



Hepatitis B Virus and Hepatitis C Virus Infections Among Outpatients in Basrah, Iraq

Ismeal Jumia Abbass ^{1,*}

¹ Department of Biology, College of Education Quran, University of Basrah, Basrah, Iraq

*Corresponding Author: Department of Biology, College of Education Quran, University of Basrah, Basrah, Iraq. Email: ismail.abbs@uobasrah.edu.iq

Received: 23 May, 2026; Accepted: 16 June, 2026

Abstract

Background: Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections pose a major global health concern, particularly in developing regions. Persistent infection with these viruses is a leading cause of chronic liver disease and is associated with severe complications, including cirrhosis and hepatocellular carcinoma. Therefore, assessing the epidemiological distribution of these infections by demographic factors such as age, sex, and gestational status is essential for developing effective prevention and control strategies.

Objectives: This study aimed to estimate the occurrence of HBV and HCV infections and to examine their epidemiological characteristics among outpatients in Basrah Governorate, Iraq, particularly their associations with age and sex.

Methods: This cross-sectional study included 1256 outpatients attending private clinics in Basrah Governorate, Iraq. Peripheral blood samples (2 mL) were collected from all participants, and serum was separated and tested for hepatitis B surface antigen (HBsAg) and antibodies to HCV (anti-HCV) using enzyme-linked immunosorbent assay (ELISA) kits (Biorex Diagnostics, UK), according to the manufacturer's instructions. Demographic data were collected, and participants were stratified by age and sex. Data were analyzed using the chi-square test, with $P \leq 0.05$ considered statistically significant.

Results: The overall prevalence of hepatitis infection was 2.30% (29 out of 1256). HBV infection prevalence was 1.11%, whereas HCV infection prevalence was slightly higher at 1.19%. Prevalence was higher among males (3.6%) than among females (1.7%), although this difference was not statistically significant. A statistically significant association was observed between age group and infection occurrence, with the highest prevalence recorded in the 21 - 40-year age group. HBV infection was more common in males, whereas HCV infection was more common in females; there was a statistically significant association between sex and infection type. Overall, HCV infection was more common than HBV infection in this study.

Conclusions: The frequency of HBV and HCV infections in Basrah was relatively low, with distinct epidemiological patterns. Hepatitis B was more common among males, whereas higher rates of hepatitis C were observed among females. Age was significantly associated with infection occurrence, particularly in the 21 - 40-year age group. These findings underscore the importance of targeted screening programs for high-risk groups and sustained public health efforts to reduce and control hepatitis infections.

Keywords: HBsAg, HCV, Seroprevalence, Epidemiology, Demographic Factors, Outpatients

1. Background

Viral hepatitis is a major global public health challenge and a leading cause of chronic liver disease, cirrhosis, and hepatocellular carcinoma (1). Among the hepatitis viruses, hepatitis B virus (HBV) and hepatitis C virus (HCV) are particularly concerning because of their high prevalence,

severe complications, and propensity for chronic infection. These viruses are primarily transmitted through blood and body fluids, including via blood transfusions, surgical and dental procedures, needle sharing, and mother-to-child transmission through the placenta (2).

Hepatitis B virus is a DNA virus belonging to the Hepadnaviridae family and can cause acute or chronic

hepatitis. Vaccination programs have substantially reduced its incidence in many countries; however, HBV remains endemic in many developing regions (3). Hepatitis C virus is an RNA virus that primarily causes chronic infection and is a major cause of cirrhosis and hepatocellular carcinoma. Unlike HBV, HCV lacks an effective vaccine, making prevention and screening essential for infection control (4).

The epidemiology of HBV and HCV infections varies by age, sex, geographic location, socioeconomic status, and exposure to risk factors. Sex and age are important determinants of the prevalence and distribution of viral hepatitis (5). Young and middle-aged adults may be more susceptible to infection because of increased social activity, occupational exposure, and healthcare-related exposures. Women, particularly pregnant women, are frequently screened for hepatitis during prenatal care, which may influence detection rates in this population (6).

Viral hepatitis remains a significant health problem in Iraq, with studies reporting variable prevalence across regions (7-9). Basrah Governorate in southern Iraq has a high population density and well-developed healthcare services, which may influence viral hepatitis transmission and detection. However, epidemiological data on the distribution of HBV and HCV infections by age and sex in this region remain limited, particularly over the past five years (10, 11).

