

## Prevalence of Hepatitis-B and Hepatitis-C among Blood Donors in Sulaimani City



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### Abstract

This is a prospective study conducted in January–May 2002. Blood Samples from 1514 healthy blood donors were screened for hepatitis B and hepatitis C in Sulaimani main blood bank. Enzyme Linked Immune Sorbent Assay (ELISA) technique was used to detect Hepatitis B Surface Antigen (HBsAg) and Anti Hepatitis C Virus Antibody (Anti HCV Ab). The prevalence rate of HBsAg and anti-HCV Ab was 2.3%, 1.2 % respectively in the blood donors.

**Keywords:**-Hepatitis B, Hepatitis C, Sulaimani, blood donors

### Introduction

Hepatitis B virus (HBV) is a DNA virus with a remarkably compact genomic structure. Despite its being small, circular, 3200-basepair size, HBV DNA codes for four sets of viral products and has a complex multiparticulate structure [1]. The envelope protein expressed on the outer surface of the virion and on the smaller spherical and tubular structures is referred to as hepatitis B surface antigen (HBsAg). The concentration of HBsAg and virus particles in the blood may reach 500 ug/mL and 10 trillion particles per milliliter, respectively [2]. After infection with HBV, the first virologic marker detectable in serum is HBsAg. Circulating HBsAg precedes elevations of serum aminotransferase activity and clinical symptoms and remains detectable during the entire icteric

or symptomatic phase of acute hepatitis B and beyond [3]. In typical cases, HBsAg

becomes undetectable 1 to 2 months after the onset of jaundice and rarely persists beyond 6 months. After HBsAg disappears, antibody to HBsAg (anti-HBs Ab) becomes detectable in serum and remains detectable indefinitely thereafter [3, 4].

HBV infection is a major global public health problem. 20% of chronically infected patients with HBV will develop cirrhosis, liver failure, or hepatocellular carcinoma. HBV infections account for 500 000 - 1.2 million deaths each year, [5].

Percutaneous inoculation of HBV has long been recognized as a major route of hepatitis B transmission [6]. Most of the hepatitis transmitted by blood transfusion is not caused by HBV; moreover, in approximately two-thirds of patients with acute type B hepatitis. There is no history of an identifiable percutaneous exposure [7].

HBsAg has been identified in most of the body fluids from infected persons, notably semen and saliva are infectious [7,8].

More than 350 million HBsAg carriers in the world constitute the main reservoir of hepatitis B in human beings. Routine screening of blood donors for HBsAg and the elimination of commercial blood sources in the early 1970s reduced the frequency of transfusion-associated hepatitis [9]. During the 1970s, the likelihood of acquiring hepatitis after transfusion of voluntarily donation, HBsAg-screened blood was approximately 10% per patient (up to 0.9% per unit transfused); 90 to 95% of those cases were classified, based on serologic exclusion of hepatitis A and B, as "non-A, non-B" hepatitis [10].

During the late 1980s and early 1990s, the first introduction of "surrogate" screening tests for non-A, non-B hepatitis and, subsequently, after the discovery of HCV, first-generation immunoassays for anti-HCV, reduced the frequency of transfusion-associated hepatitis even further. The introduction of second-generation anti-HCV assays in 1992 has reduced the frequency of transfusion-associated hepatitis C to almost imperceptible levels, 1 in 100,000 [11].

In addition to transfusion, hepatitis C can also be transmitted by other percutaneous routes, such as self-injection with intravenous drugs. Occupational exposure to blood and the likelihood of infection is increased in hemodialysis units [12, 13]. Serologic evidence for HCV infection occurs in 90% of patients with a history of transfusion-associated hepatitis (almost all occurring before 1992), hemophiliacs and others treated with

clotting factors, and injection-drug users [14-16].

In the United States, African Americans, and Mexican Americans have higher frequencies of HCV infection than the whites, and 30- to 49-year-old adult males have the highest frequencies of infection [16]. Chronic hepatitis C accounts for 20% of sporadic acute hepatitis and 40% of chronic liver disease [17].

Most asymptomatic blood donors found to have anti-HCV and approximately 40% of persons with reported cases of acute hepatitis C do not fall into a recognized risk group; however, many such blood donors do recall risk-associated behaviors when questioned carefully, and most patients with acute hepatitis C in the absence of clear-cut risk factors tend to be of lower socioeconomic backgrounds [18].

Thorough questioning of anti-HCV-reactive blood donors has identified nasal cocaine inhalation, with shared equipment, as a potential risk factor for acquiring HCV infection [9]. As a blood borne infection, HCV potentially can be transmitted sexually and perinatally [19]. Specific serologic diagnosis of hepatitis C can be made by demonstrating the presence in serum of anti-HCV [20].

