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Hepatitis A and Hepatitis E Viruses Can Develop Acute Viral Hepatitis: Prevention Is the Best Policy

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Abstract

Acute viral hepatitis is caused by hepatitis A virus (HAV) and hepatitis E virus (HEV) that is a great health problem worldwide. Both of the viruses are non-enveloped ribonucleic acid (RNA) and cause a self-limiting viral infection that is transmitted by fecal-oral route, primarily through the consumption of contaminated food and water. Both of the viruses can develop mono-infection or co-infection that is a common cause of viral hepatitis in developing countries. Some common symptoms of both diseases are fever, headache, malaise, nausea, vomiting, diarrhea, anorexia, abdominal pain, dark urine, and jaundice. The HAV is more common cause of acute hepatitis in children, and HEV is responsible for the majority of epidemic and sporadic hepatitis in adults. This study is planned to discuss the transmission and management of HAV and HEV infections to reduce morbidity and mortality for the welfare of the patients.

Keywords: HAV and HEV, co-infection, acute viral hepatitis

1. Introduction

Hepatitis A virus (HAV) and hepatitis E virus (HEV) are responsible for sporadic and epidemic forms of acute viral hepatitis (AVH) worldwide (Shinde et al., 2020). Acute liver failure and acute viral hepatitis are serious illnesses caused by the HAV and HEV. About 1.5 million clinical cases of HAV are recorded per year with about 7,134 deaths. There are globally about 20 million HEV infections each year, over which 3 million cases are symptomatic with about 56,600 deaths per year; and about 20-30% mortality among pregnant women particularly in the third trimester (WHO, 2020).

In 1973, 27nm HAV-like particles were visualized in stool samples obtained during acute phase of illness after inoculation of MS-1 strain in volunteers Stephen Feinstone, Albert Kapikian, and Robert Purcell (Feinstone et al., 1973). The HAV was first isolated in 1979 (Khuroo & Sofi, 2020). The HEV was discovered in 1983 by Russian virologist Mikhail Surenovich Balayan investigating an outbreak of unexplained hepatitis using immunoelectron microscopy among Soviet soldiers serving in Afghanistan. In 1989, the viral genome was successfully sequenced and this pathogen was formally designated as HEV (Izopet & Kamar, N. et al., 2014).

The HAV and HEV are responsible for acute viral hepatitis and more than 300 million people worldwide suffer from viral hepatitis annually (Kotwal et al., 2014). The HEV prevalence is highest in the East and South Asia, and the HAV prevalence is worldwide, especially in Africa, Asia, Europe, and North and South America. The HAV and HEV affect more men than women both in developed and developing countries (Kamar et al., 2014).

2. Literature Review

In any research, the literature review section is an introductory unit of research that helps the novice researchers to understand the subject, and it serves as an indicator of the subject that has been carried out before (Creswell, 2007). Ravindra V. Shinde and his coauthors have found that both the HAV and HEV are primarily transmitted

via the fecal-oral course. In their study they have wanted to determine the seroprevalence of HAV and HEV, and rate of co-infection in patients attending rural tertiary care center (Shinde et al., 2020). Bodhrun Naher and her coworkers have wanted to learn about the seroprevalence of HAV and HEV infections, and their co-infections in acute viral hepatitis (AVH) cases of the hospitals of Bangladesh. In their study they have found that seroprevalence of HAV was 13.75%, HEV 5.75%, and co-infection of HAV and HEV 5.25% (Naher et al., 2023).

Stanley M. Lemon and Christopher M. Walker have studied and compared HAV and HEV biology in humans and animals to enhance the understanding of host-pathogen balance in the liver, and may contribute ultimately to the control of other infectious diseases of the liver (Lemon & Walker, 2019). Ankita Sharma and her coworkers have wanted to determine the seroprevalence of acute viral hepatitis (AVH) in developing countries for HAV and HEV. They have found that the prevalence of HAV is significantly higher than that of HEV; and HAV is more predominant in males compared to females (Sharma et al., 2024). Parul Patel and her coauthors have shown that acute viral hepatitis (AVH) due to HAV and HEV infection is a major public health problem in developing countries and is an important cause of morbidity and mortality (Patel et al., 2019).

Jinwal Meena and her coworkers have expressed that HAV and HEV are enterically transmitted viruses responsible for causing acute viral hepatitis that pose a heavy burden on the healthcare system of developing nations (Meena et al., 2021). Sarita Rawat and her coworkers have studied to determine prevalence of HAV and HEV in patients presenting with acute viral hepatitis and the co-infection of these viruses in patients (Rawat et al., 2019). Meghna S. Palewar and her coauthors have emphasized on the importance of screening all hepatitis viral markers for early diagnosis and curtailment of outbreaks and epidemics by the public health sector reducing morbidity and mortality (Palewar et al., 2022).

3. Research Methodology of the Study

The research design is the plan of the researchers to develop research area that is underpinned by philosophy, methodology and method (Tie et al., 2019). Methodology is a guideline for performing good research. It examines the purposes, problems, and questions of research (Kothari, 2008). Research methodology is a strategy for planning, arranging, designing and conducting fruitful research confidently to obtain a successful result (Legesse, 2014). To prepare this article, I have used secondary data sources that are collected from published and unpublished data sources (Mohajan, 2017, 2018, 2020). I have studied books of famous authors, handbooks, and theses. I have also collected valuable information from websites and internets (Mohajan, 2024a-e).

