

The Dynamics of the Prevalence of Acute Viral Hepatitis and the Strategies against Viral Hepatitis in Mongolia

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ABSTRACT

Background: Hepatocellular carcinoma (HCC) is the most common cancer in Mongolia. The relative importance of hepatitis B virus (HBV) and hepatitis C virus (HCV) infections in HCC etiology is known to vary greatly from one part of the world to another. Principally, 95% of HCC patients have chronic viral hepatitis, including 53% hepatitis B virus, 38.9% HCV, and 5.6% have HBV/HCV coinfection. Hepatitis D virus (HDV) infection is widely spread in our country, anti-HDV has been found in more than 25% of carriers who have HBsAg.

Materials and methods: We analyzed data of patients who had been diagnosed with acute viral hepatitis in the Department of adult hepatitis, National Center for Communicable Diseases in Mongolia from 1952 to 2018.

Results: A total of 318,831 cases of acute viral hepatitis were registered in Mongolia between 1981 and 2019, which is 34.9 cases per 10,000 population. Of these, 265,931 cases of acute viral hepatitis A, or 28.6 per 10,000 populations, 48,855 cases of acute viral hepatitis B, or 5.5 cases per 10,000 populations, and 2,607 cases of acute viral hepatitis C, or 0.4 cases per 10,000 populations were recorded.

Conclusion: The prevalence of viral hepatitis in our country was the highest in 1981–1991, but since 2012, the prevalence of infection has steadily decreased. In Mongolia, since 1960, multifaceted programs and activities to combat viral hepatitis have been successfully implemented at the national level.

Keywords: Acute hepatitis, Hepatitis B virus, Hepatitis C virus, Hepatitis D virus 5, Mongolia, Viral hepatitis.

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INTRODUCTION

The World Health Organization has developed a global health strategy for viral hepatitis by 2022–2030 and set a goal to stop the spread of viral hepatitis infection at the level of public health by 2030. The strategy is defined as a 90% reduction in incidence and 65% in mortality.¹ Liver disease caused by hepatitis viruses is considered one of the pressing problems but also in the world.

Hepatocellular carcinoma (HCC) is the most common cancer in Mongolia.^{2,3} The relative importance of hepatitis B virus (HBV) and hepatitis C virus (HCV) infections in HCC etiology is known to vary greatly from one part of the world to another.⁴ Principally, 95% of HCC patients have chronic viral hepatitis, including 53% hepatitis B virus, 38.9% HCV, and 5.6% have HBV/HCV coinfection.⁵ Hepatitis D virus (HDV) infection is widely spread in our country, anti-HDV has been found in more than 25% of carriers who have HBsAg.⁶ Hepatitis D infection is highly endemic among individuals with chronic HBV infection in Mongolia. The National Enterovirus and Hepatitis Laboratory reported that in 2013, 45% of HBsAg-positive samples were also anti-HDV positive, while 30% were HDV IgM positive.⁴

The recognition of HBV as a serious disease burden and the availability of safe and effective HBV vaccines led WHO in 1991 to set 1997 as the target for integrating the HBV vaccine into national immunization programs worldwide.⁷ A 2010 study found that HBsAg prevalence among children under 5 years of age was 0.53% as a result of immunization, meeting the target set by WHO for the Pacific region. In both the Western Pacific Region (WPR) and African Region (AFR), all countries provide 3 doses of HBV vaccine; however, only 35 (95%) of 37 countries in the WPR and 13 (28%) of 47 countries in the AFR provide universal HepB-BD to all newborns. In addition, 2 countries in the WPR (Japan, New Zealand) and 1 country in the AFR

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(Mauritius) provide HepB-BD selectively to babies born to mothers who are HBsAg-positive.⁸ Also, in countries such as Taiwan and the United States, research on the correlation between non-hepatic symptoms during the infection is being actively conducted.^{9,10}

Also, with the gradual introduction of the hepatitis A vaccine in 2012, the incidence of hepatitis A was 1.0 cases per 10,000 populations, a 22-fold decrease from the pre-immunization period. Introduction into treatment practice and the start of viral load tests with modern methods and techniques became an important step in bringing care and services for viral hepatitis to the international level. In addition, the health insurance fund provides a discount on the price of the above drugs, early detection of primary liver cancer, financing the appropriate share of the cost of liver transplant treatment from the health insurance and the state budget, and increasing access to medical care and services by training doctors in foreign countries is still being implemented for long and short periods of time. In the future, we must stop the spread of viral hepatitis in order to improve the quality of life of Mongolian people and to intensify the early detection, diagnosis, treatment, and control care services of viral hepatitis among the population to achieve the global strategic goal put forward by the World Health Organization in 2030. In this manuscript, we aimed to study the prevalence of viral hepatitis in Mongolia and to conclude the national programs against viral hepatitis.