2. Objectives

This study aimed to determine the prevalence of HBV and HCV infections among outpatients in Basrah Governorate, Iraq, and to assess their distribution by age and sex. It also aimed to examine associations between demographic factors and hepatitis infections to provide epidemiological data that may inform prevention and control programs.

3. Methods

3.1. Study Design and Population

A cross-sectional study was conducted in Basrah Governorate, Iraq. A total of 1256 outpatients attending private clinics for routine follow-up and medical consultation were included. Participants comprised males and females across different age groups. Demographic data, including age and sex, were recorded for all participants. Participants were categorized into four age groups: ≤ 20 , 21 - 40, 41 - 60, and > 60 years.

3.2. Sample Collection and Laboratory Testing

Peripheral venous blood samples (2 mL) were collected from each participant under aseptic conditions during a clinic visit. Samples were allowed to clot; serum was separated by centrifugation and stored under appropriate conditions until analysis. Serum samples were tested for hepatitis B surface antigen (HBsAg) and antibodies to HCV (anti-HCV) using enzyme-linked immunosorbent assay (ELISA) kits (Biorex Diagnostics, UK), according to the manufacturer's instructions. All procedures followed standard laboratory protocols to ensure the accuracy and reliability of the results.

3.3. Ethical Considerations

All procedures were performed in accordance with established ethical standards. Informed consent was obtained from each participant before sample collection, and patient information was kept confidential.

4. Results

4.1. Overall Prevalence and Distribution by Sex

Of the 1256 outpatients tested for viral hepatitis, 29 samples were positive, yielding a prevalence of 2.31%. The remaining 1227 samples were negative, accounting for 97.69% of the total. These findings indicate a relatively low overall prevalence of viral hepatitis in the study area.

Prevalence was higher among males (3.6%) than among females (1.7%). The study included 900 females and 356 males; 16 females and 13 males tested positive. No statistically significant difference was observed between males and females ($\chi^2 = 3.18$, $P = 0.074$), as shown in Table 1.

Table 1. Distribution of Hepatitis B and C Infections According to Sex^a

Status	Male	Female
Total	356	900
Positive	13 (3.6)	16 (1.7)
Negative	343 (96.7)	884 (98.3)

^a Values are expressed as No. or No. (%).

4.2. Distribution by Age Group

In the overall sample of 1256 participants, the highest proportion of hepatitis B and C cases was observed in the 21 - 40-year age group (1.5%), followed by the 41 - 60-year age group (0.4%). The lowest proportions were observed in the ≤ 20 -year (0.20%) and > 60 -year (0.15%) age groups (Figure 1).

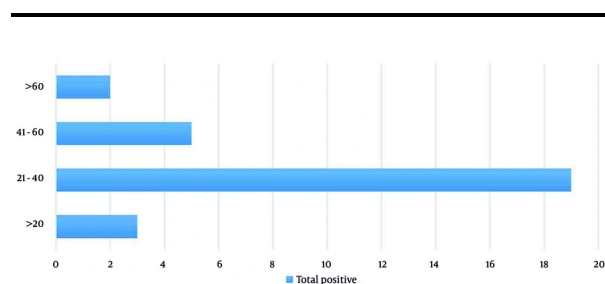


Figure 1. Distribution of Hepatitis B and C Infections According to Age Groups

Statistical analysis showed a significant association between age group and hepatitis infection ($\chi^2 = 14.2$, $P = 0.003$), indicating that infection rates varied considerably across age groups.

4.3. Association Between Sex and Hepatitis Infection Type

More HBsAg-positive cases were detected in males ($n = 9$) than in females ($n = 5$), indicating a higher prevalence of hepatitis B infection among males. In contrast, hepatitis C infection was more common among females, with 11 cases compared with 4 cases among males (Table 2).

Table 2. Association Between Sex and Hepatitis Infection Type (HBV vs HCV)^a

Sex	Total No.	HBsAg	HCV
Male	13	9 (69.3)	4 (30.7)
Female	16	5 (31.3)	11 (68.7)

^a Values are expressed as No. (%).

Abbreviations: HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; HCV, hepatitis C virus.

Statistical analysis showed a significant association between sex and infection type ($\chi^2 = 4.66$, $P = 0.031$), indicating that the distribution of HBV and HCV differed significantly between males and females.

4.4. Distribution of Hepatitis B and C Infections by Age Group

The distribution of infection types varied across age groups. Among participants aged ≤ 20 years, all 3 cases were hepatitis C infections, and no hepatitis B infection was detected. Hepatitis B predominated in the 21 - 40-year age group, with 14 cases compared with 5 hepatitis C cases. In the 41 - 60-year age group, hepatitis C was more common, with 4 cases compared with 1 hepatitis B case. Among

participants aged > 60 years, hepatitis B and C were equally distributed, with 1 case each (Table 3).

