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Review Article

Hepatitis C, Symptoms, Types, Causes, Treatment and Prevention

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Abstract

Hepatitis C is a viral disease which causes an infection, damaged, and inflammation of the liver. The first attack of the Hepatitis C virus occurs on the liver. And in initial stage immunization also occur against HCV trough immune system to kill hepatitis C virus. In chronic HCV immune system cannot completely clear HCV infection in most affected patients. HCV is a major public health issue. Hepatitis C is the cause of 27% of cirrhosis and 25% of hepatocellular carcinoma. 32% of cirrhosis occurs over the age of 25-30 years. Hepatitis C virus (HCV) is a blood born pathogen that infects only liver cells also called hepatocytes. The liver is the most important organ in our body that perform many functions like it detoxifies the blood and also helps in the undertaking of nutrients. It fights against many infections. It is estimated that 20 % of people show symptoms but 80% of people do not show symptoms in the initial stage of infection.

Introduction

Hepatitis C is a disease that affects only the liver. HCV replicates only in the liver. During infection Immune system fight with HCV and kills infected cells of the liver. But due to the rapid replication of HCV, it is tough to control it for the immune system. "Hepatitis" means inflammation of the liver and loss of liver function occurs. Hepatitis C Virus (HCV) is now a day common infectious virus that affects the liver. As viruses are host specific the host for HCV is hepatocytes [1]. About 170 million or 3% of people were affected by this infection or at the risk of developing liver cancer. More than 35000 people die of liver diseases. Using molecular biology techniques, the identification of HCV was done in 1989 by Coo et al. and Kue et al [2]. The in-vitro replication was nearly impossible [3].

Usually, this infection shows no symptoms, therefore, identification is difficult. And it has the 70 different subtypes along with seven genotypes. The infection means the presence of HCV-RNA or antibodies against it. During chronic infection, 3% to 4% of the patients develop life risk infectious that may lead to the death of the patient. No vaccines have been developed against it so it may be prevented through therapy or by taking preventive measures.

Genome of HCV

HCV is a small enveloped, single-stranded RNA virus that belongs to the family Flaviviridae and genus Hepacivirus. These virions are 50 to 80 nm in diameter [4]. HCV Its genome is 9.6kb contains a single open reading frame of 3000 amino acids that encodes for three structure proteins (core, E1, and E2) and seven non-structure proteins (p7, NS2, NS3, NS4A, NS4B, NS5A, and NS5B) as described in

Figure 1 [1,5]. HCV is a high mutation rate, an estimated frequency of 1000 mutations per nucleotide per year. The composition of HCV is like other virions it has the membrane with lipid bilayer that within the nucleocapsid [2,6].

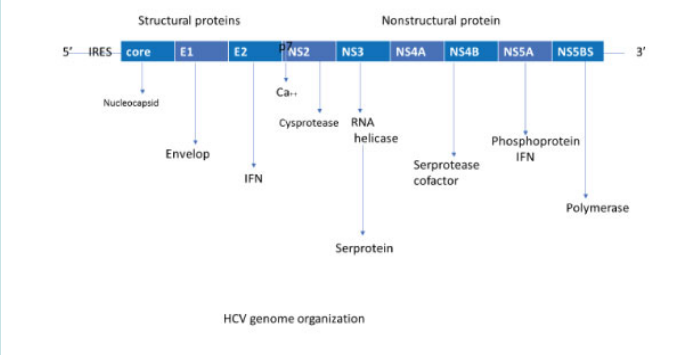

Figure 1: (HCV genome have core, E1, E2 structural proteins and NS2, NS3, NS4A, NS5A, and NS5BS are non-structural proteins these proteins are involved in the formation of different viral components.)

