Hepatitis C virus in thalassemia patients in TIKRIT

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Abstract

A cross-sectional study performed on 50 patients(60% were females and 40% were males) with thalassemia major who attend thalassemia clinic at Tikrit teaching hospital for regular blood transfusions to determine the frequency of HCV infection and studying the effects of that infection on liver function and its relation to blood transfusions and iron status. Demographic data were obtained from patients files with results of antibody testing for HCV and samples of blood were sent for serum iron level and liver enzymes. Out of 50 thalassemia patients, 10% of them had positive anti-HCV antibody, their age range 17.34 years. Eighty percent of seronegative and 66% of seropositive patients were received blood transfusion at a rate more than 100 times. It was shown that 60% of patients with positive anti-HCV had abnormal liver function tests although this not significant statistically as compared with those of negative results for HCV. Patients with positive HCV and elevated iron level constitute about 80%, and 88% for those with sronegative results and high serum iron. As well as 72% of total patients had both elevated both the iron level and liver enzymes. It has been concluded that the risk of infection with HCV was significantly increased with older age groups and with the frequency of transfusions.

Introduction

Transfusion-transmitted infections still make a great challenge in the management of patients with thalassemia major (1). The problem is more serious in the developing countries with lower economic means. Multitransfused patients (MTPs) in these countries are at higher risk of infection, and studies of infection in these patients can be a useful index for examining the blood safety filters in place(2).

Hepatitis C virus (HCV) infection is a common cause of liver disease in thalassemia major patients in Western, especially Mediterranean, countries. Its significance in thalassemic patients has not been critically evaluated (3). Thalassemia patients are at risk of blood-transmitted infections due to their long-term need for blood transfusion. Nowadays, control of viral infections, including HCV infections, is one of the main tasks of blood transfusion services worldwide (4). The World Health Organization (WHO) estimates that there are 170 million people with chronic HCV infection worldwide(5). Hepatitis C is estimated to result in 366 000 deaths annually (6).

The natural spontaneous clearance rate for hepatitis C is between 20% and 40% and is higher in children who have been parenterally infected compared to perinatal infection(7). Hepatitis C is a flavivirus which was cloned in 1989. (8)The genetic diversity allows the virus to avoid immune surveillance leading to chronic infection and difficulty in producing an effective vaccine. The most useful screening test is the detection of anti-hepatitis C IgG in serum using an enzyme immunoassay (EIA) but the detection of hepatitis C RNA is necessary to determine infectivity and response to therapy(9).

In multi-transfused population of patients with thalassemia, studies showed a high prevalence of HCVAb (47.2% weighted average, range 25– 60%) (10). Unlike highly contagious diseases like measles that have a more predictable seroprevalence, blood-borne illnesses like hepatitis are transmitted sporadically or in micro-epidemics. These micro-epidemics may account for the wide variations in prevalence seen within a nation, a province, or even a community. Identification of the causes of these micro-epidemics provides an opportunity to limit the transmission of these diseases (11,12). The aim of this study is to determine the frequency of HCV infection among patients with thalassemia.

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Patients and methods

A cross-sectional study was implicated on 50 patients suffering from thalassemia major attending the thalassemia clinic at Tikrit teaching Hospital which considered the only hematology center for those who need regular follow up and blood transfusions so that all those with thalassemia were included in the study (children and adolescent patients). The study performed from March 2010-February 2011. After obtaining an informed consent, whole blood specimens were collected from total 50 patients. Serum samples were separated and divided into 2 samples. One sample was sent for the measurements of serum iron and the second for estimation of liver enzymes namely ALT and AST. All patients were already screened using anti-HCV assays with third-generation commercial ELISA microplate kits. Positive samples were considered if the sample absorbance/cut-off ratio was more than 1, while the negative sera were confirmed when the ratio <0.9 (values given according to the manufacturer). Demographic data, such as age, sex, residency, duration of disease, number of blood transfusions were obtained from the patient record. Statistical analysis was done by using SPSS 13 pack for windows and Chi-square test(X2 –test) used for comparing groups. The level of signification was (0.05) for comparison, descriptive, and analytic statistics were carried out.

