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VIRAL HEPATITIS IN KAZAKHSTAN: REGIONAL EPIDEMIOLOGICAL OVERVIEW

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Abstract

Introduction. Viral hepatitis remains a pressing public health concern worldwide. Like many other countries, Kazakhstan faces various epidemiological challenges associated with both acute and chronic forms of hepatitis A, B, and C.

Aim. To assess the epidemiological situation of viral hepatitis in Kazakhstan, trace the dynamics of incidence from 2000 to 2023, and identify the most vulnerable regions, with a specific focus on the city of Shymkent.

Materials and Methods. A retrospective study was conducted using official statistics from the Ministry of Health of the Republic of Kazakhstan for the years 2000, 2011, and 2023. Data for the city of Shymkent were analyzed for the period from 2018 to 2024. Descriptive and analytical methods were employed, including the calculation of incidence rates, mean values, confidence intervals, and growth rates.

Results. The overall incidence of viral hepatitis in Kazakhstan decreased from 185.6 per 100,000 population in 2000 to 10.23 in 2023. The most significant reductions were observed in the Turkestan, Mangystau, and Kyzylorda regions. However, a resurgence in incidence has been noted in recent years, particularly for hepatitis A and chronic forms of hepatitis B and C. A sharp increase in acute hepatitis A cases was recorded in Shymkent in 2024. Chronic hepatitis C predominates among all chronic forms.

Conclusion. Despite notable progress in combating viral hepatitis, the risk of renewed increases in incidence remains. Enhanced preventive measures are required, including adult vaccination, improved access to treatment, and public health education initiatives to ensure sustainable control of the situation.

Keywords: epidemiology, acute viral hepatitis, chronic viral hepatitis, Kazakhstan, Shymkent

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Резюме

ВИРУСНЫЕ ГЕПАТИТЫ В КАЗАХСТАНЕ: РЕГИОНАЛЬНЫЙ ЭПИДЕМИОЛОГИЧЕСКИЙ ОБЗОР

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Введение. Вирусные гепатиты продолжают оставаться актуальной проблемой общественного здравоохранения во всём мире. Казахстан, как и многие страны, сталкивается с различными эпидемиологическими вызовами, связанными с острыми и хроническими формами гепатитов А, В и С.

Цель исследования: Оценить эпидемиологическую ситуацию по вирусным гепатитам в Казахстане, проследить динамику заболеваемости за 2000–2023 гг., определить наиболее уязвимые регионы, с акцентом на город Шымкент.

Материалы и методы: Проведено ретроспективное исследование с использованием официальной статистики Министерства здравоохранения Республики Казахстан за 2000, 2011 и 2023 гг. Для города Шымкент проанализированы данные за 2018–2024 гг. Применялись описательные и аналитические методы, рассчитывались интенсивные показатели, средние значения, доверительные интервалы и темпы прироста.

Результаты. Общий уровень заболеваемости вирусными гепатитами в Казахстане снизился с 185,6 на 100 000 населения в 2000 г. до 10,23 в 2023 г. Наибольшее снижение отмечено в Туркестанской, Мангистауской и Кызылординской областях. Однако в последние годы наблюдается повторный рост заболеваемости, особенно

гепатитом А и хроническими формами гепатита В и С. В Шымкенте зафиксирован резкий рост острых случаев гепатита А в 2024 году. Хронический гепатит С преобладает среди всех хронических форм.

Выводы. Несмотря на достигнутые успехи в борьбе с вирусными гепатитами, сохраняются риски повторного роста заболеваемости. Необходимы усиленные меры профилактики, включая вакцинацию взрослого населения, повышение доступности лечения и информационно-просветительская работа для устойчивого контроля ситуации.

Ключевые слова: эпидемиология, острый вирусный гепатит, хронический вирусный гепатит, Казахстан, Шымкент.

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Түйіндеме

ҚАЗАҚСТАНДАҒЫ ВИРУСТЫ ГЕПАТИТТЕР: АЙМАҚТЫҚ ЭПИДЕМИОЛОГИЯЛЫҚ ШОЛУ

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Кіріспе. Вирусты гепатиттер әлем бойынша қоғамдық денсаулық сақтау саласындағы өзекті мәселелердің бірі болып қалуда. Қазақстан да, басқа көптеген елдер сияқты, А, В және С вирусты гепатиттерінің жедел және созылмалы түрлерімен байланысты түрлі эпидемиологиялық қиындықтарға тап болуда.

Мақсаты: Қазақстандағы вирусты гепатиттер бойынша эпидемиологиялық жағдайды бағалау, 2000–2023 жылдар аралығындағы сырқаттанушылық динамикасын талдау, ең осал аймақтарды анықтау және Шымкент қаласына ерекше назар аудару.