Hepatitis C virus (HCV), before its identification was labeled "non-A, non-B hepatitis," is a linear, single-stranded, positive-sense, 9400-nucleotide RNA virus [21, 22]. HCV first identified in the USA in 1989 as a major causative agent of post transfusion non-A, non-B hepatitis. In the USA, antibodies to HCV are encountered in 0.1% to 1.8% of the general population. In healthy volunteer blood donors the incidence of HCV in the USA varies from 0.17% to 1.4% and in the UK is 0.35%. [23].

### Patients and Methods

This prospective study was carried out from January to May 2002 among healthy volunteer blood donors attending main blood bank in Sulaimani, Kurdistan, Iraq.

A questionnaire form was filled by those who accepted to participate in the study including demographic study and history about age, address, occupation, previous surgery and blood transfusion. From each blood bag, five milliliters of blood was aspirated into a disposable plain plastic tube and sent for the Centrallaboratory/Virology Department for detection of hepatitis-B and C using HBsAg and Anti HCV Antibody tests respectively.

HBsAg was detected through bioelisa HBsAg colour with sensitivity of 0.125 UI/ml and specificity of 99.93% [24].

Anti HCV was detected in the serum using third generation ELISA test (bioelisa HCV). Statistical analysis; X<sup>2</sup> and t-test were applied .P value less than 0.05 regarded as statistically significant .[25].

### Results

In this study 1514 healthy blood donors were evaluated. Table (1) shows that 1460 (96.5%) were male and 54 (3.5%) were female (P< 0.00). The female's age ranged 16-77 years, average age was 49.11 year, while the male's age ranged 15-83 year, the average age was 37.28 years, with statistically significant difference (p <0.01).

**Table-1 Gender and Age of the Donors**

Marital status	No.	Min. age	Max. age	Average age (Yr.)
Male	1460	15	83	37.28
Female	54	16	77	49.11

1120 (74%) donors were married while 394 (26%) were unmarried (p<0.01).

Thirty four samples (2.3%) were HBsAg positive, while 18 (1.2%) were positive for Anti HCV Antibody. One donor was positive for both B, C virus. Table-2

Table 3 and 4 show age distribution and average of blood donors according to their positive HBsAg and Anti HCV .One donor was positive for both and aged 64. Most of positive donors were among age grouping 30-39, 40-49 with statistically significant difference among age groups (p <0.01). Most of the donors, 1151 (76.5%) were from city centre, while 354 donor (23.5%) were from rural area. (P <0.05).

Blood groups (A),( O) were the most common groups among the donors constituting 32.5 % ,30.2 % respectively, while AB-negative was the least common group with statistically significant difference (p <0.01).

Majority (89.8%) of the donors were rhesus positive, while only 10.2% were rhesus negative (P <0.01). Table-5.

Twenty -five donors had the history of previous blood transfusion; among them four were AntiHCV Ab positive. None of the HBsAg positive donors had the history of blood transfusion, while 23.5% of Anti HCV Ab positive donors had positive of the history of blood transfusion, Table-6.Only 3 out of 177 (1.7%) donors who had past surgery were HBsAg positive. One of them was a medical student. History of past surgery with blood transfusion was positive in 18 (1.1%) donors.( Table 7). The donors were donating between 0-20 times, with the average of 5.4 times. Fortunately 19 of HBsAg positives donated for the first time. (Table 8)

**Table-2 Marital Status of the Donors**

Gender	HBsAg positive		Anti HCV Positive		HBsAg-Anti HCV Negative		Total	Percent
	Male	Female	Male	Female	Male	Female		
Married	13	1	2	1	1061	42	1120	74
Unmarried	19	1	9	5	358	3	394	26
Total	32	2	11	6	1419	45	1514	100

**Table -3 Age groups of the HBsAg & Anti HCV Positive Donors.**

AGE GROUPS (Year)	HBsAg positive		Anti HCV Positive	
	No.	Percent	No.	Percent
18-29	6	17.6	3	17.6
30-39	11	32.4	5	29.4
40-49	7	20.5	5	29.4
50-59	5	14.7	2	11.7
60-69	2	5.8	2	11.7
70-79	3	8.8	----	-----
Total	34	100	17	100

**Table -4 Average age of the HBsAg & Anti HCV Positive Donors.**

Gender	HBsAg Positive	Average age	Anti HCV Positive	Average age	HBsAg + Anti HCV
Male	32	40.7	11	33.5	1
Female	2	38.5	6	42.2	-
Total	34	40.5	17	38.5	1

