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ETIOLOGY AND PATHOGENESIS OF HEPATITIS B VIRUS

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Abstract: Hepatitis B is a dangerous infectious liver disease caused by the Hepatitis B virus (HBV), affecting approximately 254 million people worldwide. The disease is transmitted through blood, sexual contact, and mother-to-child transmission. Occurring in both acute and chronic forms, untreated Hepatitis B may lead to liver cirrhosis and liver cancer. Diagnostic methods mainly include testing for HBsAg, HBV DNA, and liver enzyme levels. Chronic Hepatitis B is controlled using antiviral medications such as Tenofovir and Entecavir. The most reliable preventive measure is the three-dose vaccine, which has an effectiveness rate of 95–98%. In Uzbekistan, the Hepatitis B vaccine is included in the national immunization schedule and is mandatory for newborns.

Keywords: Hepatitis B, Hepatitis B virus (HBV), liver cirrhosis, HBsAg, antiviral therapy, vaccination, chronic infection, liver cancer.

Hepatitis B is currently one of the most pressing infectious diseases facing humanity. It is caused by the Hepatitis B virus (HBV) and primarily damages liver tissue. According to the World Health Organization (WHO), more than 250–300 million people worldwide are living with chronic Hepatitis B infection. This represents approximately 3.3–3.5% of the global population, and more than 820,000 people die annually due to complications such as liver cirrhosis and liver cancer. These statistics clearly demonstrate the seriousness of the Hepatitis B problem on a global scale.

HBV is transmitted through blood, sexual contact, and vertical mother-to-child transmission. Since newborns do not yet have fully developed immunity against the virus, the probability of developing chronic infection after exposure reaches up to 90%. Therefore, prevention and early diagnosis are especially important. [1].

The danger of the disease lies in the fact that chronic Hepatitis B may progress for many years without any symptoms. As a result, patients may remain unaware of their condition until advanced liver cirrhosis or liver cancer develops. According to global statistics, more than 50% of liver cancer cases are associated with HBV infection. [2].

In Uzbekistan, Hepatitis B also remains an important medical and social issue. Approximately 3–5% of the population has signs of chronic Hepatitis B infection. Therefore, government programs aimed at combating the disease, expanding vaccination, and increasing public awareness are being implemented nationwide. This article presents scientific information regarding the etiology, pathogenesis, clinical manifestations, diagnosis, treatment methods, and prevention of Hepatitis B. This scientific article was prepared based on several international and

local scientific sources, medical guidelines, and statistical data. Information related to Uzbekistan was obtained from official reports of the Ministry of Health of the Republic of Uzbekistan and materials from specialized scientific-practical medical centers. Comparative and descriptive analysis methods were applied for the evaluation and summarization of statistical data [4].

Hepatitis B is caused by a DNA-containing virus belonging to the Hepadnaviridae family. The virus causes both acute and chronic forms of hepatitis. Chronic hepatitis develops in approximately 10% of adult patients infected with Hepatitis B. Vaccination against Hepatitis B is available. Sources of infection include patients with acute and chronic forms of the disease, as well as virus carriers.The virus is transmitted through both natural and artificial routes. Among natural routes, sexual transmission is the most common. Infection can also be transmitted from an infected mother to her child during childbirth or transplacentally during pregnancy [6].

Artificial transmission occurs through transfusion of contaminated blood or blood products and the use of non-sterile surgical or dental instruments, syringes, and other medical equipment. As little as 0.0001 ml of infected blood is sufficient to transmit the infection.

After entering the bloodstream, the virus reaches the liver, where it penetrates hepatocytes. Due to intracellular viral replication, viral proteins become incorporated into the hepatocyte membrane. These proteins are recognized by the immune system, triggering an immune response. Subsequent destruction of liver cells occurs under the influence of T-lymphocytes (killer cells). The incubation period may last from 50 to 180 days. Clinical manifestations of Hepatitis B are largely similar to those of Hepatitis A.

In many cases, the icteric (jaundice) form develops. Patients complain of digestive disorders, joint pain, and weakness. In some cases, itchy skin rashes may appear. Jaundice intensifies simultaneously with deterioration of the patient's general condition.Moderate and severe forms of the disease are most frequently observed. Compared to Hepatitis A, liver dysfunction in Hepatitis B is often more severe. Cholestatic syndrome, prolonged disease course, relapses, and liver coma are more common. Approximately 10% of patients with acute Hepatitis B develop chronic active or chronic persistent hepatitis, which may eventually lead to liver cirrhosis. Long-term immunity develops after recovery The obtained results indicate that Hepatitis B remains one of the unresolved urgent problems of global medicine. Especially in developing countries, insufficient diagnostic infrastructure, low public awareness about the disease, and difficulties in accessing healthcare services contribute to delayed diagnosis. This complicates treatment and increases therisk of complications.An important point is that currently available antiviral drugs cannot completely eliminate the disease but only keep it under control.