Құралдар мен әдістер: Зерттеу ретроспективті сипатта жүргізілді. 2000, 2011 және 2023 жылдардағы Қазақстан Республикасы Денсаулық сақтау министрлігінің ресми статистикалық деректері пайдаланылды. Шымкент қаласы бойынша 2018–2024 жылдарға арналған мәліметтер қарастырылды. Сипаттамалық және аналитикалық әдістер қолданылып, қарқындылық көрсеткіштері, орташа мәндер, сенімділік интервалдары және өсу қарқыны есептелді.

Нәтижелер. Қазақстанда вирусты гепатиттермен сырқаттанушылықтың жалпы деңгейі 2000 жылы 100 мың тұрғынға шаққанда 185,6-дан 2023 жылы 10,23-ке дейін төмендеді. Ең айқын төмендеу Түркістан, Маңғыстау және Қызылорда облыстарында байқалды. Алайда соңғы жылдары А гепатиті мен В және С гепатиттерінің созылмалы түрлерінің сырқаттанушылығы қайтадан өсіп келе жатқан үрдіс байқалуда. 2024 жылы Шымкент қаласында жедел А гепатитінің күрт өсуі тіркелді. Созылмалы түрлердің ішінде С гепатиті басымдыққа ие.

Қорытындылар. Вирусты гепатиттермен күресте қол жеткізілген табыстарға қарамастан, сырқаттанушылықтың қайта өсу қаупі сақталуда. Тұрақты эпидемиологиялық бақылау үшін ересек тұрғындарды вакцинациялауды кеңейту, емдеудің қолжетімділігін арттыру және ақпараттық-ағартушылық жұмыстарды күшейту қажет.

Түйінді сөздер: эпидемиология, жедел вирусты гепатит, созылмалы вирусты гепатит, Қазақстан, Шымкент.

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Introduction

Viral hepatitis remains a significant global health challenge, encompassing various forms such as hepatitis A, B, C, D, and E. These infections can lead to both acute and chronic liver diseases, with substantial morbidity and mortality worldwide [8,15].

As of 2022, the World Health Organization (WHO) estimated that approximately 254 million people were living with chronic hepatitis B virus (HBV) infection, and nearly 50 million with chronic hepatitis C virus (HCV) infection. These two viruses were responsible for around 1.3 million deaths

annually, primarily due to liver disease and cancer. Notably, 83% of these deaths were attributed to HBV and 17% to HCV. Despite preventive measures, there were 1.2 million new HBV infections and nearly 1 million new HCV infections in 2022 [21].

Around 1.5 million cases of hepatitis A virus (HAV) infection are reported each year worldwide but, after accounting for the large number of asymptomatic infections in young children and high rates of underreporting, the actual number of infections is likely to be about 100-120 million annually [22].

Alarmingly, projections indicate that by 2040, deaths from viral hepatitis may surpass those from HIV, tuberculosis, and malaria combined, underscoring the urgent need for enhanced global response strategies [23].

The most common types of hepatitis can be prevented or treated. Hepatitis A and hepatitis B can be prevented by vaccination. Effective treatments for hepatitis C are available but costly [19].

Addressing the burden of viral hepatitis requires a multifaceted approach. Universal hepatitis B vaccination programs are crucial. Kazakhstan implemented such a program in 1998 [6].

Vaccination against hepatitis A was included in the list of mandatory preventive immunizations in Kazakhstan by Resolution No. 2295 of the Government of the Republic of Kazakhstan dated December 30, 2009 [2].

Kazakhstan is divided into 20 geographicaladministrative areas (17 regions and 3 cities of republican significance Astana, Almaty, Shymkent). Since 2018, Shymkent has received the status of a city of republican significance. Previously, Shymkent was the administrative center of the former South Kazakhstan (now Turkestan) region.

The incidence of all types of viral hepatitis per 100,000 populations in whole over the country for 2000-2011 showed a significant decrease from 185.6 to 16.2. Regionally the lowest incidence rates of viral hepatitis in Kazakhstan were found in Pavlodar (19.1) and West Kazakhstan (22.0) regions. The highest rates were found in the South Kazakhstan (179.7) and Kyzylorda (185.1) regions [10]. During the 2014-2019 period, prevalence, incidence and mortality from chronic HBV and HCV infections increased [6].

In recent years, Kazakhstan also has experienced a notable increase in viral hepatitis. In 2023, the incidence rate of viral hepatitis exceeded 10.2 cases per 100,000 population, a significant rise from 2.5 cases per 100,000 in 2022. This surge was particularly evident with hepatitis A cases, which increased by 6.8 times, while chronic hepatitis B and C cases rose by 4.1% [1].

