

Prevalence of Hepatitis B Virus Infection among General People and Hemophilia Patients in Erbil City, Iraq during 2020-2021

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ABSTRACT

Background: Hepatitis B virus (HBV) infection is a well-recognized cause of liver disease and represents a major problem for global health. Understanding factors associated with HBV transmission could offer practical applications to reduce disease risk. **Objective:** The aim of the current study to assess prevalence and risk factors of HBV infection in city of Erbil during 2020 and 2021. **Patients and methods:** HBV infection data were collected for all registered patients, including those who had chronic bleeding disorder (hemophilia) from the Center of Infectious Disease Control and Nanakaly Hospital for Hematology & Oncology in Erbil. A structured data collection form was used to abstract data about route of infections and patients' demography. **Results:** The overall HBV infection rate in 2021 was significantly higher than in 2020, but it was particularly high among hemophilia patients (7.34%). Vast majority of the infections were found to be caused by visiting dental clinics. Occupation significantly varied among HBV-positive individuals, and free workers had a higher risk of the infection than others. The infection rate was significantly higher among males than females. The rate of family members of infected individuals who received the HBV vaccine was significantly lesser than those who did not receive the vaccine. **Conclusion:** Despite the availability of effective vaccines to the public, the risk of HBV infection is continuously growing with the advances in population dynamics in the city.

Keywords: Hepatitis-B, Hepatocellular cancer, prevalence, risk factors, viral infection, Cross sectional study, Erbil Polytechnic University.

INTRODUCTION

Liver infections with the hepatitis-B virus (HBV) threaten global health, and it is a serious public health problem ⁽¹⁾. The virus is known to initially infect parenchymal cells of the liver and eventually leads to chronic liver disease or even liver cancer in about 5% of adult cases and approximately 95% of infants and children cases ⁽²⁾. Liver cancer has been one of the leading causes of cancer death in the USA ⁽³⁾. Globally, HBV infection caused over 1.3 million deaths in 2015 ⁽⁴⁾ and 0.8 million deaths in 2019 ⁽²⁾. Unfortunately, the currently available therapies can only be used for infection management, and curing is yet to be possible ⁽⁵⁾. According to a WHO report, there are approximately 300 million people expected to have chronic hepatitis B infection, and every year, additional 1.5 million people acquire the infection ⁽²⁾.

HBV is one of the three most prevalent bloodborne pathogens. There are various levels of HBV endemic in the world. Although Asia and Africa were previously considered to be highly endemic areas for HBV, the introduction of vaccination programs has effectively dropped the endemicity levels ⁽⁶⁾. In Iraq and different countries in the Middle East, disease endemicity is at the intermediate level. The virus is commonly transmitted to uninfected susceptible individuals by several procedures, including transfusion of blood and its products; various surgical procedures; dialysis; intravenous drug administration; contact with contaminated blood; punctures by contaminated sharp materials; cosmetic procedures including tattoos or piercings; other cosmetic treatments including pedicure or manicure and shared use of hygiene tools such as a

toothbrush or razor ⁽⁷⁾. Viral transmission can also occur by incoming sexual discharge and other body fluids such as saliva ⁽⁸⁾. Additionally, in endemic regions, HBV is vertically spread from infected mothers to new-borns during birth. The virus can endure in the physical environment for over seven days, and during this period, it remains infective to susceptible people if it gets into the body ⁽²⁾. With a wide range of risk factors associated with HBV infections, hepatitis B prevalence changes according to occupation, lifestyle, and environmental factors ⁽⁹⁾.

