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PREVALENCE OF HEPATITIS B AND HEPATITIS C VIRUS INFECTIONS AMONG BLOOD DONORS IN BAGHDAD, IRAQ

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ABSTRACT

BACKGROUND: Blood transfusions are a required and therapeutic operation that are essential in saving patient lives. Every year, millions of lives are saved. Blood transfusions, however, carry several dangers that may have unfavorable repercussions. The purpose of this study was to examine the prevalence and trends of hepatitis B virus (HBV) and hepatitis C virus (HCV) among blood donors in Baghdad, Iraq, between 2019 and 2022.

Materials and Methods: From January 2019 to November 2022, a review of the data on new HBV and HCV cases over the previous four years was done in Baghdad, the capital of Iraq. Age, sex, the number of new HBV and HCV cases each year, and blood donors who registered with the National Blood Transfusion Center's laboratory and underwent screening for HBV and HCV infection during the study period were all included in the data.

In order to analyze serum samples for HBV and HCV and to confirm positive HBV and HCV results, fourth generation ELISA assays were used.

Results: A cumulative annual number of new HBV and HCV cases registered for the last four years was 1504(0.78%) , 1048 (0.14%) respectively. Number of seropositive males was 1.494 (99.3%) while 10(0.66%) were females with lowest percentage prevalence of HBV observed in the 63-65 (0.39%) followed by 18-23 years age group(1.46%) then 53-62 (10.3%) while the highest prevalence of (32.8%) was observed in the 33-42 years range followed by the 23-32 years age range with (30.6%)then age group 43-52 (20.6%)

Number of seropositive HCV males was 1025 (97.8%) while 23(2.2%) were females with lowest percentage prevalence was observed in the 18-23 (0%) followed by 63-65 years age group(0.38%) then 53-62 (6.87%) while the highest prevalence of (67.9%) was observed in the 23-42 years range .

Conclusions : According to our research, hepatitis B and C infection are rare in Baghdad, the country's capital and largest metropolis. Men are typically more impacted than women.

Additionally, the results show a significant decline in the prevalence of the two kinds (HCV and HBV) among blood donors over the study years compared to the 1970s and 1980s.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

Most HBV and HCV cases were discovered in people between the ages of 33-42 and 23-42, respectively. The prevalence of disease is expected to decline over the years 2019 through 2022.
Key word: blood transfusion , hepatitis B, hepatitis C,

Introduction

Donating blood entails taking blood samples from healthy donors, keeping them, and then transferring them to a patient who matches their blood type. Although blood transfusions are crucial for saving lives and stabilizing patient conditions, transfusion-transmitted illnesses caused by blood-borne viruses continue to be a medical concern[1].

An estimated 92 million people worldwide donate blood each year [2] Due to the presence of infectious pathogens, approximately 1.6 million of these blood units are discarded [3]. There is a 1% incidence of transfusion-related problems, including infections spread through blood transfusions [4].

With considerable mortality and morbidity rates, viral hepatitis continues to be a serious health issue[5].

Over 350 million people have chronic HBV infection worldwide [6]. More than 600 000 people die every year from the estimated 2 billion exposed people; of them, 170 million have chronic HCV, which causes around to 500 000 deaths per year [7].In general, viral hepatitis is an endemic illness in Iraq, which is related to the pertinent issues. All types of known causative agents are present in this region with varying rates of infection [4].

The two main diseases that can spread through blood transfusions are hepatitis B virus and HCV infections[8]. They are regarded as one of the greatest public health issues in developing nations as well as the primary contributors to chronic liver disease in many parts of the world.

Both HBV and HCV infections cause liver disease that progresses from liver damage to liver failure, cirrhosis, and hepatocellular cancer during an acute or chronic course [4].

HBV is very contagious and spreads quickly from infected people to others through blood transfusions, birth, unprotected sex, and sharing needles, among other methods. [9]

In developing countries where safe blood transfusion has not been established until recently, transfusion-related HBV infection continues to be a significant problem. In poor nations, screening for hepatitis B surface antigen (HBsAg) is frequently conducted. However, testing blood for HBsAg does not completely eliminate the possibility of hepatitis B transmission.

because despite the presence of HBV infection throughout the core window period, HBsAg cannot be found in the blood[10].

