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Viral Hepatitis

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Viral hepatitis is an infection that causes liver inflammation & damage. Inflammation causes swelling that occurs when tissues of the body become injured (or infected). It can damage vital organs. Studies have shown several different viruses that cause hepatitis, includes hepatitis A, B, C, D, E, and G. It is not proven whether the Hepatitis G virus is pathogenic in humans or not.

The word is derived from the Greek hêpar, meaning "liver", and -itis , meaning "inflammation". Each virus is classified and has a different family of viruses, yet all have hepatocyte-specific tropism as well as similar clinical manifestations. According to different studies of virus genotype the HBV (Pujol et al., 2020) HCV (Sarrazin, 2021), and HDV, result from the viral evolution and genomic mutation. Another study said that the origin of primate HBV is due to host evolution and migration (Locarnini et al.2021). It also says the evolution of human and old- world non-human primate (NHP) HBV involves early human migration out of Africa during the Upper Paleolithic era and the Neolithic due to agricultural expansion.

Disease agent
In the United States, the Hepatitis A, Hepatitis B, and Hepatitis C viruses causing 90% of acute viral hepatitis. Hepatitis c is the most common cause for chronic hepatitis. Hepatitis D and E are less frequently encountered. Based on the etiology of hepatitis, the severity can range from mild to severe illness which sometimes requires liver transplantation. Based on the duration it can be acute when inflammation of the liver lasts for less than 6 months and chronic when the inflammation lasts more than six months. Acute hepatitis is usually self-resolving but, in some cases, it can cause fulminant liver failure. Whereas chronic hepatitis may lead to significant morbidity and mortality. Chronic hepatitis can cause liver damage which can cause liver fibrosis,cirrhosis, hepatocellular carcinoma, and features of the portal. (Dakhil N 2009)

Hepatitis A is an RNA virus (Picornaviridae family) present in the highest concentration in the stool of an infected person with the greatest viral load shedding which usually occurs during the end of the incubation period. The mode of transmission is the fecal-oral route. It is more commonly seen in developing countries because of poverty and lack of sanitation. In some casestudies, it is reported that international travel is the most significant cause for its occurrence.
People who meet infected individuals are also at risk and almost 20% of households are reported for the secondary infection which can be a reason for its outbreaks.

Hepatitis B virus has a DNA virus (Hepadnaviridae family). The composition has a viral core called nucleocapsid, hepatitis B core antigen (HBcAg), surrounded by hepatitis B virus DNA, and DNA polymerase. Hepatitis B surface antigen (HBsAg) coats the nucleocapsid (viral surface polypeptide). Dane particle is the intact hepatitis B virus virion. It can be detected in serum, semen, vaginal mucus, saliva, and tears even lower tears. In the US, almost it is estimated that about 2.2 million people have chronic hepatitis B virus infection. The mode of transmission is through parenterally and sexually when individuals meet mucous membranes or body fluids of infected individuals some of instances are exposure to blood transfusion or blood products, use shared needles for injecting drugs, hemodialysis, people who have multiple sexual partners, prisoners, partners of hepatitis B virus carriers are at high risk, but the dominant mode of transmission is still, parenteral both globally and in the United States. Prenatal transmission cases are also reported, it usually occurs in infants of HBeAg-positive women where the probability of getting the infection to infants is 70% to 90% (You CR 2014)

Hepatitis C virus has an RNA virus (Flaviviridae family) It has six major genotypes and more than 80 subtypes due to this extensive genetic variability; it is challenging to develop a vaccineto prevent hepatitis C virus infection.

Transmission can be parenteral, perinatal, and sexual. The most common mode is sharing contaminated needles during IV drug administration and also among those who require frequent blood transfusions and organ transplantation of organs from infected donors (Li HC 2015)

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Hepatitis D has an RNA virus (Delta virus). It has hepatitis D antigen and RNA strand and used HBsAg as its envelope protein because of which those who get hepatitis D virus infection have coinfection along with the hepatitis B virus. (Rizzetto M 2015)