The persistence of the viral genome in the form of covalently closed circular DNA (cccDNA) within hepatocyte nuclei is the main limitation of current antiviral therapy. Because of this biological feature, the virus may reactivate after treatment discontinuation. Therefore, the scientific community is currently focused on developing next-generation drugs capable of eliminating or permanently suppressing cccDNA. RNA interference-based therapies, including Vir-2218 and JNJ-3989, are currently undergoing phase II and III clinical trials, and preliminary results are promising. Artificial transmission of infection occurs when transfusing contaminated blood or its components using unsterilized surgical or dental instruments, syringes, etc. For such an infection, 0.0001 ml of blood is enough. Getting into the bloodstream, the virus travels through the bloodstream to the liver, where it enters hepatocytes. Due to intracellular replication of the virus, viral proteins enter the hepatocyte membrane, which, when recognized by the cells by the immune system, cause the development of an immune response. |immune response. The subsequent death of liver cells occurs under the influence of T-lymphocytes (killer cells). The incubation period can last from 50 to 180 days. The clinical manifestations of hepatitis B are largely similar to hepatitis A. Often, an "icteric form" develops. Patients complain of digestive disorders, pain in the joints, weakness. In some cases, itchy rashes appear on the skin. Jaundice

increases in parallel with the deterioration of the patient's well-being. The most frequently recorded are “moderate” and “severe” forms of the disease. In hepatitis A, liver dysfunction is often more severe than in hepatitis B. cholestatic syndrome, exacerbation, prolonged course, as well as relapses of the disease and the development of hepatic coma often develop. In approximately 10% of patients, the acute form of hepatitis B turns into a “chronic active” or “chronic persistent form”, which over time leads to the development of liver cirrhosis. Long-term immunity develops after the disease. For preventive purposes, routine vaccination of the population is carried out. There are [[rapid] tests that allow you to detect hepatitis B in the laboratory or at home using test strips. A rapid immunochromatographic test that detects antibodies to hepatitis B is a reliable and safe tool that determines the presence or absence of the disease in 10-15 minutes. The material for the study is blood taken from a finger. If the disease is detected, 2 purple lines appear on the test indicator. A negative result is one line in the control zone. One line in the test zone or their complete absence indicates the need to repeat the analysis and conduct a new indicator. The possibility of complete cure of hepatitis B with the use of modern antiviral drugs is small. The results show that Hepatitis B remains one of the most pressing unsolved problems of global medicine. Especially in developing countries, the insufficient development of diagnostic infrastructure, low knowledge and awareness of the disease among the population, and the difficulty of seeking medical care contribute to the late detection of the disease. This, in turn, complicates the treatment process and increases the risk of complications. Importantly, currently available antiviral drugs cannot completely cure the disease, but only keep it under control. The main limitation of current antiviral drugs is the persistence of the viral genome in the nucleus of liver cells in the form of covalently closed circular DNA (cccDNA). It is precisely because of this biological feature that the virus can reactivate after treatment is stopped. Therefore, the scientific community is currently focusing on the development of a new generation of drugs that can destroy cccDNA or permanently inhibit it. In particular, drugs based on RNA interference, including Vir-2218 and JNJ-3989, are in the second and third phases of clinical trials, and the initial results are promising. Data on vaccination effectiveness show that significant progress has been made in the field of prevention. However, there are still large disparities in vaccination coverage globally. In a number of countries in Africa and Asia, vaccination coverage at birth remains below 50 percent. This indicates that stronger political will is needed to strengthen international cooperation, expand vaccine delivery and finance. In addition, simultaneous infection with hepatitis B and D viruses, i.e. coinfection, poses a particular risk, as liver damage in such patients progresses more quickly and treatment is more difficult. Another important issue that needs to be discussed in the context of Uzbekistan is stigma and social factors. In our society, patients with Hepatitis B often face social discrimination, which leads them to hide their illness and not seek medical help in a timely manner. To solve this problem, in addition to medical treatment, it is necessary to strengthen educational work among the public, disseminate accurate information through the media, and expand hepatitis B screening programs in primary health care facilities. All of the above analysis confirms that an integrated approach to the fight against Hepatitis B, i.e. the joint implementation of prevention, early diagnosis, effective treatment, and social support, is of crucial importance. As a result of metabolic processes, this important organ is damaged at the cellular level. During treatment, the patient will need to follow a diet to facilitate the functioning of the liver. Experts recommend that patients use a specially prepared diet program. First of all, a person should divide their daily food intake into 5-6 equal parts. During treatment, it is strictly forbidden to participate in mass celebrations, which are often accompanied by the consumption of harmful foods and alcoholic beverages. In the evening, the patient should eat light meals that do not have a strong effect on the digestive system. Patients with hepatitis B should exclude the following products from their daily diet: • Spicy foods and spices; • Smoked and pickled products; • Vegetables with a high content of essential oils; • Alcoholic and carbonated drinks; • Soft drinks