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

With around 3% of the world's population currently infected, the hepatitis C virus infection is still a global public health concern[11].

Numerous international epidemiological investigations have shown that there are significant regional variations in HCV prevalence [12]. Infection rates for HCV among blood donors range from 0.4% to 19.2% globally [9].

The following nations in the Arabian Gulf have the highest rates of HCV infection: Bahrain, Oman, Qatar, Kuwait, Saudi Arabia, and the United Arab Emirates [13].

Over the past ten years, the number of hepatitis cases among Iraqis has increased. Iraq is regarded as having a low endemic rate for HBV and HCV in comparison to its neighbors.

The Ministry of Health made regular hepatitis surveillance a top priority in order to improve the ability of medical staff to handle patients. The only components of the surveillance system were the provision of medications, diagnostic services, and immunization options [14].

Early in the 1970s, a program for the prevention and control of viral hepatitis was launched. Prior to donation, blood is tested for HBsAg as one of the program's key strategies. Since it was discovered that screening donated blood for HBsAg and anti-HCV before transfusion reduces the spread of viral hepatitis B and C [8].

Since 1973, the National Blood Transfusion Center in Baghdad has routinely tested donated blood for HBsAg, and screening blood donors for HCV was implemented in Iraq in 1995. A prior or current infection is indicated by a positive anti-HCV test result[15].

Therefore, there has been a significant improvement in the safety of the blood supply over the past 20 years, as seen by lowering post-transfusion infection rates and declining estimated residual risk for such infections [4].

The potential of infected donations notwithstanding screening procedures makes HBV and HCV one of the biggest threats to the safety of blood supplies worldwide.

To determine the infectious risk associated with blood transfusions as well as the efficacy of the safety measures implemented at the National Blood Transfusion Center in Baghdad, it is required to survey the prevalence and trend of TTIs (Transfusion Transmitted Infections) among blood donors. This study's objective was to determine the seroprevalence of hepatitis B and C among blood donors in Baghdad, Iraq, between 2019 and 2022.

Methods

Study Design

By obtaining information from the National Blood Transfusion Center Laboratory Registration Book, a five-year (January 2019 to November 2022) retrospective analysis was carried out.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

In order to replenish the blood that had been used or was anticipated to be used for patients from the hospital's blood bank, blood donors were either volunteers, patients' relatives or friends, or paid commercial donors who were solicited and paid by patients, their families, or friends.

In the hospital's blood bank, getting a client's past medical history is the first stage in screening potential blood donors. People are expected to respond to a series of inquiries about prior illnesses and medical issues.

Study Subjects Individuals who provided blood throughout the study period and were checked for HBV and HCV infection by the National Blood Transfusion Center's laboratory.

Sample collection

Each blood donor gave a sample of venous blood measuring three milliliters into a sterile, dry tube. For clotting and retraction, blood samples were allowed to stand at room temperature. The samples were then centrifuged to produce a clear serum. Prior to testing, the serum was separated and kept at room temperature.

The four generation Enzyme Linked Immunosorbant Assay (ELISA) test (murex, Barcelona, Spain) is used to detect HBV and HCV in blood donors. A microparticle-enzyme immunoassay (EIA) test (Abbott Architect i2000 SR Combo diagnostic kits, USA) is used to detect positive HBV and HCV results.

The same serum samples were used to retest samples with positive test findings for repeated reactivity. Reagent samples that were repeated were regarded as positive.

Statistical analysis: Data from the study were evaluated statistically using SPSS version 25 with a probability < 0.05. Chi-square is used to identify blood donor differences that are noteworthy.

Results

708.627 supposedly healthy blood donors had their blood samples taken. The donors provided basic information, such as their age and sexual orientation. They were between the ages of 18 and 65.

The study included people of all ages, and analysis is always done the following day.

The total number of blood donors in 2019, 2020, 2021, and 2022, respectively, was 190573, 177692, 216998, and 179630. In 2020, there were the fewest donations from both men and women. However, the year with the most male donors was 2021, whereas the year with the most female donors was 2019 (Table 1).

