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Viral Hepatitis as A Public Health Concern: A Review About The Situation In Iraq From 2021-2023

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ABSTRACT:

BACKGROUND:

Viral hepatitis, caused by distinct viruses (Hepatitis AVirus , Hepatitis B Virus, Hepatitis C Virus , Hepatitis D Virus, Hepatitis E Virus, and Hepatitis G Virus), is a major public health concern. In Iraq, many cases remain asymptomatic or underdiagnosed, making the true burden difficult to assess. Highlighting its impact is essential for informed public health action.

OBJECTIVE:

To determine the pattern of viral hepatitis from all Iraqi governorates-through the period of study-from the first May 2021 to the 30th of April 2023.

METHODS:

A retrospective study of people infected with viral hepatitis through the records available in the main Community Disease Control center in Baghdad for a period from 2021 to 2023 by analyzing available surveillance data.

RESULTS:

In Iraq, a total of 10,070 viral hepatitis cases were reported from 2021 to 2023, with an incidence rate of 65.0 per 1,000,000 populations per year. Males accounted for 63.8% of cases, giving an overall male-to-female ratio of 1.8:1. Hepatitis A Virus constituted 49% of cases, followed by Hepatitis B Virus (34%), Hepatitis C Virus (16.9%), and Hepatitis E Virus (0.1%). Most Hepatitis B Virus, Hepatitis C Virus, and Hepatitis E Virus cases occurred among individuals aged 15–44 years, while 90% of Hepatitis A Virus cases were among those aged 5–44 years. Hepatitis A Virus was mostly reported in Baghdad and central Iraq, Hepatitis B Virus and Hepatitis C Virus in Baghdad and northern regions, and Hepatitis E Virus in Al-Sadr City as an outbreak. A notable Hepatitis A Virus outbreak occurred in winter 2023, while most Hepatitis B Virus, Hepatitis C Virus, and Hepatitis E Virus cases peaked in spring 2022.

KEYWORDS: Viral, Hepatitis, outbreak, Iraq

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INTRODUCTION:

Viral hepatitis comprises a group of infections caused by etiologically, immunologically, and epidemiologically distinct viruses—namely hepatitis A (HAV), B (HBV), C (HCV), D (HDV), E (HEV), and G (HGV) [(1)]. These viruses contribute significantly to global morbidity and mortality, with varying transmission modes, clinical outcomes, and geographic prevalence. Despite its global burden, viral hepatitis often remains underdiagnosed due to its asymptomatic or anicteric nature, particularly in resource-limited settings[(2)].

HAV is primarily transmitted via the fecal–oral route and is responsible for a significant proportion of acute hepatitis cases in developing countries. In Iraq, the prevalence of HAV among hepatitis cases is estimated at 40.2%. HBV, a blood-borne virus, is linked to chronic infection, cirrhosis, and hepatocellular carcinoma (HCC). Historical Iraqi data showed HBsAg carrier rates ranging between 3.4% and 4.3%, classifying Iraq as a country of intermediate endemicity. Similarly, HCV, often transmitted via blood products, poses a growing threat due to its chronicity. While the prevalence among Iraqi blood donors remains low (0.07%–0.3%), much higher rates are reported among high-risk groups such as thalassemics and hemophiliacs [(2,3,4)].

HDV, an incomplete virus requiring HBV co-infection, contributes to severe liver disease. Its presence in Iraq is evidenced by a 4.1% seroprevalence among HBsAg carriers. HEV, often associated with waterborne outbreaks in areas with inadequate sanitation, has been sporadically reported in Iraq, with documented outbreaks. HGV, though less understood, has been linked to co-infection with HBV and HCV, and is commonly transmitted via parenteral exposure [5,6].

Despite existing studies, there remains a significant gap in recent, comprehensive epidemiological data on viral hepatitis in Iraq, especially in the post-pandemic context. Outdated prevalence estimates, under-reporting, and limited surveillance hinder effective planning and resource allocation. Moreover, national data often lacks stratification by virus type, age, gender, and regional distribution, impeding targeted interventions [7,8,9].