4. Objective of the Study

Main objective of this article is to discuss the aspects of HAV and HEV for the reduction of their fatality (Mohajan, 2024g-i). Both of these viruses can damage the liver and are associated with significant morbidity and mortality. These are responsible for acute viral hepatitis. Sometimes the infection with the viruses may be chronic hepatitis, liver cirrhosis, and liver failure (Mohajan, 2024k-p). Other minor objectives of the study are as follows (Mohajan, 2024f, j):

1) to focus on the characteristics of HAV and HAV,

2) to highlight on their symptoms and transmission, and

3) to stress on their prevention and treatment strategies.

5. Hepatitis A Virus (HAV)

Hepatitis A virus (HAV) infection is the most common form of acute viral hepatitis in the world that can damage the liver. It is tissue or cell specific and attacks only the liver. It is highly endemic in developing nations due to overcrowding and poor sanitation (Ambrosch et al., 2004). It never progresses into chronicity, but it can cause debilitating symptoms and acute liver failure, which is associated with high mortality (Squires et al., 2006).

5.1 Virology HAV

The HAV is a small, non-enveloped, 27-32nm ribonucleic acid (RNA) virus in the genus Hepatovirus of the family Picornaviridae (Enkirch et al., 2019). There are six HAV genotypes based on examining a 168-nucleotide fragment of the VP1-2A region. Only genotypes I, II and III infect humans and genotypes IV to VI cannot infect humans (Smith & Simmonds, 2018). Genotypes I, II, and III are further divided into subtypes A and B (Cella et al., 2018). The HAV usually affects infants and young children in developing countries, and causes an asymptomatic and self-limiting infection (Agarwal et al., 2017).

5.2 Symptoms and Transmission of HAV

The incubation period of HAV is from 15 to 50 days, with an average of 25 to 30 days. It is asymptomatic and self-limiting infections, leading to lifelong immunity (Franco et al., 2012). The symptoms of HAV are extreme fatigue, nausea, vomiting, malaise, dark urine, anorexia, jaundice, and abdominal pain along with elevated liver

enzymes (Sarangi et al., 2019). The source of infection resides in contaminated food and water, and the transmission takes place by the oral pathway through the “fecal-oral” system (Heymann, 2008). Sharing of forks, spoons, knives, and other utensils that have virus on them can spread the HAV. The disease is not spread by kissing, sneezing or saliva (WHO, 2012).

5.3 Prevention and Treatment of Hepatitis A

Prevention strategy of HAV is not costly and difficult. A person must wash hands carefully and thoroughly with soap and warm running water after using the toilet or changing diapers (Chen et al., 2010). The HAV vaccine is very safe and effective. It is made through the killing (inactivated) HAV by formaldehyde (Keeffe, 2006). The HAV vaccine is introduced in 1995 in the USA by American microbiologist Maurice Ralph Hilleman (1919-2005) and his team that saves millions of lives every year (CDC, 2018). No specific treatment of HAV is available, complete rest following infection is important for recovery. It is generally mild and self-limiting with a typical recovery in two weeks. Treatment of the HAV is palliative and supportive care (Gerardi & Zimmerman, 2005).

6. Hepatitis E Virus (HEV)

The HEV is the most common cause of acute viral hepatitis globally that is responsible for the major liver infection (Pilot et al., 1987). The prevalence of HEV is in animal species with zoonotic potential in humans (Yugo & Meng, 2013). Infection with the HEV may be related to acute illness, chronic hepatitis, liver cirrhosis, and liver failure (Guerra et al., 2017).

6.1 Virology HEV

The HEV is a small, non-enveloped, single-stranded, positive-sense ribonucleic acid (RNA) virus in the genus Orthohepevirus of the family Hepeviridae. The genome is of 7.2 kb and 27-34nm in diameter that is highly unstable due to the lack of a lipid membrane (Mayr et al., 2018). The HEV can be clustered genetically into 8 genotypes (GTs); HEV1-8 that recognize with distinct differences in geographic distribution (Sridhar et al., 2017).

6.2 Symptoms and Transmission of HEV

Usually, HEV infected people have no symptoms. Some symptoms of hepatitis E are jaundice, fever, tiredness, loss of appetite, malaise, anorexia, nausea, vomiting, abdominal pain, joint pain, hepatomegaly, pruritus dark urine, pale stools, and arthralgia (Mirazo et al., 2014). The HEV is transmitted by fecal-oral route, primarily through the consumption of contaminated food and water (Kumar et al., 2017).

6.3 Vaccination and Treatment of Hepatitis E

The HEV infections are usually self-limiting and asymptomatic in immunocompetent individuals (Mohajan, 2024j). Prevention is the most effective policy to protect HEV (Wedemeyer et al., 2012). No effective and specific treatments against HEV infection have been developed yet, and also there is no HEV vaccine available, and treatment is palliative and supportive (Mirazo et al., 2014). Current therapeutics used to treat HEV infection are the nucleoside analog ribavirin and pegylated interferon-α (PEG IFN-α) (Kamar et al., 2014). A Chinese vaccine has been demonstrated to be protective against HEV in the general population and seems to be safe in pregnancy; however, its safety and efficacy is not determined (Wu et al., 2020).

7. Conclusions

From this study, I have observed that viral hepatitis is a major public health problem in the worldwide. The HAV and HEV usually spread through the direct contact with an infected person, and a higher prevalence of HEV as compared with HAV infection. These can be transmitted through fecal contamination of food and water. Improvements in socioeconomic condition, personal hygiene, and sanitation can reduce the fatality of the diseases. Moreover, both of the diseases can be treated with medications, therapies, and nutrition supports. Prevention is the most effective method against acute viral hepatitis due to HAV and HEV through the maintaining of hygienic practices. All the nations should make efforts to increase the public awareness among citizens for the reduction of global morbidity, mortality, and economic burden.

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