**Original Research Article**

**Prevalence and Demographic Analysis of Hepatitis B and C in Different Sectors of Al-Anbar Governorate During 2024**

ABSTRACT

**Background**: The hepatitis B and hepatitis C viruses are significant global health challenges. This is the first study covering the overall governorate to show the prevalence of the disease.

**Objectives;** To estimate the prevalence of hepatitis B and C among the Anbar population during 2024, and study the demographic distribution of the disease and some related expected risk factors.

**Material and method**;A retrospective analytic cross-sectional study was done on all sectors of Anbar province, the sample was selected randomly including all ages during the 2024 year. The data was recorded on files of the Anbar public health directorate. Files include data about age, gender, residence, and some expected related factors. Blood samples were studied for hepatitis B and C by rapid direct agglutination test, positive cases were sent for accuracy and re-examined by ELISA technique in a public health lab.

**Result;** The total number of studied cases was 253572 persons with a male-to-female ratio (1.05:1). The proved hepatitis B was 585 (0.23%)patients, and hepatitis C was 151(0.06%) cases. Male cases were reported to be higher than females. Most of the patients in both types of infections were from middle-aged groups. Dental clinic visits and surgical procedures were the most expected risk factors. Most positive cases were reported in Ramadi and Fallujah cities in Anbar province.

**Conclusion;** A high percentage of hepatitis B and C infections were reported last year, another study on areas of high infection rate is recommended. Sessions at health centers and on TV programs are necessary to educate families about the risk factors of the disease, the importance of vaccination, and how contacts can deal with their patients.

**Keywords;** Hepatitis B . Hepatitis C. Prevalence. Anbar province.

INTRODUCTION

Hepatitis B virus (HBV) and hepatitis C virus (HCV) are an important and serious global health problem. Due to its chronicity, the infection can lead to the development of serious life-threatening conditions like liver cirrhosis and hepatocellular carcinoma. 1,2 TheWorld Health Organization estimated that 254 million people were living with chronic HBV infection and 50 million with HCV infection worldwide; HBV and HCV cause about 3500 deaths per day 2. The HBV more frequently affects the African region the Western Pacific region and Asia. The HCV is frequent between and within countries all around the world. 3,4 The disease is still present in our country, despite the availability of the hepatitis B vaccine and the treatment of both hepatitis B and C. This needs a heavy force from health centers and TV programs to educate people about this disease and encourage vaccinations.

Mode of transmission of HBV and HCV occurs through several ways, including direct contact with contaminated blood, blood transfusion, intravenous injections, sexual transmission, and prenatally from the mother to the fetus; however, a high percentage of disease occurs with unknown mode of transmission .5

This study aimed to ;

1. Estimate the expected prevalence of Hepatitis B and C in Anbar province during 2024.

2. Study the demographic distribution of the disease, including the distribution of the disease among age, gender, and different areas in Anbar province.

3. Study some expected risk factors of the disease.

MATERIAL AND METHOD

A retrospective cross-sectional analytic study was done on files from the Anbar public health directorate in Anbar governorate, Iraq. Permission to reach the files of patients was taken from the director of public health after giving a promise to keep the participant's information secret and to delete the files after completing the study. Ethical approval of this study was taken from the Anbar research committee. The study was done on files of patients who were diagnosed with hepatitis B and C in 2024. The study was done overall in the governorate, participants were selected randomly, and they were not forced to participate in this study. A sample includes those who visit the health centers distributed all over the governorate, those who visit dental clinics, patients before surgery, pregnant women before labor, blood donors, and children whose mothers were diagnosed with hepatitis B and C.

The arm of the individual was tied with a tourniquet, the position of a vein was disinfected with a 70% alcohol swab, and about two milliliters (2ml) of blood specimen was collected from each consenting participant using a labeled sterile vacationer. Test for hepatitis B and C was done by dipstick rapid screening kits. Positive cases were sent for accuracy in a public health lab in Ramadi city and the test was repeated by ELISA technique. Data was taken from each participant and recorded in special files including ;

1. Name.

2. Age, which was divided into 4 groups, below 20 years, from 20-40 years, from 40-60 years, and more than 60 years.

3. Gender.

4. Month of diagnosis.

5. Residence, among different cities of Anbar province.

6. Some expected risk factors were also studied for each participant including the following;

-.Health care workers

-Contact to confirm patient.