MATERIALS AND METHODS

We analyzed data from patients who had been diagnosed with acute viral hepatitis in the department of adult hepatitis, National Center for Communicable Diseases in Mongolia from 1952 to 2018. During these years, national programs that have been implemented against viral hepatitis infection in our country and their effectiveness were evaluated.

RESULTS

When considering the prevalence of viral hepatitis in our country from 1981 to 2019, the highest rate was 18.7 per 10,000 populations in 1983, and the incidence has been steadily decreasing since 2012. From 1952 to 1980, viral hepatitis A was dominant among all diagnosed viral hepatitis infections, while viral hepatitis B was first diagnosed in 1981, and viral hepatitis C was diagnosed in 1998. In the past 10 years, the incidence of acute viral hepatitis reached its peak in December 2010 and November 2011 (Fig. 1).

A total of 318,831 cases of acute viral hepatitis registered in Mongolia between 1981 and 2019, which is 34.9 cases per 10,000 populations. Of these, 265,931 cases of acute viral hepatitis A or 28.6 per 10,000 populations, 48,855 cases of acute viral hepatitis B or 5.5 cases per 10,000 populations, and 2,607 cases of acute viral hepatitis C or 0.4 cases per 10,000 populations were recorded. According to the statistical data of the disease, the total number of viral hepatitis cases was 2 in 1992–2001, 2.1 in 2002–2011, 2.2 in 2012–2019, acute viral hepatitis B was 3.9 in 1992–2001, 4.4 in 2002–2011, and 9 in 2012–2019 per 10,000 populations, the incidence of acute viral hepatitis A decrease by 1.8 times in 1992–2001, 1.8 times in 2002–2011, and 14 times in 2012–2019 (Fig. 2). Since 2012, the hepatitis A vaccine has been gradually introduced to children aged 1 year 2 months and 2 years of age, and the incidence of hepatitis A has decreased to 1.0 cases per 10,000 populations.

In Mongolia, HBsAg testing to detect HBV started in 1978, when assessing the epidemiological pattern of viral hepatitis