In summary, while global efforts have made strides in combating viral hepatitis, significant challenges remain, particularly in Kazakhstan.

The aim of our study is to assess the epidemiological situation and dynamics of viral hepatitis incidence in Kazakhstan, identify the most vulnerable regions, with an emphasis on Shymkent city.

Material and methods.

The study is retrospective. The indicators in Kazakhstan were calculated over a 24-year period, specifically for the years 2000, 2011, and 2023, which made it possible to track the dynamics of hepatitis disease rates. Additionally, data from the Shymkent region were analyzed for a 7-year period, spanning from 2018 to 2024, to provide a more localized assessment of hepatitis incidence within this specific geographic area.

The material for the study was taken from the branch of the Scientific and Practical Center for Sanitary and Epidemiological Expertise and Monitoring of the "National Center for Public Health" of the Ministry of Health of the Republic of Kazakhstan. Data of the population of Kazakhstan and the incidence of viral hepatitis were used [1].

The materials were collected and analyzed according to administrative-territorial division (17 regions and 3 cities of republican significance).

Descriptive and analytical methodologies were employed in the analysis. A range of statistical indicators were computed, including extensive, crude, and intensive measures, as well as mean values (M, P), the standard error of the mean (m), and 95% confidence intervals (95% CI). Crude incidence rates were calculated as the ratio of newly identified primary disease cases to the size of the respective population, standardized per 100,000 individuals. To evaluate the average annual rate of change in trends, the geometric mean was utilized to determine the growth or decline rate (Tg/d, %) [3].

The study was conducted in accordance with all necessary ethical standards and did not involve contact with individuals.

Results.

In 2000, the incidence rate of viral hepatitis in Kazakhstan was 185.6 per 100,000 population, decreasing to 16.2 in 2011 and further to 10.23 in 2023.

The regional characteristics of hepatitis distribution are presented in Table 1. The average incidence rate was 61.1 per 100,000 population.

The regions were classified into three clusters based on incidence levels (per 100,000 population):

Regions with low incidence rates included: Shymkent (12.5), Zhetysu (17.3), Akmola (21.7), Ulytau (22.1), Kostanay (27.5), West Kazakhstan (29.4), and Abai (32.7) regions.

Regions with moderate incidence rates included: East Kazakhstan (36.6), North Kazakhstan (36.8), Karaganda (37.9), Aktobe (48.6), Almaty Region (61.4), Zhambyl (73.4), Atyrau (89.7), as well as the cities of Astana (63.5) and Almaty (64.4).

Regions with high incidence rates included: Mangystau (147.3), Turkestan (formerly South Kazakhstan until 2018) (151.2), and Kyzylorda (219.6).

The reduction coefficient for the hepatitis burden is illustrated in Figure 1. Regional analysis identified areas with the most significant decline: Turkestan showed a 134-fold reduction, Mangystau — 74-fold, Atyrau — 60-fold, Zhambyl — 54.5-fold, and Kyzylorda — 50-fold. These regions had extremely high incidence rates in the 2000s, but substantial growth was observed by 2023.

Regions with increasing or re-emerging incidence rates included East Kazakhstan, where rates rose from 9.4 (2011) to 23.33 (2023), and Astana, which experienced an increase from 17.6 to 27.22 per 100,000 population.

Abai, Zhetysu, Ulytau, and Shymkent are newly established administrative regions following recent territorial reforms. Due to the lack of historical data, trends cannot be assessed; however, current incidence rates in these regions range from 12 to 32 per 100,000 population.

In 2023, the highest incidence rates were recorded in Abai (32.68), Astana (27.22), and East Kazakhstan (23.33). The lowest incidence rates per 100,000 were observed in Akmola (1.27), West Kazakhstan (2.61), and Kostanay (2.29) regions.

Table 1.

