
Seroprevalence of Hepatitis C and Associated Risk Factors in Hemodialysis Units in Baghdad

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Abstract

Background: Hepatitis C virus (HCV) remains a major hazard for both patients and medical staff of hemodialysis units.

Objectives: To estimate the rate of HCV infection among hemodialysis centers attendants in Baghdad and identify the possible risk factors which may contribute in the risk of infection.

Patients & Method: Across-sectional study conducted in Baghdad for the period from 1st February 2012 through July 2012, among all patients attending the five main hemodialysis centers in Baghdad during study period. Data collected by using special questionnaire-form regarding patient's age, gender, duration of dialysis, number of sessions per week, frequency, history of blood transfusion, renal transplant, surgical intervention, and hepatitis B virus co-infection, in addition of reviewing patient's medical records to confirm the laboratory results of HCV screening.

Results: A total of 526 hemodialysis patients were enrolled with an overall rate of HCV infection of 27.6% , 24.1% of them were co-infected with hepatitis B virus. The highest rates of infection was reported in Al-Kadhmiya Hemodialysis Center 71.4%, in patients aged below 30 years, females 35.5%, those attending multicenter, longer duration of hemodialysis, 3.5% in those stayed less than 12 months up to 53.1% in those stayed for 36 months and more. From 145 seropositive hemodialysis patients, 21.4% of them became positive in the first 12 month of dialysis. Blood transfusion and history of renal transplantation had no role in seroconversion rate of HCV infection. Hemodialysis patients with history of diabetes were more prone to HCV infection.

Conclusion: The rate of HCV is very high in hemodialysis patients compared to general population indicating a causal relation between hemodialysis and HCV virus transmission that needs an extreme careful observation of preventive infection control measures to limit the transmission in hemodialysis units.

Keywords: Hepatitis C, Seroprevalence, Risk Factors, Hemodialysis Units, Baghdad

Introduction:

Hepatitis C virus (HCV) infection is a form of liver inflammation that is associated with a high rate of chronic liver disease and cirrhosis⁽¹⁾. Well-known risk factors for HCV infection transmission include, blood product transfusion, organ transplantation, and chronic hemodialysis and injection drug use⁽²⁾. HCV-infected renal failure patients at increased risk for death whether they remain on hemodialysis or undergo kidney transplantation⁽³⁾.⁽⁴⁾There is wide variation in the prevalence of HCV infection among different HD units and countries as shown by Dialysis Outcome and Practice Pattern Study (DOPPS)⁽⁵⁾, where mean prevalence of HCV in different HD facilities is 13.5% and varied among countries from 2.6 % to 22.9 %⁽⁵⁾. In Arab countries the prevalence rates of HCV infection among hemodialysis patients have been reported to range from 27% in Lebanon to 75% in Syria.^(6,7) In Iraq ,a study conducted in 2003, involved 169 patients with end stage renal failure who used hemodialysis, the prevalence rate of HCV was 7.1%,⁽⁸⁾ in comparison to 1.42% in general population according to Ministry of health report in 2009⁽⁹⁾.

Objectives of the study:

- 1-To estimate the Seroprevalence rate of HCV infection among hemodialysis patients in Baghdad hemodialysis centers.
- 2-Evaluate and address the major risk factors which may contribute in the transmission of this virus among hemodialysis patients.

Patients and Method:

This is a cross-sectional study, conducted in five main hemodialysis centers in Baghdad (capital of Iraq); Al Kindi Teaching Hospital, Al Karama Teaching Hospital, Al Yurmook Teaching Hospital, Baghdad Teaching Hospital and Al Kadhmiya Teaching Hospital during the period from 1stFebruary through July 2012.

All patients attending the five hemodialysis centers during the time of the study were included. Each patient was interviewed directly according to a questionnaire form to collect data about probable risk factors for HCV infection: demographic variables (age, sex), history of hemodialysis which include: duration on hemodialysis, number of session per week, number of hemodialysis centers attended. In addition to history of co-morbidities as diabetes and hypertension.

The questionnaire form also includes questions to determine the history of renal transplantation and other surgical interventions, in addition to history of blood transfusion. The results of HCV and HBV were confirmed by reviewing the patient's medical records and matched with the results of each center records.