This review aims to address this knowledge gap by examining the reported viral hepatitis cases in Iraq between 2021 and 2023. We hypothesize that, despite ongoing public health efforts, viral hepatitis remains underdiagnosed and continues to disproportionately affect specific population groups. By analyzing available surveillance data, this study seeks to better define the current epidemiological trends, regional distribution, and demographic characteristics of reported cases, thereby informing future control strategies and health policy development in Iraq.

METHODS:

A retrospective descriptive study was conducted to assess the epidemiological patterns of viral hepatitis cases reported in Iraq from January 2021 to December 2023. The study utilized official records from the Communicable Diseases Control (CDC) Center in Baghdad, which serves as the central national registry for notifiable communicable diseases and aggregates surveillance data from all Iraqi governorates.

The target population included individuals aged 1 to 60 years who were reported as confirmed cases of viral hepatitis (HAV, HBV, HCV, and HEV) during the study period. Data were collected over a one-month period using a standardized, pre-designed questionnaire developed for this research. Extracted variables included age, sex, type of hepatitis, place of residence (governorate), and seasonal distribution of cases.

The data were compiled from the monthly surveillance reports submitted to the CDC by provincial health departments. Epidemiological measures, including incidence rates per 1,000,000 population per year, were calculated for each viral hepatitis type. Descriptive statistics, including frequency distributions and percentages, were used to analyze demographic and seasonal trends. Data analysis was performed using IBM SPSS Statistics for Windows, Version 27.0 (IBM Corp., Armonk, NY, USA).

Prior to the initiation of data collection, the CDC Center in Baghdad was formally notified and granted its approval for the conduct of the study. Ethical considerations were observed by ensuring the anonymity and confidentiality of all collected data, and no personal identifiers were used.

RESULTS:

This study analyzed the epidemiological trends of viral hepatitis cases reported across Iraq between 2021 and 2023. A total of 10,070 cases were documented through the national surveillance system. The findings are presented in terms of seasonal variation, incidence rates, demographic distribution (age and sex), and geographic distribution by governorate. The results offer insights into the burden and distribution patterns of the major types of viral hepatitis—HAV, HBV, HCV, and HEV—within the Iraqi population.

Seasonal Variation

Analysis of seasonal distribution revealed notable fluctuations in the incidence of viral hepatitis types over the study period. Hepatitis A virus (HAV) cases peaked during winter 2023, with a total of 1,089 reported cases—the highest seasonal figure observed. In contrast, the lowest number of HAV cases (155) was recorded in spring 2021. For hepatitis B virus (HBV), hepatitis C virus (HCV), and hepatitis E virus (HEV), the highest incidence was documented during spring 2022, with 690, 242, and 4 cases respectively. The lowest figures for HBV (166 cases) and HCV (48 cases) were observed in spring 2021. Notably, no HEV cases were reported during autumn of both 2021 and 2022. These seasonal trends are summarized in Table 1.

Table 1: Frequency Distribution of Viral Hepatitis Cases During the Study Period by Season.

		HAV		HBV		HCV		HEV	
		N	%	N	%	N	%	N	%
2021	Spring	155	18	166	22	48	11	1	50
	Summer	541	62	205	28	188	44	1	50
	Autumn	171	20	371	50	190	45	0	0
	TOTAL	867	100	742	100	426	100	2	100
2022	Winter	605	23	186	9	205	22	1	17
	Spring	707	27	690	34	242	27	4	66
	Summer	713	28	610	30	228	25	1	17
	Autumn	599	22	554	27	231	26	0	0
	TOTAL	2624	100	2040	100	906	100	6	100
2023	Winter	1089	76	412	65	205	54	2	50
	Spring	349	24	221	35	177	46	2	50
	TOTAL	1438	100	633	100	382	100	4	100
TOTAL YEARS		4929		3415		1714		12	

Overall Burden and Incidence Rates

A total of 10,070 cases of viral hepatitis were reported across Iraq during the three-year study period, corresponding to an overall incidence rate of 65.0 per 1,000,000 population per year. Disaggregated by virus type, the annual incidence rates were as follows: HAV – 28.2 per 1,000,000; HBV – 20.11 per 1,000,000; HCV – 8.85 per 1,000,000; and HEV – 1.9 per 1,000,000. These data are detailed in Table 2.

