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Seroconversion Rate of Hepatitis C Virus Infection among Haemodialysis Patients in AL-Kadhimiya Teaching Hospital (Dialysis Unit)

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Abstract

Background Hepatitis C virus (HCV) infection is a serious public health problem throughout the world. Chronic haemodialysis patients are at higher risk for acquiring hepatitis C virus (HCV) infection.

Objective To assess the rate of seroconversion of hepatitis C virus (HCV) infection every month for one year duration, to evaluate the possible associated risk factors and the relationship of hepatitis C virus infection with blood transfusion and duration of hemodialysis.

Methods Fifty seven patients, 37 males (65%) and 20 females (35%), who were on regular haemodialysis in Al-Kadhymia Teaching Hospital were studied during the period between January 2009 and December 2009. Patients were analyzed monthly with anti –HCV antibodies using a commercial enzyme-linked immuno-sorbant assay BioKit (bioelisa HCV 4.0) and serum Alanin aminotransferase measurements.

Results Twenty three patients (40.3%) were HCV positive of whom, 13 were males (56.5%) and 10 were females (43.5%). History of blood transfusion, number of blood transfusion and duration of haemodialysis, had significant correlation in acquiring HCV infection.

Conclusion Seroconversion of HCV infection was of high rate incidence (40.3%). Duration of HD, history of blood transfusion and number of blood transfusion(s) are factors affect the rate of seroconversion of HCV infection in patients on regular HD. The higher rate of seroconversion of HCV infection needs further research to identify the causes and to establish a well organized prophylactic program by using more sophisticated and accurate investigation.

Key words Hepatitis C virus infection, Hemodialysis, Chronic renal failure

Introduction

Hepatitis C virus (HCV) infection is a serious public health problem throughout the world, patients with chronic renal failure on haemodialysis are at higher risk to hepatitis C virus infection, with prevalence varies among different countries and haemodialysis centers [(1,2)].

Haemodialysis patients are more vulnerable to HCV infection than others because of history of blood transfusion, frequent injection and partial immunosuppression. The duration of haemodialysis treatment and nosocomial HCV transmission have also been suggested as contributing factors [(3-5)].

The typical test for anti-HCV is an enzyme immunoassay, which can occasionally yield a false-positive result, a recombinant Immunoblot assay can be used to confirm anti-HCV reactivity. The diagnosis of hepatitis C is confirmed more aptly by a qualitative sensitive assay for HCV RNA in serum such as reverse transcriptase (Polymerase Chain Reaction) [(6.7)].

Several commercial assays are available to quantify HCV RNA levels in serum (e.g. bDNA, RTPCR) but these tests have been difficult to

standardize, most patients with chronic hepatitis C have 10^5 to 10^7 IU of HCV RNA in serum, and levels are usually stable over time [8-11].

Dose reduction of Ribavirin in patients with renal failure undergoing dialysis might helpful, neither the optimal regimen nor the efficacy of therapy is established in this patients [1,2,6].

Aim of study

To assess the rate of seroconversion of hepatitis C virus (HCV) infection every month for one year duration and to evaluate the possible associated risk factors and the relationship of hepatitis C virus infection with duration of hemodialysis.

Methods

Patient Selection

This study was carried out in dialysis unit Al-Kadhimiya Teaching Hospital, in Baghdad between 1st of January and 31st of December 2009. Baseline data about patients was obtained from routine history and clinical examination this includes age, sex, duration of haemodialysis, previous blood transfusion, number of blood transfusion, drug intake (erythropoietin) and intravenous drug abuse, occupation and history of previous illness.

Laboratory Data

Blood samples were collected from all patients monthly and sera were screened by standard techniques using a commercial enzyme-linked immuno-sorbant assay Bio Kit (bioelisa HCV 4.0) for the presence of anti-HCV antibodies. Serum ALT was determine in the study group and it performed each month (normal value <20 U/L), cut-off value of serum ALT in our laboratories was 94 U/L.

Statistical Analysis

Data were analyzed by spss-17. Quantitative data presented using the Mean ±SD. Comparison of qualitative data was done by Chi-square, t-test and p value of <0.05 was considered as significant. Correlation coefficient between variables was applied.

Results

The study involved 57 patients with end stage renal disease treated with HD; they were 37 males (65%) and 20 were females (35%). The mean age of the study population was 41.28±14.37 years range from 18-71 years. HCV infection was detected in 23 patients (40.3%); they included 13 males patients (56.5%) and 10 females (43.5%) as seen in table 1.

