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MONITORING OF THE INCIDENCE OF VIRAL HEPATITIS A AMONG THE POPULATION OF RIVNE AND LVIV REGIONS OF UKRAINE IN 2014–2023

Abstract. *The article is devoted to the study of the problem of the spread of viral hepatitis A (HA). The incidence of hepatitis A in the Rivne and Lviv regions of Ukraine for 2014–2023 was analyzed.*

Topicality. *The article highlights the incidence of HA before the full-scale invasion of Ukraine by the Russian Federation and during the period of full-scale military aggression.*

The aim of the study *is to analyze the incidence and study the peculiarities of the spread of viral HA among the population of Rivne and Lviv regions of Ukraine during 2014–2023.*

Materials and methods*. A retrospective epidemiological analysis of the incidence of HA in the population of Rivne and Lviv regions of Ukraine for 2014– 2023 was conducted according to statistical reporting (form No. 40-health. "Report on the work of the sanitary and epidemiological station", № 1 and No. 2 "Report on certain infections and parasitic diseases" (monthly, annual).*

Results of the study*. It has been established that during the period of the full-scale invasion of Ukraine by the Russian Federation in 2022–2023, a 1.4-fold increase in the incidence of HA Lviv region and an increase in the risk of morbidity in Rivne region. Among the population of both regions the period 2017–2023, the most vulnerable to HA was the age group of persons of working age 25–49 years: in Rivne region, the percentage of such patients was 40.48% (85 people) of the total number of cases, in Lviv region – 46.21% (140 people), children under 14 years of age in the structure of HA incidence were 20.0% and 20.46%, respectively (42 and 62 people).*

Conclusions. *It has been established that during the period of full-scale Russian military aggression on the territory of Ukraine in 2022–2023, there was a 1.4-fold increase in the incidence of HA the Lviv region and an increase in the risk of HA in the Rivne region, which requires strengthening of epidemiological surveillance of this infection and requires mobilization of all actions of health care workers and communities in the prevention of HA, as well as increased efforts of politicians to speed up the political solution to end Russian military aggression in Ukraine.*

Key words: *viral hepatitis A, morbidity, prevention of hepatitis.*

Хоронжевська І.С., Юхимчук Ю.М. Моніторинг захворюваності вірусним гепатитом А серед населення Рівненської та Львівської областей України за 2014–2023 роки

Анотація. *Стаття присвячена вивченню проблеми поширення вірусного гепатиту А (ГА). Проаналізовано показники захворюваності гепатитом А в Рівненській та Львівській областях України за 2014–2023 роки.*

Актуальність. *У статті висвітлено стан захворюваності ГА до повномасштабного вторгнення РФ на територію України і в період повномасштабної військової агресії.*

Мета роботи *– проаналізувати захворюваність та вивчити особливості поширення вірусного ГА серед населення Рівненської та Львівської областей України протягом 2014–2023 років.*

Матеріали та методи. Проведений ретроспективний епідеміологічний аналіз захворюваності ГА населення Рівненської та Львівської областей України за 2014–2023 роки за даними статистичної звітності (форма № 40-здор. «Звіт про роботу санітарно-епідеміологічної станції», № 1 та №2 «Звіт про окремі інфекції та паразитарні захворювання» (місячна, річна).

Результати дослідження. *Встановлено, що в період повномасштабного вторгнення РФ на територію України в 2022–2023 роках відмічалось зростання захворюваності ГА у Львівській області в 1,4 рази та підвищення ризику захворюваності у Рівненській області. Серед населення обох областей за період 2017–2023 роки найбільш уразливою щодо ГА була вікова група осіб працездатного віку 25–49 років: у Рівненській області відсоток таких хворих складав 40,48% (85 осіб) від загальної кількості захворілих, у Львівській області – 46,21% (140 осіб), діти до 14 років в структурі захворюваності ГА складали 20,0% та 20,46% відповідно (42 та 62 осіб).*

Висновки. *Встановлено, що в період повномасштабної російської військової агресії на територію України в 2022–2023 роках відмічалось зростання захворюваності ГА у Львівській області в 1,4 рази та підвищення ризику захворюваності ГА у Рівненській області, що потребує посилення епідеміологічного нагляду за цією інфекцією і вимагає мобілізації всіх дій медичних працівників і громад в профілактиці ГА, а також нарощування зусиль політиків для скорішого політичного вирішення припинення російської військової агресії в Україні.*