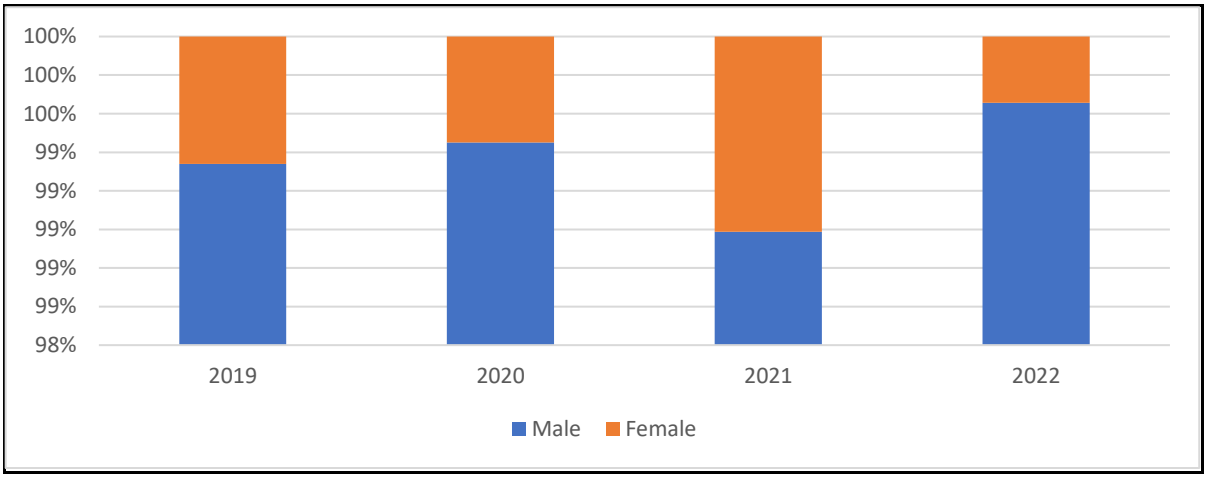
Only 6816 (0.96%) of the 708.627 blood donors were female, while 701811 (99%) were male.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

In this study, it was discovered that men gave blood at higher rates than women. There were 708.627 blood donors in the sample. Only 1048 (0.14%) and 1504 (0.78%) of them, respectively, tested positive for hepatitis B and C, respectively.

Despite the fact that the outcome indicated that the donors, it was greater in 2021 and lower in 2020. The lowest and highest numbers of HBsAg donors, respectively, occurred in 2022 and 2019 (Table 1).

Men had a greater average prevalence of HBV and HCV than women (0.66%, 2.2%, respectively) (99.3%, 97.8%).



Some cases of positive HBV,HCV come from other cities rather than Baghdad for denote blood and recorded among donors but delete from calculation including as shown in table (1,2)

Study shows variation with time from 2019 to 2022 where the seroprevalence of HBV was slightly decreased from (0.23%) in 2019 to (0.2%, 0.18%, 0.16%) in 2020 ,2021, 2022 , respectively(Table 1).

on the other side, seroprevalence of HCV was increased from (0.1%) in 2019 to (0.14%)% in 2020 then slightly increased to (0.15%) in 2021 and decreased slightly further to (0.14%) in just teen months in 2022(Table 2).

Table (1): Total Screened Number, HBV by gender for the series (2019 – 2022).

Year of Donation	2019	2020	2021	2022
Total Screened No.	190573	177692	216998	179630
Male	187416	176504	215217	178293
Female	3157	1188	1781	1337
HBV Positive	454(0.23%)	364(0.2%)	395(0.18%)	291(0.16%)
Male	451(99.3%)	362(99.4%)	391(98.9%)	290(99.6%)
Female	3(0.66%)	2(0.54%)	4(1%)	1(0.3%)
HBV positive donors from	43	22	70	45

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

other cities that delete from calculation				

From table (1) above, it is clear that the female positive (HBV) number is very low (hardly remember) comparing with male positive numbers.

Table (2) below shows the results of Chi-square test (χ^2) to positive persons (HBV) using (SPSS 26) program, the result indicates that the test statistic was (5.372), which is significant at the level of significance (0.041), this indicates to the quality of conciliation and that the number of HBV positive is considered very acceptable, compared to the size of the selected sample.