-Surgery last year

-Diabetic patients

-Children born to infected mothers

-New artificial kidney patients

-Blood or blood product recipients

-Dental clinic visitors last year

Exclusion criteria ;

1. Patients with incomplete data

2. Mixed hepatitis B and C infection.

During the study, normal noninfected participants were regarded as controls when comparing the demographic distribution of cases. A Chi-square (X2) test was performed for all the data to check for a relationship in detecting hepatitis B and C infection using the Statistical Package for Social Sciences (SPSS) Version 26.0. The differences were considered significant only when P ≤ 0.05.

RESULTS

The total number of participants in this study was (253572), from those (129687) were males and (123885) were females, in a ratio of 1.05:1. The proven hepatitis B cases were 585 (0.23%), and hepatitis C was 151 (0.06%) after sending all suspected and positive cases to retested in Public health labs in Ramadi city using ELISA technique. As shown in figures 1, and 2.

Figure 1 . Prevalence of hepatitis B during 2024.

Figure 2. Prevalence of Hepatitis C during 2024.

The distribution of cases among months of diagnosis during (2024) is shown in Table 1. No significant variation in the seasonal distribution of cases. P-value <0.05.

Table 1. Monthly prevalence of hepatitis B and C

|  |  |  |  |
| --- | --- | --- | --- |
| Month | Studied cases | Hepatitis B positive | Hepatitis C positive |
| January | 27704 | 69(0.25%) | 19(0.07%) |
| February | 16969 | 51(0.3%) | 12(0.07%) |
| March | 20092 | 71(0.35%) | 19(0.09%) |
| April | 25407 | 61(0.24%) | 11(0.04%) |
| May | 21798 | 49(0.22%) | 140(0.06%) |
| June | 19803 | 43(0.22%) | 11(0.055%) |
| July | 22834 | 39(0.17%) | 10(0.04%) |
| August | 18963 | 41(0.21%) | 12(0.06%) |
| September | 17840 | 50(0.28%) | 15(0.08%) |
| October | 24058 | 48(0.19%) | 11(0.05%) |
| November | 19340 | 21(0.1%) | 3(0.016%) |
| December | 18764 | 42(0.22%) | 14(0.07%) |
| Total | 253572 | 585(0.23%) | 151(0.06%) |

The P-value among different months of diagnosis of hepatitis B and C is non-significant >0.05

From (129687) studied male participants, 352(60.2%) were diagnosed with hepatitis B, and 87(57.6%) diagnosed with hepatitis C. While from 123885 studied female participants, 233(39.8%) were diagnosed with hepatitis B, and 64(42.4%) were diagnosed with hepatitis C. P-value was non-significant among gender distribution >0.05. As shown in table 2.

Table 2. Gender distribution of cases

|  |  |  |  |
| --- | --- | --- | --- |
| Gender | Studied cases | Hepatitis B positive | Hepatitis C positive |
| Male | 129687 | 352(60.2%) | 87(57.6%) |
| Female | 123885 | 233(39.8%) | 64(42.4%) |
| Total | 253572 | 585 | 151 |

P-value among different gender is non-significant >0.05

Age distribution of infected cases in hepatitis B showed that a higher infection rate was reported in the age group between 20-40 years (58.4%), and the least was among ages more than 60 years old (7.5%). Also among hepatitis C infection, most of the cases were reported in the age group between 20-40 years(56.3%), but the least was reported among those below 20 years (3.97%). The difference between percentages of both hepatitis B and C was non-significant. As shown in table 3.

Table 3. Age distribution of positive cases

|  |  |  |
| --- | --- | --- |
| Age | Hepatitis B | Hepatitis C |
| <20 year | 44(7.5%) | 6(3.97%) |
| 20-40 | 342(58.4%) | 85(56.3%) |
| 40-60 | 165(28.2%) | 51(33.8%) |
| >60 | 34(5.8%) | 9(5.96%) |
| Total | 585 | 151 |

The P-value among the percentage of 2 types of infection among different age groups is not significant >0.05

Possible related risk factors revealed that the most expected risk factors were dental clinic visits and surgical procedures. As in table 4.

