

Prevalence of Hepatitis C Virus Infection Among Blood Donors and Certain Risky Groups in Diyala Province

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Abstract

Background: Although the prevalence of hepatitis C virus infection among the general population is generally low; however, the risk of chronic hepatitis C virus infection is still high in certain groups of patients particularly multiple recipients of blood or blood products

Objectives: The present study aimed to determine the hepatitis C virus infection rate among unpaid blood donors and certain risky population in Diyala province.

Materials and methods: The present study was conducted in Diyala province for the period from 1st. August/ 2009 to 30th./May 2010. A total of 248 subjects were included and categorized in 4 study groups namely; unpaid blood donors, healthcare workers, thalassemia, hemodialysis patients. Blood samples were collected; sera were separated and kept frozen till use. Detection of anti- hepatitis C virus antibody was carried out in the Public Health Laboratory in Baquba, using the third generation ELISA technique (Bioelisa hepatitis C virus). Repeatedly positive sera by ELISA were confirmed by immunoblot assay (Lia Tek hepatitis C virus III) in the Central Public Health Laboratory-Baghdad. Data were statistically analyzed.

Results: the results showed that the higher hepatitis C virus infection rate was recorded among thalassemia patients (26.2%), followed by hemodialysis patients (21.7%) and Healthcare workers (3.3%), while the lowest infection rate was recorded among blood donors (1.1%). Neither age nor gender has significantly increased the hepatitis C virus infection in study groups. hepatitis C virus infection increased as the duration of hemodialysis prolonged. Conclusion: the hepatitis C virus infection rate, although it is acceptable among blood donors, but is still high among certain risky population in Diyala province.

Keywords: viral hepatitis, HCV, Diyala

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Introduction

Hepatitis C is a hepatotropic and lymphotropic virus that causes acute and chronic hepatitis, liver cirrhosis and hepatocellular carcinoma [1]. hepatitis C virus infection is a major public health problem. Up to 3% of the world's population is infected with hepatitis C virus, and at least 200 millions chronic carriers globally [2]. 55% to 85% of these patients become chronic

carriers with approximately one third present extra hepatic manifestations [3].

Hepatitis C viruses a blood-borne virus that is transmitted most efficiently by direct percutaneous exposure to infected blood or other body fluids [4]. Although the prevalence of hepatitis C virus infection among the general population is generally low, and that the implementation of anti-hepatitis C virus screening program of blood units has reduced the residual risk of

infection to less than 1: 250,000/ blood unit [5]. However, the risk of chronic hepatitis C virus infection is still high in certain groups of patients particularly multiple recipients of blood or blood products [6,7], hemodialysis patients [8], patients with diabetes mellitus [9], Patients with different type of malignancies [10], patients with rheumatoid arthritis [11]. Additionally, high hepatitis C virus chronicity rate have been reported among health care workers from different parts of the world [12-14].

Patients and Methods

This cross sectional study was conducted in Diyala province- Iraq in Baquba Teaching Hospital and Al- Batul Teaching Hospital for the period from 1st. August/ 2009 to 30th/May 2010 including the patients attending the hemodialysis and thalassemic units, blood donors and health workers as a risk groups. A total of 248 persons were included and categorized in 4 study groups; unpaid blood donors, healthcare workers, thalassemia and hemodialysis patients, information was taken for each person regarding age, sex, duration of hemodialysis in years and others. Blood samples were collected; sera were separated and kept frozen until use.

Detection of anti- hepatitis C virus antibody was carried out in the Public Health Laboratory in Baquba by specialist personal, using the third generation ELISA technique (Bioelisa hepatitis C virus). Repeatedly positive sera by ELISA were confirmed by immunoblot assay (Lia Tek hepatitis C virus III) in the Central Public Health Laboratory- Baghdad. Statistical analysis was done, using chi square and results were considered significant if the p value was (<0.05).

Results

A total of 248 subjects distributed in 4 study groups including thalassemia, hemodialysis, health care workers, and blood donors. Table (1) shows the number tested, number and percentage of hepatitis C virus positive subjects and the 95% confidence interval for the prevalence of anti- hepatitis C virus antibody in each study group. Obviously, the higher infection rate was recorded among thalassemia patients (26.2%) with a 95% confidence interval range (14.4 - 42.3), while the lowest infection rate was recorded among blood donors (1.1%) with a 95% confidence interval range (0.1 - 6.7).

Table (1): Hepatitis C virus infection rate and 95% confidence intervals in studied groups.