There is only a limited number of literature that has addressed the prevalence of hepatitis B among haemophilia patients in Iraq ⁽¹⁰⁾, and particularly in the Kurdistan Region, there is so far no publication available in this regard. Haemophilia patients are likely to be at higher risk of infection with bloodborne pathogens due to their continuous need to receive blood products; therefore, they need to be monitored regularly ⁽¹¹⁾. Prevention strategies involve three main approaches, including first: prevention of awareness, health education, hepatitis B vaccines which are thought to be very effective for all the population, and administration of prophylaxis for post-exposure. Second: implementation of proper sanitary and hygienic practices, blood safety, and responsibility-taking for sex safety and health practices. Third: Implementation of anti-viral prophylaxis to prevent vertical transmission of hepatitis B from mother to child ⁽²⁾. One of the key issues with prevention strategies is that nearly 90% of HBV-infected people lack awareness of their infection; despite the existing challenges, WHO has declared that it has the plan to eliminate HBV infection in the world by 2030. To eliminate HBV infection in Iraq, effective

strategies should be established depending on the available epidemiological data and risk factors. This study was designed to investigate the prevalence of HBV and its associated risk factors in Erbil City, Kurdistan region, Northern Iraq.

PATIENTS AND METHODS

This study was conducted on all registered patients with hepatitis B during the two consequent years of 2020 and 2021 in the Center of Infectious Disease Control, Erbil office. Data on hepatitis B infection among haemophilia patients were collected from Nanakaly Hospital for Hematology & Oncology in Erbil. We used the online resources of MacroTrends to obtain the population size of the Erbil district during 2020 and 2021 ⁽¹²⁾.

Hepatitis B testing was carried out for the participants following standard testing guidelines by WHO ⁽¹³⁾. In brief, after twice positive HBsAg serological test results, HBV nucleic acid testing (NAT) was carried out at the Internal lab of Hawler Teaching Hospital to confirm the test positivity.

A structured data collection form was used to abstract the following data:

Demographic characteristics: Sex, age, residence, marital status, education, and occupation. **Clinical profile of the patients:** Type of Hepatitis.

Surgical history: Synovectomy, circumcision, dental intervention, and other types of surgical operations (if present)

Family history regarding the HBV- positives cases and hepatitis vaccine.

Clinical history and demography data were collected by reviewing all patient records at the Center for Infectious

Disease Control, while information regarding the vaccination status of the family members of infected patients was obtained by filling out a form after calling patients or their first-degree relatives.

Ethical approval:

The Ethics Committee at the Salahaddin University, Erbil granted its approval for the study. The study was undertaken after gaining the ethical approval of Erbil Health Technical College, Erbil Polytechnic University and the Erbil Health directory. Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical Analysis

A Prism-Biograph (version 7) program was used for data analysis. Qualitative data were defined as numbers and percentages. Chi-Square test and Fischer exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as means and SD. P value ≤ 0.05 was considered to be statistically significant.

RESULTS

During 2020 and 2021, 117 HBV-positive patients were recorded at the Center of Infection Control, Erbil. Out of these patients, 86.6% were originally residents of Erbil District. The rate of infection in 2021 was significantly higher than the rate which was recorded in 2020 [Chi-square 11.82, P value < 0.001] (**Figure 1**).

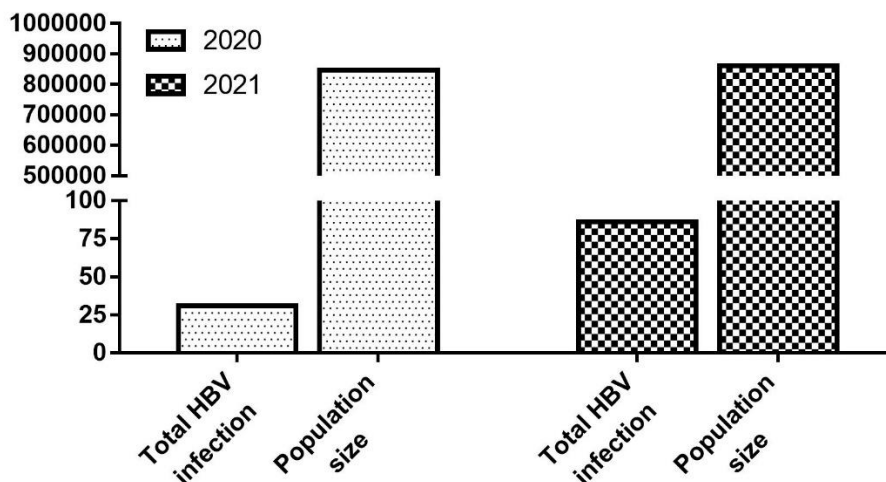


Figure 1. The number of HBV infections registered and estimated population size during 2020 (lined bars) and 2021 (dotted bars).