Table 4. Possible risk factors among studied patients

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Studied cases | Hepatitis B | Hepatitis C |
| Health care workers | 1738 | 1(0.017%) | 0(0%) |
| Contact to confirm the case | 500 | 9(1.8%) | 0(0%) |
| Surgery last year | 40706 | 93(0.29%) | 25(0.06%) |
| Diabetic patients | 286 | 0(0%) | 0(0%) |
| Children born to infected mothers | 94 | 4(4.3%) | 1(0.94%) |
| New artificial kidney patients | 2075 | 11(0.5%) | 22(1.1%) |
| Blood or blood product recipients | 9275 | 2(0.02%) | 0(0%) |
| Dental clinic visitors last year | 97919 | 222(0.23%) | 52(0.05%) |

The distribution of cases among different cities in Anbar province showed more positive cases found in Ramadi and Fallujah cities. As shown in table 5.

Table 5. Distribution of cases among all governorate cities

|  |  |  |
| --- | --- | --- |
| **City** | Hepatitis B | Hepatitis C |
| Ramadi | 211 (36%) | 54 (35.7%) |
| Fallujah | 112 (19.1%) | 36 (23.8%) |
| Aameriah | 65 (11-1%) | 7 (4.6%) |
| Karmah | 34 (5.8%) | 12 (7.9%) |
| Heet | 14 (2.4%) | 4 (2.6%) |
| Anah | 3 (0.5%) | 1 (0.6%) |
| Rawah | 5 (0.85%) | 0 (0%) |
| Hadithah | 19 (2.4%) | 6 (3.9%) |
| Saghlawiah | 11 (1.9%) | 3 (1.9%) |
| Baghdadi | 11 (1.9%) | 1 (0.6%) |
| Rutbah | 6 (1%) | 1 (0.6%) |
| Khalidiah | 24 (4.1%) | 5 (3.3%) |
| Obiadi | 8 (1.36%) | 10 (6%) |
| Qaim | 62 (10.6%) | 20 (13.2%) |
| **Total** | 585 | 151 |

DISCUSSION

This study was one of a series of studies done and well done on the prevalence and demographic distribution of infectious diseases in Anbar province, like brucellosis 6, kala-azar7, measles, and others. The study is retrospective, so information is restricted to that done previously, another study on the effect of vaccination on the emergence of hepatitis B is recommended to show the effectiveness of the vaccine. However, this study is an important one, as it reflects the geographical, gender, and age distribution of the disease and gives hints about some risk factors that can play a role in increasing the prevalence of the disease, so we can explain this to populations through educational sessions in all sectors.

The prevalence of hepatitis B was 0.23% of studied cases, and that of hepatitis C was 0.06%. The study sample was large and occupied about one-eighth of the total number of Anbar population but it surely did not reflect the real rate of the disease, however; another big community study is recommended to show the real prevalence of the disease and to target the focus areas of infections. The national prevalence rate of HBV in Iraq was 1.6% and that of HCV was low at 0.4% in a general study in the country.8  In a new study in Zakho City,9 the prevalence of hepatitis B and C was (0.54%)and (0.045%) respectively. In a north Iran study, the prevalence of HBV and HCV was 0.24%, and 0.11% respectively10. The prevalence rate of the hepatitis C virus in Basra11 city was 2%, and the prevalence of hepatitis B in another study12 was 1.36 %. These differences between studies depend on many factors including sample size, individual targets of study, age of participants selected, and type of investigation done.

Infections were reported slightly more in males than females in both hepatitis B and C, this result was against what was found in the Thailand13 study which revealed a male-to-female ratio of hepatitis B ( 1: 3), and that the ratio of male to female in hepatitis C cases was (5.8 :1 ). Another study in Taiwan14 showed that the male sex was significantly more with HBV infection, whereas the female sex was significantly more with HCV infection, explaining theoretically that males may be more prone to HBV infection due to the effect of sex hormones 14. Many studies showed that hepatitis C infection is predominant in females; However, several reviews have reported no sex disparity, and other studies have even reported that HCV infection is more common in men than in women15,16. These differences may be explained by the level of education, the target of the sampling study, or to occupational state of participants. In our governorate, males are usually exposed to infection due to their jobs, as females are mostly housewives without external exposure.