Study groups	No. tested	Hepatitis C virus positive		95% confidence intervals
		No.	%	
Thalasseia	42	11	26.2	(14.4-42.3)
Hemodialysis	23	5	21.7	(8.3-44.2)
Health care workers	90	3	3.3	(0.9-10.1)
Blood donors	93	1	1.1	(0.1-6.7)

The anti- hepatitis C virus positivity rate was insignificantly (P=0.06) higher in the age group 20-49 years compared to other age group, table (2).

Table (2): Hepatitis C virus positivity rate by age groups in thalassemia patients.

Age groups (Years)	Anti- hepatitis C virus negative		Anti- hepatitis C virus positive		Total	
	No.	%	No.	%	No.	%
< 20	31	77.5	9	22.5	40	100
20-49	0	0	2	100	2	100

P= 0.06 [NS]

The results in table (3) showed that both male and female thalassemic patients were almost equally infected by hepatitis C virus (26.1% vs. 26.3%) respectively. The P value was (0.63).

Table (3): Hepatitis C virus infection rate by gender in thalassemia patients.

Gender	Anti- hepatitis C virus negative		Anti- hepatitis C virus positive		Total	
	No.	%	No.	%	No.	%
Female	14	73.7	5	26.3	19	100
Male	17	73.9	6	26.1	23	100

P= 0.63 [NS]

There was insignificant effect of age on the anti- hepatitis C virus positivity rate between the age groups in hemodialysis patients, table(4).

Table (4): Hepatitis C virus positivity rate by age groups in hemodialysis patients.

Age groups (Years)	Anti- hepatitis C virus negative		Anti- hepatitis C virus positive		Total	
	No.	%	No.	%	No.	%
20-49	17	81	4	19	21	100
50 +	1	50	1	50	2	100

P= 0.40 [NS]

The results showed that the anti- hepatitis C virus positivity rate in female was higher than that in males (30% vs. 15.4%). However, the difference between the two groups was statistically insignificant (P= 0.37), tabl3 (5).

Table (5): Hepatitis C virus infection rate by gender in hemodialysis patients.

Gender	Anti- hepatitis C virus negative		Anti- hepatitis C virus positive		Total	
	No.	%	No.	%	No.	%
Female	7	70	3	30	10	100
Male	11	84.6	2	15.4	13	100

P= 0.37 [NS]

Results in table (6) revealed that patients with anti- hepatitis C virus positive had higher median duration of hemodialysis compared to those with anti- hepatitis C virus negative (3 vs. 1.5 years). However, the difference was failed to reach the statistical significance (P= 0.07), table (6).

Table (6): Hepatitis C virus infection rate by duration of hemodialysis.

Duration of hemodialysis (Years)	Anti- hepatitis C virus antibody		P (Mann-Whitney)
	Negative	Positive	
No. of patients	18	5	0.07 [NS]
Range	(0.5-5)	(1-23)	
Median	1.5	3	
Interquartile range	(1-2.3)	(1.5-14.5)	

Table (7) revealed that the anti- hepatitis C virus positive rate was higher in health workers 50 years old and more compared to those below 50 years old. The difference was statistically insignificant, (P=0.06).

Table (7): Hepatitis C virus positivity rate by age groups among health care workers.

Age groups (Years)	Anti- hepatitis C virus negative		Anti- hepatitis C virus positive		Total	
	No.	%	No.	%	No.	%
20- 49	75	98.7	1	1.3	76	100
>=50	12	85.7	2	14.3	14	100

P= 0.06 [NS]

Female health care workers had slightly elevated anti- hepatitis C virus positivity rate compared to that male (4.2% vs. 2.4%). The difference was statistically insignificant (P=0.55), table (8).

Table (8): Hepatitis C virus infection rate by gender among health care workers.

Gender	Anti- hepatitis C virus negative		Anti- hepatitis C virus positive		Total	
	No.	%	No.	%	No.	%
Female	46	95.8	2	4.2	48	100
Male	42	97.6	1	2.4	42	100

P= 0.55 [NS]

The age of only one blood donor who tested positive for anti- hepatitis C virus antibody was 54 years old. The difference among age groups was statistically significant (P= 0.03), table (9).

Table (9): Hepatitis C virus infection by age among blood donors.

Age groups (Years)	Anti- hepatitis C virus negative		Anti- hepatitis C virus positive		Total	
	No.	%	No.	%	No.	%
< 20	1	100	0	0	1	100
20-49	89	100	0	0	89	100
>=50	2	66.7	1	33.3	3	100

P= 0.03 [S]

Discussion

Preventing the transmission of infectious diseases has never been more challenging

than today in a world that is characterized by tremendous globalization, connectivity, and speed. hepatitis C virus is one of these infectious diseases, which derived it



importance from its worldwide distribution and its serious long-term sequel [5].