Table 2: Frequency Distribution of Viral Hepatitis Cases by Viral Marker.

Types of Hepatitis	N	%
HAV	**4929**	**49**
HBV	**3415**	**34**
HCV	**1714**	**16.9**
HEV	**12**	**0.1**
Total	**10070**	**100%**

Sex Distribution

The analysis revealed a consistent male predominance across all types of viral hepatitis. Overall, 63.8% of reported cases were male and 36.2% female, yielding a male-to-female ratio of 1.8:1. In HAV cases, males accounted for 64.7% (36.6 per 1,000,000), while females constituted 35.3% (19.85 per 1,000,000). HBV cases showed a similar trend, with males representing 65.7% (26.45 per 1,000,000) and females 34.3% (13.7 per 1,000,000). For HCV, 57.4% of cases occurred in males (10.15 per 1,000,000) and 42.5% in females (7.5 per 1,000,000). The disparity was most pronounced in HEV, where males accounted for 79.2% of cases (3.05 per 1,000,000), compared to 20.8% in females (0.8 per 1,000,000). Full details are provided in Table 3.

Table 3: Frequency Distribution of Reported Viral Hepatitis Cases During Study Period by Sex.

Types of Hepatitis	N	MALE		FEMALE	
		N	%	N	%
HAV	4929	3189	64.7	1740	35.3
HBV	3415	2244	65.7	1171	34.3
HCV	1714	984	57.4	730	42.5
HEV	12	10	79.2	2	20.8

Age Distribution

The majority of viral hepatitis cases were reported among individuals aged 15–44 years, except for HAV, which was most frequent among those aged 5–44 years. Specifically, HAV was highest among the 5–14 (45.3%; 47.95 per 1,000,000) and 15–44 year age groups (46.2%; 29.5 per 1,000,000). HBV showed the highest burden in the 15–44 year group, accounting for 75% of cases (33.95 per 1,000,000). Similarly, 70.5% of HCV cases were reported in this age group (14.1 per 1,000,000), as were 59.4% of HEV cases (2.55 per 1,000,000). The lowest

incidence was observed in children under 5 years of age: 4.9% for HAV (8.2 per 1,000,000), 1.75% for HBV (4.15 per 1,000,000), 3.45% for HCV (3.6 per 1,000,000), and 0% for HEV. These age-related trends are presented in Table 4.

Table 4: Frequency Distribution of Reported Viral Hepatitis Cases During Study Period by Age.

Types of Hepatitis	N	< 5 YRS		5-14 YRS		15-44 YRS		+45 YRS	
		N	%	N	%	N	%	N	%
HAV	4929	242	4.9	2233	45.3	2275	46.16	179	3.6
HBV	3415	113	3.5	485	14.2	2561	75	256	7.5
HCV	1714	118	6.9	274	16	1208	70.5	114	6.6
HEV	12	0	0	4	34.6	7	59.4	1	6

Geographical Distribution

Geographical analysis indicated varying regional patterns by virus type. The highest percentages of HAV cases were recorded in Baghdad (13.5%), Wasit (10.4%), and Al-Anbar (10.1%). For HBV, the largest proportion of cases occurred in Baghdad (29%), followed by Ninawa (11.7%), Salah Al-Din (7%), and Kirkuk (6.6%). HCV cases were concentrated in Baghdad (51.4%) and Sulaymaniyah (15.5%). HEV showed a marked geographic concentration in Baghdad, which accounted for 85.1% of total reported HEV cases, reflecting localized outbreak activity. These findings are summarized in Table 5.

Table 5: Frequency Distribution of Reported Viral Hepatitis Cases by Governorate.

