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ORIGINAL ARTICLE

Prevalence of Hepatitis B and C Infection in Hemodialysis Patients of Rasht (Center of Guilan Province, Northern Part of Iran)

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Background and Aims: **Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are significant health problems, as they can lead to chronic active hepatitis, liver cirrhosis, and hepatic carcinoma. Factors associated with HBV propagation include blood and derivates transfusion, duration and frequency of hemodialysis, equipment contamination and contact among patients as well as between them and health-care workers. Transmission of HCV through dialysis units has shown a progressive increase worldwide, ranging from 5% in some western countries to 70% in some developing countries. The aim of this study was to determine the prevalence of HBV and HCV infections in hemodialysis patients of Rasht (center of Guilan province, North of Iran).**

Methods: **A cross-sectional analysis was performed on 163 chronic (>6 months) hemodialysis patients. Patients from the hemodialysis unit of Rasht were interviewed. The following data was collected: name, age, gender, occupation, duration of dialysis and cause of End Stage Renal Disease. Blood samples were collected and screened for HBsAg and anti-HCV antibodies by a third-generation enzyme-linked immunosorbent assay (ELISA). Qualitative HCV determination in ELISA positive cases (after two tests) was performed by QIAGEN OneStep reverse transcriptase polymerase chain reaction (RT-PCR) kit (assay sensitivity 100 copies/mL).**

Results: **Five patients were hepatitis B surface antigen (HBsAg) positive (3.06%) and 30 were anti HCV antibody positive by ELISA (18.40%). HCV positivity was confirmed by PCR in 17(10.42%) patients. All patients had a minimum of two to a maximum of three dialysis sessions per week. Mean age in HBsAg positive cases was 47.3 years and all of them were male. Duration of dialysis was 8-12 years in all five HBsAg positive patients. Mean age in HCV positive patients was 42.3 years. 66% of HCV positive patients were male and 33.33% of them were female. Duration of dialysis was 0-4 years in 33.33 % of HCV positive patients, 4-8 years in 26.66% of cases, 8-12 years in 20% and 12-16 years in 20% of them.**

Conclusions: **This project suggests that hepatitis C infection has a high prevalence in dialysis patients and Anti-HCV Ab test should be performed before scheduling them. Although some references refuse to suggest isolation of dialysis settings for this group of patients, strategies such as closed control of services given to these patients such as blood transfusion and also training the personnel of hemodialysis units for infection prevention seems to be necessary.**

Keywords: **Hepatitis B, Hepatitis C, Hemodialysis**

Introduction

Hepatitis B and C virus infections are global common health problem, leading to acute and chronic hepatitis and their consequences of cirrhosis and hepatocellular carcinoma [1].

During 1970s, HBV infection was recognized as a great risk to hemodialysis patients [2], as HBV infection prevalence overcame 50% in some centers [3]. Hepatitis B virus (HBV) can be detected in blood

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and derivatives as well as in saliva, semen, vaginal secretion and exudates from cutaneous ulcers [4]. Chronic hepatitis B diagnosis is based on the existence of hepatitis B surface antigen (HBsAg) and HBV DNA in blood. HBV infection is less prevalent than hepatitis C virus (HCV) in dialysis units. HBV incidence in hemodialysis patients has dramatically decreased especially due to selection of blood donors, HBsAg positive patients isolation during dialysis and routine vaccination of uraemic patients [5].

Also, patients on hemodialysis belong to the high-risk group of HCV infection [6-8]. The prevalence of HCV infection in dialysis patients ranges from 4% to more than 70% in some countries [9]. The main reasons for such a high incidence of infections are a high prevalence of HCV infection in the general population, lack of standard infection precautions and effective vaccination, inadequate disinfection procedures of dialysis machines and other medical equipment, as well as infection transmission from patient to patient, especially in dialysis centers with a high percentage of infected patients [10]. Blood and its components (plasma, serum, albumins, etc.) are the main sources of HCV infection. A history of transfusion before the year 1993 was the primary HCV infection risk factor [11]. The breaking of tissue continuity (unintentional or resulting from medical treatments) causes parenteral entry of infection. Thorough blood testing for transfusion purposes and the reduction in transfusion number, especially within the group of dialysis patients, due to common erythropoietin administration has led to decreasing occurrences of post-transfusion HCV infection [12-15]. In recent years, an increasing role has been assigned to hospital-transmitted infections (nosocomial) [16-19]. Serological detection of antibodies to HCV antigens is the mainstay of HCV diagnosis in dialysis population. However, these tests do not distinguish between acute and chronic infections. Because of the absence of an efficient in vitro culture system for HCV or assays capable of assessing HCV viral antigens, direct detection of HCV has depended on nucleic acid amplification technology. HCV viraemia (HCV RNA) detection, viral load quantification, and HCV genotyping are commercially available and commonly used by clinical nephrologists within dialysis units [20].

Materials and Methods

A descriptive cross sectional study on 163 chronic (>6 months) hemodialysis patients of the single ward of Razi Hospital of Rasht was performed. Data was collected between June, 2007 and August, 2007. All patients were interviewed by a physician and a questionnaire was filled for each patient. Questionnaires included data such as name, age, gender, address, duration of dialysis (year) and cause of End Stage Renal Disease. Informed consent was obtained from all of them. Blood samples were collected through venopuncture in dry tubes (9.5 ml) with vacuum. After clot retraction, samples were centrifuged at 1500 to 2000 rpm and stored in 1 mL aliquots at -20°C. Serological markers of hepatitis B and C virus were detected by enzyme-linked immunosorbent assay (ELISA) using commercially available kits. Qualitative HCV determination in ELISA positive cases (after two tests) was performed by QIAGEN OneStep reverse transcriptase polymerase chain reaction (RT-PCR) kit (assay sensitivity 100 copies/mL).The project was approved by the ethics committee of the faculty of medicine , Guilan University of Medical Sciences. Data was collected on a personal computer and statistical analysis was done using SPSS version 14.

