



**Ministry of Higher
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The seroprevalence of blood borne viruses among blood donors and the coming to marry in Diyala governorate

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surgery.**

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Abstract

Background: The majority of blood transfusion-related infections, such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Transfusions of infectious blood can cause significant morbidity and mortality, which affect not only the recipients but also their families, communities, and larger society.

Objectives: The aim of the study was to determine the prevalence of HBV, HCV, and HIV among voluntary and replacement blood donors, and those who were coming to marriage in the Diyala governorate.

Patients and Methods: A cross-sectional survey was conducted in Baqubah Teaching Hospital Diyala governorate in the period from 1st January 2022 to 31st of December 2022. A total of 35652 were collected, 28126 blood donors and 7526 coming to marriage who underwent the blood tests in the blood bank in Baquba teaching hospital and general health directorate. Patients were tested for hepatitis B surface antigen (HBsAg), HCV antibody (HCV-Ab), and human immunodeficiency virus antibody (HIV-Ab)

Results: Among the studied sample, the prevalence of HBsAg, HCV-Ab, and HIV-Ab in blood donors were 31 (0.1%), 7 (0.02%), and 0 (0%) respectively. While people who came married were 23 (0.3%), 8 (0.1%), and 3 (0.04%) respectively. The infection with the viruses was in males more than in females with highly significant differences (<0.001) According to statistics, in blood donors the age range of (21-30) years had the highest percentage of HBV and HCV infections, followed by (31-44) years and (17-20) years, respectively. While in people comes to marriage the age range of (21-30) years had the highest percentage of HBV and HCV infections, followed by (17-20) years and (31-44) years, respectively.

Conclusion: Infection rates of blood-borne viruses among donors and people who come to be married in Diyala were similar to those in other parts of Iraq. At-risk target groups should start receiving education and vaccinations. In addition, the study of society.

Keywords: seroprevalence, blood donors, blood-borne viruses, HBV, HCV, HIV.

Introduction

Hepatitis-related liver disease is a severe public health issue that affects millions of individuals worldwide [1]. Viral hepatitis can present as a life-threatening infection or a subclinical condition that causes substantial morbidity and mortality in underdeveloped and developing nations [2].

Hepatitis B virus is generally recognized as highly infectious and associated with the long-term occurrence of disease and death due to complications like cirrhosis, portal hypertension, and Hepatocellular carcinoma. Approximately 2 billion people have been infected by HBV, and 350 million individuals have chronic infections [3].

Blumberg and his colleagues discovered the hepatitis B virus (HBV) in the United States nearly half a century ago. However, this historical discovery of the result is irrelevant research. In their quest to uncover the cause of transfusion-associated jaundice, they came across a protein in the stored serum of an indigenous Australian population, which they later identified as HBV surface antigen. (HBsAg) [4].

The Hepatitis C virus was identified in 1989 as the major agent of post-transfusion hepatitis previously designated under the name of “non-A, non-B hepatitis [5].

The discovery of the hepatitis C virus (HCV) is a more recent development. Consequently, approximately 75% of TAH became classified as non-A, non-B hepatitis (NANBH). Subsequently, however, it was Houghton and colleagues from Chiron Corporation who identified this NANB hepatitis virus and termed the new agent as hepatitis C virus (HCV) [4].

The oldest case of HIV-1 infection is thought to have occurred in a sailor from Manchester who passed away in 1959 from an AIDS-like sickness; however, the veracity of this case has not been established. Members of a Norwegian family who had been infected earlier than 1971 were identified by genetic analysis of sequences from clinical materials gathered from 1971 to 1976, and it was discovered that they had HIV-1 outlier group viruses, a variant type that is primarily found in West Africa. Here, we describe the viral sequences amplified and characterized from a

1959 African plasma sample that had previously been determined to be HIV-1 seropositive(6).

Many nations around the world have drastically varied rates of HIV infection among blood donors and HIV infection occurs worldwide. Human immunodeficiency virus is one member of the human retrovirus and is linked to a gradual immunological impairment that is accompanied by a variety of opportunistic diseases (7).

