

Original Research Article

The Impact of the Infection by Hepatitis C Virus and other Risk Factors among Patients with Chronic Kidney Disease getting Dialysis

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Abstract

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A prospective study was designed to discuss the spread of hepatitis C virus HCV and the incidence of diabetes mellitus type 2 in addition to other risk factors like donation and receiving blood. Quite a number of patients underwent tattoo operation and among one hundred patients with chronic kidney disease CKD (55 females and 45 males) enrolled in the department of dialysis at Baghdad Teaching Hospital from the period of February to December/2019. All patient underwent blood investigation of HbA1c and Sera were examined by ELISA to investigate HCV antibodies in blood samples patients studied. The results showed that thirty six patients had the infection of hepatitis C virus and thirty five of them were suffering from diabetes mellitus type 2. The results also obtained that (53) of chronic kidney disease patients donated blood before been patients (28 were females and 25 males). 53 of these patients had received blood before (28 females and 25 males) and 10 of these patients had tattoo operation (4males and 6 females). Significant correlation was found between gender of the patients included in this study. We concluded that Chronic Hemodialysis patients commonly exposed to the infection by hepatitis C virus and more frequently had diabetes mellitus type 2. People who had donated or received blood and who also had done tattoo operation or not were also higher in percentage among hemodialysis patients than others.

Keywords: Diabetes mellitus, HCV, CKD, tattoo operation

INTRODUCTION

Hemodialysis is a treatment to filter and clear patients' blood from wastes and water when kidneys cannot do their job. Hemodialysis helps to control and balance the important minerals and blood pressure. Through hemodialysis, processing patients are vulnerable to high risk by many bloodborne infections because of exposure to contaminated tools and medical equipment (Furusyo *et al.*, 2000). HCV infection reported is more frequent in hemodialysis individuals than general humans (Nguyen *et al.*, 2019). HCV spread greatly from less than 5% to about 60% in different areas of the world (Fabrizi *et al.*, 2005; Dumortier *et al.*, 2013). Infection by HCV is

constantly related with the age of the patients and number of transfusing blood without taking geographic location in consideration (Meyers *et al.*, 2003).

Unfortunately patients having dialysis are at risk for infection with HCV from another patient in coordination with a treatment program (Mbaeyi and Thompson, 2013; Fabrizi and Messa, 2015).

High rates of liver-related morbidity and mortality is associated with HCV infection. Chronic infections with hepatitis C virus are more than 170-180 million in the world and about 2.8% of the population are infected with HCV (Poynard *et al.*, 2003; Tang and Lai, 2005;

Perico *et al.*, 2009).

In recent years, the incidence of infection by HCV among people with chronic kidney disease was more common and caused many different health problems all over the world. Actually, some form of kidney diseases are precipitated by HCV infection (Cacoub *et al.*, 2015). HCV infection mostly induce kidney damage or injury by formation of cryoglobulins and immune complexes, also induce direct cytopathic effect (Barsoum *et al.*, 2017).

Dialysis modality is closely associated with the frequency of HCV infection. In accordance with publication from the Centers for Disease and Control in 2001 concerning the recommendations for preventing transmission of infections with respect to hemodialysis patients, observed decrease in prevalence of HD-related viral transmission (Saxena *et al.*, 2016).

During dialysis, HCV patients are more vulnerable to exposure or injury than other humans with immune deficiency virus, HIV and hepatitis B in addition to cirrhosis, psychiatric disorders and anemia. This is because HCV infection affects more significantly (Kawaguchi *et al.*, 2004).

MATERIAL AND METHOD

A prospective study was done during the period (February to December 2019) on 100 Chronic Hemodialysis patients (55 females and 45 males) and had been taken from Baghdad Teaching Hospital, Department of Nephrology.

A questionnaire sheet was filled out for each CKD patients and it include age, gender, donated or received blood or no getting tattoo operation or not

All patients studied underwent blood investigation HbA1c and if HbA1c is less than 7%, it is considered normal and more than 7%, abnormal. Sera were examined by RecombiLISA HCV Ab kit principle of the indirect EIA technique to estimate IgG and IgM to HCV in sera of humans according to Balsari *et al.* (1980).

Assay procedure

4-5 ml of blood has been harvested from patients and centrifuged at speed 1000-2000 rpm for 10 minutes and by using a pipette, 2ml of serum was taken in another plain tube.

Preparation

1. All reagents, controls have been brought to room temperature (18-26°C).
2. Concentrated washing buffer diluted 30 fold with distilled water. And 580 ml of distilled water was added to a 20 ml concentrated washing buffer and mixed properly.

The concentrated washing buffer was warmed up if precipitants appeared.

3. Each reagent was mixed before added to the test wells.

4. The number of microwells was determined and marked on the ELISA working sheet with the appropriate information. Positive and Negative Controls were required to run in duplicate to ensure accuracy.

In the final step of preparation. The microplate reader settled wavelength at 450 nm and measured the absorbance of each well against the blank well within 15 minutes after adding a stop solution. A filter of 620 - 690 nm can be used as a reference wavelength to optimize the assay result.