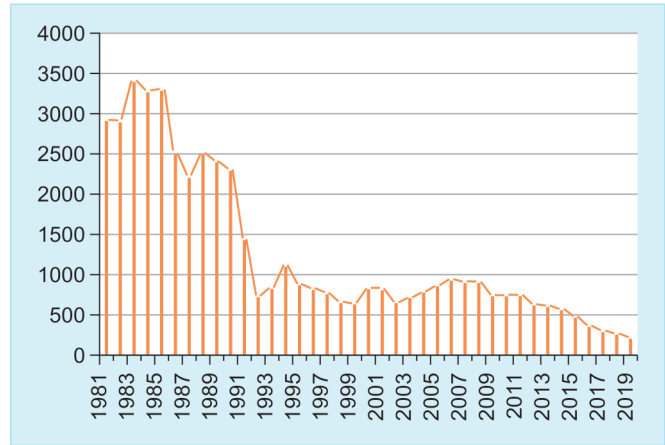


Fig. 1: Prevalence of viral hepatitis in Mongolia from 1981 to 2019

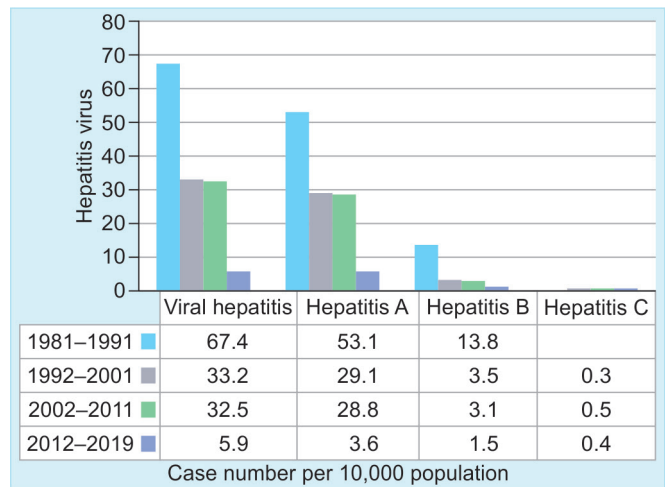


Fig. 2: Incidence of viral hepatitis registered in Mongolia between 1981 and 2019

in 1972–1979, 0–12 months and 1-year-old children were mainly affected and HBsAg was positive in 51.8–60% of them, 1981–1985 18.5% of 62,316 cases of acute hepatitis diagnosed with 33,390 people tested positive for HBsAg (Arslan R. PhD dissertation in Mongolian language, 1979). Anti-HDV was also tested at this time and 46.5% of 167 serology tests were positive. In Mongolia, acute HBV infection was officially registered in 1981. Acute HBV infection per 10,000 population reached its peak at 17–18.7 in 1981–1985 and 0.7 per 10,000 populations in 2019. In recent years, the incidence of HCV infection has increased significantly compared to other viral hepatitis infections. Our researchers have determined that HCV infection accounts for 35–45% of patients with hepatocellular carcinoma.

Immunization coverage against HBV is 95.8–99.5% during this period. In 1995, after the introduction of hepatitis B vaccination in Mongolia, the average incidence of hepatitis B decreased by half compared to the previous period. Acute HBV infection was diagnosed in 5.3% of children who received hepatitis B vaccine and 9.5% of children who were not vaccinated. In 2006, a study comparing the results of hepatitis B vaccine coverage among 2-year-old children in urban and rural Mongolia found that the coverage

of HBV immunization is good and the proportion of children with specific immunity is sufficient (Fig. 3).

The incidence of acute HBV infection among children under the age of 5 years was the highest in 1998–2001, when 57–103 children were sick, and since 2011, it has decreased by 14.2–25.7 times. One of the main routes of transmission is from an HIV-infected mother to her child at birth. By developing a health care policy document to stop mother-to-child transmission of HIV, HBV, and syphilis, with the goal of HBsAg prevalence among children being less than 0.1%, every pregnant mother should be tested for infection, and newborns born to infected mothers should be tested for HBV immunoglobulin. The prevalence of B, C, and D virus infections among the relatively healthy donor population of our country was determined. Among donors, the prevalence of HBV was 10%, the prevalence of C virus was 14%, and it was determined that 80% of people carrying hepatitis B were infected with D virus. A total of 35 (0.23%) HBV DNA positive cases were found among 14,948 HBV surface antigen (HBsAg) negative donors included in the study.

In Mongolia (1993–1998), the incidence of viral hepatitis infection after blood transfusion was recorded as 3.38–0.25%. The National Center for Blood Transfusion Research (NCTRC) introduced PCR technology in testing for post-transfusion infections in May

2012, and 100% of blood donors are tested for HBV, HIV/AIDS, and HCV. As a result, the incidence of blood-borne infections has decreased significantly (Fig. 4).

Comparing the age of patients with acute HBV infection by year, the incidence of children up to 10 years of age has decreased significantly, and the incidence is still high among young people aged 20–29, while the incidence is increasing among those over 30 years of age. Between 1998 and 2019, according to the age of patients with acute HBV infection, the incidence among children under the age of 1 and after 2010 among children aged 10–19 years has decreased (Fig. 5).