About 86.6% of the patients were originally from Erbil District. There were only a few who were from other Iraqi cities or foreign countries, including Iran, Turkey, India, Palestine, and Yemen (Figure 2).

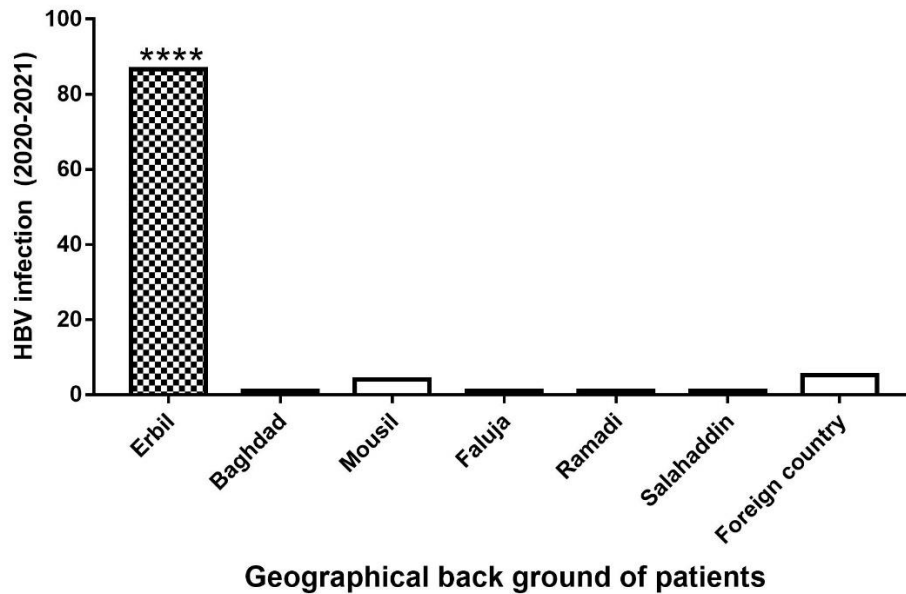


Figure 2. Total HBV infection among Erbil-resident patients with different geographical backgrounds during two consequent years of 2020 and 2021.

The patients were commonly infected due to transfusion procedures of blood or blood products, visiting a dentist's clinic, having an infected person in the family, having sex with an infected partner or having a history of surgery (Figure 3). The vast majority of the patients (83.8%) were found to have been infected after visiting a dentist, while only a fewer number of patients were infected through other routes such as surgery (7.1%), Blood transfusion (6.1%), other family members (2%) or sexual contact (1%) (Chi-square 84.25, P value <0.0001). Although the overall transfusion-transmitted HBV infection rate represented the third highest rate after dentistry and surgery, out of 177 registered hemophilia patients, 13 (7.3%) cases were confirmed to be HBV-positive.