RESULT AND DISCUSSION

Table (1) and figure (1) revealed that 36 out of 100 patients were infected with HCV. 10 patients out of 31, their age ranges from 20-40 years while 18 out of 43 patients (41-60), other 8% were between (61-80 years ($\chi^2=0.566$). Association between age and HCV has also been documented by many researchers (Mehta *et al.*, 2003). Series of cases of patients with MPGN and HCV enumerate average age to be about 50 years or older (Mehta *et al.*, 2000). Although the mechanism of association between HCV and renal disease is still uncertain. Many recent researches suggested that glomerular injury results from deposition of circulating immune complexes containing hepatitis C antibodies, antigens, complement (Fukui *et al.*, 2003). It may be as a result of accelerated atherosclerosis in HCV patients and this was the suggestion of some workers on this side (Daghestani and Pomeroy, 1999).

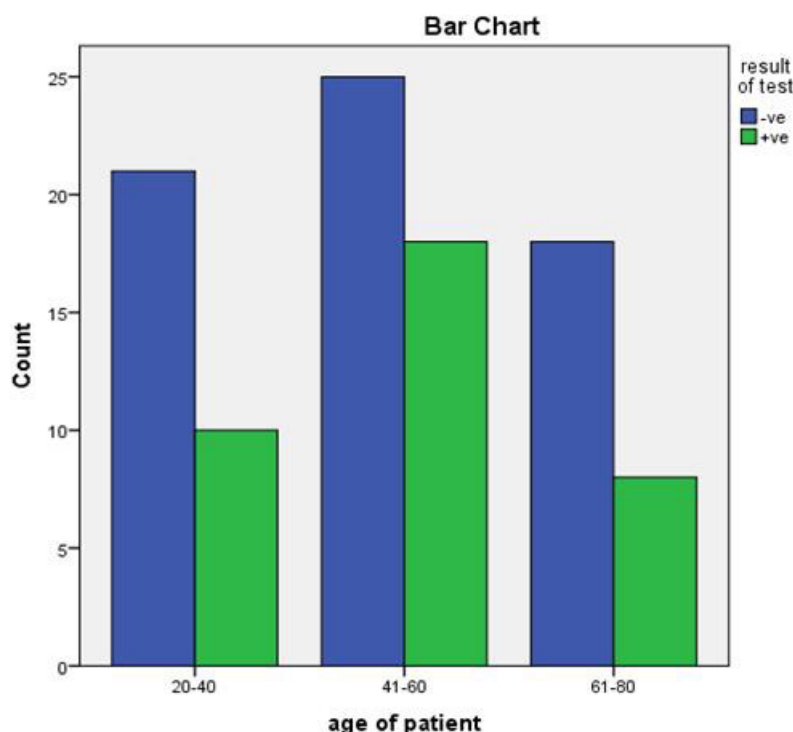
Table (2) showed 25 out of 55 CKD females were infected with HCV infection and 11 out of 45 males having renal failure with hepatitis C virus infection. No significant differences were found among gender studied ($\chi^2=0.29$).

Regardless of age, CKD numbers are greater in females than males. A previous study recorded a high incidence of CKD among Swiss females compared to males (4.5%, 11.5% respectively). Other study by Brown *et al.* reported that women had a tendency to have a higher CKD than men (Brown *et al.*, 2003). Chadban *et al.* established a significant difference between gender in HCV infection (9.3%, 13.0% in men and women respectively) (Chadban *et al.*, 2003).

The results also obtained that 53 patients donated blood in which 28 of them were females and 25 males. The universal rate of HCV spread widely from less than 1% in the Hong Kong and Sweden population to more than 14% in Egypt (Koff, 1998). 3.2% from China individuals were infected by Hepatitis C Virus (Liu, 1998). Infections through the skin exposures involving repeated utilization of syringes and blood products are the most

Table 1. Results of the of the infection by hepatitis C virus distributed according to age of CKD patients

Age of patients	result of test	Result of test		Total	Chi-Square
		-ve	+ve		
age of patient	20-40	21	10	31	.566 (NS)
	41-60	25	18	43	
	61-80	18	8	26	
Total		64	36	100	

**Figure 1.** Histogram shows distribution of hepatitis C virus according to age of CKD patients**Table 2.** The dispensation of infection by hepatitis C virus among CKD patients according to gender

Gender of studying group	Result of test		Total (%)	Chi-Square
	-ve	+ve		
Female	30	25	55	0.29 (NS)
Male	34	11	45	
Total	64	36	100	

NS: Non significant.

real-threatening factors. Many Chinese studies suggested that over 70% of injected drug users (IDUs) were found to have HCV antibodies in patients serum (Yuan *et al.*, 2004). This is in agreement with the foundation of other study in the USA (Garten *et al.*, 2004). In most industrialized countries, as the control diseases center and prevalence informed in 2005, it showed that there was significantly reduction in the risk of infection with HCV during blood transfusion because transfusion of blood is screened and risk manor in

peoples donors were identified (CDCP, 2005). Medical syringes and blood caused real health problems (Chandra *et al.*, 2003)