Statistical Analysis: Data were analyzed using SPSS version 18. Chi-square test used to evaluate the association between study variables and HCV infection. A (P value ≤ 0.05) was considered statistically significant.

Results

A total of 526 hemodialysis patients were recruited from hemodialysis centers in Baghdad. The overall rate of HCV virus infection was 145(27.6%) as demonstrated in figure (1). Out of the 145 seropositive patients, 35 (24.1%) of them were seropositive for HBV, while 110 (79.9%) of the hemodialysis patients were seropositive for HCV only. Table (1).

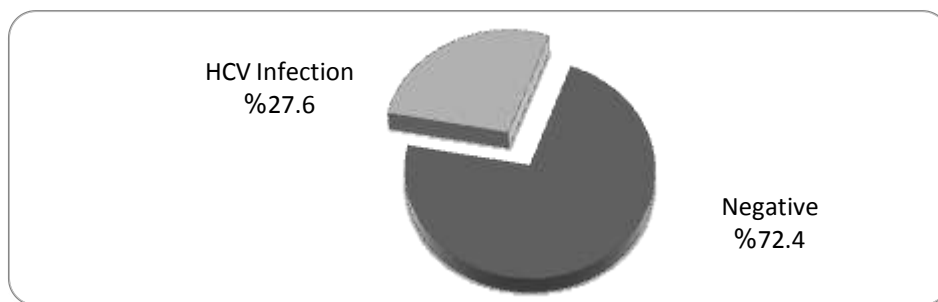


Figure- 1 Rate of hepatitis C virus infection among hemodialysis patients in hemodialysis units in Baghdad

Table- 1 Distribution of hemodialysis patients according to seropositivity for HCV and HBV co infection.

HBV infection	HCV infection				Total
	Seropositive		Sero negative		No.
	No.	%	No.	%	
Seropositive for HBV infection	35	24.1	18	4.7	53
Sero negative for HBV infection	110	75.9	363	95.3	473
Total Patients	145		381		526

$\chi^2 = 43.687$ df= 1 P= 0.000

Table- 2 The seroprevalence for HCV infection according to hemodialysis centers in Baghdad

Hemodialysis unit	Total	Seropositive for HCV	
	No.	No.	%
Al Kindi	162	37	22.8
Al Karama	122	21	17.2
Al Yarmouk	113	33	29.2
Baghdad hospital	66	9	13.6
Al Kadhmiya	63	45	71.4
Total Patients	526	145	27.6

Table (3) shows the age distribution of hemodialysis patients, highest rate of HCV infection was observed in age group below 30 years, and last rate was observed in age group over 70 years 9(20.4%), with statistical significant association. P=0.027.

Although male patients represent 55.1% of the total hemodialysis patients, only 61(21.1%) of them were HCV seropositive and 84(35.6%) of the female patients were HCV seropositive. This difference in infection rates between females and males had statistical significant association (P=0.0001). Table-3

Table- 3 Distribution of hemodialysis patients according to age, gender and seropositivity for HCV

*Age(year)	Total No.	HCV Positive	
		No.	%
< 30	32	26	81.3
30-39	130	32	24.6
40-49	91	24	26.4
50-59	128	28	21.9
60-69	101	26	25.7
≥70	44	9	20.5
Total patients	526	145	27.6
**Gender	Total No.	HCV Positive	
		No.	%
Male	290	61	21.1
Female	236	84	35.5
Total Patients	526	145	

* $\chi^2=50.177$ df= 5 P= 0.027
 ** $\chi^2=13.812$ df= 1 P= 0.0001

Attending multicenter shows statistical significance association with HCV infection (P=0.0001), as revealed by

table-4. Among 67 patients who were attended multicenter, 59.7% of them were infected with HCV infection.

Table-4 Theseeroprevalence for HCV infection in relation to attending multidialysis centers

Attending multidialysis	Total	HCV seropositive	
	No.	No.	%
Yes	67	40	59.7
No	459	105	22.9
Total Patients	526	145	27.6

$\chi^2= 39.708$ df= 1 P= 0.0001

Table -5 demonstrated the duration of dialysis among the study group, infection rates ranged from 3.5% in patients who stayed less than 12 months on hemodialysis up to 53.1% for patients who stayed for 36 months and more on hemodialysis. The longer the dialysis the more is HCV seropositivity

(P=0.0001).From 145 seropositive hemodialysis patients, 31 (21.4%) of them became positive in the first 12 month of dialysis, 73 (50.3%) became seropositive in the next 12-24 months and the remaining 41(28.3%) became seropositive in the next following months.