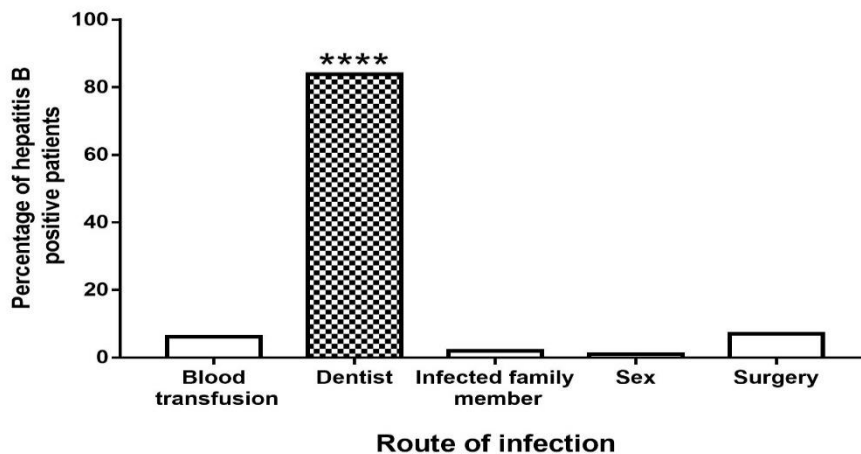


Figure 3. From the registered clinical history of patients, HBV infection was due to five main routes (blood/blood product, visiting a dentist, from an infected family member, sex, or due to surgical treatment). The vast majority of the patients were found to have contracted the infection due to visiting dentist clinics (dotted bar).

The prevalence of hepatitis B was significantly affected by patients' occupation (Chi-square 75.47, P value <0.0001) (Figure 4). The rate of HBV infection was significantly higher among free workers (those who practice multiple types of work), and housewives had a significantly higher infection rate than the other job types (barber, doctor, nurse, farmer, meat man, military officer, party holder, peshmarga (soldier), police, retired employees, grocery seller, school teacher, student, housegirl, jobless and unknown profession).

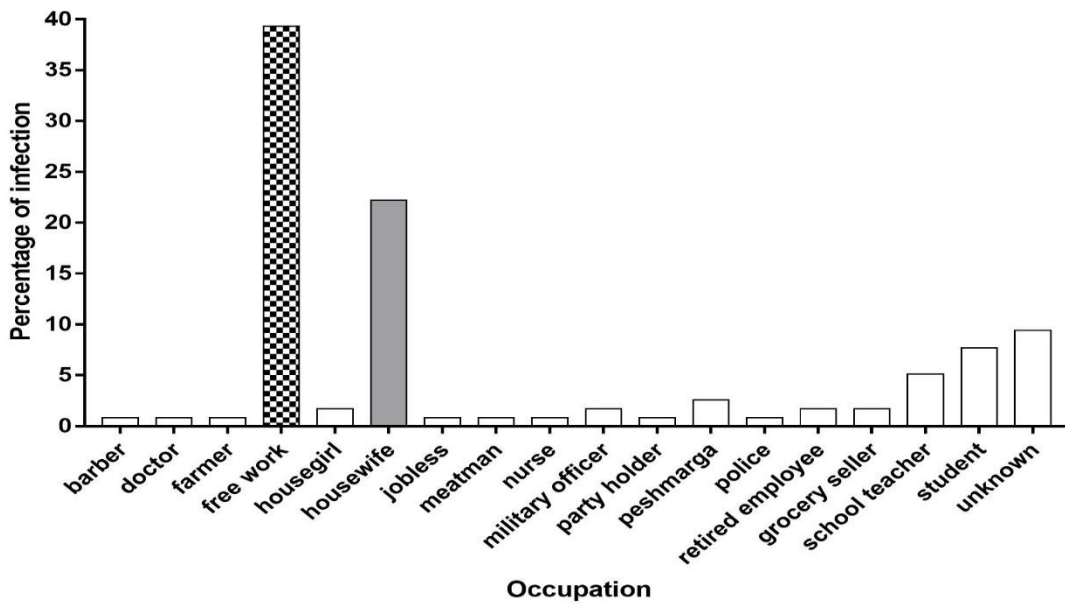


Figure 4. The rate of infection was remarkably higher among free workers (dotted bar) and housewives (shaded bar) compared to the rest of the occupation types.

Gender was also found to play a role in determining the infection rate (Figure 5). Generally, males were found to be more prone to contracting the infection than females (Chi-square 6.659, P value 0.0099).