**Table-5 Blood groups of the Donors**

Blood Group	HBsAg positive		Anti HCV Positive		HBsAg ,Anti HCV Negative		Total	%
	Male	Female	Male	Female	Male	Femal e		
A	10	0	4	2	457	13	486	32.5
B	8	2	2	1	276	12	301	20.1
AB	3	0	1	0	98	3	105	7
O	7	0	3	2	425	13	450	30.2
A-	2	0	0	1	36	3	42	2.8
B-	0	0	0	0	23	0	23	1.6
O-	2	0	1	1	74	1	79	5.3
AB-	0	0	0	0	7	1	8	0.5
Total	32	2	11	7	1396	46	1494	100

Table-6 Past History of blood transfusion

Blood transfusion	HBsAg positive		Anti HCV Positive		HBsAg-Anti HCV Negative		Total
	Male	Female	Male	Female	Male	Female	
Received Blood	0	0	1	3	19	2	25
Not Received Blood	32	2	10	3	1400	43	1489
TOTAL	32	2	11	6	1419	45	1514

Table-7 History of surgical operations

	HBsAg positive		Anti HCV Positive		HBsAg, HCV-Ab Negative		Total
	Male	Female	Male	Female	Male	Female	
Past Surgery	2	1	0	0	164	10	177 (11.7%)
No Past Surgery	30	1	11	6	1255	35	1338 (88.3%)

Table-8 Total and Average Units of blood Donated.

	HBsAg positive		AntiHCV Positive		HBsAg, AntiHCV Negative		Total
	Male	Female	Male	Female	Male	Female	
Number of Donors	32	2	11	7	1419	45	1514
Total Units	127	3	12	7	7972	116	8236
Average	4.2	1.5	1.1	1	5.6	2.7	5.4

### Discussion

Hepatitis B& C virus infections are major global public health problems. Worldwide approximately 2 billion people who have been infected, out of them more than 350 millions are chronic carriers of HBV. [5].

According to the World Health Organization estimation, approximately 3% of the world population, or about 170 million people, may be infected with hepatitis C virus [23, 26]. We screened 1514 donors, 1460 of them were males, while only 54 (3.5%) donors were females. This reflects the poor health education in our society about blood donation, also possibly

because of the lower mean hemoglobin concentration among females, because

of the burden of menstrual cycle, multiple pregnancies and lactation on them during the reproductive period. Also due to the social consideration, that is ashamed if a female donates in the presence of the male.

The mean age of male donors were more than females, possibly because the mean half lives of males were more.

Most of the donors (74%) were married, because of our oriental, Islamic society encourages early marriage. The marital status occupies most of the active periods of life, during which people can donate.

Hepatitis-B antigen was positive in 2.3% of the samples, this figure represents a moderate prevalence as, serum HBsAg prevalence is 0.1 to 0.5% in normal populations in the United States and Western Europe [15, 16]. Chronic carriers are especially prevalent in the Middle and Far East and in sub Saharan Africa, the prevalence rate of up to 5 to 20% has been found [27]. Wang CS et al (Southern Taiwan's A-Lein township) in a community based study found that among 6,095 patients, 13.8% were positive for hepatitis B surface antigen and 17 % were positive for anti-HCV. [28].

Butsashvili et al study found that out of 4970 donors 7.3% had anti-HCV, HBsAg was positive in 4.1%, They concluded that the prevalence of HCV and HBV in Georgia was higher than national prevalence estimates of viral hepatitis in neighboring countries. [29].

The prevalence of Hepatitis -C in the present study was 1.2% ,This is the first study in Sulaimani to evaluate Hepatitis-C prevalence ,because unfortunately the Anti HCV tests were not available for blood screening until the end of 2000,This was part of the embargo of the central government on the Kurdistan region.

In the United States, 0.5% of volunteer blood donors; and 1.8% of the general population, which translates into 4 million persons had HCV. [15].Comparable frequencies of HCV infection occur in most countries around the world, but extraordinarily high prevalences of HCV infection occur in certain countries, such as Egypt, where more than 20% of the population in some cities are infected[30 ,31].

One patient was positive for both HBsAg, Anti HCV.This reflects the shared risks for transmission of both infection.

Most of the donors, 1151 (76.5%) were from city centre, while 354 donors (23.5%) were from rural areas ( $P<0.01$ ). This is explained by the lack of proper blood bank in rural areas, deficient facilities of transmission and lower health education about blood donation.

Blood group A and O were the most common group among the donors constituting 32.5 % and 30.6 % respectively, while AB-negative was the least common group with statistically significant difference ( $p <0.01$ ).

This is in concord with a previous study conducted by nassreen-alwafi 1999-sulaimani.

