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The Prevalence of Hepatitis B virus and Hepatitis C virus Infection among Blood Donors in Thi-Qar Blood Bank from 2020 to 2021

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Abstract

Hepatitis B virus and Hepatitis C virus are the most common causes of liver diseases. They are a significant global health issue. Hepatitis B (HBV) and Hepatitis C viruses (HCV)' infection caused by blood transfusions is still a major problem in developing countries. Cirrhosis, liver failure, and hepatocellular cancer are considered long-term complications of hepatitis B and C viruses. The objective of this research is to determine the epidemiology and the prevalence of HBV and HCV among blood donors at Thi-Qar blood bank during the period from 2020-2021. Demographic data has been collected from the central blood bank in Thi-Qar province, Iraq from the period 2020-2021. A total of (113887) blood donors have been included in this study. A total of 81 (0.14%) donors have shown positive for HBV and 57 (0.09%) for HCV. The highest age range between HBV and HCV-infected patients was between 30-40 years old (39.51%, 38.6%) respectively, while the lower age range between HBV-infected patients was between >20 years old (1.23%) and for HCV the lower age range was ≤60. Data also showed that the highest prevalence of HBV and HCV according to the place of residence was between urban residences between both infections. In conclusion, this research shows that Thi-Qar province may consider a low endemic area with HBV and HCV.

Keywords

Hepatitis B virus, Hepatitis C virus, blood donors, prevalence**,** Thi-Qar

الخلاصه

من اشهرمسببات امراض الكبد. وهما من المشاكل HCV و HBV يعتبر التهاب الكبد الفايروسي من نوع الناتجه من عمليات نقل HCV و HBV الصحيه العالميه الهامه. لا تزال الاصابه بالتهاب الكبد الفايروسي نوع الدم تمثل مشكله رئيسيه في البلدان الناميه. يعتبرتليف الكبد، والفشل الكبدي وسرطان الكبد من المضاعفات الهدف من هذا البحث هو تحديد نسبه .HCV و HBV طويله الامد نتيجه الاصابه بالتهاب الكبد الفايروسي نوع بين متبرعي الدم في مصرف الدم في ذي قار HCV و HBV انتشار وبائيات التهاب الكبد الفايروسي من نوع للفتره بين 2020_ 2021. تم جمع البيانات الديموغرافيه من مصرف الدم المركزي في محافظه ذي قار ، العراق للفتره من 2020_ 2021. تضمنت هذه الدراسه مجموع (113887) متبرعا للدم. اظهر اجمالي 81 اعلى فئه .HCV و 57 (0.09٪) موجبا للاصابه بفايروس HBV (0.14٪) متبرعا موجبا بالاصابه بفايروس كانت تتراوح ما بين سن 30-40 سنه (39.51 ٪ ، 38.6٪) علي HCV و HBV عمريه مصابه بفايروسي التوالي . في حين الفئه العمريه الادنى كانت اقل من عشرين سنه (1.23٪) للمصابين بفايروس التهاب الكبد كما اوضحت . **60** كانت للعمراكبر من HCV وبالنسبه للفئه العمريه الادنى بالنسبه للمصابين ب .HBV نوع

كانت في المساكن الحضريه لكلا الفايروسين. في HCV و HBV النتائج ان اعلى نسبه انتشار لفايروسي الكبد و HBV الختام، اظهر البحث ان محافظه ذي قار قد تعتبر مدينه منخفضه التوطن بفايروسي التهاب الكبد HCV.

Introduction

Hepatitis B virus (HBV) and hepatitis C virus (HCV) Infection both can cause acute and chronic hepatitis infection and it's a global health problem [1], [2]. Each year, deaths from viral hepatitis are approximately 90% caused by hepatitis B and C viruses, and 10% of deaths each year are due to other viruses that infect the liver [3]. Cirrhosis, liver failure, and hepatocellular cancer are considered long-term complications of hepatitis B and C viruses [4]. About 1.4 million deaths per year (about 687 000 deaths caused by HBV and 704 000 deaths due to HCV) [5].