Viral Classification

- Group: +_RNA (as visualized in Figure 2 given below)
- Order: Unassigned
- Family: Flaviviridae
- Genus: Hepaciviral
- Species: Hepaciviral C [7]

Role of Liver

The liver is an important and largest organ of the body that stores nutrients and minerals, vitamins, sugars, fats, filters blood and fight infection-causing harmful agents present in the blood during the cleaning of blood like microbes, toxins, and alcohol and remove waste from the body. The liver also performs 500 important functions of the body [8,9]. During the infection of hepatitis C, the functions of the liver can be

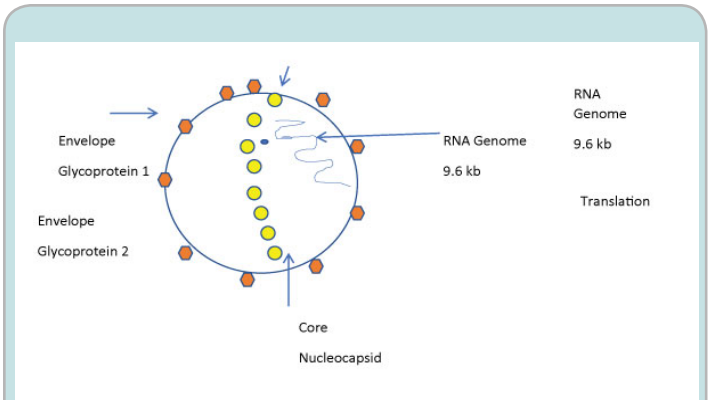

Figure 2: (Hepatitis-C Virus is single stranded RNA virus which have envelope proteins called glycoprotein 1 and 2 and core nucleocapsid.)

infected [10].

There are five most common types of viral infections:

1. Hepatitis A
2. Hepatitis B
3. Hepatitis C
4. Hepatitis D
5. Hepatitis E

4 out of 10 people of the world that infected with the hepatitis C virus and develop chronic stage of this disease only hepatitis C lead to chronic disease.

Cycle

Entry of HCV

The HCV has host-derived proteins E1 and E2 on its membrane which surrounds the nucleocapsid. Without host viruses are non-living particles these need the entry into the host. The hypervariable region of 27 amino acids called hypervariable region 1 controls the HCV entry avoiding the immune system.

E2 involved in the fusion but not supported evidence of its involvement. E1 may perform this function along with the attachment. Entry is controlled by clathrin-mediated endocytosis [7].

Replication

After entry cytoplasm is the receiving site for released viral genome. In the cytoplasm, the translation of viral proteins and replication of viral RNA occurs.

Assembly and release

As the replication process completed the maturation of viruses occurs the maturation or assembly is done in the ER-derived compartment and is then released following exocytosis pathway. And these viruses can now infect other hepatocytes.

Transmission

HCV Hepatitis C Virus mostly transfer when the blood of an infected person with the hepatitis C virus enters the body of another person who is not [11]. Most people infected with HCV by blood transfusion, sharing of needles, syringes, or any other equipment to inject drugs [12]. HCV also transfers through blood transfusions and organ transplantation. Sexual transmission of HCV from one partner to another is also possible from 5%-8% and the chance of vertical transition during pregnancy is 2%-8% and 6% worldwide infants born with HCV. HCV also spread when getting body modification like tattoos and piercings with contaminated and non- sterilized facilities, equipment, dyes, and informal setting [13].

Symptoms

Symptoms of HCV do not appear at the initial stage. Many people in the world which are infected with HCV do not have any symptoms therefore, they do not become able to identify that they are infected with HCV. But symptoms of

HCV are fever, feeling tired, weight loss poor appetite, loss of stomach balance, throwing up, dark and less urine, grey-colored stool, muscle or joint pain, yellow skin and eyes, blood vomiting, esophageal and gastric varices. If symptoms occur in an acute condition, then they appear 2 weeks to 6 months after entering the HCV [13]. If symptoms occur in chronic hepatitis C condition, then it takes decades to appear. In chronic condition its infection progress to liver cancer [12].

Effects

130-180 million (more than 3%) people of the world are affected by HCV. Hepatitis C virus is a major cause of liver disease worldwide, its acute infection cause chronicity in fibrosis, cirrhosis, and in the development of Hepatocellular Carcinoma (HCC) [14]. The mortality rate of HCV chronic disease is also very high more than 350,000 individuals die annually [15]. Highest reported rates of HCV infection are in developing countries like Asia, Africa, North America, and Thailand also due to polluted water and non-hygienic environment. Pakistan has the 2nd highest infection rate in the world, 4.5%-8%. The ratio of Hepatitis C is more in Pakistan than India. The ratio of HCV in Pakistan is 12% and in India is 2% [16].