Twenty -five donors had the history of previous blood transfusion; among them four were AntiHCV positive. None of the HBsAg positive donors had history of blood transfusion, while 23.5% of Anti HCV positive donors had positive history.Table-5This finding is explained by the fact that blood in our blood bank was screened only for HIV, HBsAg before 2001, and screening for HCV only started at the end of 2000.Therefore, people who received blood before that date were at risk of acquiring HCV infection. [32, 33].

Only 3 out of 177 (1.7%) donors who had past surgery were HBsAg positive.One of them was a medical student. History of past surgery with blood transfusion was positive in 18 (1.1%) donors. This means that surgery with contaminated instruments is another essential way of transmitting HBV infection [34, 35], especially in

the emergency department, where sometimes non-screened blood had been given and non sterilized instruments might have been used.

The donors were donating between 1-20 times, with the average of 5.6 transfusion in male donors and 2.7 in the females.

The average of the previous blood transfusion among HBsAg positive male and female donors was 4.2, 1.5 respectively, and among Anti HCV positive donors was 1.1, 1 time for male and female donors respectively. This is because ,screening for hepatitis C was not available before 2000, and screening for hepatitis B was not satisfactory, as the reagents were irregularly supplied and there were periods of total deficiency that sometimes lasted several months to year.

This explains the important and at the same times the dangerous role of blood transfusion in transmitting of HBV, HCV...infection and the par amount significance of blood screening in their prevention [36, 37]. Frequency of infectious donations entering the blood supply in England, between 1993 and 2001 was 1 in 260 000 for HBV and 1 in 8 million for HIV. For HCV, the frequency of infectious donations was 1 in 520 000 during 1993-98 and fell to 1 in 30 million during 1999-2001 when all donations were tested for HCV RNA. [38].

In this study multiple blood donations by the carriers, indicate that the previous screening and registration in blood bank was deficient and had not been computerized yet. Soldan K et al in England found that the risk of donations from new donors was found to be approximately seven fold higher than

the risk from donations from repeated donors [38].

For hepatitis C an effective vaccine is not available yet [33, 39, 40], but hepatitis B infection can be prevented to a very good extent through proper vaccination program [41- 43]. Table- 9 shows comprison of our study with some other studies.

### Conclusion

The prevalence rate of HBsAg, Anti HCV positive results among blood donors in Sulaimani was 2.3%, 1.7% respectively. Most of the donors were married males, and from city centre.

Blood screening is very important both for finding healthy carriers and for prevention.

Blood transfusion and surgery are among important ways of transmission ,but significant numbers of infected persons had no clear source for infection. Possibly they contract the infection from contaminated needle, minor injuries, vertical transmission,....etc.

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## رێژهی تووشبوون به قایروسی هه وکردنی جگهر جوړی B,C له نیوان خوین به خسانی بانکی خوین له شاری سلیمانی

محمد عمر محمد

کۆلیجی پزیشکی / زانکۆی سلیمانی / ههرێمی کوردستان - عێراق  
ئهم لیکۆینهوهیه له نیوان مانگی کانوونی ٢ تا ئایاری ساڵی ٢٠٠٢ ئه نجام دراوه .  
نمونه ی خوین له ١٥١٤ کسه له خوین به خسانی بانکی خوینی سههرکی سلیمانی وهگرایا ، تکنیکسی ELISA به کارهینرا به مه بهستی ناسینهوهی قایروسی هه وکردنی جگهر جوړی B,C .  
وهدهرکهوت کهرێژهی HBsAg ، وه دژتهنی قایروسی Anti HCV به رێژهی ٢,٢٪ وه ١,٢٪ پوزیتیف بوون یهک به دوا یهک له خوین به خساندا .  
پشکنینی خوین زۆر گرنگه بۆ دهستنی شانکردنی ئهو کهسانه ی که هه لگری ئهم قایروسانه ن به مه بهستی رێگرتن نه گواستنه وه یان بۆ کهسانی تر .

## نسبة انتشار قایروس الکبد نوع (ب ، ث) . بین المتبرعين بالدم في مصرف الدم في مدينه السلیمانیة

محمد عمر محمد

کلیة الطب / جامعة السلیمانیة / اقلیم کوردستان - العراق  
أجريت هذه الدراسة من كانون ثاني الى أيار ٢٠٠٢ . تم أخذ نماذج الدم من ١٥١٤ شخص ممن تبرعو بالدم في مصرف الدم الرئيسي في السلیمانیة ، استعمل تقنية ال ( ايليزا ) ELISA للتعرف على وجود قایروس الکبد من نوع B,C .  
كان نسبة HBsAg ، Anti HCV موجبا في ٢,٢٪ و ١,٢٪ بتسلسل بين المتبرعين .  
وقد تبين أن فحص الدم يعتبر من الطرق المهمة لتعرف على الأشخاص الحاملين لهذين القایروسيين والحد من انتشارهما للأخرين .