Ключові слова: *вірусний гепатит А, захворюваність, профілактика гепатиту А.*

Introduction. Hepatitis A (HA) is an acute infectious disease with liver damage caused by the Hepatitis A virus (HAV). The disease is closely associated with the consumption of poor-quality drinking water or food, unsatisfactory sanitary conditions of living and staying, and poor personal hygiene. The disease can occur among adolescents and adults from high-risk groups, such as people who inject drugs, men who have sex with men, and people who visit areas with high endemicity without prior immunization. A report on the World Health Organization (WHO) website dated February 12, 2025 states that HA is spread mainly when an uninfected and unvaccinated person consumes food or water contaminated with the feces of an infected person. Unlike hepatitis B and C, HA does not cause chronic liver disease, but it can cause mild to severe symptoms and rarely fulminant hepatitis (acute liver failure), which can be fatal. According to WHO estimates, in 2016, 7 134 people died of hepatitis A worldwide, accounting for 0.5% of deaths due to viral hepatitis [1; 2; 3].

HA remains an urgent medical and social public health problem in Ukraine. The risk of the spread of HA is increasing due to the full-scale Russian aggression against our country on February 24, 2022. Today in Ukraine, due to the full-scale Russian aggression, hospitals are destroyed, water supply and sewerage networks are damaged, polluting the environment, in many regions there is no clean drinking water and electricity, a large number of internally displaced persons living in difficult sanitary and living conditions [4; 5].

The purpose of the study is to study and analyze the incidence of HA in the population of Rivne and Lviv regions of Ukraine in 2014–2023.

To achieve this goal, the following tasks need to be accomplished:

– to analyze the incidence of HA in the population of Rivne and Lviv regions of Ukraine,

– to assess the age structure, morbidity dynamics and completeness of laboratory examination of patients and contact persons with HA;

– To analyze the rates of vaccination against HA in Rivne and Lviv regions for 2014–2023.

The object of the study is the infectious morbidity of HA among the population of Rivne and Lviv regions of Ukraine.

The subject of the study is the structure and indicators of infectious morbidity of HA, the status of vaccination against HA among the population of Rivne and Lviv regions of Ukraine in 2014–2023.

Materials and methods. The study used analytical techniques of the epidemiological method, descriptive, statistical and graphical methods. A retrospective epidemiological analysis of the incidence of HA in the population of Rivne and Lviv regions of Ukraine for 2014–2023 was carried out according to statistical reporting (form No. 40-health. "Report on the work of the sanitary and epidemiological station", №1 and №2 "Report on certain infections and parasitic diseases" (monthly, annual) of the Rivne Regional Center for Disease Control and Prevention of the Ministry of Health of Ukraine (Rivne Regional Center for Disease Control and Prevention of the Ministry of Health of Ukraine) and the Lviv Regional Center for Disease Control and Prevention of the Ministry of Health of Ukraine (Lviv Regional Center Disease Control and Prevention of the Ministry of Health of Ukraine) [6–8].

Results of the study. Viral hepatitis (VH) is a group of infectious diseases whose clinical picture is mainly caused by liver damage. Hepatitis is caused by hepatotropic viruses, among which the most studied to date are hepatitis A, B, C, D, E. Hepatitis A and E viruses cause hepatitis, which belong to the group of intestinal infections and have a fecal-oral mechanism of transmission. Hepatitis B, C, D viruses cause the development of parenteral hepatitis and have a hemocontact mechanism of transmission; these hepatitis lead to 96% of all deaths associated with hepatitis [9–11].

HA is common worldwide, but in many developed countries, thanks to the use of a highly effective vaccine, the incidence has been significantly reduced. Patients with any form of acute infectious process are the source of HA infection. The main mechanism of transmission of the HA virus, fecal-oral, occurs through water, food, unwashed hands and household items contaminated with HA. Anyone who has not been vaccinated or previously infected can become infected with HA. Risk factors include: unsanitary conditions, lack of clean and safe water, living with an infected person, visiting areas with a high incidence rate without prior immunization. The most effective means of combating HA are improving sanitary and hygienic environmental conditions, living conditions, food and water safety, personal hygiene, and vaccination against HA [12].