Tests

There are many tests of hepatitis C that performed to detect, diagnose and monitor the treatment of HCV. The way to know about HCV infection is hepatitis C antibodies of bloodstreams. It is a blood test if its result is positive then RNA test done to find the stage of hepatitis C. So, in serology test hepatitis C identified by the presence of antibodies to the HCV by use of enzymes immunoassay. Early diagnosis and treatment of HCV infection minimize the risk of both long-term complications like fibrosis and cirrhosis development and transmission of infection in the community. There are the following tests:

ELISA, RNA polymerase chain reaction (PCR), liver biopsies, HCV antibodies blood tests, RNA viral load, HCV genotype serological and molecular markers of HCV infection are correctly diagnosed inactive and acute chronic infection. It is also indicated by real-time PCR. Biochemical and molecular markers are now available that can be used in screening and monitoring of HCV. Now mostly quantitative PCR and branched PCR use. But ultra-sensitive test uses to identify the viral initial stage. Through PCR only 1-2 weeks required to identify HCV. Liver biopsies are used to find the rate of liver damage. HCV first recognized in 1975 as a viral, hepatitis causing agents [2].

Types

Acute hepatitis

The initial stage of infection in which symptoms do not appear. More than 20% of people of initial stage infection are able to clear or get rid of this infection without any treatment due to the proper work of the immune system [2].

Chronic HCV

But most people of the world develop chronic or lifelong infection of HCV due to not proper treatment in the initial stage. Chronic hepatitis C causes serious liver problems including liver disease, loss of liver function, liver failure, and even liver cancer. More than 355 million people are chronically infected with HCV. About 80% of patients of HCV develop chronic condition [11].

Alcoholic hepatitis C

Hepatitis become strong interaction with alcohol and people with alcoholic HCV may have no symptoms, so difficult to the diagnosis of HCV in alcoholic people. Alcohol directly damages the liver.

HIV Co-Infection

A person infected with HIV is a high risk of HIV-HCV co-infection more than other people. About 2.2 million people in the world have HIV-HCV co-infection. It is observed that HCV is six times greater in individuals who also have HIV.

Treatments

There are two methods of treatment of HCV:

Vaccinations

There are no preventive or therapeutic vaccines present against HCV. Develop a vaccine of HCV is a big challenge. Some vaccine available which work on antibody response that affects out the only outer surface of viruses. But unfortunately, HCV is highly variable among strains, and rapidly mutating, so making an effective vaccine is very difficult.

Medication

Antiviral medication is given in the early stage of HCV like sofosbuvir, simeprevir, peginterferon, and ribavirin. They are pills that are taken daily at one time, these pills contain antiviral. Most patients need pills for 8-12 weeks and they get rid 95% [12].

Liver transplant

For chronic diseases of the liver like cirrhosis or liver cancer required half liver transplant of another healthy and family member [17].

Preventions

Use clean, uncontaminated and sterilized razors, needles. Blood should be testing before donating blood. from the exchange of intravenous drug injection and personal care items such as razors, toothbrushes. Eat low-fat food, drink water and juices. HCV is not spread through casual contact like hugging, kissing, sharing eating, cooking utensils, and food or water. There is no evidence of breastfeeding spread of HCV, but infected mother recommended avoiding breastfeeding during nipples injuring and bleeding and if her concentration of HCV is high [18,19].

Conclusion

A load of the Hepatitis C virus is more in the males rather than females and particularly in the males of rural areas. The main reason for the spreading of the Hepatitis C virus in rural areas people is that they lack understanding, sanitation and lack of health care facilities. It is more common in young people of the age range 20 to 45. If we want to reduce the spreading of Hepatitis C (HCV) in the people of all over the world then we should aware the people by giving information about it. The people should be aware of organizing health care programs, seminars on the public sector and social media. We can aware the people by giving the knowledge, what is Hepatitis C (HCV), what are the symptoms and causes. If these symptoms appear then they should consult the clinicians. If they have Hepatitis C (HCV) then, what should they do to prevent from an acute infection that leads to liver cancer? If they have not, then they should adopt preventive measures. We can also aware people by giving knowledge about the importance of liver in our body because it is an infectious disease of the liver. In this review paper, we discussed all the Hepatitis C (HCV) virus.

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