	HAV		HBV		HCV		HEV	
	N	%	N	%	N	%	N	%
Ninawa	281	5.7	402	11.7	56	3.3	0	0
Kirkuk	133	2.7	225	6.6	54	3.2	0	0
Salah ad Din	320	6.5	239	7	39	2.3	0	0
Diyala	331	6.7	205	6	21	1.2	0	0
Baghdad	665	13.5	992	29	881	51.4	10	85.1
Anbar	498	10.1	92	2.7	20	1.2	0	0
Babil	281	5.7	41	1.24	62	3.6	0	0
Wasit	512	10.4	145	4.26	25	1.5	0	0
Karbala	305	6.2	154	4.5	37	2.1	0	0
Najaf	405	8.2	182	5.3	53	3.1	0	0
Al Muthanna	167	3.4	47	1.4	13	0.7	0	0
Dhi Qar	365	7.4	93	2.7	49	2.9	0	0
Maysan	187	3.8	105	3.1	65	3.8	0	0
Al Basrah	173	3.5	102	3	73	4.2	0	0
Sulaymania	306	6.2	222	6.5	266	15.5	2	14.9
Duhok	0	0	0	0	0	0	0	0
Erbil	0	0	64	1.9	0	0	0	0
Qadisiah	0	0	105	3.1	0	0	0	0
Total (Iraq)	4929	100	3415	100	1714	100	12	100

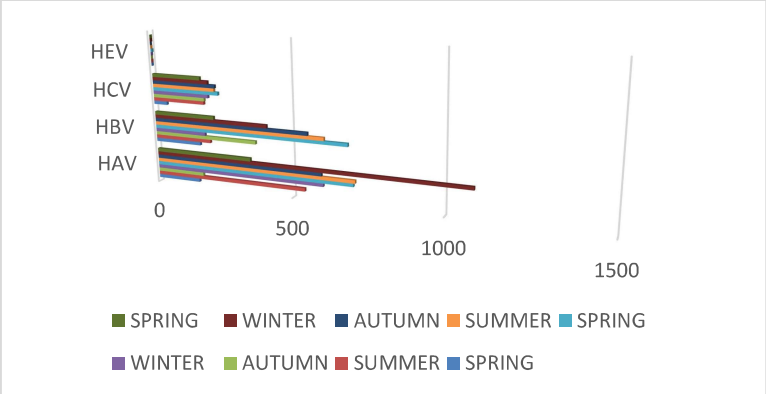


Figure 1:

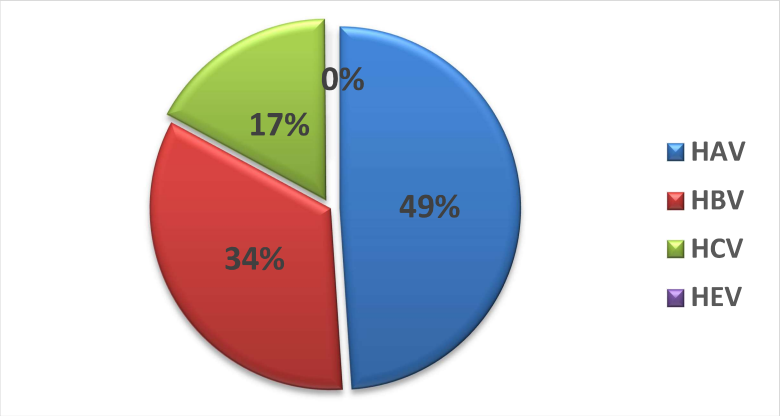
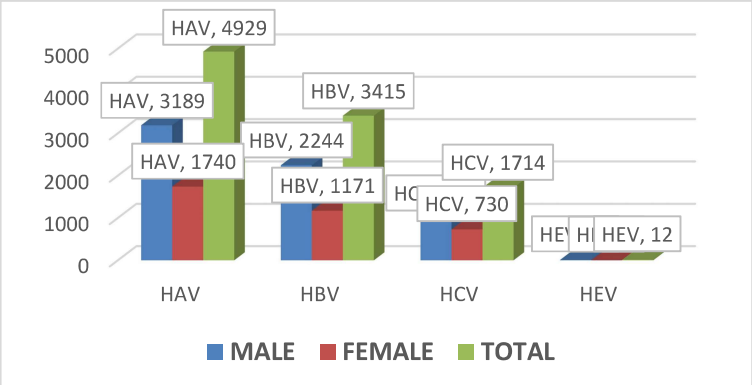