The hepatitis A virus (HAV) was discovered in 1973 by American scientists Feinstone S. M., Kapikian A. Z., Purcell R. H. during the study of human biomaterial using immunoelectron microscopy [13]. HAV contains a positive sense RNA chain and is classified as a member of the genus Hepatovirus, family Picornaviridae. HAV is relatively resistant to high temperatures, acids, fat solvents, disinfectants, and tolerates low temperatures. All of this contributes to the long-term preservation of the HAV in the environment: it can survive for months in fresh and

salt water; at room temperature, HAV survives for several weeks; at 60 °C, it partially loses infectivity in 4–12 hours, and completely in a few minutes at 85 °C. HAV is highly resistant to chlorine, which makes it able to penetrate tap water through the barriers of water treatment plants.

In most cases, the disease is asymptomatic, especially in children and young adults. Acute liver failure is rare among people with concomitant chronic diseases [14].

The severity of the disease and mortality are higher in older age groups. Infected children under the age of 6 usually do not experience any noticeable symptoms, and only 10% of such patients develop jaundice.

Cases of HA do not clinically differ from other types of acute viral hepatitis. The diagnosis is made by detecting specific antibodies to HA (anti-HAV IgM) in the blood. Additional tests include reverse transcription polymerase chain reaction (RT-PCR) to detect the HAV RNA.

The most effective methods of combating HA are improving sanitary and hygienic living conditions, food safety, clean and safe water, and vaccination against HA.

HA remains an urgent public health problem in Ukraine. The epidemic situation with HA is now being exacerbated by Russia's full-scale invasion of Ukraine, which began on February 24, 2022. Destroyed hospitals, thousands of unburied bodies, damaged water and sewerage networks that pollute the environment, lack of clean drinking water and electricity, and a large number of internally displaced persons living in difficult living conditions increase the risk of spread of HA.

In the period before the full-scale Russian military aggression on the territory of Ukraine, there was a gradual decrease in the incidence of HA from 9.73 cases per 100 thousand people in 2014 to 0.95 in 2021 (10.2 times). In 2023, during the second year of the war, the incidence of HA in Ukraine increased by 3.76 times compared to 2022 and amounted to 2.56 (Fig. 1). The increase in the incidence of HA occurred due to the Transcarpathian region, where the intensity rate increased to 25.45, Vinnytsia (24.63), Ivano-Frankivsk (4.0), Volyn (2.85) regions and the city of Kyiv (2.54) (Fig. 2). In the structure of the VH, the incidence of HA was 25.5% in 2019 and 4.9% in 2022, in 2023 this figure increased to 10.8% (2.2 times) (Fig. 2) [15].

In Rivne and Lviv regions in 2023, the incidence of HA was below the national average.

However, for the period 2014-2023 in Rivne region during 2016-2017, the incidence of HA was higher than the national average by 1.1 times (2016) and 1.2 times (2017), but from 2017 to 2023, there was a decrease in the incidence of HA (from 9.22 to 0.43, respectively (a decrease of 21 times) (Fig. 1).

In the Lviv region, during 2014–2023, the incidence of HA was lower than the national average, and since 2016, there has been a decrease in the incidence of HA from 4.17 to 0.68 cases per 100 thousand people in 2022 (a 6-fold decrease). In 2023, the incidence of HA in the Lviv region increased by 1.4 times compared to 2022 Fig. 1