Table 3. Distribution of HBV (HBsAg) and HCV Infections According to Age Groups

Age Group (y)	Total Positive	HBsAg	HCV
≤ 20	3	0	3
21 - 40	19	14	5
41 - 60	5	1	4
> 60	2	1	1
Total	29	16	13

Abbreviations: HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; HCV, hepatitis C virus.

Statistical analysis revealed a significant association between age group and infection type ($\chi^2 = 12.6$, $P = 0.005$), indicating that the distribution of HBV and HCV varied significantly across age groups.

5. Discussion

The overall prevalence was in close agreement with previous studies conducted in Iraq. A study of blood donors in Basrah reported a hepatitis B prevalence of approximately 2.3, which was similar to that in the present study (12). This similarity suggests relative stability in the epidemiological pattern of hepatitis B infection in Basrah over time.

The higher prevalence among males, without a statistically significant difference between sexes, was consistent with several previous studies (13-15).

The highest prevalence of hepatitis B and C infections was observed in the 21 - 40-year age group. This group represents the largest and most socially and economically active segment of the population, which may increase exposure to infection risk factors, including medical procedures, blood transfusions, travel, dental treatments, and occupational exposure (16).

The expansion of hepatitis vaccination programs in response to risk factors has shifted hepatitis B prevention toward younger age groups (≤ 20 years). Variation in hepatitis C infection rates among older participants (> 60 years) may be attributable to reduced exposure to risk factors and to the smaller sample size in this group (17).

The present study demonstrated a significant association between sex and infection type. Hepatitis B was more prevalent among males, whereas hepatitis C was more prevalent among females. This finding reflects a distinct epidemiological pattern in the study population. The higher prevalence of HBV among males may be attributable to greater exposure to occupational hazards,

surgical procedures, and increased social mobility, which may increase contact with infected blood or body fluids. The higher prevalence of HCV among females may be related to greater exposure to healthcare settings, including antenatal care, blood transfusions, and medical interventions (18).

The significant association between sex and infection type highlights the importance of considering demographic factors in the epidemiology of viral hepatitis and of developing targeted prevention strategies for each group.

The study also demonstrated a significant association between age group and infection type. Hepatitis B was more prevalent among individuals aged 21 - 40 years, whereas hepatitis C was more common in the ≤ 20 -year and 41 - 60-year age groups. The higher prevalence of hepatitis B in the 21 - 40-year group may reflect generational differences in immunity and vaccination coverage. Individuals in this group were likely born before the introduction or widespread implementation of hepatitis B vaccination programs, making them more susceptible than younger groups that benefited from early immunization (19).

Variation in hepatitis B prevalence across age groups may also reflect differences in immune response and viral persistence, with individuals in early adulthood potentially having a greater likelihood of chronic infection following exposure (20).

The higher prevalence of hepatitis C in both younger and older age groups may be related to historical exposure patterns and cumulative risk. In older adults, hepatitis C may reflect infections acquired years earlier, given the disease's long incubation period and tendency to remain undiagnosed for extended periods (21). Among younger individuals, HCV infection may indicate ongoing community transmission associated with unrecognized or subclinical infections rather than direct exposure to traditional risk factors (22).

Differences in the biological characteristics of HBV and HCV may contribute to their age-related distributions. Hepatitis B is likely influenced by immunity and vaccination status, whereas hepatitis C tends to persist chronically in the community, contributing to its prevalence across broader age groups (23). These findings highlight the importance of age-specific prevention strategies, including HBV vaccination and enhanced HCV screening, particularly in vulnerable groups.

5.1. Conclusions

The prevalence of HBV and HCV infections among outpatients in Basrah Governorate, Iraq, was relatively low.

However, clear epidemiological differences were observed across demographic groups. Hepatitis B was more common among males, whereas hepatitis C was more prevalent among females, with a statistically significant association between sex and infection type. Age was also significantly associated with infection distribution, with the highest prevalence recorded in the 21 - 40-year group. A significant association was found between age group and hepatitis virus type.

These findings underscore the need for targeted screening and investigative programs for high-risk groups, particularly individuals aged 21 - 40 years. Strengthening HBV vaccination campaigns, developing early HCV detection strategies, and increasing community health awareness are essential measures to reduce the burden of viral hepatitis.

Footnotes

AI Use Disclosure: The author declares that no generative AI tools were used in the creation of this article.