Table- 5 The distribution of hemodialysis patients according to HCV infection and length of time on hemodialysis

*Length of time on hemodialysis	Total	HCV seropositive	
	No.	No.	%
Less than 12 months	114	4	3.5
12-24 month	227	46	20.3
25-36 month	8	1	12.5
More than 36 months	177	94	53.1
Total Patients	526	145	27.6
Time in months from first hemodialysis session until diagnosis of HCV	HCV seropositive		
Less than 12 months		No.	%
12-24 months		31	21.4
More than 24 months		73	50.3
Total Patients		41	28.3
Less than 12 months		145	27.6
12-24 months		31	21.4
		73	50.3

* $\chi^2= 97.841$ df= 3 P= 0.0001

The rate of HCV infection in hemodialysis patients varied according to number of hemodialysis session per week, the majority of study group were

under 2 sessions per week, according to result in table - 6.

The relationship between number of hemodialysis sessions per week and HCV infection seropositive was statistically not significant (P=0.506).

Table -6 Distribution of hemo patients according to seropositivity for HCV & No. of hemodialysis sessions/week

No. of hemodialysis sessions per week	Total	HCV positive	
	No.	No.	%
Once	10	2	20.0%
Twice	465	132	28.4%
Three times	51	11	21.6%
Total Patients	526	145	

$\chi^2 = 1.362$ df= 2 P= 0.506

Table-7 shows the history of blood transfusion and previous history of renal transplantation, in present study the results failed to show statistical significance association neither between the history of blood transfusion ,nor previous history of renal

transplantation and HCV infection,(P=0.084 , P=0.067) respectively. Regarding previous surgical history and HCV infection, only 4 (7.6%) patients gave history of previous surgical intervention, and all of them were seropositive for HCV infection (100%).

Table -7 Distribution of hemodialysis patients according to seropositivity for HCV and history of blood transfusion and renal transplantation

*History of blood transfusion	Total	HCV Positive	
	No.	No.	%
No	198	46	23.2
Yes	328	99	30.1
Total Patients	526	145	
**History of previous renal transplant	Total	HCV Positive	
	No.	No.	%
Yes	37	15	40.5
No	489	130	26.6
Total Patients	526	145	

$\chi^2 = 2.987$ df= 1 P= 0.084 $\chi^2 = 3.355$ df= 1 P= 0.067

Table -8 shows the distribution of study group according to history of chronic diseases. In this study, 111 hemodialysis patients were diabetic; of them (18%) were HCV seropositive compared to 125(30.1%) seropositive patients from 415 non diabetic patients,

being diabetic patient increases the risk for acquiring HCV infection (P=0.011).

Among the total study group, 265 were hypertensive, only 66(24.9%) of them were HCV seropositive, hypertension had no statistical significant association with HCV infection (P=0.196).

Table -8 Distribution of hemodialysis patients according to seropositivity for HCV and (DM & Hypertension)

Diabetes Mellitus	Total	HCV Positive	
	No.	No.	%
Yes	111	20	18
No	415	125	30.1
Total Patients	526	145	
$\chi^2 = 6.424$ df= 1 P= 0.011			
Hypertension			
Yes	265	66	24.9
No	261	79	30.3
Total Patients	526	145	
$\chi^2 = 1.894$ df= 1 P= 0.196			

Discussion:

In this study the overall prevalence of hepatitis C virus in hemodialysis centers in Baghdad was 27.6 %, this rate is very much higher than the rate reported by a previous study done by Khattab (8), in 2003 in Iraqi renal transplant center, which reported prevalence of (7.1%).Prevalence of HCV infection in general

population in Iraq was 1.4 % according to MOH report 2010 (9). Difference in prevalence rate of HCV infection between hemodialysis patients and general population, indicating the high risk for infectivity of HCV in hemodialysis centers. (10, 11).By comparing the prevalence rate of the current study with neighboring countries like in Syria, the prevalence of HCV infection

in hemodialysis centers was 48.9%, which is much higher than this study, in other countries prevalence rates varied from 34.6% in Jordan to 27% in Lebanon which is nearly the same as in this study.⁽¹²⁾ This variation might be due to the variety in the risk factors that could affect HCV infection rates, or may be due to variation in the degree of implementation of universal precautions to prevent nosocomial transmission⁽¹³⁾ Also machines and nursing and patient isolation plays a major role in the spread of HCV infection^(14,15).