In the process of implementation of the “Healthy Liver National Program” in 2017–2020, aligned with the global strategy of the World Health Organization, the coordination of health policies and sectors was strengthened, the quality of care was improved, advanced technologies were introduced in a very short time, and reforms took place in the health care system of Mongolia. Briefly these are:

- New diagnostically technology has been introduced: The rapid diagnosis of viral serology for early detection of infection has entered primary medical practice, molecular biological analysis for viral nucleic acid counting has been carried out by 22

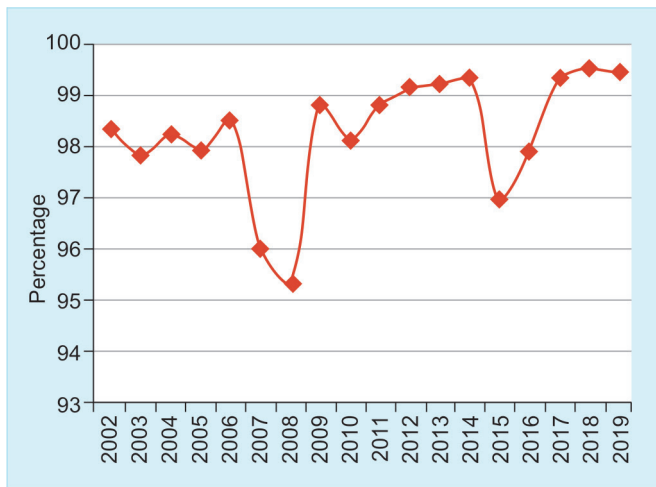


Fig. 3: Immunization status against hepatitis B virus

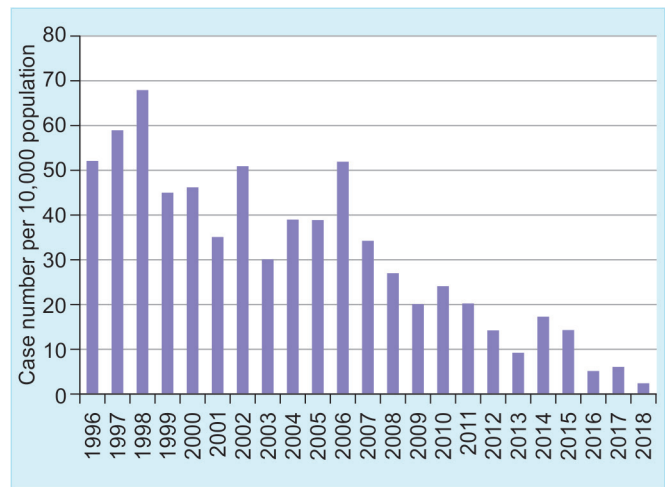


Fig. 4: Acute hepatitis B virus infection in children under five years of age

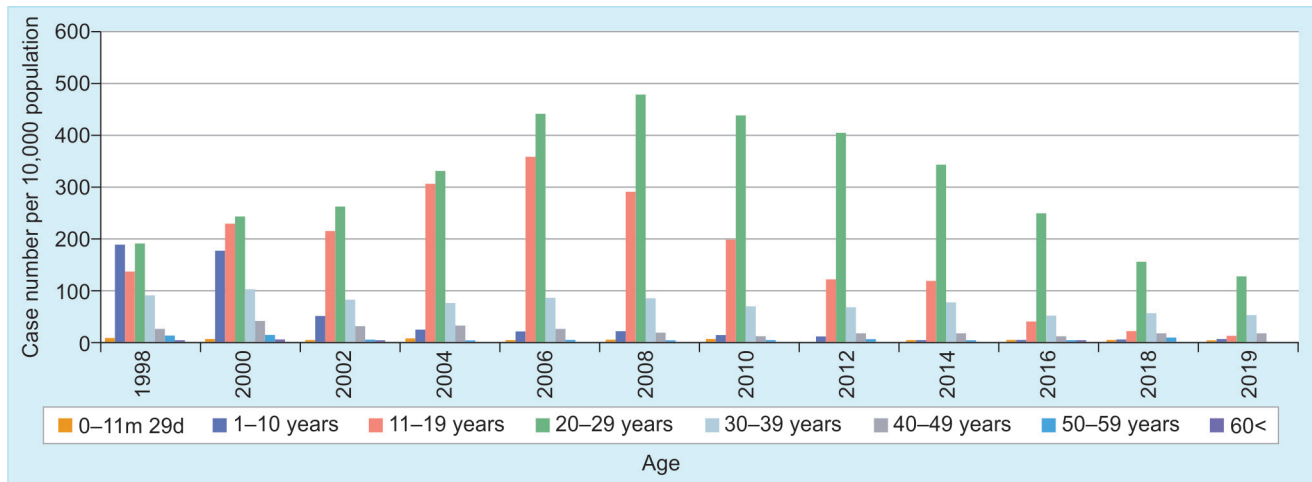


Fig. 5: A comparison of age status of patients with acute hepatitis B

laboratories by WHO standards, and a laboratory quality control and evaluation system has been established.