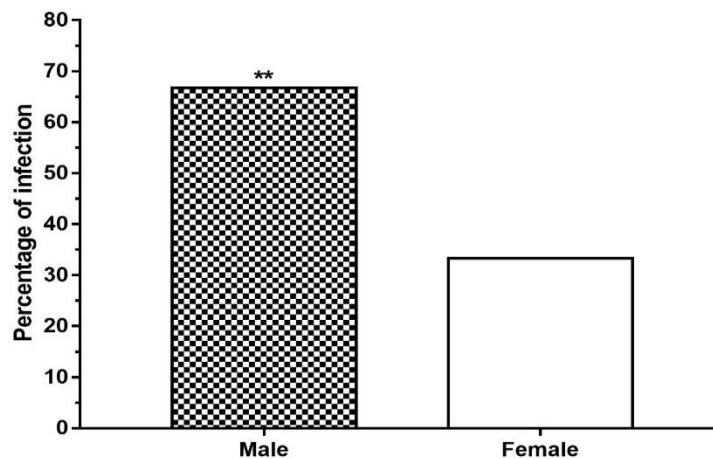


Figure 5. The difference in the infection rate between male (dotted bar) and female (shaded bar) participants.

The infection rate was significantly higher among married individuals than singles (Chi-square 23.65, P value <0.0001).

Although the infection rate was only slightly higher among those who traveled abroad, the difference was not significant (Chi-square 3.57, P value= 0.0589).

The infection rate was significantly higher among medium economic than at good and bad levels (Chi-square 85.51, P value <0.0001).

Out of 72 HBV-positive patients who were randomly chosen and contacted to gather the required information regarding the infection rate among their family members, they had a mean of 5.6 (SD 3.5) family members living with them in the same house. The range was between a minimum of 1 and maximum a maximum of 16 with (SD 3.5). Of all the family members of patients, a mean of 3 persons (SD 3.14) was tested for HBV infection, only 1.4 (SD 2.71) had received HBV vaccine while the vast majority is a mean of 4.25 (SD 0.44) did not receive HBV vaccine. The number of unvaccinated family members was significantly greater than those who have received the vaccine (Chi-square 483, P value <0.0001) (Table 1).

Table 1 summarizes the medical history which includes the number of family members involved in the patient's household, the number of family members who were subjected to HBV screening tests after realizing their first HBV-positive member in the family, and the number of family members who have received the required doses of HBV vaccine.

Table 1. Medical history of included patients.

| Characteristics | Family member per household | Family member tested | A family member received the vaccine | Unvaccinated family member |
|--------------------|-----------------------------|----------------------|--------------------------------------|----------------------------|
| Number of values | 72 | 71 | 72 | 71 |
| Minimum | 1 | 0 | 0 | 0 |
| Maximum | 16 | 16 | 16 | 16 |
| Mean | 5.60 | 3.00 | 1.40 | 4.25 |
| Std. Deviation | 3.50 | 3.14 | 2.71 | 3.73 |
| Std. Error of Mean | 0.41 | 0.37 | 0.32 | 0.44 |

DISCUSSION

The prevalence of hepatitis B infection is affected by several factors, including exposure risks to the virus, implementation levels of prevention strategies, and vaccination programs. The spreading of infectious agents, including HBV, in medical settings, could be a major problem for public health. Medical doctors can widen their knowledge and increase their skills to protect their patients from the occupational risks of hepatitis B infection. The current study aimed to obtain data regarding patients who contracted HBV infection during 2020-2021 and the overall hepatitis B prevalence among haemophilia patients registered in Erbil District. We believe that our sample was representative of the whole population. This study proves that HBV infection is becoming more challenging as its rate greatly increased in 2021 compared to the previous years. Although several reasons were found to associate with hepatitis B infection prevalence, the risk was increased by visiting dental clinics.

