



Hepatitis B and C and their relationship to patient demographics in Duhok city, Iraq

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Received: 15 Mar. 2025 Received in revised forum: 20 Apr. 2025 Accepted: 24 Apr. 2025

Final Proof Reading: 13 Apr. 2026 Available online: 25 Apr. 2026

ABSTRACT

The current study aimed to assess the prevalence of hepatitis B and C among males and females and different age groups in Duhok City. Samples were collected from the central laboratory of Duhok Health Department, informed consent was obtained from the patients, and then 2 ml of venous blood was drawn. Tests were performed to diagnose viral infection using ELISA technique. The results of the current study showed that the number of infections with hepatitis B virus was higher than type C was 51.3% and 48.7% respectively. It also showed that the number of infected males was higher than females, as the percentage of males infected with hepatitis B and C virus was 50.6% and 58.9%, while the percentage of infected females was 49.4% and 41.1% respectively, the results also showed that the highest age group infected with the virus is the group (18-28) as the percentage of those infected with viral hepatitis B and C reached 35% and 51% respectively, while the lowest age group infected with the virus was ≥ 40 , as the percentage of those infected with viral hepatitis B and C reached 24% and 14% respectively. We conclude from the study that the prevalence of hepatitis B is higher than C, the results also showed that male gender and age are considered risk factors for hepatitis B and C, as the results showed a positive relationship between the prevalence of viral infection with types B and C and males and young ages.

Keywords: HCV, HBV, Seroprevalence, gender

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التهاب الكبد الفيروسي نوعي B و C وعلاقتها بالديموغرافية للمرضى في مدينة دهوك، العراق

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الملخص

هدف البحث الحالي الى تقييم نسبة انتشار الاصابة بالتهاب الكبد الفيروسي نوعي B و C بين الذكور والاناث وبين الفئات العمرية المختلفة في محافظة دهوك، جمعت العينات من المختبر المركزي التابع لدائرة صحة دهوك وتم اخذ الموافقة المستتيرة من المرضى ومن ثم سحب 2مل من الدم الوريدي تم اجراء الاختبارات لتشخيص الإصابة الفيروسيّة باستخدام تقنية الاليزا , أظهرت النتائج من خلال الدراسة الحالية ان اعداد الإصابات بالتهاب الكبد الفيروسي لنوع B اعلى من نوع C اذ بلغت (51.3%, 48.7%) على التوالي , كما أظهرت النتائج أن عدد الذكور المصابين أعلى من الإناث حيث بلغت نسبة الذكور المصابين بفيروس التهاب الكبد الفيروسي نوعي B و C (50.6%, 58.9%) بينما بلغت نسبة الإناث المصابات (49.4% , 41.1%) على التوالي. كما بينت النتائج أيضا ان اعلى فئة عمرية مصابة بالفيروس هي الفئة (18-28) اذ بلغت نسبة المصابين بالتهاب الكبد الفيروسي نوعي B و C (35% , 51%) على التوالي بينما كانت اقل فئة عمرية مصابة بالفيروس هي ≥ 40 حيث بلغت نسبة المصابين بالتهاب الكبد الفيروسي نوعي B و C (24%, 14%) على التوالي. نستنتج من الدراسة ان نسبة انتشار فيروس التهاب الكبد نوع B اعلى من C وكما بينت النتائج أيضا ان الجنس الذكري والعمر يعتبر عامل خطورة للإصابة بالتهاب الكبد الفيروسي نوعي B و C حيث أظهرت النتائج علاقة إيجابية بين انتشار الإصابة الفيروسيّة لنوعي B و C في الذكور في الاعمار الصغيرة .

INTRODUCTION

Viral hepatitis refers to inflammation of the liver caused by a viral infection ⁽¹⁾, There are six viruses that selectively infect the liver and cause viral hepatitis namely Hepatitis A Virus (HAV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Hepatitis D Virus (HDV), Hepatitis G Virus (HGV), and Hepatitis E Virus (HEV) ⁽²⁾, Hepatitis B and Hepatitis C viruses pose a major global health challenges leading to serious complications such as cirrhosis and hepatocellular carcinoma. Despite the availability of vaccines and treatments these infections still persist especially in areas such as Iraq ⁽³⁾ (HBV) and (HCV) are considered the most dangerous types because they cause chronic hepatitis, which often leads to hepatocellular carcinoma (HCC) ⁽²⁾, Hepatitis B virus is a double-stranded DNA virus belonging to the *Hepadnaviridae* family and hepatitis B virus infection is the most common chronic viral infection in the world ⁽⁴⁾, While hepatitis C virus is a small