- New advanced treatment methods have been introduced: Antiviral drugs, new drugs (DAAs) have been registered in Mongolia's list of essential drugs, and the system of drug distribution, stockpiling, and price control has improved. Direct anti-HCV drugs are 95% effective against the virus and have the potential to kill the virus. Currently, there is no information yet on how long-term anti-HCV therapy affects kidney function.
- Anti-HBV drugs: Alpha interferon (1998), peg-interferon (2009), nucleoside analogues: Lamivudine (2006), entecavir (2009), telbivudine (2013), tenofovir disoproxil (2014), tenofovir alafenamide (2018); Drugs for direct treatment against HCV—sofosbuvir, ledipasvir/sofosbuvir (2015), daclatasvir (2016), anti-HDV bulevirtide (2021) were registered in the Mongolian drug registry.
- Primary doctors, nurses, laboratory assistants, and epidemiologists were trained in viral hepatitis diagnosis and treatment training across the country, and human resources were empowered.
- Clinical and laboratory standards are developed and implemented in care.
- Between the healthcare institutions, pharmacies, and healthcare insurance system have built an integrated healthcare network.
- Comprehensive healthcare services for early detection, diagnosis, treatment, and control of hepatitis virus infection can be obtained by Mongolians in their communities without financial difficulties and healthcare services are accessible, inclusive, and decentralized.
- Immunization programs, blood safety, hospital-acquired infection prevention, and the use of disposable syringes to prevent the spread of infection and modern standard technology of hospital infection prevention have been implemented to ensure the safety of the client.

As of 2020, a total of 1,152,220 people over the age of 15 were screened for hepatitis B and C within the framework of the "Healthy Liver National Program" and the HBsAg positive rate for HBV was 7.8%, and the anti-HCV positive rate for HCV was 9.3%. Based on the above indicators, it is estimated that about 170,000 of Mongolia's population over the age of 15 are chronically infected with HCV, and about 306,000 are anti-HCV positive. Comparing the results of the "Healthy Liver National Program" with the 2020 goal of the global strategy of the healthcare institutions, 53% of the population living with chronic HBV infection (GHSS 2020: 30% and 10%) and 35% of the population (GHSS 2020: 30 and 21%) living with chronic HCV has confirmed diagnosis. 22,466 people with HBV infection (GHSS 2020: 30 and 2%) and 29,729 people with HCV infection (GHSS 2020: 30 and 13%) received antiviral treatment.

DISCUSSION

In the last century, the prevalence of HBV and HCV infection and related diseases has increased in our country, causing significant health and economic damage to the population. As a result of multifaceted measures to combat and prevent infectious diseases, some infectious diseases have decreased significantly, and non-infectious diseases have become a priority, but viral hepatitis infection remains a pressing problem. More than 3,000 people die every day from liver disease caused by hepatitis. Early detection and treatment of hepatitis B, C, and D virus infections can save lives. It has been studied that 80% of the causes of HCC in the

world are HCV. Since 1982 in some countries of the world, and since 1991 in Mongolia, immunization against HBV has been started, the morbidity and mortality of acute HBV virus infection have decreased, and the proportion of HBsAg carriers among children under 5 years of age has reached 0.53% although the incidence and mortality of HBV infection is decreasing, the incidence remains high among young people aged 15–30 years.¹¹ According to the study of P Nyamdavaa, the level of HBsAg prevalence in Mongolia was $11.8 \pm 1.82\%$ or $11.8 \pm 1.82\%$ in areas with high prevalence according to a meta-analysis of eight studies before widespread immunization against hepatitis B virus.¹² In 2001, researcher N Khurelbaatar conducted a study of 167, 29.7–31.6% of people aged 19–53 and 6.4% of children aged 0–15 years were positive for HBsAg carriers, of which 7.7% were boys and 4.9% were girls. Increased exposure to HBV was also confirmed by immunization results in 2.6% of HBV-vaccinated children and 9.5% of non-vaccinated children.¹³