Figure 2:



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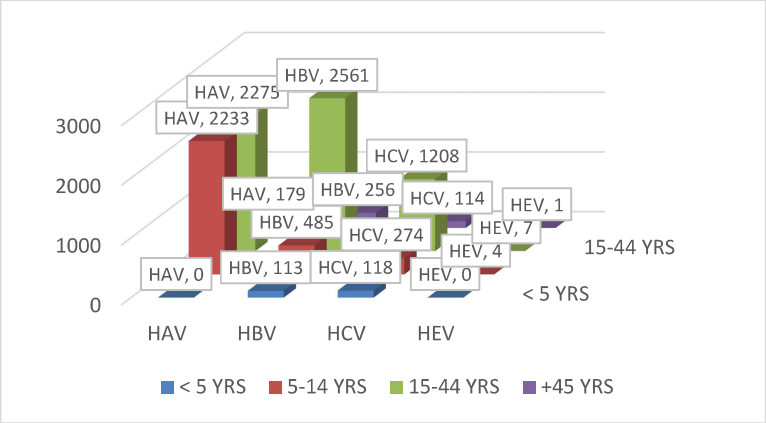

Figure 4:

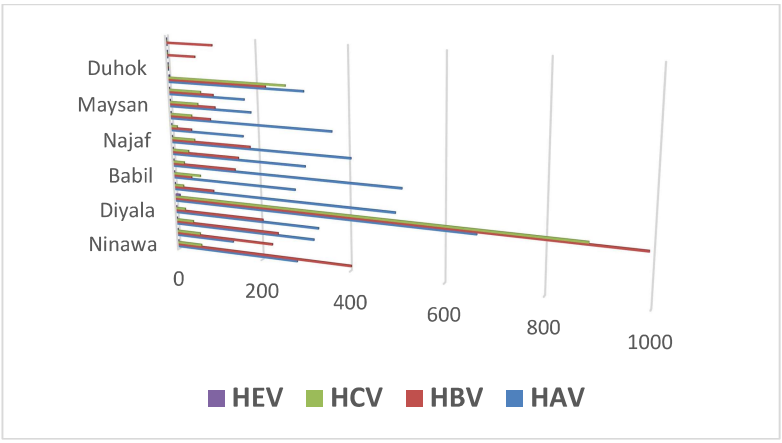

Figure 5:

DISCUSSION:

The analysis of viral hepatitis surveillance data in Iraq between 2021 and 2023 reveals important epidemiological trends and variations across hepatitis types, age groups, sexes, seasons, and geographic regions. A total of 10,070 cases were reported nationwide, with an overall incidence rate of 65.0 per 1,000,000 population per year. Hepatitis A virus (HAV) constituted the highest proportion of reported cases (49%), a finding consistent with data from Jordan (48%) but higher than rates in Kuwait (34.4%), Tunisia (39%), and Egypt (13%) [10,11]. The predominance of HAV in Iraq likely reflects underlying socioeconomic conditions, inadequate sanitation, and limited access to safe water. Conversely, the proportion of HAV was lower than previously reported figures in Iraq, Bahrain, Syria, and Iran, suggesting possible shifts in transmission dynamics or improvements in hygiene [10, 12].

Hepatitis B virus (HBV), comprising 34% of cases, demonstrated rates similar to those reported in Iraq and Tunisia (32–36%) but higher than in Bahrain, Egypt, and Syria. Variations in HBV prevalence between and within countries are influenced by multiple factors, including vaccination coverage, blood safety practices, and cultural or behavioral exposures [12,13]. The high burden of HBV among adults aged 15–44 years aligns with known occupational and iatrogenic risk exposures and is consistent with earlier regional studies [4,14]. The impact of Iraq's Expanded Program on Immunization (EPI) is reflected in the low HBV rates among children under five.