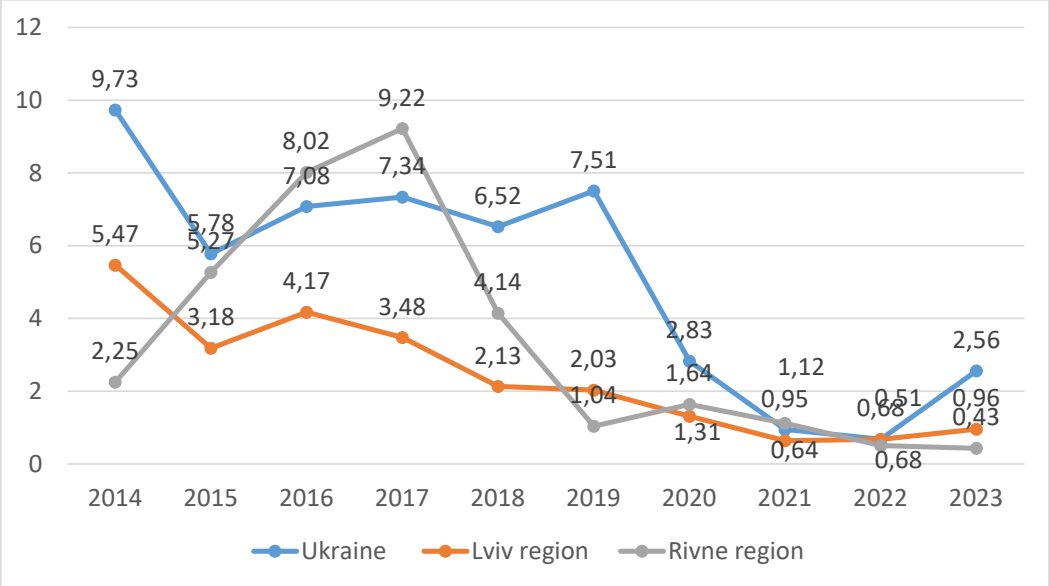

Fig. 1. Incidence of HA in Rivne and Lviv regions of Ukraine for 2014–2023 (in intensive indicators – cases per 100 thousand people)

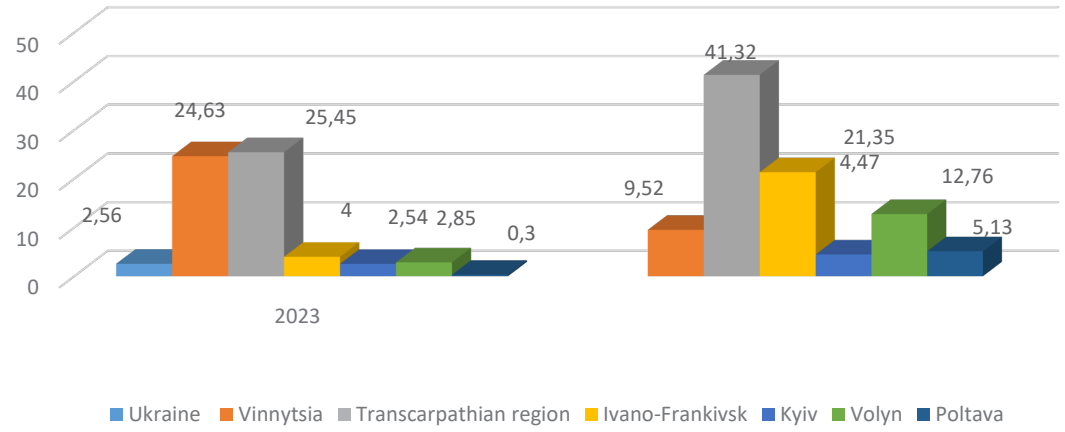

Fig. 2. Hepatitis A incidence in 2023 in Ukraine, Vinnytsia, Zakarpattia, Ivano-Frankivsk, Volyn regions and Kyiv city (in intensity rates per 100 thousand people)