There are various serological markers used to detect HBV infection, including measuring the levels of HBsAg and HBcAb. Furthermore, HBV can be detected using molecular diagnosis such as PCR [6]. HCV infection is diagnosed by the detection of IgG in serum or plasma utilizing an immunoassay. However, the detection of HCV nucleic acid is considered the gold standard for acute infection [7].

Most new infections with HCV are subclinical. In addition, Most HCV patients develop chronic hepatitis (70–90%), and many of them are at risk of developing chronic active hepatitis and cirrhosis (10–20%). Hepatocellular carcinoma caused by HCV an account for 1-3% of infected patients that considers the 5th most known cause of cancer globally [8].

Blood safety is considered a major public health issue in the whole world and especially in developing countries. HBV and blood-borne microorganisms, are transmitted by different routes including contaminated blood transfusion, sexual contact, sharing contaminated needles and unsafe injections practice [9], [10]. Chronic infection may occur due to HBV and HCV infection, especially in infants, and they are major determinants in the development of liver disease and hepatocellular carcinoma in those who are infected as children [11].

In the last few decades, viral hepatitis due to HBV and HCV infections has been reduced [12]. Many previous Iraqi's studies have shown that HBV endemicity is low [13] with a rate of 3.2 % in Samara [14], (9.12%) in Baghdad [15], and in Kurdistan, the HBV prevalence was (0.78%) [16], while in Basrah the seroprevalence was

(2.3%) [17]. HCV seroprevalence in many Iraqi types of research was as follows (0.1%, 0.2%, 90%, 51.2%, and 67.3%) in Basrah, Kurdistan, Baghdad and among thalassaemic children in Baghdad respectively [15]–[18].

This decline in viral hepatitis in Iraq is a consequence of increasing awareness of viral hepatitis complications including the chronicity of the disease and hepatocellular carcinoma in addition to the increase in health educational programs adopted by health authorities and vaccination programs.

In comparison to the neighboring countries, viral hepatitis prevalence is higher as shown in a Jordani study, which revealed that 0.9% blood associated HCV infection among blood donors [19] Another study In Jordan showed that chronic HBV seroprevalence was studied to be between 1.4 and 3.5 percent, revealing low-intermediate endemicity of the virus [20], other Kuwaiti study showed that the prevalence of HCV was (0.9% among Kuwaiti citizens and 5.4% among non-Kuwaiti residences) [21] .

In Turkey, a study revealed that the prevalence of hepatitis B and C was 4% and 1% respectively [22] .

Therefore, it is crucial to determine the viral hepatitis prevalence in the Iraqi population to assess the burden of viral hepatitis, especially HBV and HCV, and to estimate the number of chronically infected individuals.

The aim of the study

The research aims for determining the epidemiology and the prevalence of HBV and HCV among blood donors at Thi-Qar blood bank during the period from 2020-2021. An epidemiological study could offer an observation of the current situation of viral hepatitis in Thi-Qar province including the impact of the vaccination policy for HBV and current screening programs to further control HBV and HCV transmission in the Thi-Qar population.

Materials and methods

Demographic data including (gender, age, and place of residence) has been collected from the Thi-Qar central blood bank database and the diagnostic markers used in the diagnosis of these viruses have also been recorded involving (Anti HBsAg, In Tech PRODUCTS, ELISA kit from China; and Anti-HCV 4th generation ELISA kit from

fortress diagnostics, United kingdom).

Statistical analysis

Statistical evaluation was performed using SPSS version 25. The statistical analysis used the Chi-square test, and a P value of 0.05 was deemed statistically significant.

Results

The current study included 113887 people from urban and rural areas, as well as men and women of various ages, at the Thi-Qar central blood bank.

The findings revealed that (81) of the (56438) tested men were infected with the hepatitis B virus, while none of the (377) tested women.

Furthermore, (57) patients were infected with the Hepatitis C virus among the total number of men (56699), while none of the (373) tested women blood donors were infected during the period from 2020 to 2021 in the central blood bank in Nasiriyah city, as illustrated in the (Table 1). The prevalence of the infection was calculated and valued at (0.14%) for HBV and (0.09%) for HCV. In addition, the prevalence of HBV among men and women was as follow (0.14%, 0.00%) respectively, while the prevalence of HCV among men and women was as follow (0.09%) as shown in (Table 1).