Both HBV, HCV, and HIV are transmitted through direct contact with blood, transfusion of blood and blood products, intravenous injections, and unprotected sex (8). Due to a lack of routine serological tests for HBV, HCV, and HIV in underdeveloped nations, the transfer of infection from donors to recipients is being recorded more frequently (9).

Parenteral drug users, institutionalized people, healthcare workers, patients who have received multiple transfusions, recipients of organ transplants, hemodialysis patients, highly promiscuous people, sexual contact, and newborns whose mothers have the virus are among the high-risk populations for HBV infections (10).

Hepatocellular carcinoma(HCC) is known to be at risk for both chronic hepatitis B and chronic hepatitis C. According to reports, the prevalence of cirrhosis is 80.9% and 75.8%, respectively, in people with HCC and chronic hepatitis B or C. Without cirrhosis, HCC occurs less frequently in chronic viral hepatitis. Furthermore, the majority of non-cirrhotic instances of HCC are linked to the hepatitis C virus rather than the hepatitis B virus (11).

With the persistence of R5 HIV-1 strains at the AIDS stage, significant progress has been made in understanding the function of CCR5 (R5) and CXCR4 (X4) HIV strains in disease development. This demonstrates that R5 strains are equally capable of generating CD4+ T cell depletion and contributing to the development of illness as X4 strains (12).

The World Health Organization (WHO) advised systematic serological testing for transfusion-transmissible diseases (TTIs), including HBV, HCV, AND HIV, to address that and stop the spread of these infections (13).

Also, it was utilized to estimate the prevalence of HBV and HCV among blood donors, which aids medical professionals in comprehending the epidemiology of such an illness in the population (14).

Medications approved to treat CHB, include interferon (pegylated) and antiviral agents, such as entecavir, and tenofovir. For those with CHB, the decision to treat or not, with approved medications, varies by individual and considers serology, HBV genotype, and liver enzymes [15].

The AASLD and Infectious Diseases Society of America hepatitis C guidance recommend that all individuals with chronic hepatitis C be treated with antiviral medications unless there is a shortened life expectancy due to non-hepatic liver diseases, successful treatment is indicated by a sustained virological response (SVR), which is the absence of HCV-RNA 12 or more weeks after completion of treatment [16].

Iraq was listed as having a low-intermediate HBV prevalence, with a reported frequency of 0.5% in blood donors (17) (18). HBV among blood donors was ranging from (1.6% - 4%), and HCV ranged (0.2% -0.5%) (19).

The prevalence rates reported from other Mediterranean countries were 1.8% in Turkey, 0.55-0.66 % and 2.2% in the Gaza Strip. In Saudi Arabia The prevalence of HCV infections is low in the general population, less in children than in adults, and unscreened blood transfusion before 1990 and intravenous drug use are the main modes of infection [20,21].

Because there are medications that lower the risk of developing liver disease and liver cancer, it is important to identify patients who are infected with the virus, figure out how to treat them and prevent infection from spreading to healthy people.

Aim of study

To identify the seroprevalence of HBV, HCV, and HIV among blood donors and the coming to marriage in Diyala governorate. And the relation between some criteria such as age, sex, and infection rate.

Patients and methods

Study design

This is a cross-sectional survey study conducted in the Diyala governorate in the period from 1st January 2022 to 31st December 2022. The study included all the blood donors and the coming marriage in who underwent the blood tests in the blood bank in Baquba teaching hospital and general health directorate.

- 1-** Donors' records which involve name, age, sex, and address.
- 2-** Virology records, this involves all the infected donors by hepatitis B, hepatitis C and HIV viruses.

Patients

A total of 35652 were collected, 28126 blood donors all of whom were males mean age of 32 years old, and 7526 coming to marriage 3826 were males and 3700 were females mean age was 25 years old.

Blood sample

All participants were included in the study's sample population. Each donor provided a sample of blood measuring 5 ml. The samples were then centrifuged for 5 minutes at 10000 rpm to prepare the serum, and tested by enzyme-linked immunosorbent assay (ELISA). This study depends on the records (archives) available in this blood bank, and these records are:

The ethical clearance was obtained from the ethical committee in the college of medicine, University of Diyala.

