Detection of Blood Borne Viruses among Blood Donation in Diyala Governorate during 2024

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Abstract

Background: Blood-borne viruses are viruses that some people carry in their blood and can be spread from one person to another. Those infected with blood-borne viruses may show little or no symptoms of serious disease, but other infected people may be severely ill. A screening test is done to detect potential health disorders or diseases in people who do not have any symptoms of disease. The goal is early detection and lifestyle changes or surveillance, to reduce the risk of disease, or to detect it early enough to treat it most effectively.

Objective: To determine the blood viral infection among blood donation in Diyala governorate during 2024.

Patients and Methods: Cross sectional study was conducted in the Blood Bunk in Baqubah Teaching Hospital during the period from January to December 2024 in Diyala Governorate. A seroepidemiologic survey about hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) infection using enzyme linked immunosorbent assay for qualitative detection for each virus.

Results: The rate of blood viral infection among blood donation was 2.45% (701 out of 28.546) in Diyala Governorate during 2024. High percentages of HBV 2.31% (662 cases) was noticed in this study followed by HCV and HIV 0.08% (25 cases) and 0.04% (14 cases) respectively. Infection in males more than females, and most positive cases were reported in age group 31-45 years 356 (53.78%) for HBV, 15(60%) for HCV, and 6 (42.85%) for HIV. There were differences between the accommodations of patients in Baqubah and around Baqubah with each virus. Hepatitis B virus cases are distributed consistently throughout the year, with the highest prevalence in March 89(13.44%) and May 78(11.78%). Hepatitis C virus shows a relatively stable low prevalence across months, peaking slightly in January 5(20%) and August 5(20%). Human immunodeficiency virus cases remain consistently rare, with minor spikes in August 6(42.86%) and October 2(14.30%).

Conclusion: Proportion of viral infection among blood donation was still high in Diyala governorate, further studies are recommended to fellow up the rate of infection.

Keywords: Hepatitis B virus, Hepatitis C virus, human immunodeficiency, ELISA, epidemiology

Introduction

Hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV), infection are serious worldwide health issues [1]. Globally, an estimated 200 million people have an HCV infection and 350 million people have a chronic HBV infection [2]. Infection may be linked to a higher death rate due to these viruses may raise the risk of developing major liver illnesses such cirrhosis, liver failure, and hepatocellular carcinoma (HCC) [3]. The main ways for HBV and HCV transmission are direct contact with blood, intravenous injections, transfusions of blood and blood products, and unprotected intercourse [4]. Even so, receiving blood transfusions and its byproducts is known to increase the risk of contracting HBV and HCV [5]. A non-alternative life-saving treatment saves thousands of lives annually and lowers morbidity [6].

The World Health Organization (WHO) advised systematic serological testing for transfusion-transmissible diseases (TTIs), such as HBV and HCV, in order to address this issue and lessen the spread of these infections [7]. The outcomes of the donors' tests may serve as a sign of a secure blood supply [8]. Additionally, it was employed to ascertain the incidence rates of HBV and HCV among blood donors, which aids medical professionals in comprehending the community's epidemiology of these infections [9]. Prevalence rates of HBV and HCV significantly decreased once the blood donor predonation screening system was put into place [10]. In addition, donors were more aware of the need to avoid risk factors after learning about the ways that HBV and HCV are spread [11]. Additionally, with the introduction of HBV vaccination, the prevalence of HBV in the general population has decreased worldwide, particularly among young people [12]. This decrease is especially pronounced in children under 14 because of the introduction of the HBV vaccine into the national immunization program [13].

Human immunodeficiency virus is one of the worst pandemics in human history, having killed 39 million people to far and infected 70 million. Given the substantial danger of HIV transmission through blood transfusions, WHO guidelines require that blood products be screened for viral infections [14]. Depending on a number of factors, including the incidence of HIV, public awareness campaigns about blood donation, pre-donation screening, and donor selection, the prevalence of HIV among blood donors varies by region and nation [15].

The aim of the study was to detect the blood viral infection on blood donation in Diyala governorate during 2024 and find the risk factors for the blood viral infection.

Patients and Methods

Cross sectional study was conducted in the Blood Bunk in Baubah Teaching Hospital during the period between January to December 2024 in Diyala Governorate. A seroepidemiologic survey about hepatitis B virus and hepatitis C virus infection were carried out in a several groups comprising 85patients were divided in several groups, blood donor 42 patients, hemodialysis 25 patients, thalassemia 14 patients and 4 patients with cancer, ranging in age from 1 month to 60 years. Diagnosed using enzyme linked immunosorbent assay for qualitative detection of Hepatitis B surface antigen (HBsAg) in human serum or plasma (REF-BXE0781C, LOT-CV-2310-6, Abbott Ireland), HCV 4th generation –enzyme linked immunosorbent assay for qualitative detection of antibodies to HCV in human serum or plasma (REF-BXE0741C, LOT-BS-2310-4, Abbott Ireland) and HIV 4th generation (Ag/Ab) enzyme linked immunosorbent assay for qualitative detection of antibodies to human immunodeficiency virus type-1, 2 in human serum or plasma (REF-BXE0792C, LOT-HAA-2310-2, Abbott Ireland).