The results in table 3 showed that 54 patients that donated blood, 30 of them were females and 24 males. No significant correlation was noticed between genders of the CKD patients that received blood or none ($\chi^2=.0643$). HCV may be transmitted by blood or by organs transplantation due to thorough screening of blood supply for the presence of the virus and inactivation

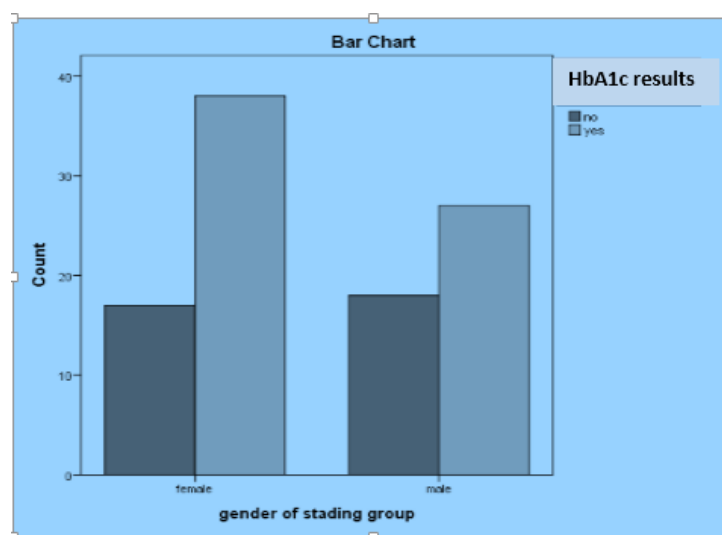
Table 3. Propagation of CKD patients according to receiving of blood or none

Gender	Receiving of blood or none		Total	Chi-Square
	No	yes		
Female	25	30	55	0.643
Male	21	24	45	
Total	46	54	100	(NS)

Table 4. The incidence of HbA1c among CKD patients

Gender of studying group* have chronic disease	HbA1c		Total	Chi-Square
	HbA1c≤7%	HbA1c>7%		
Gender	Female	17	38	55
	Male	18	27	45
Total		35	65	100

S: Significant

**Figure 2.** Histogram shows the incidence of HbA1c among CKD patients**Table 5.** Distribution of CKD patients according to get a tattoo or none

Gender		Get a tattoo		Total	Chi-Square
		No	Yes		
Gender of studying group	Female	49	6	55	.738 (S)
	Male	41	4	45	
Total		90	10	100	

procedures destroying blood borne viruses (Stramer *et al.*, 2004). In the last years, blood banks have instituted many techniques that utilized nucleic acid amplification of the h virus C which will detect the presence of the virus even when the infection is new and all these techniques were estimated to have prevented fifty six transfusion-associated HCV infections per year in the USA since

1999, and have lowered the current risks of acquiring HCV infection via transfusing blood products to one in two million (Stramer *et al.*, 2004).

In table 4 and figure (2), it appeared that 35 out of 100 CKD patients in which 17 of them were females and 18 males had diabetes mellitus type 2, with significant correlation ($\chi^2=0.0343$). Rogal *et al* established that the

incidence of kidney failure in the world after diabetes was determined associated with other factors including older age, hypertension, cirrhosis, substance abuse) and associated with progression of CKD. This result may be correlated with the amount of time that patients were exposed to HCV (Rogal *et al.*, 2016).

In this study the results showed that 10 of CKD patients were getting tattoo operations (6 females and 4 males). Significant correlation was found between gender of the patients that were getting tattoo operation or none ($\chi^2=0.738$)

In recent observation, there was an increase in the universal propagation of tattooing. The current study corresponds with studies of the USA National Institute of Diabetes and Digestive and Kidney Diseases in 2012, that found similar results including 36% of people under 30 years getting tattoos (Laumann, and Derick, 2006). Other Canadian references found that about 8% of adolescent students and youth have at least one tattoo operation. In the tattoo process, special pigments are injected by puncturing into the dermal layer of skin. Tattooing tools and equipment should not have contact with bodily fluids and blood. If it does and these equipment are used several times from one person to another without sterilization or appropriate hygiene techniques, viral and microbial infections may be transmitted easily. In addition, tattoo pigment ingredients may not be kept in sterile cans and this is the important role in transmission of the infection (Deschesnes *et al.*, 2006). Increasing tattoos operation over the world has proved the roles in the transmission of many blood-borne diseases including hepatitis C (Tohme and Holmberg, 2012).

CONCLUSION

1. Chronic Hemodialysis Patients were commonly exposed to the infection by hepatitis C virus
2. more frequently incidence of diabetes mellitus type 2 among hemodialysis Patients than other peoples
- 3-The frequency of blood donation or receiving it, getting tattoo operation among chronic hemodialysis Patients than others.

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