the viral load in the blood. The response to treatment also varies by genetic factors, with the production of anti-HBe antibodies occurring in 37% of those with genotype A, compared to 6% for genotype B. Genotype B has a similar response to genotype A regarding anti-HBe production, while genotype C produces anti-HBe at a rate of 15%. Sustained loss of HBeAg production following treatment is 45% for genotype A and B but only 25% to 30% for genotypes C and D (Schweitzer *et al.*, 2015)(Ghafil *et al.*, 2023).

1.1.3. Hepatitis C

Primarily spreads through blood or blood products contaminated with the virus. Approximately 80% of those infected develop chronic hepatitis, with 20% of them developing cirrhosis. Within 10 years, 5% may develop liver cancer (Murray, Rosenthal and Pfaller, 2019). Chronic hepatitis C is the leading cause of liver transplants in many countries, particularly the United States, costing an estimated $600 million annually in medical expenses and lost work hours according to the World Health Organization (WHO).

Symptoms

Early infection often presents as acute hepatitis with general fatigue, loss of appetite, nausea, vomiting, mild fever, dark urine, and skin rashes, which are common signs of viral liver diseases. Symptoms last several weeks, followed by gradual recovery in most cases. However, liver damage may result in liver failure and death in some cases. The virus infects over 170 million people worldwide, many of whom suffer from chronic liver disease. Chronic hepatitis C can progress to cirrhosis and, in some cases, liver cancer Patients with chronic hepatitis should avoid alcohol, as it accelerates liver damage (Shepard, 2006). Acute symptoms of hepatitis C occur in only about 15% of cases. These symptoms are usually mild and vague, including loss of appetite, fatigue, nausea, muscle or joint pain, and weight loss. Jaundice (yellowing of the skin and eyes) is rare in severe cases. Without treatment, the infection resolves on its own in 10–50% of cases, with young females more likely to clear the virus (Seeff, 2002).

Chronic Infection

Approximately 80% of those exposed to HCV get chronic infection. Most individuals endure minor or no symptoms for decades, however chronic hepatitis C may be linked to fatigue (Younossi et al., 2007). Hepatitis C is the primary aetiology of cirrhosis and hepatocellular carcinoma in chronic patients. Between 10–30% of those infected for more than 30 years will eventually develop cirrhosis (Di Bisceglie, 1997). Cirrhosis is more prevalent among those co-infected with hepatitis B or HIV, thos e with a history of alcohol abuse, and males (Fattovich et al., 1997)(Fattovich *et al.*, 2002). Patients with cirrhosis face a twentyfold increased risk of liver cancer, with an annual incidence of 1–3% (El-Serag, 2012). In alcoholics, the risk increases 100 times (Donato, 2002). Hepatitis C accounts for 27% of cirrhosis cases and 25% of liver cancer cases globally (Perz *et al.*, 2006). Cirrhosis can lead to complications such as high blood pressure in the veins leading to the liver, fluid accumulation in the chest, easy bruising or bleeding, enlarged veins in the stomach and esophagus, jaundice, and brain damage (Grebely and Dore, 2011).

Extrahepatic Manifestations

Hepatitis C is also linked, though rarely, to Sjögren's syndrome (an autoimmune disorder), low platelet counts, chronic skin conditions, diabetes, and non-Hodgkin’s lymphoma .Other effects may include oral manifestations like lichen planus, inflammation of the salivary glands, dry mouth, smooth tongue, teeth grinding, and perioral rashes (AL-HASHIMI, 2001).

Causes

Hepatitis C is a diminutive, enveloped, positive-sense single-stranded RNA virus classified within the genus Hepaciviral of the family Flaviviridae. There exist seven primary genotypes of the hepatitis C virus. In the United States, genotype 1 constitutes 70% of instances, whereas genotype 2 comprises 20%. All other genotypes comprise

approximately 1% of cases. Genotype 1 is the predominant variant in South America and Europe (Simmonds *et al.*, 2005).

Transmission

In developed countries, HCV is primarily spread through intravenous drug use. In developing countries, the primary routes of transmission are blood transfusions and unsafe medical procedures (Hajarizadeh, Grebely and Dore, 2013).

Prevention

Since 2011, there has been no vaccine for hepatitis C. Vaccines are still under development. Preventive measures, including needle exchange programs and substance addiction treatment, diminish the risk of hepatitis C transmission among injection drug users by 75%. National blood donor screening is essential, along with compliance with international safety protocols in healthcare settings. In nations with inadequate sterile syringe availability, the administration of oral medications is advised. In 20% of instances, the transmission source remains unidentified; nevertheless, a significant portion is probably associated with intravenous drug use (Nelson *et al.*, 2011).