Results

The rate of blood born viral infection among blood donation was 2.45% (701 out of 28.546) in Diyala Governorate during 2024. High percentages of HBV 2.31% (662 cases) was noticed in this study followed by HCV and HIV 0.08% (25 cases) and 0.04% (14 cases) respectively as shown in Table 1.

Table 1: Distribution of Blood Borne Viruses among Study Population.

Type infection	Frequency
HBV	662
HCV	25
HIV	14
Total	701

The distribution of Hepatitis B, C and HIV infections among a total sample of 701 individuals, stratified by gender. Hepatitis B was reported 413 cases (62.40%) among males; Hepatitis C was observed more 15 cases (60%) among males, while equal percentage was noticed among HIV cases as shown in Table 2.

Table 2: Distribution of Infection Types Hepatitis B Virus, Hepatitis C Virus and Human immunodeficiency virus by Gender.

Gender		Type infection No.(%)		
		HBV	HCV	HIV
Female	Count & (%)	249(37.60%)	10(40%)	7(50%)
Male	Count & (%)	413(62.40%)	15(60%)	7(50%)
Total	Count & (%)	662(100%)	25(100%)	14(100%)

Highlights the distribution of Hepatitis B and C infections, and HIV among different age groups. Most cases were recorded among age group 31-45 years old, HBV accounts for 356 (53.78%), HCV for 15(60%), and HIV for 6(42.85%). While low percentage was recorded in age group 15-30 and 46-60 years as shown in Table 3.

Table 3: Distribution of Infection Types Hepatitis B Virus, Hepatitis C Virus and Human immunodeficiency virus by Age Group.

Age group Years	Type infection No. (%)		
	HBV	HCV	HIV
15-30	160(24.17%)	7(28%)	3(21.43%)
31-45	356(53.78%)	15(60%)	6(42.85%)
46-60	146(22.05%)	3(12%)	5(35.72%)
Total	662(100%)	25(100%)	14(100%)

The prevalence of Hepatitis B, C infections, and HIV in Baqubah and surrounding areas. Most HBC, HCV cases reported around Baqubah areas, HBV accounts for 46.8% of the total, HCV for 1.6%, and HIV for 1.0%. While in the Baqubah, HBV represents 47.6% of the total, HCV 2.0%, and HIV 1.0% as shown in Table 4.

Table 4: Distribution of Infection Types Hepatitis B Virus, Hepatitis C Virus and Human immunodeficiency virus by Location.

location	Type infection No. (%)		
	HBV	HCV	HIV
Baqubah	328(49.55%)	11(44%)	7(50%)
Around Baqubah	334(50.45%)	14(56%)	7(50%)
Total	662(100%)	25(100%)	14(100%)

Outlines the monthly distribution of hepatitis B virus, hepatitis C virus, and HIV infections. Hepatitis B virus cases are distributed consistently throughout the year, with the highest prevalence in March 89(13.44%) and May 78(11.78%). Hepatitis C virus shows a relatively stable low prevalence across months, peaking slightly in January 5(20%) and August 5(20%). Human imunodeficiency virus cases remain consistently rare, with minor spikes in August 6(42.86%) and October 2(14.30%).

Table 5: Distribution of HBV, HCV, and HIV among study population during 2024.

Months	Viral infection		
	HBV	**HCV**	**HIV**
January	43(6.50%)	5(20%)	1(7.14%)
February	58(8.76%)	4(16%)	0
March	89(13.44%)	2(8%)	1(7.14%)
April	44(6.65%)	2(8%)	1(7.14%)
May	78(11.78%)	1(4%)	1(7.14%)
June	40(6.04%)	3(%)	0
July	70(10.57%)	0	1(7.14%)
August	28(4.25%)	5(20%)	6(42.86%)
September	38(5.74%)	1(4%)	0%
October	48(7.25%)	0	2(14.30%)
November	56(8.45%)	2(8%)	1(7.14%)
December	70(10.57%)	0	0
Total	**662(100%)**	**25(100%)**	**14(100%)**

Discussion

This study demonstrates that HBV is the most predominant infection with rate 2.31% among blood donors in Diyala governorate compared to HCV was 0.08% and HIV was 0.04%, which are much less prevalent in the population observed. The present results showed that the HBV infection was higher than the study done by Mohammed *et al.* (2023) was reported 1504(0.78%) and 1048 (0.14%) for HBV and HCV respectively in Baghdad [16] and with Mohammed *et al*. (2023): transfusion-transmissible infections in a stride of blood donors in Basra, were reported 1.14% and 0.11% for HBV and HCV respectively [17]. Hussein (2018) reported 5/438 (1.14%) of the subjects were HBsAg positive among blood donors attending blood bank in Duhok city [18].While the results of current study lower than other study, which reported high frequency 13.82%, 9.25% and 0.61% for HBV, HCV, HIV respectively in Diyala governorate [19].