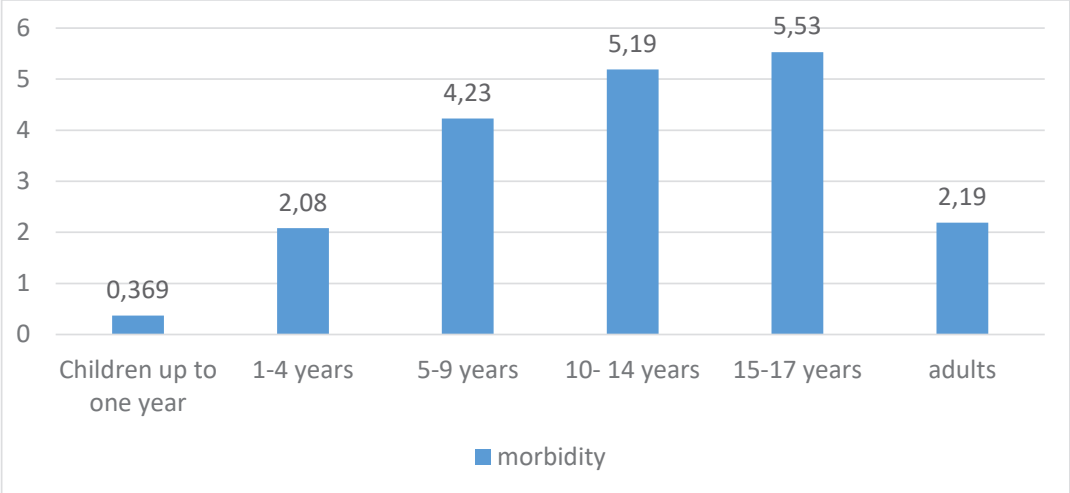

Fig. 3. Incidence of HA of the population of Ukraine of different age groups in intensive indicators (per 100 thousand population) in 2023

In total, in 2023, 1 050 cases of HA were registered in Ukraine, including 1 case among children under 1 year of age (intensity rate 0.369 per 100 thousand population); 27 cases among children aged 1–4 years (rate .08); 94 cases among children aged 5–9 years (4.23); 121 cases among children aged 10–14 years (5.19); 68 cases among children aged 15–17 years (5.53); 739 cases among adults (rate 2.19) (Fig. 3). The incidence of HA in children aged 15–17 years (5.19) was 2.5 times higher than in adults (2.19), the incidence of HA in children aged 10–14 years was 2.4 times higher than in adults, and among children aged 5–9 years it was 1.9 times higher (Fig. 3). At the same time, in the age structure. the adult population accounted for 70.4% of cases of HA in the total number of patients; children aged 10–14 years – 11.5%; children aged 5–9 years – 8.94%; 15–17 years – 6.5%; 1–4 years – 2.57%; children under 1 year – 0.09%.

In Rivne region, in the age structure of HA in 2017–2023, the largest number of patients was observed in people aged 25–49 years – 40.48% (85 people), in people aged 15–24 years this figure was 24.28% (51 people), in children aged 0–14 years – 20.0% (42 people) (Table 1). Among the patients, the contact and household route of infection was noted, water and food routes of infection were not established.

One of the important measures to prevent the spread of HA is timely laboratory diagnosis. The analysis of the dynamics of the incidence of HA and the number of persons examined for diagnostic and surveillance purposes in Rivne region in 2014–2023 showed that the ratio of the number of laboratory tests performed to the number of registered cases of HA in some years differs, which is due to the availability of diagnostic test systems (Table 2, Fig. 4).

Table 1

Age structure of the incidence of HA in Rivne region in 2017–2023

Age, years	2017	2018	2019	2020	2021	2022	2023	Total for 2017–2023
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
0–14	24 (22,43)	10 (20,83)	1 (8,34)	3 (15,78)	2 (15,38)	1 (16,66)	1 (20,0)	42 (20,0)
15–24	17 (15,88)	12 (25)	8 (66,66)	7 (36,85)	4 (30,77)	2 (33,34)	1 (20,0)	51 (24,28)
25–49	50 (46,73)	18 (37,5)	3 (25)	5 (26,32)	6 (46,16)	2 (33,34)	1 (20,0)	85 (40,48)
50 +	16 (14,96)	8 (16,67)	- -	4 (21,05)	1 (7,69)	1 (16,66)	2 (40,0)	32 (15,24)

Table 2

Results of laboratory testing for serological markers of HA by ELISA in Rivne region for diagnostic and epidemiological surveillance purposes in 2014–2023

Years	Examination for diagnostic purposes		Examination for the purpose of epidemiological surveillance	
	Number of people surveyed	Of these, with a positive result	Number of people surveyed	Of these, with a positive result
2014	42	20	145	-
2015	1	1	82	8
2016	97	89	294	12
2017	106	106	200	12
2018	48	48	74	9
2019	286	12	133	0
2020	118	19	27	-
2021	148	13	6	-
2022	18	6	11	-
2023	6	3	23	2