Thalassemia patients represent the upmost risky population for hepatitis C virus infection in this study with an infectivity rate 26.2%. These results were consistent with previous reports [15,16]. As a part of multiple blood recipients, transfusion of untested or hepatitis C virus positive blood units are the main route for transmitting infection to thalassemia patients particularly those received blood units before the introduction of anti-hepatitis C virus antibody in the predonation screening program. Of note, in Iraq, the screening of anti-hepatitis C virus antibody by ELISA technique was introduced in 1995.

Regarding the gender, the results showed that both sexes are almost equally infected with hepatitis C virus. This is obviously denoted that both sexes are under the same risk for acquiring hepatitis C virus infection. On the other hand, although the difference between age groups was failed to reach the levels of statistical significance ($P= 0.05$). However, the 100% hepatitis C virus positivity rate among patients with 20-49 years old clearly indicate that the risk of virus infection increased as the patient become older.

Due to the fact that the plasma viral load of hepatitis C virus is low compared to hepatitis B virus (10^6 copies/ml vs. 10^9 copies/ml) and the relatively long incubation period of hepatitis C virus infection (median 120 days) [1,5]. Therefore, to reduce the residual risk of hepatitis C virus infection through blood transfusion, certain countries have implemented new hepatitis C virus nucleic acid detection assays instead of EIA as screening test in blood banks. These new techniques have better sensitivity and specificity over that of EIAs [17,18].

Hemodialysis patients included in this study showed high hepatitis C virus infection rate (21.7%). This result was not unusual since almost all previous studies concluded that

hemodialysis remains as a highly risk group for hepatitis C virus infection despite the obvious reduction provided by testing blood donors for anti-hepatitis C virus antibody [19]. Moreover, other workers provide convincing evidence for nosocomial transmission of hepatitis C virus in hemodialysis units [8]. The anti-hepatitis C virus positivity rate was frequently associated with blood transfusion and in some patients; hepatitis C virus was probably transmitted within the dialysis units as suggested by the correlation between prevalence of anti-hepatitis C virus positivity rate and the duration of hemodialysis [20]. It is also possible that health workers may transmit hepatitis C virus to hemodialysis patients, since high prevalence of hepatitis C virus infection have been documented among health workers in dialysis units [12,13]. The present study also revealed that the hepatitis C virus positivity rate was increased as the median duration of dialysis prolonged. Again this result was consistent with previous studies affirming the high hepatitis C virus positivity rate among patients with longer duration of hemodialysis [8].

A relatively high hepatitis C virus positivity rate was found among health workers as compared to blood donors (3.3% vs. 1.1%). These results were in agreement with previous reports affirming that health workers are at risk for infection by hepatitis C virus via exposure to infected blood or body fluids [12]. Actually, it is not unusual to find high hepatitis C virus positivity rate among health workers as they routinely dealing with asymptomatic infected patients and their body secretions often without sufficient safety precautions. Of note, some of these patients are serologically silent [3]. Transmission of hepatitis C virus following accidental needle stick is an important thread to health workers. The overall rate of hepatitis C virus transmission after needle stick exposure range from 0%-10%

depending on viral load in the body fluid, inoculum size, and tissue exposed [4].

The results also revealed insignificant difference of hepatitis C virus infection between sexes, although males had higher hepatitis C virus infection compared to females (4.2% vs. 2.4%). Similar higher rate was recorded in females in another study [13]. However, discordant results were also reported [21]. The high hepatitis C virus positivity rate among female health workers obtained in this study probably related to the enrollment of midwives. Therefore, it has been recommended that all health workers with viremia above 10^6 particle/ml should not be allowed to perform exposure prone procedures in health care settings [22].

The hepatitis C virus positivity rate among unpaid blood donors in the present study was 1.1%. Seroprevalence of anti-hepatitis C virus antibody among blood donors from different countries yielded variable positivity rate; 2.8% among Ghanaian blood donors [23], 0.59% among healthy voluntary blood donors in Shiraz-Iran [24], 0.99% in Saudi Arabia [25], 0.4% in Tunisia [26], 1.4% in Kerala [27] and 0.5% among Turkish blood donors [28]. Undoubtedly, blood transfusion is an important mode of transmission of viral infection to the recipient. Hepatitis B, C, human immunodeficiency virus (HIV) is obligatory screening tests by blood banks. In Iraq, screening for anti-hepatitis C virus was introduced in 1995. To improve the blood safety and reduce the risk of residual hepatitis C virus infection, many countries have introduced new hepatitis C virus nucleic acid detection-based assays in the pre-donation screening program. These new techniques shorten the window period and reduce the residual risk of hepatitis C virus infection to less than 1: 250,000/unit [18].

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