Most reported cases of hepatitis B and C belong to the middle age group and fewer reported cases are from the lower age group, another study in Turkey 17 and Saudi Arabia 18 revealed the same results, our results were similar to those studied in India19 and Indonesia20. In recent years, HBV childhood vaccination programs have reduced this infection, even so in the present study, many cases of infants were reported getting their infection from their mothers during labor, this problem can be avoided through encouraging vaccination and providing specific immunoglobulin, another study also recommended to show the prevalence of hepatitis among babies from infected mothers. Hepatitis C infection is transmitted mainly through injections, sexual transmission, and less through infected mother to their born infants.

Among the expected risk factors that may increase the rate of infections were Dental clinic visitors, surgical procedures, and kidney dialysis patients. However, many of the diagnosed cases had more than one risk factor. The same results were obtained in many other studies 21,22,23. The rising prevalence rate of HBV and HCV can be attributed to the lack of public awareness about routes of transmission. Efforts to facilitate screening of infections before dental or surgical procedures, and pre-blood transfusion should be available. Special operations rooms should be prepared for infected patients. Frequent visits to barbers and beauty centers from health center staff are recommended.

Most of the cases in Anbar governorate were from Ramadi and Fallujah cities, however, the disease was diagnosed in all cities of Anbar province. This is attributed to the large populations of these two cities. The major limitation of this study was the retrospective type of this study, although the sharing number is high, it still does not reflect the real positive cases as those cases were reported from visitors to health centers.

CONCLUSION

The prevalence of infection with hepatitis B was 0.23%. The prevalence of hepatitis C was 0.06%. Males were more affected than females among both types of infections. Most of the cases were from middle-aged patients among both types of infections. The most expected risk factors are dental clinic visits and surgical procedures. Encourage vaccination for all ages, especially medical staff workers, barbers, and beauty centers are recommended. Providing immunoglobulin for newborn babies with infected mothers. A special study on the effectiveness of vaccination among medical and high-risk groups is recommended. Comparison of results between rapid screening tests and ELISA tests for diagnosis of HBV and HCV is also recommended.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

**Authors hereby declare** that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

ACKNOWLEDGMENT

We would like to express our deepest thanks to all the people who participated in this study the director of public health at Anbar directorate, and for medical and laboratory staff for their help throughout the execution of this study.

REFERENCES

1. Walaa Abdelhamed, Mohamed El-Kassas; Hepatitis B virus as a risk factor for hepatocellular carcinoma: There is still much work to do. Liver Research 8 (2024) 83-90.

2. World Health Organization. Hepatitis B, https://www.who.int/news-room/factsheets/detail/hepatitis-b; [9 April 2024].

3. Dolan K, Wirtz AL, Moazen B, Ndeffo-Mbah M, Galvani A, Kinner SA, Courtney R, McKee M, Amon JJ, Maher L, Hellard M, Beyrer C, Altice FL. Global burden of HIV, viral hepatitis, and tuberculosis in prisoners and detainees. Lancet. 2016 Sep 10;388(10049):1089-1102..

4. MacLachlan JH, Cowie BC. Hepatitis B virus epidemiology. Cold Spring Harb Perspect Med. 2015 May 1;5(5):a021410. doi: 10.1101/cshperspect.a021410. PMID: 25934461; PMCID: PMC4448582 .

5. Trépo C, Chan HL, Lok A. Hepatitis B virus infection. Lancet. 2014 Dec 6;384(9959):2053-63. doi: 10.1016/S0140-6736(14)60220-8. Epub 2014 Jun 18. PMID: 24954675.

6. Hani Y Danhash, Rafi Khaleel Al-Ani, Maher S Khalee. Modes of Transmission of Brucellosis in Anbar Governorate, Iraq. Anb. Med. J. 18(1):5−9, 2022.

7. Rafi Khaleel Al-Ani, Hameed Ghafil Faris Dawud, Khalid Talib Nawaf Khalaf; Kala-Azar among Children in Anbar Province, Iraq: A Retrospective Study. International Medical Journal Vol. 32, No. 2, pp. 75 - 78, June 2025.