Table 1: Prevalence of HBV and HCV according to gender in Thi-Qar province during the period from 2020-2021.

Gender	Total tested	HBsAg	Prevalence	Gender	Total tested	HCV Ab	Prevalence
Male	56438	81	0.14%	Male	56699	57	0.10%
Female	377	0	0.00%	Female	373	0	0.00%
Total	56815	81	0.14%	Total	57072	57	0.09%

The research showed that the highest number of infected individuals with HBV was in February and November 2020. While the lower number of infected persons was in April, May and December 2020. In addition, in 2021, data showed that the highest number of infected individuals was in April and February 2021. However, as shown in Fig 1, there was no statistically significant difference in the prevalence of HBV

infections between 2020and 2021 (p value > 0.05).

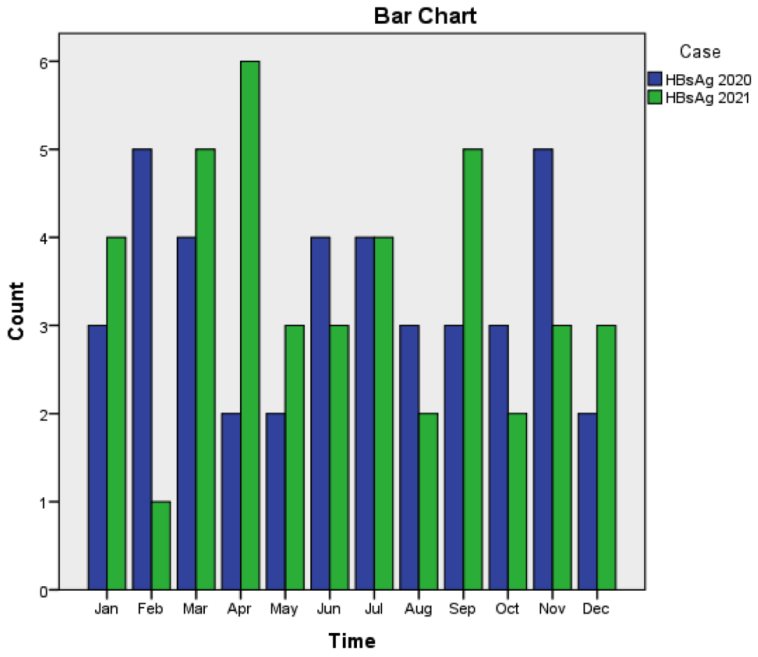

Fig 1: The Distribution of Hepatitis B Virus infection during the period 2020-2021. X2: 6.852, df: 11, p value: 0.811.

The current study indicated that the highest number of infected individuals with HCV was in June 2020. While the lower number of infected persons was in June, March and April 2020. In addition, in 2021, data showed that the highest number of infected individuals was in June 2021. While the lower number of HCV patients was in January 2021. However, there was no statistically significant difference between the prevalence of HCV infections during the period 2020-2021, (p value > 0.05) as illustrated in (Fig 2).

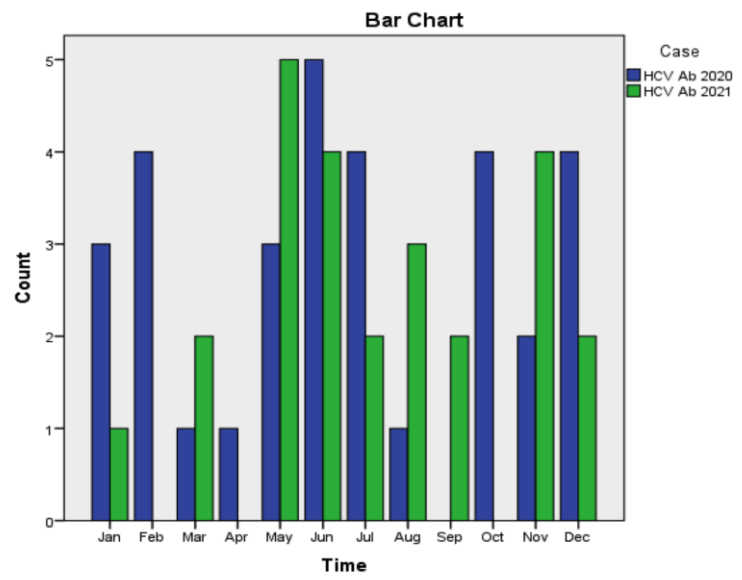

Fig 2: The Distribution of Hepatitis C Virus infection during the period 2020-2021. $X^{2:}$ 15.316, df: 11, p value: 0.168.