enveloped virus, belonging to the *Flaviviridae* family, genetic material is single stranded positive-sense ribonucleic acid ⁽⁵⁾, Hepatitis B and C virus have a range of symptoms include acute illness lasting several weeks, yellowing of the skin and eyes (jaundice), dark urine, nausea, vomiting and abdominal pain. In severe, it causes liver failure, which may lead to death ^(6,7) Other viruses cause liver damage, such as Corona-virus ⁽⁸⁾ infection is diagnosed by detecting the pathogen and confirming its presence in the body of the infected person, as the purpose of diagnosing a viral infection is to allow the identification and treatment of infected people. Therefore, diagnosing a viral infection is important to prevent the development of the disease and the spread of the virus ⁽⁹⁾. The importance of laboratory diagnosis lies in confirming the diagnosis of hepatitis B virus infection, due to the difficulty of distinguishing it clinically from other types, which makes laboratory verification necessary. In addition

to the possible hidden expansion, 80% of individuals infected with the hepatitis B virus do not show symptoms⁽¹⁰⁾, as for the hepatitis C virus, about 80% do not show symptoms, and in the absence of laboratory tests specific to the virus, most patients do not realize that they are infected with the virus⁽¹¹⁾. The indirect tests aim to detect antibodies caused by viral infections, including IgM for acute infection and IgG for acute or chronic infection. While in direct tests include virus isolation, detection of viral antigens, and viral nucleic acids⁽¹²⁾. ELISA technology is used to detect antibodies and is considered sensitive for detecting viral infections⁽¹³⁾.

The virus is transmitted in several ways, but blood and its derivatives (serum, plasma) are considered the most common ways of transmitting viruses as blood donation and transfusion are two major factors that contribute to the spread of blood-borne diseases, Medical references consider contaminated blood transfusion as one of the most important ways of contracting hepatitis C virus⁽¹⁴⁾, This is due to the patients continuous need for blood transfusions, and as a result, they are exposed to continuous blood transfusions. It is transmitted among health care workers and is known as high-risk groups, as studies have reported 13.4% of hepatitis infections among health care workers⁽¹⁵⁾, most health care workers' infections are through needle sticks contaminated with the blood of an infected person. Surgical operations are a risk factor for the transmission of viruses, including some incorrect behaviors of specialists. Medicine during surgical operations in terms of poor sterilization⁽¹⁶⁾. As well as dental surgeries, where the use of unsterilized tools can help spread the virus⁽¹⁷⁾. Some wrong behaviors such as poor hygiene practices of barbers can transmit the virus to customers, as the virus can remain on razor blades for several days and the virus can be easily transmitted through unsterilized blades infected with blood containing the virus from one person to another. Many researches revealed that barbers are a cause of the spread of hepatitis C virus⁽¹⁸⁾. Some studies have documented a

prevalence rate ranging from 17.9-24.7% due to the use of unclean blades⁽¹⁹⁾. Drug abuse in Pakistan and many other developing countries is due to social customs in the main injection for the spread of hepatitis C. According to studies, intravenous drug abuse increases the chance of infection with the virus by 46 times compared to health care workers⁽²⁰⁾.

Aim of the study

The aim of present study is arranging the infected with viral hepatitis B and C into specific categories, including two groups according to gender (male and female) and according to the age group of those infected to determine the prevalence of viral infections among these groups.

MATERIALS AND METHODS

Samples were collected from the central laboratory of Duhok Health Department, 150 samples were collected during the study period from 1-7-2023 to 1-1-2024. Information was collected from each patient through a questionnaire after obtaining his/her personal consent, including information (gender and age). Then, 2 ml of peripheral blood was drawn and placed in test tubes containing an anticoagulant. The centrifugation process was performed to separate the serum and detect hepatitis B surface antigen (HBsAg) using the HBs Ag ELISA Kit / Advanced /China according to the manufacturer's instructions. Serum samples were added to wells pre-coated with specific antibodies, and the optical density was measured at 450 nm, with a cut-off index value of 1.00 used to define a positive result. Similarly, antibodies to hepatitis C virus were detected using the HCV Ab ELISA Kit / CTK/ USA, Plasma samples were placed in wells coated with HCV antigens and the optical density was measured at 450 nm with a cutoff index value of 1.00 used to define a positive result.