Statistical analysis

The data analysis was done by Statistical Package for Social Sciences (SPSS) version 26. Data were presented as numbers and percentages for qualitative variables The Chi-

square test was used for the analytical assessment and a P value of ≤ 0.05 were considered statistically significant

Results

The infection rate of HBV, HCV, and HIV was in blood donors 31 (0.1%), 7 (0.02%), and 3 (0.04%) respectively, while in people who come to marriage was 23 (0.3%), 8 (0.1%), and 0 (0%) respectively. As shown in Table 1

Table1: infection rate of blood-borne viruses in study populations

Bloodborne Viruses	Frequency	Blood donors	Going to marriage	Total Percent
HBV	54	31(0.1%)	23 (0.3 %)	1.5%
HCV	15	7 (0.02%)	8 (0.1%)	0.4%
HIV	3	3 (0.04%)	0 (0%)	0.1%

Concerning age, the age of infected patients with HBV in blood donors with a mean age was 28.5 ± 8 , HCV patients with a mean age was 30.5 ± 10.7 , and HIV patients with a mean age of 28.3 ± 6.5 . The age range of (21-30) years had the highest percentage of HBV and HCV infections, followed by (31-44) years and (17-20) years, respectively, while HIV infection was in the age range of (22-35).

While in people who come to marriage the age of infected patients with HBV mean of 24.7 ± 7 , HCV patients with a mean age were 23.6 ± 6.4 , and no HIV infection. The age range of (21-30) years had the highest percentage of HBV and HCV infections, followed by (17-20) years and (31-44) years, respectively. The results are shown in Table 2

Table2: distribution of patients according to age in study populations

Blood borne viruses	Age group	Blood donors	Come to marriage
HBV	17-20 years old	5 (16.1%)	9 (39.1%)
	21-30 years old	16 (51.6%)	10 (43.5%)
	31-44 years old	10 (32.3%)	4 (17.4%)
HCV	17-20 years old	2 (28.6%)	3 (37.5%)
	21-30 years old	3 (42.8%)	4 (50%)
	31-44 years old	2 (28.6%)	1 (12.5%)

HIV	22 years old	1 (33.3%)	0 (0%)
	28 years old	1 (33.3%)	0 (0%)
	35 years old	1 (33.3%)	0 (0%)

Regarding the sex, the infection of HBV in blood donors 31 patients 28 (90.3%) were males and 3(9.7%) were female with high statistical differences (P =0.01), HCV 7 patients 4 (57.4%) were female and 3(42.6%) were males with no significant differences. While HIV 3 patients were infected all of them were males with significant differences (P=<0.05).

On the other hand, in the infection rate of the three viruses in people who come to marry, HBV 23 patients 21 (91.3%) were male and 2 (8.6%) were females with highly significant differences (P= <0.01), HCV 8 patients 7 (87.5%) were males and 1 (12.5%) were females with significant differences, while there is no subject infected with HIV. The results showed in Table 3.

Table3: distribution of patients according to sex in study populations

Blood-borne Viruses	Sex	Blood donors	Going to marriage	P value
HBV	Male	28 (90.3%)	21 (91.3%)	0.01*
	Female	3(9.7%)	2 (8.6%)	
HCV	Male	3(42.6%)	7 (87.5%)	0.2
	Female	4 (57.4%)	21 (91.3%)	
HIV	Male	3 (100%)	0 (0%)	0.05*
	Female	0(0%)	0(0%)	
* Significant Differences				

Discussion

Infections with the hepatitis B and C viruses are a serious global public health issue. HBV and HCV are spreading at an alarming rate globally, which has had a significant impact on various nations, including Iraq. Globally, recent research showed that more than 70 million people have HIV infection, around 200 million people have HCV infection, and about 350 million people are chronically infected with HBV (22)

A recent study reported the infection of HBV, and HCV in blood donors was (0.1%), and (0.02%) respectively. The results were less than other studies conducted in Iraq reported that the prevalence of HBV among blood donors ranged from (1.6% - 4%) (23-27), and HCV ranged from (0.2% - 0.5%) (23, 24, 28, 29). And less than Global studies that reported HBV prevalence among blood donors ranged from 1.4% to 4.2%, and HCV prevalence ranged from 0.3% to 0.57% (30,31).