HCV accounted for 16.9% of cases, slightly exceeding figures from Jordan (13%) and significantly higher than those in Bahrain and Syria, but remaining below those in Egypt and Kuwait. HCV transmission in Iraq remains strongly linked to parenteral exposure, including medical procedures, unsafe injections, and transfusions, particularly among younger adults [10]. HEV was responsible for 3.2% of reported cases, mostly identified during a localized outbreak in Al-Sadr City, Baghdad. This pattern resembles outbreaks observed in other resource-constrained settings and was likely driven by contaminated water sources and poor environmental infrastructure [15, 16, 17].

Male predominance was evident across all hepatitis types, with an overall male-to-female ratio of 1.8:1. Similar findings have been reported in Iraq, Iran, Nepal, and the United States [11,12]. This disparity may reflect increased occupational exposure among males or biological differences in disease progression and carrier status, particularly in HBV infections [4,18]. Age distribution trends showed that the 15–44 year age group was consistently the most affected by HBV, HCV, and HEV, while HAV was more evenly spread between the 5–44 year range. These patterns reflect typical age-related exposure risks and variations in immune response, with younger children often experiencing milder or asymptomatic courses, especially in HAV and HEV infections [4,10, 18].

Geographically, Baghdad reported the highest number of cases for all hepatitis types, followed by elevated HBV and HCV rates in northern governorates such as Ninawa and Sulaymaniyah. Differences in ethnic composition, healthcare access, and environmental conditions may contribute to regional disparities [4,12]. The concentration of HEV cases in Al-Sadr City reflects the localized nature of outbreaks related to waterborne contamination, inadequate sewage systems, and intermittent access to chlorinated drinking water [15].

Seasonal analysis revealed a winter peak for HAV in 2023 and a spring 2022 peak for HBV, HCV, and HEV. These trends deviate from classic temperate patterns, where HAV peaks in autumn and winter, and suggest context-specific influences such as rainfall, water contamination, and healthcare-seeking behaviors [13,14]. The absence of reported HEV cases during autumn 2021 and 2022 outside of the outbreak period may reflect underreporting or misclassification of subclinical infections.

Several limitations must be acknowledged. This study relied on routine surveillance data, which may underrepresent true infection rates, particularly in asymptomatic or mild cases that do not seek medical care. The retrospective nature of the analysis limits causal inference, and incomplete reporting on patient occupation, vaccination status, and socioeconomic background constrains a more detailed risk assessment. Moreover, inconsistencies in diagnostic practices across governorates may affect data comparability.

Despite these limitations, the findings underscore the ongoing public health importance of viral hepatitis in Iraq. The burden remains concentrated among adults, with HAV still highly endemic and HEV posing outbreak risks in vulnerable urban areas. HBV and HCV continue to persist in the general population despite vaccination and blood safety measures. These results highlight the urgent need to strengthen health education campaigns addressing modes of transmission and prevention strategies; to enhance disease registration systems with standardized data collection tools across all governorates; and to improve training of healthcare personnel involved in data reporting and referral to the CDC. Expanding HBV immunization coverage—particularly among infants—and improving water sanitation in high-risk areas such as Al-Sadr City are critical interventions. Investing in these public health priorities is essential to reduce the transmission and long-term consequences of viral hepatitis in Iraq.

Conflict of Interests:

The authors declare that they have no competing interests.

Ethical approval for the study was obtained from scientific and ethical committee / ministry of health / Iraq.

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Authors' Contributions:

The first author conducted data collection, performed statistical analysis, and drafted the initial version of the manuscript. The second author conceptualized and designed the study, supervised the research process, and reviewed the final manuscript. The third author contributed to the literature review, assisted with data interpretation, and critically revised the manuscript for intellectual content. The fourth author managed research administration, obtained ethical approvals, and contributed to manuscript editing and formatting for

submission. All authors read and approved the final manuscript.

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