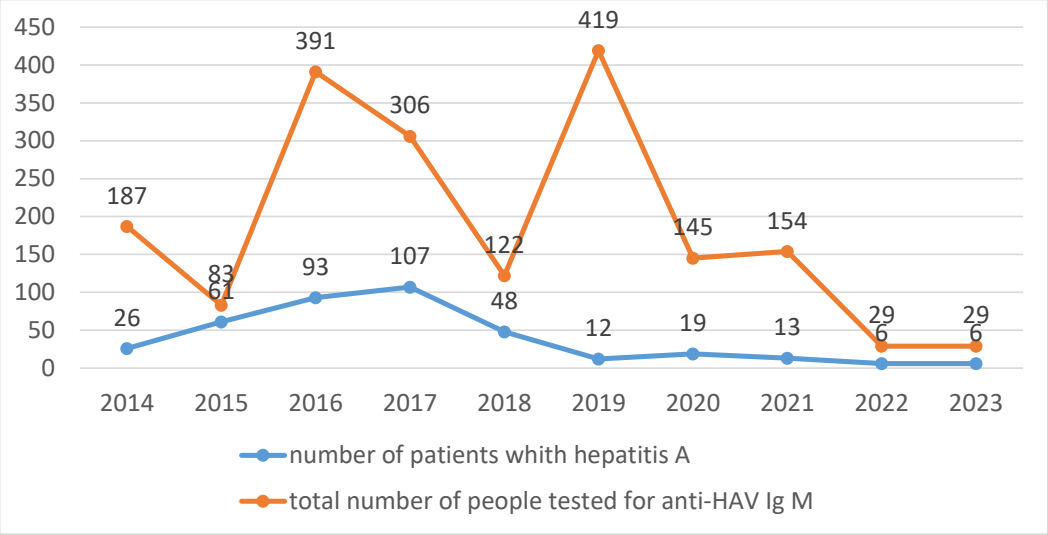

Fig. 4. Dynamics of morbidity and data of laboratory examination for markers of HA by ELISA in Rivne region for diagnostic and epidemiological surveillance purposes for 2014–2023 (in absolute numbers)

In 2019–2023, 128 samples of environmental objects (food, drinking water, swimming pool water, open water) were tested in Rivne region to detect the HA antigen by ELISA, and no positive samples were found. In 2022 and 2023, such studies were not conducted due to the lack of appropriate test systems (Fig. 5).

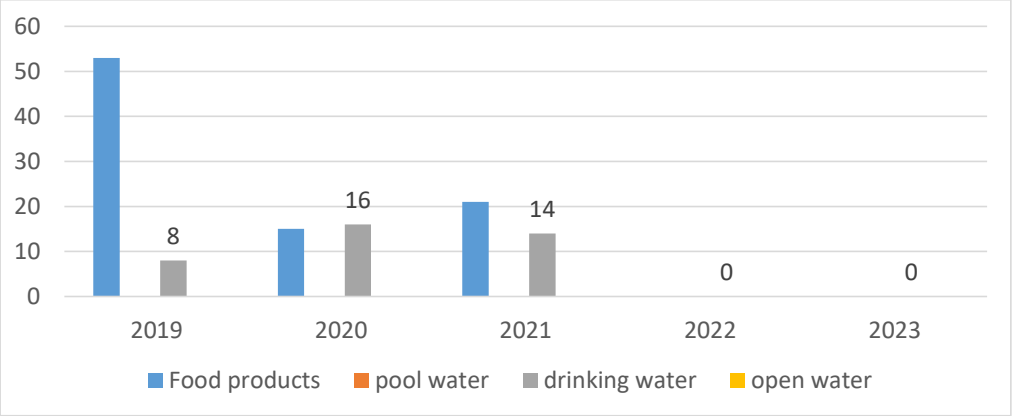

Fig. 5. Examination of environmental samples for the detection of HA virus antigens by ELISA in Rivne region in 2019–2023 (in absolute numbers)