Modes of transmission for hepatitis D virus is similar as to hepatitis B virus, but only perinataltransmission is uncommon Hepatitis E has RNA virus (Hepevirus genus) The primary mode of transmission is the fecal-oral route. Person-to-person transmission is rare but occasionally maternal-neonatal transmission can occur which is reported in few studies (Pérez-Gracia MT 2015)

Hepatitis G virus has RNA virus (Flaviviridae family). The primary mode of transmission is through infected blood and blood products. It occurs with people who have chronic hepatitis B or hepatitis C infections. It is not clearly proven that it as an agent that causes hepatitis by itself. (Soleiman-Meigooni 2015)

According to CDC, most people with hepatitis are asymptomatic. If symptoms occur with an acute infection, it will appear anytime from 2 weeks to 6 months after exposure which means the average incubation period is 28 days (range: 15-50 days). Chronic viral hepatitis which takes decades to develop. Signs and Symptoms of hepatitis include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, light-colored stools, joint pain, and jaundice.

Education will help people to think cautiously towards disease awareness lowers disease transmission (Singh PK 2018). Awareness campaigns to educate the entire community and implement the corrective measure to improve the current situation of Hepatitis. (Scotto G 2013). Health education helps people to ask for their rights if the provider isn't authentically delivering services which include administering safe injection both in the healthcare system and among intravenous drug users and also educating common people for safer sex practices will reduce the rate of occurrence. It is equally important that proper testing for the virus and follow up visits are monitored in order to complete the full course of vaccination (Grebely2017)

Improvement of the socio-economic condition has reduced the prevalence of hepatitis. The government along with the public health sector should ensure universal access to clean water, hygienic food handling, safety practices, and proper sanitation systems (Grebely2017). Properdisposal of medical waste also restricted the contamination from infected people. Screening and early detection will help to start the preventive measure and reduce its morbidity and mortality. According to WHO the Vaccination campaigns for HAV and HBV infections are central which ensures the maximum implementation of the vision. WHO has provided proper guidelines and support to reduce disease transmission.

Although hepatitis B vaccine is effective only 27% for newborns worldwide. According to one of the studies, the birth dose vaccination of HBV is critical to prevent mother-to-child transmission. Even due to high-cost treatment is not accessible in many countries. Due to the peculiarity of the virus HCV, there is no vaccination available. For HCV we use traditional curative treatment which is based on genotyping of the virus followed by safe blood transfusion strategies which are quite similar to that of HBV. Vaccination for other types of hepatitis is under research.

With comprehensive global action plans and collaborations, viral hepatitis can be controlled. Intervention includes Implementing the WHO global model. In this strategy, five core interventions are proposed and the targeted areas include vaccination plans (hepatitis B, A, & E), prevention of the vertical transmission (hepatitis B), injection and blood products safety, harm reduction, and finally the treatment.

Nurse-led approach This model is proposed for the prisoner where the hepatitis C management was established, and it provides proper advice for harm minimization, diagnosis, and treatment.(Leonard NR 2013)

Outreach treatment is important in viral hepatitis management. A mobile clinic is an innovative, flexible, and effective way to provide proper healthcare management for chronic viral hepatitis. This will help the low-middle-income group of people who are infected with viral hepatitis and also improve viral clearance as well as reduce the risk behaviors by educating them.

A post-exposure prophylaxis-A huge number of cases are reported in the healthcare worker for viral hepatitis due to accidental needle injury. As the exposure to the virus is confirmed IgG treatment should be provided which will stop the infection from developing.

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Hepatitis A virus (HAV) is major public health problem in developing countries. Chronic hepatitis B is still an incurable disease despite the availability of vaccines and drugs. It can circulate in the blood, with 108–1010 infectious particles/mL of blood hence this virus is highly contagious. Along with the healthcare system where the worker gets due to the needle injury, the nosocomial transmission of HBV has also been reported a high number of outbreaks worldwide over the past few years. Another few common transmission pathways for HBV include the use of multidose vials, dental or biopsy equipment, dialysis units, contaminated finger-stick devices, acupuncture needles, endoscopes, unsafe surgical and injection procedures. (Sauerbrei A. 2014) . Alcohol and aflatoxin are two important factors that affect chronic hepatitis B prognosis. (Zeng,Z.2008)