Table 1. Demographic Features of the study population

Group	No	%
Total number	57	100
HCV positive male patients	13	22.9
HCV negative male patients	24	42.1
HCV positive female patients	10	17.5
HCV negative female patients	10	17.5
Mean age ±SD	41.28±14.37years	
Age range	18-71 years	

The over-all seroconversion of HCV infection in male patients was 35.1% while it was 50% in females, but the relationship between sex and seropositivity was not significant (p >0.05). The mean age of HCV positive and HCV negative patients were 40.2±13.1 and 42±15.3 years, respectively (Table 2).

Table 2. Comparison of HCV Positive and Negative Patients on Haemodialysis

Parameter		HCV Positive Patients n=23	HCV Negative Patients n=34	P Value
Age		40.2±13.1	42±15.3	0.6
Gender	Male	13 (56.5%)	24 (70.5%)	0.2
	Female	10 (43.5%)	10 (29.5%)	

Regarding the duration on haemodialysis it is found that (40.3%) of the study populations were being dialyzed for one year the frequency of HD was2-3 times each week (mean 2.1). The seroconversion of HCV infection among patients on haemodialysis more than six months was (51.4%) as compared to (22.7%) among patients on dialysis for less than six months (Table 3).

Table 3. Relationship between Duration and Frequency of HD (No. of dialysis/time period) and Risk of Acquire Infection

Duration of haemodialysis	Number of patients	HCV +ve	HCV –ve	P Value
More than 6 months	35 (61.4%)	18 (51.4%)	17 (48.6%)	0.03
Less than 6 months	22 (38.6%)	5 (22.7%)	17 (77.3%)	

During one year of haemodialysis, 23(40.3%) new cases were identified with seroconversion of HCV infection. The frequency of seroconversion of HCV infection among chronic haemodialysis patients are significantly increasing with duration of haemodialysis (Table 4).

Table 4. Rate of Seroconversion of HCV Infection Monthly in Al-Kadhymia Teaching Hospital

Time of Haemodialysis	Number of Patients	HCV +ve	
		Number	%
January	38	2	5.2
February	38	2	5.2
March	39	3	7.7
April	40	9	12.5
May	40	10	22.5
June	42	11	23.8
July	45	11	24.4
August	47	16	23.4
September	48	16	33.3
October	50	19	32
November	54	23	35.1
December	57		40.3
Total number	57	23	40.3*

*Correlation Coefficient is significant

The twenty three new cases were identified with seroconversion of HCV infection, twenty out of twenty three of study patients investigated monthly serum ALT. Blood screening showed variable ALT levels preceding the anti-HCV seroconversion (Table 5).

Table 5. Serum ALT level 4 month before the Seroconversion of HCV Infection

Case number	ALT levels 4months before seroconversion					ALT/Anti HCV seroconversion	
	Month 1	Month 2	Month 3	Month 4	Mean ± SD	value	Month
04	10	28	86	>94	54.50 ± 41	>94	April
05	27	80	>94	13	53.50 ± 39.50	13	April
06	16	21	76	>94	51.75 ± 39	15	May
07	26	34	26	63	37.25 ± 17.50	>94	May
08	12	11	57	>94	43.50 ± 39.90	56	May
09	14	13	17	22	16.50 ± 4	19	May
10	24	19	34	33	27.50 ± 7.20	63	June
11	22	52	73	>94	60.25 ± 30.70	>94	July
12	18	35	85	>94	58 ± 37.20	26	August
13	7	25	18	78	32 ± 31.54	>94	September
14	15	18	40	46	29.75 ± 15.54	76	September
15	25	14	>94	>94	56.75 ± 43.20	>94	September
16	10	16	15	>94	33.75 ± 40.25	65	September
17	15	26	13	>94	37 ± 38.42	31	November
18	11	14	>94	13	33 ± 40.68	>94	November
19	61	69	89	60	69.75 ± 13.40	90	November
20	25	37	30	93	46.25 ± 31.55	>94	December
21	26	39	>94	90	62.25 ± 34.70	54	December
22	12	51	28	>94	46.25 ± 35.63	18	December
23	14	69	50	>94	56.75 ± 33.70	94	December
Total	Mean ± SD = 43.96±13.74					(63. 9±32.33)*	

*statistically significant p< 0.05 using t-test

A total 40 study patients (70.1%) were received blood transfusion; out of the total, 23 were HCV positive (52.5%) compared to the rest 17 patients (29.9%) who were not transfused, 2 were HCV positive (11.8%). 24 patients were transfused with more than five units of blood; among them, 16 were HCV positive (66.6%) as compared to 16 patients were received less than five units of blood; among them,5 were HCV positive (31.25%) as seen in table 6.