Authors' Contribution: Study Concept and Design: I. J. A.; Data Acquisition: I. J. A.; Data Analysis and Interpretation: I. J. A.; Manuscript Drafting: I. J. A.; Critical Revision for Important Intellectual Content: I. J. A.; Statistical Analysis: I. J. A.; Administrative, Technical, and Material Support: I. J. A.; Study Supervision: I. J. A.

Conflict of Interests Statement: The authors declare no conflict of interest.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: The study was approved by the Ethics Committee of the College of Education for Pure Sciences, University of Basrah, Iraq.

Funding/Support: No external funding or financial support was received for this study.

Informed Consent: The study ensured anonymity and confidentiality of all collected data, and all procedures were conducted in accordance with ethical guidelines for human research.

References

1. Ramasamy S, Raghavan B, Pavithran S, Misra S, Susindran B, Lahariya C. Eliminating viral hepatitis from India and Southeast Asia by 2030: challenges and ways forward. *Preventive Medicine Research & Reviews*. 2024;1(2):84-89. https://doi.org/10.4103/PMRR.PMRR_2_23.

2. Chikwendu A, Unikutelle HL, Olumide AT. Hepatitis B and C virus prevalence among patients and healthcare workers' prevention practices towards the viruses in a secondary healthcare facility in Northern Nigeria. *Pan Afr Med J*. 2023;**46**. [PubMed ID: 38314232]. [PubMed Central ID: PMC10837276]. <https://doi.org/10.11604/pamj.2023.46.82.40530>.
3. Nguyen MH, Wong G, Gane E, Kao JH, Dusheiko G. Hepatitis B Virus: Advances in Prevention, Diagnosis, and Therapy. *Clin Microbiol Rev*. 2020;**33**(2). e00046-19. [PubMed ID: 32102898]. [PubMed Central ID: PMC7048015]. <https://doi.org/10.1128/CMR.00046-19>.
4. Liu J, Yuan T, Xue L, Liang H. Pathogenesis, prevention, and therapeutic advances in hepatitis B, C, and D. *Viol J*. 2025;**22**(1). 274. [PubMed ID: 40790753]. [PubMed Central ID: PMC12337480]. <https://doi.org/10.1186/s12985-025-02907-3>.
5. Olakunde BO, Adeyinka DA, Olakunde OA, Eneh SC, Ogundipe T. Epidemiology of Hepatitis B Virus Infection in Nigeria: A Narrative Review of Prevalence, Transmission, Genotypes, Coinfections, and Mortality. *J Trop Med*. 2025;**2025**(1). 4939367. [PubMed ID: 41050435]. [PubMed Central ID: PMC12494470]. <https://doi.org/10.1155/jotm/4939367>.
6. Yang S, Zhong L, Huang L, Lin S, Li Y. Global burden and trends of viral hepatitis among women of childbearing age from 1990 to 2021. *Front Microbiol*. 1990;**16**. 1553129. [PubMed ID: 40061861]. [PubMed Central ID: PMC11885505]. <https://doi.org/10.3389/fmicb.2025.1553129>.
7. Jalal MA, Etemad K, Karami M, Namdari M, Lami F, Taher TMJ. Ten-year analysis of hepatitis B incidence in Iraq. *East Mediterr Health J*. 2025;**31**(8):486-493. [PubMed ID: 40960037]. <https://doi.org/10.26719/2025.31.8.486>.
8. Al-Barzany NH, Ali KS. Prevalence of Hepatitis B Core Antibodies and Occult Hepatitis B Infection among Blood Donors in Erbil Governorate, Iraq. *UHD J Sci Technol*. 2025;**9**(2):1-6. <https://doi.org/10.21928/uhdjt.v9n2y2025.ppt-6>.
9. Ali HH, Alyasiri AJ. Geographical distribution of hepatitis A, B and C infection in Al-Muthanna province, comparative study. *J Biomed Biosens*. 2024;**4**(1):14-30. <https://doi.org/10.58613/jbb412>.
10. Al-Mussa Z, Thamair H. The prevalence rate of hepatitis c virus in basrah city and the common causative risk factors: the prevalence rate of hepatitis c virus in basrah city and the common causative risk factors. *Iraqi Natl J Med*. 2019;**1**(2):59-65. <https://doi.org/10.37319/iqnjm.1.2.5>.