Results

In this study, 50 patients with thalassemia major were included and tested for anti-HCV antibody with their ages range between pediatric and adolescent. Thirty (60%) of those were females and 20 (40%) were males. As in table (1), 5 (10%) out of 50 of thalassemia patients had positive results for anti-HCV antibody. The age range of the studied patients was 2-19 years (the average 10.26 years). The average age for positive HCV patients equals to 17.34years. A higher frequency of positive anti-HCV antibody was seen in females (60%) than males (40%) although these findings were statistically not significant (P>0.05). Also there were 30(66%) of total thalassemia patients with urban residency and 15(44%) from rural regions; 4 (80%) of those with positive results were from urban areas. A significant finding was shown in comparing the age with the positivity of anti-HCV antibody. There were 15 (30%) thalassemia patients with duration of disease lasting ≥5 years, and 12(24%) with history of splenectomy.

In the present study, the relation between the infection with HCV and the frequency of blood transfusions was evaluated as shown in table(2). There were 29(58%) from total number (50) of patients received blood transfusions in a frequency of ≥100 times, and 9(82%) out of 11 (seronegative and seropositive patients) were received blood 101-150 times. There were 2(66%) of total number of seropositive HCV patients who received >150 times blood transfusions when compared with seronegative patients at the same frequency of transfusion. A significant relation (P<0.05) was observed in regard to frequency of blood transfusion and the risk of infection with hepatitis C virus.

Regardless the positive anti-HCV antibody tests, the results showed that 27(54%) of thalassemia patients had abnormal liver functions which is detected by elevations of liver enzymes whereas 23(46%) revealed normal serum level of liver enzymes as shown in table (3). It also shown that 24(89%) and 3(11%) of those with abnormal liver functions (27 patients) had negative and positive anti-HCV results respectively. Three (60%) patients from those with seropositive anti-HCV (5 patients) had increased levels of liver enzymes. The findings between seropositive and negative cases in relation to liver function tests revealed no significance statistically (P>0.05).

It was revealed that 28 (56%) patients with thalassemia had elevated levels of serum iron and 22 (44%) of them show normal serum iron level. As in table (4), 24 (86%) of those who were negative results for HCV and 4 patients (14%) with seropositive hepatitis had abnormal iron levels. Four (80%) thalassemia patients with positive results for HCV had high levels of serum iron. It has been shown that 21 (75%)

patients had elevated levels of both iron and liver enzymes in their sera regardless wither infected by HCV or not. Also there was a significant effect on levels of liver enzymes in patients who had abnormal iron levels as compared with those of normal levels ($P<0.05$).

Discussion

Transfusion-transmitted infections are a major health problem in multi-transfused patients especially of hepatitis B and C and HIV which show increasing prevalence worldwide. A total number of patients included in this study were 50 patients with thalassemia major. Ten percent out of 50 of thalassemia patients had positive results for anti-HCV antibody. This finding is inconsistent with that of Omar N., Salama K., Adolf S., El-Saeed GS., Abdel Ghaffar N., and Ezzat N. they studied 174 patients and there were 51.7% had positive anti-HCV(1). The Higher female frequency (60%) than males (40%) in this study was also seen by Mehri Ghafourian Boroujerdnia et al. who studied the prevalence of HCV among thalassemia patients . They revealed that there 47.1% and 52.9% were males and females respectively(13). A positive anti-HCV antibody test was seen in older age group than in those than in those with negative antibody testing of the same age group. Omar N., Salama K., Adolf S., El-Saeed GS., Abdel Ghaffar N., Ezzat N. found that there were a significant correlation between the age of the patients and HCV infection(1). However, Bhattacharya DK, Bhattachajee S, De M, and Lahiri P, studying the prevalence of HCV in thalassemia and hemophilic patients showed that anti-HCV positivity was not related to the age of the patient(14).