In 2010 survey demonstrated that 10.4% of healthy individuals, 9.8% of blood donors, 8.6% of pregnant women, 41.7% of people with chronic hepatitis, 30.1% of patients who have HCC with liver cirrhosis, 75% among children with hemophilia were HBsAg positive.¹⁴ However, in 2013, a study of some risk factors for HBV revealed that 12.7% of the dental population, 13.2% of people who received home injection service, 15% of people who received blood transfusion, 12.4% of people who had tattoos had HBV infection.¹⁵

Our country is one of the countries with a high incidence and mortality of liver cancer, and the death rate of liver cancer has continuously increased in the last ten years, and 15% of all deaths are due to liver disease. In 2013, a total of 200,000 people in Mongolia were infected with chronic HCV or the prevalence rate was estimated to be 6.8 percent. The level of viremia in the blood is estimated to be about 70%, and the prevalence of anti-HCV antibodies is 9.8% (285,700 cases). Today, prevalence estimates are based on studies conducted among the entire population, while low prevalence estimates are based on studies conducted among blood donors.^{16,17}

Researchers M Monkhnasan and D Davaalkham et al. conducted a study involving more than 1,000 health workers working at all levels of urban and rural health institutions and found that 68.2% had anti-HBc, 7.69% had HBsAg, and 21.9% had anti-HCV markers were found to be positive. Almost half (46.2%) of the medical professionals diagnosed with HCV infection had HCV RNA, which is an interesting indicator of high viral activity.¹⁸ When comparing the geographic area, city, province, and professions such as doctors, nurses, medical specialists, and service workers, the prevalence of infection is relatively high. Most of the healthcare workers pricked themselves with syringes and share instruments at their workplace, and on average 2–3 times in a year. Years of working in a healthcare facility is a risk factor, and researchers have found that the risk of infection increases by 10% for every 1 year of work.¹⁹

In Mongolia, the issues of combating hepatitis virus infection, prevention of infection, treatment in case of infection, and prevention of further complications are reflected in current national programs, strategies, and policies, many guidelines are developed, increasing access to drug supply, improving the quality of diagnosis, training, and research to improve the knowledge of medical specialists. It has a history of implementing multifaceted measures such as supporting activities, improving information, and training campaigns for the people.^{20,21}

Particularly:

- Targeted prevention program to combat viral hepatitis (1988–2000).

- National Program for Combating Infectious Diseases (2002–2010, 2011–2015).
- National Strategy for Viral Hepatitis Control and Prevention (2010–2015).
- National Liver Protection Subprogram (2014).
- Sub-program to prevent viral hepatitis and reduce liver disease and mortality (2015).
- National Program for Prevention and Control of Infectious Diseases (2017).
- Healthy Liver National Program (2017).
- Healthy Liver National Program implementation plan (2022–2026).

Also, many activities were implemented to prevent new transmission of HBV. In order to prevent mother-to-child transmission, guidelines for the prevention of the triple infection of HIV/AIDS, HBV, and syphilis have been issued, requiring every pregnant mother to be tested for the triple infection and, if necessary, to receive treatment, to inject HIV immunoglobulin to every infant born to a mother with HIV infection, and to provide hospital and cosmetic services. Measures such as the use of disposable syringes, improvement of the sterilization and disinfection of reusable instruments, improvement of the quality of blood donor infection detection tests, and immunization of medical staff have been implemented.

CONCLUSION

The prevalence of viral hepatitis in our country was the highest in 1981–1991, but since 2012, the prevalence of infection has steadily decreased. In Mongolia, since 1960, multifaceted programs and activities to combat viral hepatitis have been successfully implemented at the national level.

AUTHOR CONTRIBUTIONS

BB and BB: Conceptualization; TB: Methodology; GD: Software; BB and TB: Validation; GD: Formal analysis; BT: Investigation; GDs: Resources; BB: Data curation; TB: Writing-original draft preparation; TL: Writing-review and editing; ChT: Visualization; BB: Supervision; TL and BB: Project administration; All authors have read and agreed to the published version of the manuscript.

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