In the current study there has been a wide variation in prevalence rate observed between different hemodialysis units in Baghdad, ranging from 71.4 % in Al Kadhmiya to 13.6% in Baghdad Hospital, this difference may be due to the problem facing the units by adding more patients on the expense of space and staff causing a defect in controlling nosocomial infections between patients as previous studies concluded.^(10,16,17) As well as the effect of nosocomial infection transmission of HCV as indicated by epidemiological and molecular studies which have showed the role of hemodialysis environment for dissemination of HCV between patients.^(6,18) Furthermore low the prevalence of HCV infection in some hemodialysis centers may be due to partial immunosuppression in those patients resulting in a poor antibody response to hepatitis virus infection, making serology screening of HCV underestimated^(2,11,20)

Age of hemodialysis patients has a significant effect on HCV infection rate, this is in agreement with other studies that revealed statistical significant association between younger age patients and HCV seropositivity^(10, 11, 20). Prevalence rate of HCV infection showed statistical significant association with patient gender; female patients were at higher risk for HCV infection, this has also been reported by the previous study carried in Baghdad., were the rate of infection among female was 10.4%, compared to 4.9% in males.⁽⁸⁾ Others suggest that there is no relationship between gender of the patient and prevalence of HCV infection^(13, 21). A significant relationship had been found in our study between attending multicenter and risk of infection, this finding supported by previous studies^(14, 17,18) conclusions which exhibited the effect of attending multicenter on seroconversion rate of HCV infection, this might be related to different degree of cleaning and disinfection of hemodialysis membranes, machines instruments and environmental surface to prevent nosocomial transmission^(14, 22). The rate of HCV infection proved a statistical significance in relation to the length of time of hemodialysis the patients spend, this finding in agreement with studies conducted in Libya⁽¹⁰⁾, Saudi Arabia⁽¹⁴⁾ Palestine⁽¹⁶⁾, Syria⁽²³⁾, and Iran⁽²⁴⁾ which recognized that dialysis treatment could be a specific, independent risk factor for HCV infection. This might be related to the increase of period of exposure to the virus; the more the patients stay in contact with hemodialysis machines the more the risk to HCV infection increase.⁽¹⁰⁾ Besides hemodialysis patients are immune compromised and any minor breach in universal control of HCV infection could make them exposed to the virus.⁽¹⁴⁾ Blood transfusion

is considered as important factor in the transmission of HCV infection although it is conflicting; many studies have shown a positive correlation between it and HCV infection,^(8, 11, 13, 14, 16, 19). Others show no relation, like studies carried out in Saudi Arabia and India, which decided that there's no relationship between blood transfusion and HCV seropositivity^(20, 25). This finding backings the present study result which showed no relation between blood transfusion history and rate of HCV infection. This may be due to many factors including screening programs of transfused blood for all donors after 1995 or may be due to better handling of anemic patients in hemodialysis centers using iron supplement and erythropoietin^(8, 10, 11). Regarding renal transplant history, in the present work there is a higher rate of HCV infection in hemodialysis patients with renal transplant history, this is in accord with the studies carried in Jordan⁽¹³⁾ and Saudi Arabia⁽²⁰⁾. High prevalence of HCV infection was observed in patients with diabetes, this have been in agreement with other studies carried out in Saudi Arabia⁽²⁰⁾, Libya⁽²⁶⁾, and Bangladesh⁽²⁷⁾ which determined that diabetes mellitus may play a role in increasing the prevalence rate of HCV infection in hemodialysis patients .

Conclusion: HCV is common infection among hemodialysis patients and rate of HCV infection is high in those patients compared to general population, it remains a major threat for dialysis centers for both patients and medical staff.

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