Hepatitis B virus was more common than others this could be related with fact the HBV can survive outside the body for at least 7 days. During that time, the virus is still capable of

causing infection [20]. Depending on a complex combination of behavioral, environmental, and host factors, the prevalence of HBV infection varies from one nation to the next [21].

The distribution of HBV, HCV and HIV infection by gender in the study. HBV and HCV are more predominant in males 413(62.40%) and 15(60%) than females while equal percentages between males and females in HIV. These findings are consistent with Mohammed et al. (2023) who reported that number of seropositive males was 1.494 (99.3%) while 10(0.66%) were females with lowest percentage [16] and with the study of Hussein *et al*. (2018) who studied the prevalence of hepatitis B infection among blood donation in Diyala province and showed that the prevalence of HBV was greater in males than in females [22]. In general, men gave blood at higher rates than women did. The belief that men are generally considered to be in better health than women are and that men are better suited to donate blood than women may help to explain the majority of male donors. Men are thought to be able to donate blood more frequently than women are and to produce platelets, which are used to treat people who are severely bleeding in emergencies. Contrarily, the fact that women are prohibited from giving blood during pregnancy, the six months following, and while they are nursing, in addition to the fact that women are more likely than men to suffer from iron deficiency anemia, prevents many females from doing so as well as males having more occupational exposure, lifestyle factors, and lower vaccination rates.

The distribution of HBV, HCV, and HIV by age group is presented in Table 3 in this study. HBV and HCV prevalence peaked in people of age group 31-45 years followed by 15-30 years age group and 46-65 years age group while HIV is most frequent in the 31-45 age group followed by 46-65 years old. These findings indicate that middle-aged population have the greatest risk for viral infections. This outcome is comparable to those of other studies conducted in [16][22][23][24]. This discrepancy may be attributed to differences in the study design, target population comprising of general donors and high-risk groups. These findings underscore the need for focused HBV screening and vaccination efforts, particularly among the adult population, specifically those in their 30s and 40s.

Current study compares the prevalence of HBV, HCV, and HIV in Baqubah and its vicinity. HBV and HCV are responsible for 334(50.45%) and 14(56%) of infections in the surrounding areas of Baqubah, whereas HIV is unchanged at 50% in both regions. These results are similar to that published by Al-Mahdawi *et al*., (2022) blood screening tests for the voluntary blood donation in Diyala governorate [25]. According to their study, HBV was the most commonly detected infection in the blood samples, which was more prevalent in rural areas than urban areas may reflect improved access to health care and detection, while cases in rural areas may be underreported owing to fewer individuals having been screened, they suggested. In contrast, this study demonstrated a relatively equal distribution of HIV across the regions; this may suggest that risk factors related to transmission, including lifestyle, medical practices, and awareness, are comparable between Baqubah and its surrounding regions.

Monthly distribution of hepatitis B virus, hepatitis C virus and HIV in this study during the year. There is seasonal stability in the prevalence of HBV cases by months, with the highest burden observed 13.44% in March and 11.78% in May while HCV remains low, peaking slightly 20% in January and August and HIV-inflected infections were 42.86% in August, 14.30% in October. These results are consistent with the study by Mohammed *et al.* (2022) that reported on seasonal variations in viral hepatitis infections among blood donors in Iraq [17]. They explore this dataset and find that HBV infections were heightened during the spring-early summer months matching our study's peak in March and May. They reasoned that seasonal differences could be connected to having more social contacts, visits to the doctor, or seasonal atmospheric conditions that affect transmission dynamics. Their study also reported minor variation of HCV throughout the months, in line with our results of a low but stable prevalence. The increase in HIV cases in certain months that we observed is consistent with their noting that trends in HIV often track changes in the epidemiology of disease in general rather than hypothesized seasonal patterns. These parallels highlight the importance of year round screening and targeted public health interventions to curtail viral transmission in all seasons.

In conclusion. Proportion of viral infection among blood donation was still high in Diyala governorate, further studies are recommended to fellow up the rate of infection as well as increased efforts in HBV Vaccination particularly in high-risk groups such as males and people aged 31–45 years. Educational initiatives must be carried out to increase awareness about blood born viruses' transmission, risk factors, and early screening especially in areas

with a high prevalence as well as increase personal hygiene, and preventive healthcare. Equitable access to care in both urban (Baqubah) and rural settings is critical for regular screening, treatment, and prevention of viral infections. Addressing Seasonal Peaks of HBV: The aforementioned months (March and May) are considered HBV-months, as the prevalence of HBV is higher at this time, and further studies are needed to determine the factors causing seasonal peaks which will help in better coverage of preventive measures during high-risk months.

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