According to this study, seropositive donors had a higher risk of HBV infection than HCV infection (0.1%), and (0.02%) respectively. This result was similar to studies conducted in different cities of Iraq, such as in Babylon governorate (28), in Al-Anbar governorate (29), Basra (32), Duhok (33), Najaf (34), and Holy Karbala (35).

All of these studies found that in seropositive blood donors, HBV infection was more prevalent than HCV infection. Health initiatives must therefore be accessible to enlighten individuals about HBV's infectious environment and transmission mechanisms. It is crucial to encourage people, especially those in high-risk groups, to get the hepatitis B vaccine because the disease is preventable through immunization.

The current study reported that HBV was higher among males (90.3%) than females (9.7%), while in HCV the infection rate was slightly high in females (57.4%) than in males (42.6%). These results were similar to other studies conducted in Iraq (28,32,35,36) and different from the study done in the Diyala governorate (37). This is because the majority of blood donors were men, which may be explained by the fact that men in Iraqi society are more independent and assertive.

The age distribution of infected patients in blood donors was from 17 years old to 44 years old. The higher percentage in age groups (21-30 years old) and (31-44 years old) years. these results are similar to the study in Thi-Qar (38) and in Diyala (39) in Erbil (40) but different from the study done in Basra (32)

The infection rate of HIV among blood donors in this study was (0.04%), which was similar to the results of the study done in Najaf Province (41), and lower than the study conducted in 2021 in Diyala (39) and all of Iraq (45). In Iraq, the previous studies revealed no cases of HIV among blood donors such as in Basra (42), Kirkuk (43), and all of Iraq (27).

All HIV-positive cases were males, this result is similar to the result of the study in Najaf Province (41) and Sudan (44) This may be due to men being more likely to acquire infection because they are more prone to risky behaviors.

The age distribution of HIV cases was from 22-35 years old. This is similar to the study in Al-Najaf (41). This may be because this age group has a higher sexual activity

Our study's inability to assess risk variables that might be related to seropositive blood donors is one of its weaknesses because information regarding seronegative blood donors is not readily available.

On the other hand, the results of this study showed the prevalence of HBV, HCV, and HIV in people who come to marriage 23 (0.3 %), 8 (0.1%), and 0 (0%) respectively. When the results compared with other studies in different cities of Iraq were lower than another study in Diyala governorate (46), in Duhok (47) in Al-Diwaniya (48)

The results were near to the results of studies done in Sulaimania (49), Zakho City (50) Saudi Arabia (51), and similar to studies in Baghdad (52).

These varying rates may be caused by the many populations included in these studies with various risk factor profiles and the time the study was conducted, but generally speaking, the rate found in this study is within the low prevalence range.

The results of the current study showed the infection of HBV in people who come to marriage was in males (91.3%) more than females (8.6%), while HCV was in females more than males. These results are similar to the results of the study in Zakho (50), Duhok (47), Sulaimani (52), and Saudi Arabia (53)

The reason behind this gender difference is unclear. The disparity may be brought on by the opposing effects of sex hormones, as well as the conservative society's lack of exposure to women outside the home. Androgen stimulates viral transcription in several experimental animal models, but estrogen inhibits HBV transcription (54).

Regarding the age of the infection of HBV, HBV in people who come to marriage was in the age group (21-30 years old) more than other age groups. This may be because this age is when sexual activity and the factors of transmission of the disease are more, because the infected people are from the youth category, and they are the most vulnerable group in society to the factors of virus transmission, such as tattoos, addiction, and illegal sexual activity.

Conclusion

Infection rates of blood-borne viruses among donors and people who come to be married in Diyala were similar to those in other parts of Iraq. At-risk target groups should start receiving education and vaccinations. Premarital screening couples appear to have low rates of HBV and HCV infections. Males were more likely than females to have HBV, suggesting that preventive screening programs for men ought to be given more consideration.

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