Table 6. Relationship between History of Blood Transfusion/Number of Blood Transfusion and Seroconversion of HCV Infection Hospital

Parameter	No.	HCV+ve Patients	HCV-ve Patients	P Value
+ve history of blood transfusion	Yes (n=40) No (n=17)	21(52.5%) 2 (11.8%)	19 (47.5%) 15 (88.2%)	0.004
No. of blood transfusion	5units (n=24) 5 units (n=16)	16(66.6%) 5(31.25%)	8(33.4%) 11(68.75%)	0.027

Thirteen males and ten female participants were seropositive, but the relationship between sex and seropositivity was not significant ($p > 0.05$). The relationship between duration of haemodialysis, history of blood transfusion and number of transfused units and seropositivity were statistically significant ($p < 0.05$).

Discussion

The seroconversion and seroprevalence of HCV infection among dialysis patients is generally much higher than healthy blood donors, it ranges from 1 to >80% in different series [12-15], this wide difference may reflect the demographic variations among the general population in these countries, however, the dialysis process itself and the level of hygiene standards influence the prevalence of HCV infection [16-19].

The results of the current study indicate that the cumulative rate of seroconversion during one year of HCV infection is (40.3%). But the seroprevalence of HCV infection in HD unit in AL-Kadhimiya Teaching Hospital (36.8%) nearly same as other centers of HD in Baghdad (39.5%) but higher than the results of studies conducted in Nineveh (15.3%) and Basra (7.5%) [20-22].

Also the present study shows higher rate of seroconversion than European countries (12-17.7%) and nearly same results were found in regional countries (32%) and lower than the results found in Egypt and Pakistan (44,56%) respectively [23-26].

The duration of the present study already lasted for 12 months and showed a high seroconversion rate of HCV infection over a short certain period, characterizing an outbreak of HCV infection in this period (epidimicity). It seems that the HD environment play a role in the transmission of HCV, the possible routes of transmission may be through contact of patients with contaminated environmental surfaces and sharing equipments (i.e. gloves, Clamps, sphygmomanometer, dressing and needles).

There is no statistical difference between male (56.5%) and female patients (43.5) in the assessment of the rate of seroconversion of HCV infection ($p=0.2$).

There is significant correlation between the rate of seroconversion and the duration of hemodialysis which has been noted in the current study which is compatible with the results of regional countries such as Iran and Jordan [27,28].

During the investigation from (January 2009 to December 2009), ALT was evaluated in only 23 patients 4 months prior to the appearance of HCV antibodies, the level of ALT varied at the initial stages of infection , reaching up to the level of >94 U/L (the cutoff reading level in the adopted laboratory) in the period preceding the 4 months of the appearance of anti-HCV antibodies in the serum the study results were compatible with the study done by Engel et al which showed variable s ALT levels preceding the appearance of anti-HCV antibodies [29]. It should be noted that the appearance of antibodies in haemodialysis patients delayed in comparison with non-haemodialysis patients and seroconversion may depend on each patient response and most of uremic patients reaching end stage renal disease are immunocompromised [30].

Many patients with end stage renal disease need blood transfusion(s) for correction of anemia [31,32]. In this study the data showed that HCV infection was detected in (52.5%) of patients who had received blood transfusion(s); versus (11.8%) of HD patients who did not have history of receiving blood transfusion(s) were HCV positive, this was statistically significant different ($p=0.004$). The irregular intake of erythropoietin throughout the year (the drugs most of time was unavailable which necessitate frequent blood transfusions might explain the increase rate of seroconversion of HCV infection). Furthermore, it has been noted that the number of transfusions was directly proportional to the seroconversion of HCV infection in the study group. The results were compatible with study

by Shaheen FA. Study in whom analyzed the blood transfusion(s), both independently and in combination with other risk factors for acquiring HCV infection, HCV infection was detected in 34% of patients who had received blood transfusion(s) versus 16% of HD patients who did not have history of receiving blood transfusion were HCV positive [33].

Conclusion

There is higher rate of seroconversion of HCV infection among patients undergoing HD therapy. Duration of HD, history and number of blood transfusion(s) affect the rate of seroconversion of HCV infection in patients on regular HD. Laboratory test results showed variable ALT preceding seroconversion of HCV infection.

It has been suggested that, the patients on HD need strict adherence to infection control measures in dialysis unit. Measures which should be considered include prevention of patient-to-patient contamination and separate haemodialysis systems for HCV seropositive patients. The data also reinforce the importance of serological screening at the onset of dialysis treatment and at regular intervals thereafter to identify all HCV-infected patients. Further detailed research on the role of blood transfusions in acquiring HCV infection is required.

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