Table 3

Age structure of the incidence of HA in the Lviv region in 2017–2023

Age, years	2017	2018	2019	2020	2021	2022	2023	Total for 2017– 2023
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
0–14	11 (12,5)	22 (22,22)	8 (15,68)	7 (21,21)	5 (31,25)	3 (17,65)	6 (25)	62 (20,46)
15–24	25 (28,4)	14 (25,93)	13 (25,49)	12 (36,37)	3 (18,75)	3 (17,65)	1 (4,17)	71 (23,43)
25–49	43 (48,87)	33 (42,59)	27 (52,95)	9 (27,27)	7 (43,75)	10 (58,82)	11 (45,83)	140 (46,21)
50 +	9 (10,23)	5 (9,26)	3 (5,88)	5 (15,15)	1 (6,25)	1 (5,88)	6 (25)	30 (9,9)

Table 4

Results of testing for HA by ELISA in the Lviv region for diagnostic and epidemiological surveillance purposes in 2014–2023

Years	Examination for diagnostic purposes		Examination for the purpose of epidemiological surveillance	
	Number of people surveyed	Of these, with a positive result	Number of people surveyed	Of these, with a positive result
2014	1	1	520	24
2015	512	30	10577	90
2016	183	42	2070	10
2017	39	29	720	-
2018	135	15	4786	40
2019	18	17	126	-
2020	33	33	524	-
2021	3	-	264	-
2022	85	17	51	-
2023	138	24	62	-

In the Lviv region, in the age structure of HA in 2017–2023, the largest number of patients was observed in persons aged 25–49 years – 46.21% (140 people), in persons aged 15–24 years this figure was 23.43% (71 people), in children aged 0–14 years – 20.46% (62 people) (Table 3). Among the patients during this period, the contact and household route of infection was noted, water and food routes of infection were not established.

Analyzing the dynamics of the incidence of HA and the number of laboratory tests (for diagnostic and epidemiological purposes) in the Lviv region in 2014–2023, it was found that the ratio of the number of laboratory tests to the number of registered cases of HA in some years differs (1:142.2 in 2015 and 1:2.82 in 2019), which is due to the availability of diagnostic test systems (Table 4, Fig. 6)

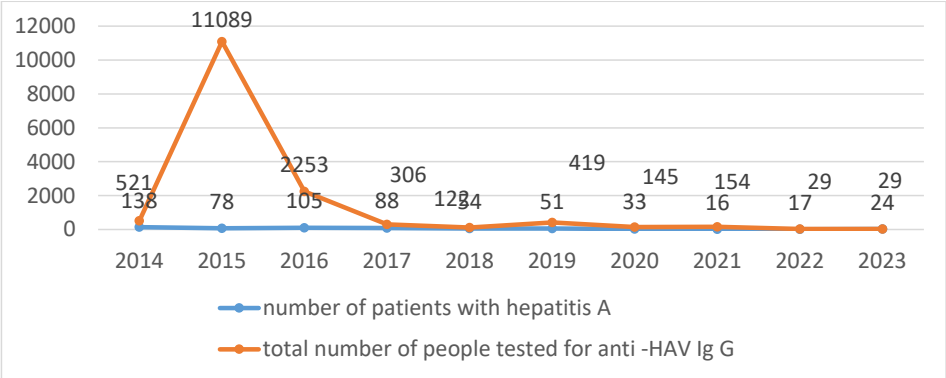

Fig. 6. Dynamics of morbidity and laboratory testing for HA by ELISA in the Lviv region for diagnostic and epidemiological surveillance purposes in 2014–2023 (in absolute numbers)

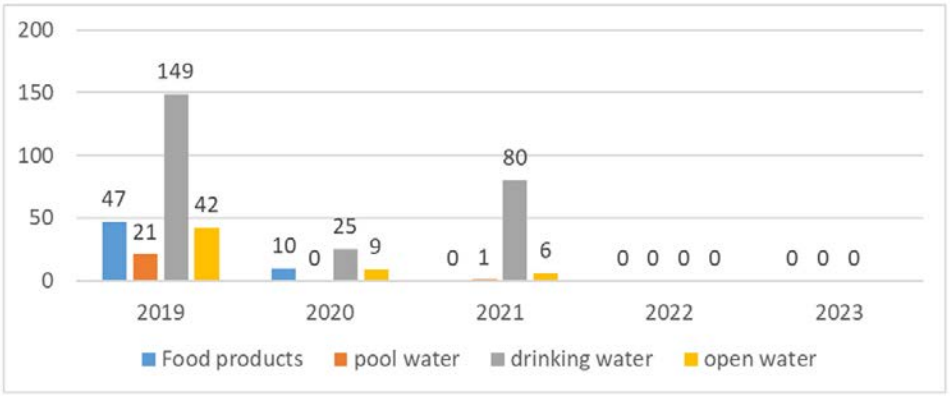

Fig. 7. Examination of environmental samples for the detection of antigens by ELISA in the Lviv region in 2019–2023