Nº	Region/year	2000	2011	2023	mean
1	Abay	-	-	32.7	32.7
2	Akmola	55.9	8.1	1.3	21.7
3	Aktobe	135.0	7.2	3.6	48.6
4	Almaty	142.8	25.3	15.9	61.4
5	Atyrau	257.5	7.4	4.3	89.7
6	East Kazakhstan	77.0	9.4	23.3	36.6
7	Zhambyl	201.1	15.3	3.7	73.4
8	Jetisy	-	-	17.3	17.3
9	West Kazakhstan	80.7	4.8	2.6	29.4
10	Karaganda	92.5	13.3	8.0	37.9
11	Kyzylorda	604.2	42.4	12.1	219.6
12	Kostanayskaya	72.7	7.6	2.3	27.5
13	Mangystau	429.1	6.9	5.8	147.3
14	Pavlodar	76.7	4.0	4.5	28.4
15	North Kazakhstan	102.4	4.8	3.2	36.8
16	Turkestan*	420.8	29.5	3.1	151.2
17	Ulytau	-	-	22.1	22.1
18	Almaty	169.6	13.9	9.8	64.4
19	Astana	145.7	17.6	27.2	63.5
20	Shymkent	-	-	12.6	12.6
	Kazakhstan	185.6	16.2	10.2	61.1

The regional distribution of the viral hepatitis per 100,000 population



Figure 1. The reduction coefficient (ratio) of hepatitis from 2000 to 2023 in Kazakhstan.

An analysis of the incidence of viral hepatitis in the city of Shymkent over the period 2018 to 2024 revealed the following findings. The total number of viral hepatitis cases during the study period was 3,725, of which 14% were acute and 86% chronic.

Among acute hepatitis cases, the highest incidence was recorded in 2024, with 226 cases (18.49 per

100,000 population), and the lowest in 2021, with 7 cases (0.65 per 100,000) (see Table 2). The average incidence during the study period was 74.4 cases per year in absolute terms, and 6.44 per 100,000 population. A sharp increase in incidence was observed from 2021 to 2024, with the absolute number of cases rising more than 30-fold.

Table 2.

Incidence rates of viral hepatitis in Shymkent city per 100,000 population for the period 2018-2024.

Infection/year Mean		m	95% CI		T(g/d)
Acute viral hepatitis total	6.44	2.74	1.07	11.80	20.21
including hepatitis A	5.88	2.78	0.44	11.32	22.18
including hepatitis B	0.44	0.10	0.24	0.64	-8.39
including hepatitis D	0.01	0.01	-0.01	0.04	-
including hepatitis C	0.11	0.07	-0.04	0.25	-
including hepatitis E	0.00	0.00	0.00	0.00	-
Chronic viral hepatitis, newly diagnosed, total:	41.47	4.09	33.46	49.49	-3.69
including chronic viral hepatitis B with delta	0.46	0.11	0.23	0.68	8.76
Chronic viral hepatitis B without delta	16.76	2.40	12.06	21.45	-6.54
Chronic viral hepatitis C	24.26	1.89	20.56	27.96	-1.52

Hepatitis A was the most prevalent among acute cases, accounting for 91.9%. The highest number of hepatitis A cases was observed in 2024, with 221 cases (18.08 per 100,000 population).

The average annual number of newly diagnosed chronic viral hepatitis cases during 2018-2024 was 458, corresponding to 41.47 per 100,000 population. The maximum was recorded in 2018 with 562 cases (55.56 per 100,000), and the minimum in 2020 with 302 cases (29.09 per 100,000). A moderate decline was observed until 2021, followed by a renewed increase.

Hepatitis B with delta agent accounted for 1.1% of chronic cases, chronic hepatitis B (without delta agent)

constituted 40.2%, and chronic hepatitis C made up 58.7% of all chronic viral hepatitis cases.

The average annual number of chronic hepatitis B cases (without delta agent) was 184 (16.76 per 100,000 population), with fluctuations ranging from 101 cases in 2021 to 267 in 2018.

Chronic hepatitis C had the highest incidence among chronic forms, ranging from 180 to 323 cases per year. The average was 269 cases annually (24.26 per 100,000 population).

The prevalence of different types of viral hepatitis is illustrated in Figure 2.



Figure 2. Incidence of Acute and Chronic Viral Hepatitis per 100,000 Population in the City of Shymkent, 2018-2024

Discussion

The results of our study reveal significant progress in controlling viral hepatitis in Kazakhstan over the past two decades, especially in the early 2000s following the implementation of key public health measures such as the introduction of hepatitis B vaccination in 1998 and mandatory hepatitis A vaccination in 2009. These interventions appear to have contributed substantially to the national reduction in incidence from 185.6 per 100,000 population in 2000 to 10.23 in 2023 – highlighting the effectiveness of vaccination programs, a trend supported by global evidence [16,18,24].

However, the recent resurgence of viral hepatitis, particularly hepatitis A and chronic forms of hepatitis B and C, signals new challenges. In 2023, Kazakhstan experienced a more than fourfold increase in the national incidence rate compared to 2022, with hepatitis A cases rising by nearly 7 times. Similar resurgences in hepatitis A have been reported in other countries due to declining herd immunity, migration, and localized outbreaks [4,11,12]. This highlights the need to reassess adult vaccination coverage and sanitation measures, especially in urbanizing regions like Shymkent.