The study result also revealed that the highest age range between HBV-infected patients was between **30-40** years old (**39.51**%), while the lower age range among HBV-infected patients was between >20 years old (1.23%). Furthermore, data has shown that the highest age range between HCV-infected patients was between 30-40 years old (38.6%), while the lower age range between HBV-infected patients was between ≤ 60 years old (1.75%) (Table 2).

Table 2: Prevalence of HBV and HCV according to age group in Thi-Qar province during the period from 2020-2021.

Ag group (Years)	HBsAg positive	%	HCV Ab positive	%
>20	1	1.23	0	0.00
20-30	14	17.28	19	33.33
30-40	32	39.51	22	38.60

40-50	**24**	**29.63**	**15**	**26.32**
50-60	**7**	**8.64**	**3**	**5.26**
≤ 60	**2**	**2.47**	**1**	**1.75**

There was no statistically significant difference between the prevalence of HBV and HCV infections during the period 2020-2021, as shown in the (Fig 1 and 2). The result shows that the majority of infected individuals are from the urban area for both HBV and HCV infections. Additionally, data showed that there were highly statistically significant differences in the prevalence of HBV and HCV according to the place of residence (urban versus rural areas) during the period 2020-2021 (p value 0.01) as shown in the (Fig 3 and 4).

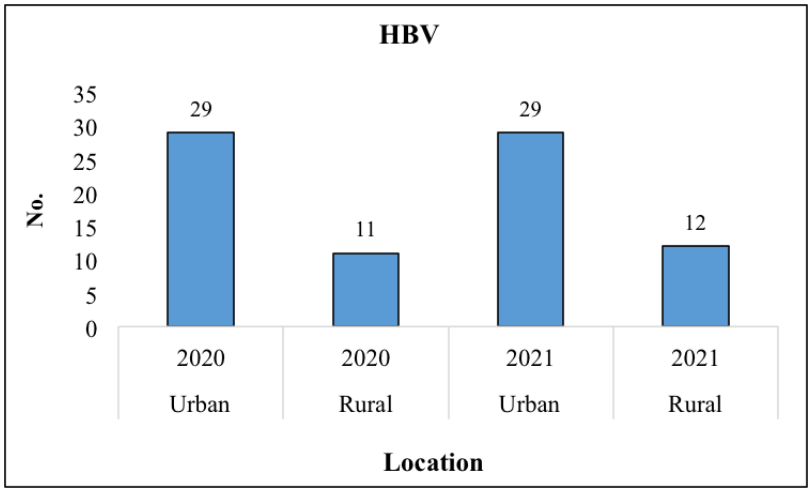

Fig 3: The Distribution of Hepatitis B Virus infection according to the place of residence during **2020**; $X^{2:}$ 8.100, df: 1, p value: 0.004; during **2021**. $X^{2:}$ 7.049, df: 1, p value: 0.008.