Treatment

Hepatitis C virus (HCV) causes chronic infection in approximately 50–80% of infected individuals. Of these, around 40–80% can be cured with treatment. In rare cases, the infection resolves without treatment. Individuals with chronic hepatitis C should avoid alcohol, liver-toxic medications, and should be vaccinated against hepatitis A and hepatitis B. The main treatment for HCV involves two medications: interferon and ribavirin. Approximately 50–80% of patients administered these medications achieve a cure. Patients who develop cirrhosis or liver cancer may require a liver transplant, although the virus often recurs after transplantation. Notably, there is no vaccine for hepatitis C (Strader *et al.*, 2004).

1.1.4. Hepatitis D

Also known as the delta virus, cannot replicate on its own and needs the occurrence of hepatitis B. It coexists with hepatitis B and is found in approximately 8% of hepatitis B patients and less than 2% of hepatitis B carriers.

Transmission

Hepatitis D spreads through blood transfusions and sexual contact. Risk factors are similar to those of hepatitis B, with intravenous drug users being particularly vulnerable.

Prevention

Hepatitis D infection can be prevented through the hepatitis B vaccine (Murray, Rosenthal and Pfaller, 2019).

1.1.5. Hepatitis E

It is primarily an epidemic disease linked to water contamination. It is transmitted through the consumption of contaminated food and drink. Since the virus is excreted in feces, contaminated drinking water is often the source of infection. The incubation period is 2 to 9 weeks. Individuals aged 15-40 are most susceptible, with pregnant women being at the highest risk, with mortality rates as high as 20%, compared to less than 1% for others (Shepard, 2006). Clinically, hepatitis E is indistinguishable from hepatitis A and typically resolves on its own (Murray, Rosenthal and Pfaller, 2019).

1.1.6. Hepatitis G

It was discovered in 1996, and research on this virus is still ongoing. Initially thought to cause viral hepatitis, later studies did not conclusively link it to the disease. As more research emerges, understanding of this virus may evolve. Hepatitis G belongs to the Flaviviridae family and shares structural similarities with the hepatitis C virus. It spreads through blood transfusions and sexual contact. Although it has been found in cases of chronic hepatitis, its direct association with the disease is uncertain. Studies on human immune deficiency virus (HIV) patients have shown that those with co-infections of HIV and hepatitis G tend to survive longer than those infected with HIV alone. Approximately 2% of healthy blood donors in the U.S. carry the hepatitis G virus, though they do not exhibit symptoms. Ninety to one hundred percent of carriers develop chronic infections, though these rarely cause significant harm compared to other viral hepatitis families (Shepard, 2006).

2. Prognosis After Treatment

An infection with hepatitis B can be either short-lived (acute) or long-lasting (chronic). Acute, self-limiting infections typically resolve in a matter of weeks or months for those affected. Children have a poorer healing rate compared to adults. If an adult or older child gets the virus, almost 95% of them will get well and even develop immunity. The percentage of children that recover falls to 30% when they are younger, and if they are infected at birth, just 5% of babies will be able to eliminate the virus. Cirrhosis and cancer of the liver threaten the lives of 40% of this population. In youngsters between the ages of 1 and 6, 70% of cases are resolved (Lampertico *et al.*, 2017).

Hepatitis D can only occur in individuals co-infected with hepatitis B, as hepatitis D uses the surface antigen of hepatitis B to form its viral envelope. Co-infection with hepatitis D increases the risk of cirrhosis and liver cancer (Liaw and Chu, 2009). Polyarteritis nodosa is more common in people infected with hepatitis B.

Hepatitis C is a viral infection that predominantly impacts the liver. The hepatitis C virus (HCV) is the etiological agent of this disease. Hepatitis C often manifests asymptomatically; however, chronic infection can cause liver fibrosis, potentially progressing to cirrhosis over time (Lauer and Walker, 2001). Patients with cirrhosis may develop liver failure, liver cancer, or markedly distended veins in the esophagus and stomach, potentially resulting in substantial hemorrhaging that could be fatal. HCV is mainly transmitted through blood-to-blood contact, often due to intravenous drug use, unsterilized medical equipment, and blood transfusions. It is estimated that between 130 to 170 million people worldwide are infected with hepatitis C (Lavanchy, 2009). Research on the hepatitis C virus commenced in the 1970s, with its existence being verified in 1989. It remains unclear whether the virus affects any other animals (Choo *et al.*, 1989).

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