The regional disparities in hepatitis burden within Kazakhstan reflect broader global trends. Geographic and socioeconomic factors contribute to differential exposure, healthcare access, and reporting quality. For instance, higher incidence in Turkestan, Kyzylorda, and Mangystau regions (400-600 per 100,000 population) may be attributed to historical underinvestment in public health infrastructure and higher baseline prevalence. Comparable patterns have been documented in low- and middle-income countries, where hepatitis B and C remain highly endemic in specific regions despite national control efforts [15].

The increase in chronic hepatitis B and C cases observed since 2014 in Kazakhstan aligns with global trends showing a growing burden of chronic viral hepatitis. According to the WHO, an estimated 296 million people globally were living with chronic HBV and 58 million with HCV in 2022, with most unaware of their infection [25]. The majority of these cases progress silently, often being diagnosed only when advanced liver disease develops. This underlines the importance of robust screening and early diagnosis programs, which remain suboptimal in many regions, including parts of Kazakhstan.

In Shymkent, although the overall average incidence of viral hepatitis was among the lowest in the country, the local data from 2018–2024 point to a significant upward trend, especially in acute hepatitis A cases. The sharp increase from 0.65 to 18.49 per 100,000 population between 2021 and 2024 likely indicates a localized outbreak. Similar outbreaks in Europe and North America have often been linked to lapses in sanitation, water safety, and vaccination gaps [9].

Currently, 34 countries have included vaccination against HAV in their routine childhood immunization programs [26], but still HAV and HEV are endemic in many low-income countries [11,17]. In recent years, there has been an increase in the incidence of hepatitis A in various countries. For example, in Brazil, a study conducted in the city of Porto Alegre showed an HAV antibody prevalence rate of 26% among children of low socioeconomic status

aged 5–9 years [13], while in a separate survey in rural Amazonia, prevalence was 46% among 5–10 year-olds [5].

This demonstrates the continued relevance of basic public health infrastructure even in lower-incidence settings.

Chronic hepatitis C was the most prevalent form among chronic infections in Shymkent, accounting for nearly 59% of cases. This aligns with global patterns where hepatitis C, due to its often asymptomatic course, remains underdiagnosed and undertreated, especially in resourceconstrained settings [7]. Although direct-acting antivirals (DAAs) offer curative treatment, their high cost and limited access remain barriers in many parts of the world, including Central Asia [14]. Chronic hepatitis C is the most prevalent and persistent form among chronic hepatitis infections, a finding that is also supported by previous studies [12].

Expanding affordable treatment options and integrating hepatitis services into primary care is critical.

Lastly, the low proportion of hepatitis B with delta agent (1.1%) observed in Shymkent is consistent with global estimates, where HDV coinfection affects approximately 5% of HBV-infected individuals [20]. However, due to its aggressive course, even low-prevalence delta hepatitis warrants surveillance and timely management.

In summary, while Kazakhstan has made considerable strides in reducing the burden of viral hepatitis, recent increases in incidence, particularly in hepatitis A and chronic forms of B and C, highlight the need for renewed attention. National strategies should include enhanced adult immunization programs, expanded diagnostic and treatment access, and targeted regional interventions. Continued investment in surveillance, public awareness, and health system strengthening is essential to align with the WHO goal of eliminating viral hepatitis as a public health threat by 2030 [25].

To further reduce the burden of viral hepatitis in Kazakhstan, it is necessary to: expand vaccination coverage, including among the adult population; strengthen epidemiological surveillance and early detection systems; ensure access to modern diagnostic and treatment methods, particularly for chronic forms; conduct targeted public awareness and education campaigns.

A comprehensive implementation of these measures will not only help stabilize the epidemiological situation but also bring Kazakhstan closer to the global WHO goal of eliminating viral hepatitis as a public health threat by 2030.

Conclusion.

Thus, over the past two decades, Kazakhstan has witnessed a significant decline in the overall incidence of viral hepatitis, indicating the effectiveness of national immunization programs and sanitary-epidemiological measures. However, the data also highlight emerging epidemiological risks in recent years - particularly the rising incidence of hepatitis A, as well as chronic forms of hepatitis B and C.

Marked regional disparities in incidence levels underscore the need for a differentiated approach to the prevention and control of viral hepatitis across the country. Particular attention should be directed toward regions with a high current disease burden, such as Kyzylorda, Turkestan, and Mangystau, as well as newly established administrative entities, including the city of Shymkent, where a sharp increase in acute cases has been observed over the past three years. **Publication information:** This article has not been previously published and has not been considered by any other publication.

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