Results

Out of 163 patients, five patients were positive for HBsAg (3.06%) and 30 were positive for anti HCV antibody by ELISA (18.40%). HCV positivity was confirmed in 17(10.42%) patients by PCR. All 163 patients had a minimum of two to a maximum of three dialysis sessions per week. Mean age in HBsAg positive cases was 47.3 years and all of them were male. Duration of dialysis was 8-12 years in all five HBsAg positive patients. Mean age in HCV positive patients was 42.3 years. 66.6% of HCV positive patients were male and 33.3% of them were female. Duration of dialysis was 0-4 years in 33.3 % of HCV positive patients, 4-8 years in 26.66% of cases, 8-12 years in 20% and 12-16 years in 20% of them.

Discussion

Hemodialysis patients are at high risk for viral hepatitis infections due to the high number of blood transfusion sessions, prolonged vascular access and the potential for exposure to infected patients and contaminated equipment [21, 22]. A significant risk of cirrhosis development and

decompensation of liver function is observed in HBV and HCV infected hemodialysis patients [23]. Boulaajaj *et al.* reported a 2% HBsAg positivity in 168 hemodialysis patients [24]. Yakaryilmaz *et al.* found HBV infection in 13.3% of hemodialysis patients in Turkey [25] (Table 1). There were reports of a high prevalence of HBV infection (10%) in hemodialysis patients in Carrilho *et al.* studies [6]. Otedo *et al.* in Kenya (Nairobi) have reported a low prevalence of HBV (8%) in hemodialysis patients [26] (Table 1). Thanachartwet *et al.* have reported that the seroprevalence of HBV is 6.3% in 2003 [27]. Ishida *et al.* in Thailand (Bangkok) have reported HBV positivity to be 6.5% [28]. The prevalence of HBV in Brazil (Goias), India (panjuga), Iran (Tabriz), Romania (Kluj -Napoca) has been reported to be 56.7% [29], 1.4% [30], 4.6% [31], and 21.6% [32] respectively and in our study , there were five patients with HBsAg and its prevalence was 3.06% (Table 1).

The prevalence of HCV infection varies greatly among various populations of patients on hemodialysis from different geographic regions. The reports since 1999 gathered in this review presented a range for HCV seroprevalence among hemodialysis patients from 1.9% in Slovenia to 80% in Senegal [33]. Boulaajaj *et al.* also reported HCV positivity to be 76% [24]. Yakaryilmaz *et al.* have reported that HCV infection (20.2%) is more prevalent than HBV infection (13.3%) in hemodialysis patients [25]. Carneiro *et al.* showed an anti HCV prevalence of 39% [34]. Otedo *et al.* also have reported a low prevalence of HCV (5%) in these patients [26]. Hamankaya *et al.* have reported that the prevalence of HCV positivity in their hemodialysis unit is 4.7% [35]. Thanachartwet *et al.* and Alavian *et al.* have reported that the seroprevalence of HCV was 4.8% [27] (Table 2) and 13.2% [36] in 2003, respectively. In our study, we found the prevalence of HCV infection in hemodialysis patients to be 10.42%, which is higher than among the non-hemodialysis patients (2-3%) [37, 38].

Table 1. Prevalence of HBV infection in dialysis patients compared with our study.

Study	Prevalence of HBV
Teles SA *et al.* (Brazil) [29]	56.7%
Bocsan Is *et al.* (Romania) [34]	21.6%
Yakaryilmaz F *et al* (Turkey) [25]	13.3%
Otedo AE *et al.* (Kenya) [26]	8.3%
Thanachartwet V *et al.* (Thailand) [27]	6.3%
Kheradpezhouh M *et al.* (Iran) [31]	4.6%
Reddy GA *et al.* (India) [30]	1.4%
Boulaajaj K *et al.* (Maroc) [24]	2%
Our study	3.06%

Table 2. Prevalence of HCV infection in dialysis patients compared with our study.

Study	Prevalence of HCV
Boulaajaj K *et al.* (Maroc) [24]	76%
harmankaya O *et al.* (Turkey) [35]	4.7%
Carneiro MA *et al.* (Brazil) [39]	39%
Yakaryilmaz F *et al.* (Turkey) [25]	20.2%
Reddy GA *et al.* (India) [30]	5.9%
Thanachartwet V *et al.* (Thailand) [27]	6.5%
Otedo AE *et al.* (Kenya) [26]	5%
Kheradpezhouh M *et al.* (Iran) [31]	20.4%
Our study	10.42%

A Study by Bocsan *et al.* showed that viral hepatitis markers are related to the duration of dialysis [39]. Ehisaf *et al.* reported that the presence of anti HCV has a relationship with the duration of dialysis [40]. Carneiro *et al.* showed the relationship between anti HCV and duration of dialysis [32]. In our study, duration of dialysis was 0-4 years in 33.33 % of HCV positive patients, 4-8 years in 26.66% of cases, 8-12 years in 20% and 12-16 years in 20% of them that is in accordance with the mentioned studies.

Conclusions

This project suggests that the hepatitis C infection presents high prevalence in patients undergoing dialysis and Anti-HCV test should be performed before schedule of patients for hemodialysis .Although some references don't suggest isolation of dialysis setting for this group of patients, strategies such as closed control of services given to this patients such as blood transfusion and also training the personnel of hemodialysis units for preventing of infection seems to be necessary.

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