Table (2): HBV Chi – Square Test

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.372[a]	3	0.041
Likelihood Ratio	3.254	3	0.140
Linear-by-Linear Association	0.019	1	0.291
N of Valid Cases	1504		
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.93.			

Table (3): Total Screened Number, HCV by gender for the series (2019 – 2022).

Year of donation	**2019**	**2020**	**2021**	**2022**
Total screened number	190573	177692	216998	179630
Male	187416	176504	215217	178293
Female	3157	1188	1781	1337
HCV positive N(%)	205(0.10%)	260(0.14%)	329(0.15%)	254(0.14%)
HCV positive male(%)	196(95.6%)	258(99.2%)	324(98.4%)	247(97.2%)
HCV positive female(%)	9(4.39%)	2(0.76%)	5(1.51%)	7(2.75%)
HCV positive donors from other cities that delete from calculation	9	25	64	15

Table (5) below shows the results of Chi-square test (χ^2) to positive persons (HCV) using (SPSS 26) program, the result indicates that the test statistic was (8.136), which is significant at the level of significance (0.043), this indicates to the quality of conciliation and that the number of HCV positive is considered very acceptable, compared to the size of the selected sample.

Table (4): HCV Chi – Square Test

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.136[a]	3	0.043
Likelihood Ratio	7.979	3	0.046

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

Linear-by-Linear Association	0.596	1	0.440
N of Valid Cases	1048		
a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 4.50.			

Regarding age distributions, most of the affected donors were between 20-40 years age.

Age distribution of HBsAg positive and anti-HCV positive blood donors are shown in (Table 5,6).

Table (5): HBV numbers by age groups & its percentage (2019 – 2022).

Age Group HBV Positive	2019	2020	2021	2022
< 22	2(0.4%)	6(1.6%)	8 (2%)	6(2%)
23-32	133 (29.2%)	110(30.2%)	121(30.6%)	97(33.3%)
33-42	151 (33.2%)	127(34.8%)	127(32.1%)	89(30.5%)
43-52	113 (24.8%)	88(24.1%)	90(22.7%)	74(25.4%)
53-62	52 (11.4%)	31(8.5%)	48 (12.1%)	25(8.59%)
63 & over	3(0.6%)	2(0.5%)	1(0.25%)	0
Positive HBV from other cities	43	22	70	45
Total number	454	364	395	291

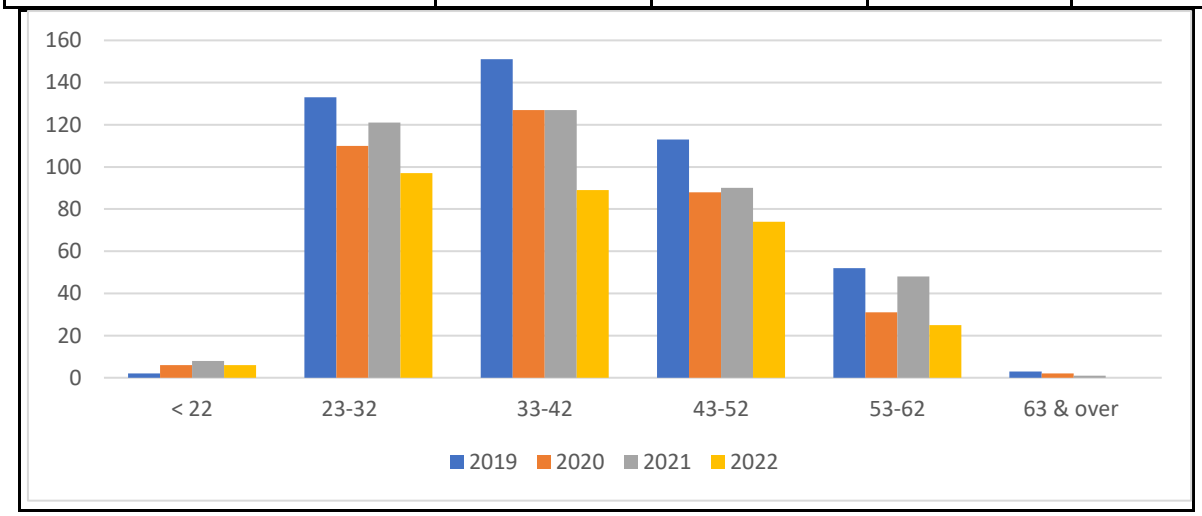


Figure (2): HBV Positive by Age Group (2019 – 2022)

Figure (2) above shows in general that the age group (33 – 42) had the highest positive of HBV for (2019), that means there are decreasing in positive numbers for the same years below, while the lowest year was (2022), and the lowest age group was (63 & over).