8. Tarky, A. M., Akram, W. A., Al-Naaimi, A. S., & Omer, A. R. (2013). Epidemiology of viral hepatitis B and C in Iraq: a national survey 2005-2006. Zanco Journal of Medical Sciences (Zanco J Med Sci), 17(1), 370\_380.

9. Jamal, S. A., Naqid, I. A., Hussein, N. R., Yousif, S. H., Yousif, S. A., Hasso, S. S., Hazim, T. M., Mustafa, A. S., Taher, P. I., & Jamal, T. B.. The Prevalence of Hepatitis B and C Virus in Healthy Women in Zakho City, Kurdistan Region of Iraq: A Brief Report. Journal of Kermanshah University of Medical Sciences, (2019), 23(4). <https://doi.org/10.5812/JKUMS.99337>

10. Mansour-Ghanaei F, Joukar F, Naghipour M, Hassanipour S, Yeganeh S, Sepehrimanesh M, Fathalipour M. Epidemiologic profile of viral hepatitis B and C in North of Iran: results from PERSIAN Guilan Cohort Study (PGCS). BMC Res Notes. 2021 Feb 10;14(1):59.

11. Zainab H. Al-Mussa; Hawazin Y. Thamair; The prevalence rate of hepatitis C VIRUS IN Basrah city and the common causative risk factors. Iraqi Natl J Med [Internet]. 2019 Jun. 1 [cited 2025 Apr. 14];1(2):59-65.

12. Awatif H.Issa, Saad S.Hamadi, Salow Al-odor, Hayder A. Mahmoud; Epidemiological study of hepatitis B virus infections in patients in Basrah province. Basrah Journal of Veterinary Research, Vol. 11, No.3, 2012.p.82-88.

13. Lekskulchai V. Prevalence of Hepatitis B and C Virus Infections: Influence of National Health Care Policies and Local Clinical Practices. Med Sci Monit Basic Res. 2021 Nov 1;27:e933692.

14. Wang AC, Geng J-H, Wang C-W, Wu D-W, and Chen S-C.Sex difference in the associations among risk factors with hepatitis B and C infections in a large Taiwanese population study. Front. Public Health (2022);10:1068078.

15. Boix R, Cano R, Gallego P, Vallejo F, Fernández-Cuenca R, Noguer I, et al. Hepatitis C hospitalizations in Spain, 2004-2013: a retrospective epidemiological study. BMC Health Serv Res. (2017) 17:461.

16. Esmaeili A, Mirzazadeh A, Morris MD, Hajarizadeh B, Sacks HS, et al. The effect of female sex on hepatitis c incidence among people who inject drugs: results from the international multicohort InC3 collaborative. Clin Infect Dis. (2018) 66:20–8.

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 Feb;48(1):37-41.

18. Ibrahim G Alghamdi, Rahaf M Alghamdi, Mohamed S Alghamd; Epidemiology of Hepatitis B in Saudi Arabia from 2006 to 2021; Hepatic Medicine: Evidence and Research 2023:15. P.233–247

19. Faghihi SH, Azarbakhsh H, Piraee 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. 2024 Feb 7;7(2):e1812.

20. Lusida MI, Juniastuti Y, Yano Y. Current hepatitis B virus infection situation in Indonesia and its genetic diversity. World J Gastroenterol. 2016;22(32):7264.

21 Samo AA, Laghari ZA, Baig NM, Khoso GM. Prevalence and Risk Factors Associated with Hepatitis B and C in Nawabshah, Sindh, Pakistan. Am J Trop Med Hyg. 2020 Dec 21;104(3):1101-1105.

22. Abbasi IN, Fatmi Z, Kadir MM, Sathiakumar N. Prevalence of hepatitis B virus infection among barbers and their knowledge, attitude, and practices in the district of Sukkur, Sindh. Int J Occup Med Environ Health; 2014, 27: 757–765.

23. Desikan P, Khan Z,. Prevalence of hepatitis B and hepatitis C virus co-infection in India: a systematic review and meta-analysis. Indian J Med Microbiol; 2017, 35: 332–339.