During Summer multiple sources of transmission are seen which increase the rate of occurrence of viral hepatitis. Commonly due to the activities like summer travel to an endemic area, swimming habits of the population in hot months, increase sexual contact, tattoo, poor hygiene and environmental sanitation and the food habit, still more confirmation and research is requiredin this field. **(**Moucari R 2007)

According to one of the studies, the most likely contributing factor for the seasonal occurrence of hepatitis A and E is the disruption of sanitation and water supplies (Lockwood GL 2007). In another study which is conducted in the UK found that more sexual activity and unsafe sex coincided with the summer vacation along with an increase in the human immunodeficiency virus-positive tests in the months following Christmas. (Fares A. 2015)

The peak incidence of HAV infection was seen in the rainy season in the coast of Rio de Janeiro in Brazil. These HAV is transmitted indirectly through rainfall because these rains usually fill up the rivers and then it starts overflowing, and the persons could be contaminated with these waters. (Villar LM 2002)

A longitudinal study of cocaine and cocaine metabolites in wastewater suggests that a clear seasonal difference is indicative of human seasonal cocaine use patterns and it is related to the seasonal occurrence of HCV or HBV(Mari F,2009)

According to U.S. Department of Health and Human Services the Asian Americans and Pacific Islanders are the racial/ethnic groups that are mostly affected by the hepatitis B virus. Asian Americans and Pacific Islanders altogether contribute to 5% of the U.S. population, where they represent about half of all persons living with hepatitis B. As a result of which 1 in 12 Asian Americans and Pacific Islanders are living with hepatitis B.

According to CDC, the age-adjusted hepatitis B-related mortality rate decreased from 0.46 per 100,000 population (2017) to 0.42 in 2019 but there is a target set by CDC which aims for an 11.9% reduction from 2019 by 2025. We can achieve this by increasing access to testing for hepatitis B as well as a treatment for chronic hepatitis patients. We should also start using digital technology and telemedicine models for more effective results. The cost-benefit program helps the low middle income. We should support the research and development for more effective anti-viral therapies to reduce. (CDC 2021)

According to CDC, a total of 123,312 new chronic hepatitis C cases were reported in 2019 where it is observed a high number of males compared with females across all age groups. For both males and females, the bimodal age distribution was observed. The rate of infection is highest among persons aged 20–39 years (peak: 29 years) and a second apex was observed around 55–70years (peak: 59 years)

Periodic epidemics have occurred in the United States approximately every decade for Hepatitis A and the last nationwide epidemic occurred in 1995 (CDC 2000). Since then, rates of Hepatitis A have declined and are now the lowest in 2019. More cases were reported for hepatitis A were among American Indians/Alaska Natives and Hispanics but after vaccination got approved in 1995 and administer successfully the rates dropped. No cases were reported for developing chronic infection develops after Hepatitis A and which help to reduce the overall burden ofdisease due to HAV.

For hepatitis B both acute and chronic infections are a major cause of morbidity and mortality in the United States. Because most Hepatitis B infected persons are asymptomatic which increases the rate significantly and even symptomatic persons were underreported. After 1892 the vaccine for hepatitis B was available which decreased the rates by 70% from the 1980s to 2000. The HBV infection was highest among blacks and Hispanics than non-Hispanics .in the age group of 20-39 years the highest incidence of cases were reported. A comprehensive immunization strategy to eliminate HBV transmission was adopted in the United States includes preventing perinatal HBV transmission by proper screening of all pregnant women

for HBsAg and providing immune prophylaxis (infants of HBV-infected women). Routine immunization for all the infants (3 catch-up vaccination) with priority for those in the age group of 11 to 12 years along with vaccination of adolescents as well as adults at high risk for infection.

Although we have tried a lot of strategies to prevent viral Hepatitis globally, still many hurdles need to be overcome. One of the important actions to be adopted to control outbreaks is prompt immune serum treatment. For the development and assessment of the national viral hepatitis plan, WHO has published a technical report manually in 2017. This guidance could help us to strategy and control outbreaks.

These actions need to be strengthened and reinforced to stop the spread and provide a viral hepatitis-free future for the next generation. There is no single measure that will reduce this but having a global vision and implementing multiple strategies will surely help to reduce the globaldisease burden

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