Table (6): HCV numbers by age groups & its percentage (2019 – 2022).

Year of donation HCV positive	2019	2020	2021	2022

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

22<	0	2(0.76%)	14(4.2%)	17(6.69%)
23-32	60(29.2%)	96(36.9%)	117(35.5%)	83(32.6%)
33-42	76(37%)	90(34.6%)	112(34%)	78(30.7%)
43-52	52(25.3%)	49(18.8%)	61(18.5%)	56(22%)
53-62	16(7.8%)	21(8%)	25(7.59%)	10(3.93%)
63>	1(0.48%)	2(0.7%)	NO	1(0.39%)
Total number	205	260	329	254
Positive HCV from other cities that delete from calculation	9	25	64	15

Source:

Figure (3) shows that in general that the age group (23 – 32) had the highest positive of HCV for (2021), that means there are decreasing in positive numbers for the same years below, while the lowest year was (2019), but become more than (2022) for the age group (53 – 62) the lowest age group was (63 & over).

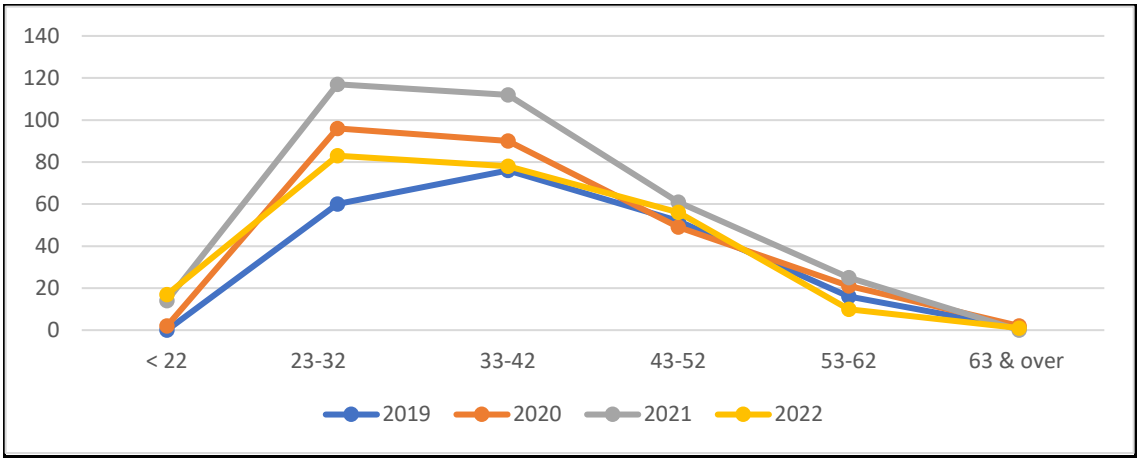


Figure (3): HCV Positive by Age Group (2019 – 2022)

Discussion

Although blood transfusion is a crucial component of medical therapy and can save millions of lives annually around the world, it also carries a risk that could endanger life. To reduce this risk to a minimum, careful donor selection and sensitive screening tests of every donated blood are required [16]. One of the most crucial goals of any blood transfusion organization is to provide a safe and adequate blood supply. Strict screening of all blood donors is required to stop the spread of viral diseases. All given blood must be serologically screened for HBV, HCV, and HIV in Iran [17]. The effectiveness of the safety precautions implemented by blood transfusion facilities is demonstrated by tracking the trend of viral infections in the blood donor population over time [18].