With recent economic development and the presence of various diplomatic affairs, international NGOs, and business projects, there are multi-ethnic communities either from middle and southern Iraqi cities or foreign countries, including Iran, Turkey, Bangladesh, India, Palestine, and Yemen living in the city of Erbil. Although the presence of a relatively large number of people (mostly workers) from highly hepatitis B endemic countries such as Bangladesh ⁽¹⁴⁾ and other Southeast Asian countries, only a few people who are originally not from Erbil was HBV positive, this might be due to the strict health measure imposed by KRG at airports and land borders during passenger entry into the region.

Understanding the route of infection is the key to HBV infection prevention ⁽¹⁵⁾. In the current study, out of 99 HBV-positive patients, 83 (83.8%) were found to be infected by visiting dentists, followed by 7 (7.1%) by performing surgery, 6 (6%) blood transfusion, 2 (2%) vertical transmission from mother to preborn child and 1 (1%) by sexual contact. This study highlights the serious risk of improper hygienic status practised by dental clinics in the city. The transmission of HBV in dental practices can be prevented by practising regular clinical hygiene, such as firm disinfection of surfaces and the work area, equipment, the entire dental unit, and even the water-supply system ⁽¹⁶⁾.

The results of this study indicated that job-related exposures determine the risk of HBV infection among the residents. We found that free workers, including those

who do not have a specific stable job, had the highest risk of HBV infections (39.3%), and this was followed by a housewife (22.2%), students (7.6%), and school teachers (5.1%). At the same time, the rest of the other professions, such as barber, doctor, nurse, farmer, meat man, security officer, and soldier, had a much lesser risk of the infection ranging between 2.5% to 0.5% only. It is difficult to realize the exact cause of the high infection rate among workers. The main reasons might include the fact that free worker communities generally have limited hygiene backgrounds due to difficult economic conditions and starting to work at an early age before completing school programs. It might also associate with the nature of the environment they work in it.

The Hepatitis B infection rate was significantly higher among males than females, which is likely due to the cultural habits of the region allowing males to more commonly perform duties outside of the house and hence having higher exposure risks to infected individuals or contaminated objects. Another possible reason for the higher prevalence of HBV among males might relate to their sexual chromosomes and hormones. For example, it has been reported that contrary to women, men are generally more susceptible to viral infections ⁽¹⁷⁾. The infection rate was higher among married individuals than singles, and this might be due to two main reasons. First, married people are likely to stay longer outside working as they have a bigger responsibility to cover the expenditures of their families, and the second reason might involve an increased risk of acquiring infection from partners.

The prevalence of hepatitis B among haemophilia patients is high (7.3%) in comparison to the neighbouring country of Iran, which has been estimated to be 4.9% only ⁽¹¹⁾. Parts of the treatment for haemophilia patients include receiving blood components that should be taken from healthy donors ⁽¹⁸⁾. Therefore, all blood donors should be thoroughly examined for HBV infections prior to the transfusion procedure. People with a medium level of socioeconomic had a significantly higher infection rate (91.5%) in comparison with high and low levels. This difference is expected to associate with the abundance rate of this economic class as the vast majority of people are expected to fall to a medium level. This particularly might be true as, to some extent, the infection rate was similar between high and lower economic classes.

The key strategy to prevent and control the hepatitis B vaccine involves vaccination of the family members of

infected individuals⁽¹⁹⁾. Unfortunately, the largest number of family members of infected individuals did not receive the HBV vaccine. Vaccination and avoiding exposure to contaminated blood or body fluids of infected individuals are critical to prevent HBV infection^(15,16). It is encouraging that the required HBV vaccine is available at most of the public health centres in the region, but probably lack of awareness could be the reason that many people who are at high risk of HBV infection are yet to receive the vaccine.

CONCLUSIONS

Our findings suggest that the risk of HBV infection is continuously growing with the advances in population dynamics in the city of Erbil. Although strict measures are followed by the border agencies to limit the entry of infected individuals into the region and despite the availability of HBV vaccines free of charge at public health centres, there is an increasing risk of HBV infection.

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