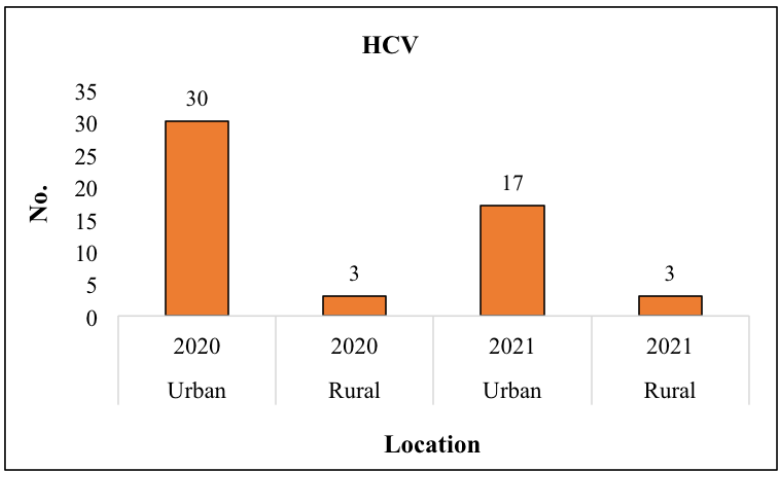

Fig 4: The Distribution of Hepatitis C Virus infection according to the place of residence during **2020**; $X^{2:}$ 22.091، df: 1, p value: 0.000. During **2021**. $X^{2:}$ 9.800، df: 1, p value: 0.002.

Discussion

Viral hepatitis is a considerable problem for the world's health since it can lead to serous health conditions such as hepatic failure, hepatocellular carcinoma and liver cirrhosis [11]. There are many behavioral, environmental and host factors contribute to the viral hepatitis prevalence [13].

This research revealed that the prevalence of HBV and HCV among the population in Thi-Qar province was (0.14%) for HBV and (0.09%) for HCV respectively, indicating low prevalence of viral hepatitis. These results are with an agreement with a local cross-sectional study performed in all the eighteenth Iraqi's cities and found that the epidemiological rate of HBs Ag was 1.6%. Alternatively the rate for HCV was 0.4% indicating both HBV and HCV have low prevalence rate in Iraq [13]. Furthmore, the findings of this study is comply with the a study conducted in Kurdistan which showed a low HBV prevalence (1.37%) [23]. Additionally, the data of our research is also compared with the findings of neighboring countries such as Iran and found that Iran is also considered as a low endemic country with HBV and HCV[24], [25]. In Egypt, a study shows that there is a dropping in the viral hepatitis rate recently due to the nation vaccination program [26].

The low prevalence of viral hepatitis among Thi-Qar residences may suggest that fewer individuals were actually infected at the time of blood donation. Furthermore there are many factors that may be linked to the low endemicity of viral hepatitis including unrestricted access to availability of vaccination, and improving of medical services. In addition, the low prevalence of viral hepatitis may be due acquired immunity from natural infection.

The highest infected age group was 30-40 between men for both viruses, this is may be explained by this age being more prone to high-risk behaviors such as tattooing, cupping or utilizing intravenous drugs.

This study also revealed that HBV and HCV infection was found to be significantly

higher in donors from urban areas than the rural regions, several factors may be attributed to this result including the low health educational level and low access to the health authority messages.

Blood transfusion is an important medical practice, and screening blood for different infectious agents is one of its main components-and concerns. Sufficient screening of blood before transfusion is of ultimate significance, due to occurrence of transfusion-transmitted infections is leading cause of mortalities and morbidities globally [27].

Conclusion

In summary, this study shows that Thi-Qar province may consider low endemic area with HBV and HCV as the study revealed that the prevalence of HBV was (0.14%) and (0.09%) for HCV.

Studies are needed in Iraq to identify the number of eligible donors, by the current HBV screening guidelines, are positive for the presence of HBV DNA and, thus, reconsider the precautionary measures of donors' selection.

Recommendations

To limit the risk of transfusion-associated infections, Iraqi's blood banks have to apply nucleic acid test (NAT) such as PCR technique, which is able of identifying the viruses in blood to screen blood donors. This risk is commonly associated with the utilizing of donated blood during the window period, in which the infected donor may not show any signs and symptoms and without detectable circulating antigens and/or antibodies. This might increase the chance for transferring the viruses during blood transfusion to the recipients. We recommend that conducting epidemiological studies regularly to assess the prevalence of these virus infections and to offer an antiviral therapy to those unaware of infection.

Statements and Declarations

Declaration of competing interest

The authors declare that there is no conflict of interest.

Funding

No funding was received for conducting this study.

Ethical Approval

Patient confidentiality and identity were safeguarded as per the research guidelines required by the hospital governing body. Ethical and institutional approval for the

study was obtained from the Thi-Qar health institution (approval number: 214 in 17/3/2022).

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