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

In this study, it was discovered that men gave blood at higher rates than women.
This outcome is comparable to those of other studies conducted in Pakistan, Iran, Ethiopia, and Gondar, which discovered that male donors made up (98.1%), (93.2%), (70.1%), (87.9%), and respectively (1.9%), (6.8%), (29.9%), and (12.1%) of the population.[19],[20] ,[21],[22].
The belief that men are generally considered to be in better health than women 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 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.
There were 708.627 blood donors in the sample. Only 1048 (0.14%) and 1504 (0.78%) of them, respectively, tested positive for hepatitis B and C, respectively. that is, a greater rate of HBV infection than HCV infection among seropositive donors (0.78%, 0.14%, respectively), which was consistent with research carried out in other nations like Iran[17,32-35] and in different towns throughout Iraq[4, 10,23-31]. All of these investigations demonstrated that in seropositive blood donors, HBV infection was more prevalent than HCV infection.
Health initiatives must therefore be accessible to enlighten individuals about the HBV's infectious environment and transmission mechanisms. It is crucial to encourage people, especially those in high-risk groups, to get vaccinated against hepatitis B because the disease is preventable with a vaccine.
Depending on a complex combination of behavioral, environmental, and host factors, the prevalence of HBV infection varies from one nation to the next[36].
Men had a greater average prevalence of HBV and HCV than women (0.66%, 2.2%, respectively) (99.3%, 97.8%).This is because most blood donors were men, and men in Iraqi society tend to be more independent and assertive in their decision-making. This finding was in agreement with those of other studies carried out in Iraq [4, 10, 23, 28, 31] as well as in other nations[35, 37].
HBV prevalence was 3.6% among blood donors and military people in the 1970s, and 4.1% in blood donors in the 1980s, according to studies[38]. Prior to our investigation, other studies conducted in Iraq in recent years found that HBV prevalence among blood donors ranged from 0.6% to 4%[38-43] while HCV prevalence ranged from (0.09% to 0.5%)[4,10,23-25,39,40]. That was roughly the same as our study's findings, which showed that the prevalence of HBV and HCV was 0.78% and 0.14%, respectively.

Since the epidemiology of HBV infection has significantly declined over time, it is possible that increased public knowledge of hepatitis infection transmission and utilized disposable syringes is to blame for the declining trend of hepatitis B virus and hepatitis C virus over 2019, 2020, 2021, and 2022. This could be a result of hepatitis B preventive and control initiatives. Additionally, it shows that the disease's endemicity is decreasing from intermediate (more than 2%) to low (less

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 07, 2023

than 2%). Because many nations with effective vaccination programs have significantly decreased the incidence of HBV infection, the establishment of a hepatitis B vaccine program in 1993 may also have contributed to this decrease. The study also revealed a low prevalence of HCV, which was caused by national Blood Transfusion Centers using more accurate HCV test kits to screen blood. Additionally, in recent years, the general population has become more informed of the ways that HCV infection is spread.

Studies on the prevalence of hepatitis in blood donors have also been undertaken in various nations; the results for HBV and HCV in the United Arab Emirates Emirate (U.A.E), Egypt, Jordan, and Pakistan [4] were 0.6%, 4.04%, 0.9%, and 7.5%, respectively.

Regarding age distributions, the majority of the HBV and HCV positive donors were between the ages of 23 and 42, which was in agreement with a prior study done in Iraq that found that the majority of the infected donors were in the 20–40 age range.

Unexpectedly, we found that the prevalence of positive HBV and HCV declined with age. This can be explained by the fact that sexual activity is a more common way for hepatitis infection to spread [44]. It may be because the majority of the donors were in the younger and middle-aged age ranges.

Conclusions

According to our research, hepatitis B and C infection are rare in Baghdad, the country's capital and largest metropolis. Men are typically more impacted than women.

Additionally, the results show a significant decline in the prevalence of the two kinds (HCV and HBV) among blood donors over the study years compared to the 1970s and 1980s.

Most HBV and HCV cases were discovered in people between the ages of 33-42 and 23-42, respectively. The prevalence of disease is expected to decline over the years 2019 through 2022.

In addition to the ongoing immunization of children under the age of five, effective methods for preventing and controlling HBV infection include strengthening and expanding the vaccination program to include all risk groups, as well as educational programs about the illness and its transmission routes.

Data Availability Data available on reasonable request.

Conflicts of Interest Authors declare no conflict of interests for this article.

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