11. Abas IJ, Al-Ali S. Study the Incidence of Hepatitis B and C Viruses Infections among Pregnant Women in Basrah-Iraq. *Int J Pharm Res*. 2021;**13**(1). <https://doi.org/10.31838/ijpr/2021.13.01.721>.
12. Al-Rubaye A, Tariq Z, Alrubaiy L. Prevalence of hepatitis B seromarkers and hepatitis C antibodies in blood donors in Basra, Iraq. *BMJ open Gastroenterol*. 2016;**3**(1):e000067. [PubMed ID: 26966550]. [PubMed Central ID: PMC4782278]. <https://doi.org/10.1136/bmjgast-2015-000067>.
13. Raheem T, Orukpe-Moses M, Akindele S, Wahab M, Ojerinola O, Akande D, et al. Age, gender pattern and liver function markers in hepatitis B and C seropositive participants attending a health facility in Yaba-Lagos, Nigeria. *J Biosci Med*. 2021;**9**(7):44-58. <https://doi.org/10.4236/jbm.2021.97007>.
14. Liu M, Li L, Zhao J, Ungvari GS, Ng CH, Duan Z, et al. Gender differences in demographic and clinical characteristics in patients with HBV-related liver diseases in China. *PeerJ*. 2022;**10**. e13828. [PubMed ID: 35959480]. [PubMed Central ID: PMC9359133]. <https://doi.org/10.7717/peerj.13828>.
15. Abdel-Gawad M, Nour M, El-Raey F, Nagdy H, Almansoury Y, El-Kassas M. Gender differences in prevalence of hepatitis C virus infection in Egypt: a systematic review and meta-analysis. *Sci Rep*. 2023;**13**(1). 2499. [PubMed ID: 36781919]. [PubMed Central ID: PMC9925441]. <https://doi.org/10.1038/s41598-023-29262-z>.
16. Faghihi SH, Azarbakhsh H, Pirae E. Epidemiological study of hepatitis B and hepatitis C infection in Kohgiluyeh and Boyer-Ahmad province (Iran) from 2008 to 2021: A cross-sectional study. *Health Sci Rep*. 2008;**7**(2). e1812. [PubMed ID: 38328787]. [PubMed Central ID: PMC10848580]. <https://doi.org/10.1002/hsr2.1812>.
17. Guclu E, Ogutlu A, Karabay O. A Study on the Age-Related Changes in Hepatitis B and C Virus Serology. *Eurasian J Med*. 2016;**48**(1):37-41. [PubMed ID: 27026763]. [PubMed Central ID: PMC4792495]. <https://doi.org/10.5152/eurasianjmed.2015.85>.
18. Stroffolini T, Stroffolini G. Prevalence and modes of transmission of hepatitis C virus infection: a historical worldwide review. *Viruses*. 2024;**16**(7):1115. [PubMed ID: 39066277]. [PubMed Central ID: PMC11281430]. <https://doi.org/10.3390/v16071115>.
19. Zhao H, Zhou X, Zhou YH. Hepatitis B vaccine development and implementation. *Hum Vaccin Immunother*. 2020;**16**(7):1533-1544. [PubMed ID: 32186974]. [PubMed Central ID: PMC7482909]. <https://doi.org/10.1080/21645515.2020.1732166>.
20. Shimakawa Y, Yan HJ, Tsuchiya N, Bottomley C, Hall AJ. Association of early age at establishment of chronic hepatitis B infection with persistent viral replication, liver cirrhosis and hepatocellular carcinoma: a systematic review. *PLoS One*. 2013;**8**(7):e69430. [PubMed ID: 23894479]. [PubMed Central ID: PMC3716646]. <https://doi.org/10.1371/journal.pone.0069430>.
21. Reid M, Price JC, Tien PC. Hepatitis C Virus Infection in the Older Patient. *Infect Dis Clin North Am*. 2017;**31**(4):827-838. [PubMed ID: 29079161]. [PubMed Central ID: PMC5675560]. <https://doi.org/10.1016/j.idc.2017.07.014>.
22. Woyesa SB, Amente KD. Hepatitis C Virus Dynamic Transmission Models Among People Who Inject Drugs. *Infect Drug Resist*. 2023;**16**:1061-1068. [PubMed ID: 36845020]. [PubMed Central ID: PMC9951810]. <https://doi.org/10.2147/IDR.S403133>.
23. Saraceni C, Birk J. A review of hepatitis B virus and hepatitis C virus immunopathogenesis. *J Clin Transl Hepatol*. 2021;**9**(3):409-418. [PubMed ID: 34221927]. [PubMed Central ID: PMC8237136]. <https://doi.org/10.14218/JCTH.2020.00095>.