and ice cream; • Fatty meat and fish; • Poultry meat; • Foods high in cholesterol. Patients are recommended to include the following in their daily diet: • Cereals, especially oatmeal; • Dairy products; • Soy, olive and vegetable oils; • Chicken egg whites; • Low-fat varieties of meat and fish. It is necessary to steam the products, because with such processing the product retains a maximum of useful substances. The daily diet should contain 3500 kcal (100 grams of protein, 100 grams of fat, 450 grams of carbohydrates). In severe cases of hepatitis, patients may develop various complications: Inflammation of the brain. Many patients develop hepatic encephalopathy. Patients experience anxiety, hallucinations, and fear. Over time, the functions of the nervous system are disrupted, resulting in worsening of the condition, sleep disorders, etc. In the final stage of encephalopathy, the patient may fall into a coma. 1) Liver or respiratory failure; 2) Liver cirrhosis or hepatocellular cancer. Patients with hepatitis B should be treated in a timely manner to prevent the disease from progressing to an acute or chronic stage. The progression of the disease depends on the life expectancy of patients.Hepatitis B disease remains one of the most serious problems of global medicine due to its prevalence, severe complications and complexity of treatment. The conducted analyses have shown that although a drug that completely eliminates the disease has not yet been developed, the disease can be controlled and prevented through existing antiviral drugs and a vaccine with 95-98 percent effectiveness. Early diagnosis, continuous treatment and comprehensive vaccination programs have been scientifically proven to significantly reduce morbidity and mortality. In Uzbekistan, the implementation of systematic measures at the state level, raising public awareness and expanding screening programs will be an important step in the fight against Hepatitis B.

1. REFERENCES USED

2. . Inomov J.I., Nazarov Sh.E. "Issues of the spread and prevention of hepatitis B in Uzbekistan." Medical Journal, Tashkent, 2021. - pp. 45-52.
3. 2. Mirzayev A.Kh., Kholikov B.T. "Modern methods of treating chronic viral hepatitis." Medical Bulletin of Uzbekistan, 2020. - Issue 3, pp. 28-34.
4. Rashidova N.S. "Hepatitis B prevention and vaccination effectiveness in newborns." Pediatrics Journal, Tashkent, 2022. - pp. 67-73.O'zbekiston
5. Ministry of Health of the Republic of Uzbekistan. "State Program for Combating Viral Hepatitis 2017-2021." Tashkent, 2017.
6. Khasanov A.A., Toshmatov U.R. "The relationship between liver cirrhosis and hepatocellular carcinoma with hepatitis B." Medical Journal of Uzbekistan, 2019. - Issue 2, pp. 14-19.
7. World Health Organization. "Global Hepatitis Report 2023." Geneva: WHO Press, 2023. - 112 p.
8. European Association for the Study of the Liver (EASL). "Clinical Practice Guidelines on Hepatitis B Virus Infection." Journal of Hepatology, 2017. Vol. 67, No. 2. - P. 370-398.
9. Terrault N.A., Lok A.S.F., McMahon B.J. et al. "Update on Prevention, Diagnosis, and Treatment of Chronic Hepatitis B: AASLD 2018 Hepatitis B Guidance." Hepatology, 2018. Vol. 67, No. 4. - P. 1560-1599.
10. Lok A.S.F., Brook M.F. "Chronic Hepatitis B: Update 2009." Hepatology, 2009. Vol. 50, No. 3. - P. 661-662.
11. Revill P.A., Chisari F.V., Block J.M. et al. "A Global Scientific Strategy to Cure Hepatitis B." Lancet Gastroenterology & Hepatology, 2019. Vol. 4, No. 7. -P. 545-558