Ethical Approval

The final study protocol was approved by the Scientific and Ethical Committee, University of Duhok and Duhok Polytechnic University, on 30 Aug 2023, with reference number 30082023-7-6,

subject to the requirement to obtain informed consent from each patient.

RESULTS AND DISCUSSION

1: Distribution of samples according to the type of viral infection:

One hundred fifty samples were collected during the study period from 1-7-2023 to 1-1-2024. The results of diagnosing the samples, as shown in Table (4-1), showed that the number of people infected with viral hepatitis HBV reached 77 and the percentage was 51.3%. As for those infected with hepatitis type HCV, the number of infected people reached 73 and the percentage was 48.7%. The results of the study show that the number of people infected with viral hepatitis HBV is more than with viral hepatitis HCV.

Table 1: Distribution of infected samples according to the type of viral infection

Type of viral infection	Number of infected	Percentage
HBV	77	51.3%
HCV	73	48.7%
Total	150	100%

We conclude from our current study that the incidence of HBV is higher than that of HCV, however, it can be considered a similar rate. As Iraq is located within the regions where the prevalence of HBV is higher than that of HCV, the reason may be due to race, as race may play a role in viral infections, in addition to the fact that the total number of people infected with type B is more numerous than type C in all countries of the world, as the World Health Organization estimated that 254 million people live with chronic hepatitis B infection and 50 million are infected with hepatitis C infection worldwide, in addition to the fact that hepatitis B and C cause about 3,500 deaths per day⁽²¹⁾. There are no country-level studies to report the prevalence of HBV and HCV, but there are a group of studies that revealed the number of infected people among blood donors, among those about to get married, among patients with thalassemia and those with renal failure, among prisoners and health sector workers⁽³⁾.

The results of current study were similar in that the prevalence of hepatitis B virus is higher than C virus with a group of studies in country, Iraq, and mention some of them, Where results were similar to the results of the researcher ⁽³⁾, in his study that was conducted retrospectively from October 1, 2019 to December 31, 2023, which included 15,091 people who were about to get married, and where their study aimed to reveal the percentage of those infected with viral hepatitis (B and C) among those about to get married in Zakho, as 139 were detected with hepatitis B and 10 with C virus, where the percentages of those infected with HBV and HCV reached (0.92%, 0.07%) respectively.

And agreed with⁽²²⁾ in Anbar to determine the number of people infected with viral hepatitis types (A), (B) and (C) among children who underwent tests to detect viral hepatitis types A, B and C using ELISA technology. The results of their study showed that the number of infections was as follows: (50, 42 and 35) respectively, and the percentages were (39.4%, 33.1% and 27.5%). These results are similar in that hepatitis B has a higher percentage than hepatitis C. The results of The current study were also similar to the results of the⁽²³⁾ in his study that aimed to detect the percentage of people infected with viral hepatitis (B and C) among blood donors in the city of Dohuk, as 62 people infected with HBV and 16 people infected with HCV were detected out of a total of 9700 donors, where the percentages of people infected with HBV and HCV were (0.78%, 0.2%) respectively. The results of our study were similar to the study conducted by ⁽²⁴⁾ that the overall rate of prevalence of viral hepatitis (B) and (C) among blood donors in Babylon during the period from 2007 to 2008 was (0.7%) and (0.5%) respectively. And agreed with the present result ⁽²⁵⁾ which were conducted at the main blood transfusion center in Dhi Qar from 2005 to 2008. The study included 1990 people who visited the center and confirmed the presence of 176 infected with hepatitis B virus and 100 infected with hepatitis C virus. The

percentage of viral infections for hepatitis B and C was (8.8%, 5%) respectively.

2: Distribution of samples according to gender and viral infection:

The results of the study, as shown in Table (2), showed that the percentage of males infected with

HBV was 50.6% of the total infected samples, while the percentage of females was 49.4%. The results of the current study showed that the percentage of males infected with HCV was 58.9%, while the percentage of females infected was 41.1%.

Table 2: Distribution of infected samples according to sex

Type of viral infection	Number of infected (male)	Percentage	Number of infected (females)	Percentage
HBV	39	%50.6	38	49.4%
HCV	43	%58.9	30	41.1%
Total	82	%100	68	100%

The reason for the higher incidence in males than in females may be that males are more exposed to risk factors and contact than women, and that males are more involved in medical activities, which makes them more susceptible to the virus than women.