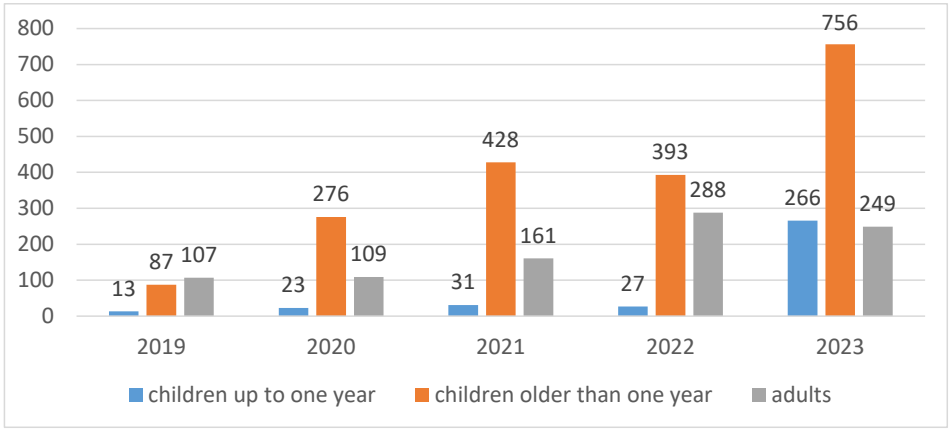

Fig. 8. Data on vaccinations against HA in Lviv region for 2019–2023 (in absolute numbers)

During the 2019–2023 epidemiological monitoring for HA in Lviv region, 390 samples from environmental objects (food, drinking water, pool water, open water) were tested by laboratory to detect the HA antigen by ELISA, and no positive samples were found. In 2022 and 2023, such studies were not conducted due to the lack of appropriate test systems (Fig. 7).

One of the effective measures that can prevent HA infection is vaccination of people at risk. In the Lviv region, vaccination against HA is carried out among children with the Twinrix and Havrix 720 vaccines, and among adults with the Havrix 1 440 vaccine. In 2023, there was a 6.1-fold increase in the total number of people vaccinated against HA compared to 2019, including in the age group of children 1 year and older – by 8.68 times and among the adult population – by 2.3 times (Fig. 8).

In Rivne region, there were significantly fewer vaccinations against HA during this period.

Thus, the incidence of HA in Rivne and Lviv regions remains an urgent public health problem that requires constant attention from specialized professionals. In the context of Russian military aggression, the risk of an increase in the incidence of HA remains high.

Conclusions. It has been established that the full-scale Russian military aggression against Ukraine, which began on February 24, 2022, has led to an increase in the risk of hepatitis A infection in Rivne and Lviv regions of Ukraine. In 2023, the incidence of hepatitis A in Lviv region increased by 1.4 times compared to 2022.

It was found that the most vulnerable age group among patients with HA were persons of working age 25–49 years, in Rivne region the percentage of these patients was 40.48% (85 people), and in Lviv region – 46.21% (140 people). Children aged 0–14 years in the structure of the incidence of HA were 20.0% (42 people) in Rivne region, and 20.46% (62 people) in Lviv region.

It was determined that in 2023 in Lviv region there was a 6.1-fold increase in the total number of people vaccinated against HA compared to 2019, including in the age group of children 1 year and older – by 8.68 times and among the adult population – by 2.3 times.

In order to prevent HA, it is necessary to strengthen epidemiological surveillance of this infection. The most effective methods of combating HA in Ukraine today are stopping full-scale Russian military aggression, improving sanitary and hygienic living conditions, food safety, clean and safe water, and vaccination against HA.

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