The present study showed that 66% of patients with seropositive HCV were received blood transfusion with a frequency >100 times. The rate of acquisition of HCV is increased with increased number of blood transfusion. In contrast, Bhattacharya DK, Bhattachajee S, De M, Lahiri P found that positive anti-HCV antibody in thalassemia patients was not related with the units of blood and blood components transfused(14). However, our results were correlated with the findings of Hassanshahi G, Arababadi M, Assar S, Hakimi H, Karamabad MN, Abedinzadeh M, Rafatpanah H, and Derakhshan R in that the higher percent (70%) of seropositive HCV cases were seen in patients who received more blood units(4).

HCV is one of the hepatotropic viruses with subsequent liver damage. On studying the relation between its effects on liver function as indicated by abnormal elevations of enzymes, it was shown that 89% of seronegative patients had elevated liver enzymes while 60% of seropositive cases had abnormal liver function tests. As opposite to this not significant observation of the presented study, Wanachiwanawin W, Luengrojanakul P, SirangKapracha P, Leowattana W, and Fucharoen S were found that thalassemia patients with HCV had a significant abnormal level of liver enzymes (81.4%)(3).

Serum iron level revealed that 65% of total thalassemia patients had elevated measures, of which 86% of those who were seronegative. Eighty percent with seropositive results had also elevated level of serum iron. This significant result was found by Ameli M, Besharati S, Nemati K, and Zamani F who found that the mean serum iron was higher in anti-HCV positive than negative patients (15).This finding may be related to the frequency of transfusions which in turn related to more risk of iron overload and acquisition of infection.

CONCLUSION:

Hepatitis C infection is increased with age as the chronicity increased especially in those need frequent blood transfusions which is considered another risk factor for infection. There was a close association between seropositive HCV and iron overload in thalassemia patients.

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Table (1): Sociodemographic characteristics of study sample.

		Hepatitis C				P-value
		Seropositive		Seronegative		
		No.	%	No.	%	
Age	< 5 yr	0	0%	13	26%	Significant
	5-10 yr	2	4%	15	30%	
	11-15 yr	1	2%	9	18%	
	16-20yr	1	2%	3	6%	
	> 20 yr	1	2%	5	10%	
	Total	5	10%	45	90%	
Gender	Male	2	40%	18	40%	Not significant
	Female	3	60%	27	60%	
	Total	5	100%	45	100%	
Residency	Urban	4	80%	30	66%	Not significant
	Rural	1	20%	15	34%	
	Total	5	100%	45	100%	

Table (2): Relation between number of blood transfusion and hepatitis.

		Hepatitis C				Total	
		Seropositive		Seronegative			
		No.	%	No.	%	No.	%
Number of Blood transfusion	< 50	0	0%	21	100%	21	42%
	50 – 100	0	0%	9	100%	9	18%
	101 -150	2	18%	9	82%	11	22%
	151- 200	2	66%	1	34%	3	6%
	>200	1	17%	5	83%	6	12%
	Total	5	10%	45	90%	50	100%

P-value<0.05(significant)

Table (3): Relation between hepatitis and liver function test.

		Hepatitis C				Total	
		Seropositive		Seronegative			
		No.	%	No.	%	No.	%
Liver Function Test	Normal	2	8.7%	21	91.3%	23	46%
	Abnormal	3	11%	24	89%	27	54%
	Total	5	10%	45	90%	50	100%

P-value>0.05 (not significant)

Table (4): Relation between hepatitis C and serum iron.

		Hepatitis C				Total	
		Seropositive		Seronegative			
		No.	%	No.	%	No.	%
Serum Iron	Normal	1	4.5%	21	95.5%	22	44%
	Elevated	4	14%	24	86%	28	56%
	Total	5	10%	45	90%	50	100%

P-value<0.05(significant)