The results of this study show that the percentage of males is higher than the percentage of females, and these results are similar to what was stated by ⁽²⁶⁾ in his study on those infected with viral hepatitis HBV in Baghdad Governorate, where the infection rate in his study in males was (54.53%), and as for females, the infection rate was (47.39%) , And agreed with Naqid *et al* in his study ⁽³⁾, and the differences between the sexes were noticeable, as males constituted 65.47% of hepatitis B virus infections, which is a much higher percentage than females 34.53%.It was close to the results of researcher ⁽²⁷⁾ in his study on those infected With viral hepatitis type HBV in Salah al-Din Governorate, the infection rate in males reached (60%) while the infection rate in females reached (40%).It was partially close to the results of the study of Al-Azzi in Diyala Governorate, where the infection rate of hepatitis type HBV in males reached 91.9% and in females 8.1%. Most studies have shown that males are more infected than females ⁽²⁸⁾ , and in general, it was found that the natural distribution between males and females for patients with hepatitis B virus type HBV ranges from (1:1) to (2.6:1) ⁽²⁹⁻³¹⁾ As for those infected with hepatitis B virus type HCV, the results of the current study showed that the

percentage of males infected with hepatitis B virus HCV was 58.9%, while the percentage of infected females was 41.1%. The results of the current study were consistent with many studies, as the results of study were consistent with the results of the researcher ⁽³²⁾ in Akre district, Dohuk Governorate, as the percentage of infected males was (58.6%), while the percentage of infected females was (41.4%). And agreed with ⁽³⁾ in his study, the differences between the sexes were noticeable, as when 60% of hepatitis C virus infections were among males, the percentage of females was 40%. The results of our study were similar to the results of researcher ⁽³³⁾ in Nineveh Governorate, as the percentage of infected males was (57.69%), while the percentage of infected females was (42.31%) This does not agree with what the researcher ⁽³⁴⁾ has concluded, as he showed that viral infections are more common among women than men. The reason for the difference with the present results may be that his study was on another virus.

3: The prevalence of infection among age groups:

The results of the current study, showed that the highest infection rate was among the age groups (18-28), where the number of patients infected with hepatitis B and C viruses reached (27and37) respectively, which is the highest category, as the percentage was (%35and%51) respectively, followed by the age groups (29-39), where the number of patients infected with hepatitis B and C viruses reached (26 and22) respectively, and the

percentage was (%34 and%30) and the lowest number of infections was in the age group (≥ 40), where the number of patients infected with hepatitis

B and C viruses reached (24and14) respectively, and the percentage was (%31and%19) respectively. as shown in Table (3).

Table 3: shows the percentage distribution of patients according to age groups

age groups	Number (percentage)	
	HBV	HCV
Type of viral infection	HBV	HCV
18 – 28	27 (35%)	37 (51%)
29 – 39	26 (34%)	22 (30%)
≥ 40	24 (31%)	14 (19%)
Total	77 (100%)	73 (100%)

The results of our studies were compatible with the results of the Naqid *et al* where the highest prevalence of hepatitis B infection was found in the age group 23-31 years, as the infection rate reached (73.38%) while it was the lowest injury rate in the category ≥ 41 , as it reached (5.76%). The prevalence of hepatitis C virus infection was the highest spread in the age group 23-31 years, when the injury rate reached (50%) while it was the lowest injury rate in the category ≥ 41 as it reached (10%) (3). This finding is consistent with a previous study (35, 36) which reported that the highest rates of hepatitis B and C virus infection were among individuals aged 20 to 30 years.

These results are compatible with a study conducted by (37, 38) where the infection among the Asian people of age groups (10-30 years) was 85% for people with hepatitis B and the infection rate was 12% of those over the age of 50 years.

The high rate of acute hepatitis C cases was reported among individuals between the ages of 20 and 39 years, as the injury coincided with the most influencing age groups with drug and excessive doses in the United States, indicating that there is a possible link between these factors and the transmission of the hepatitis (39, 40).

CONCLUSION

Several factors play a role in viral infections, including age and gender. It has been shown that males and young age groups are potential risk factors for viral infection. This may be due to the fact that young males are the group most exposed to practices that may contribute to viral infection.

Conflict of interests: The authors declared no conflicting interests.

Sources of funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author contribution: Authors contributed equally in the study.

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