Prevalence of Hepatitis C Virus Infection in Haemodialysis Patients from One Centre in Tripoli, Libya

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Abstract

End stage renal disease (ESRD) patients on maintenance haemodialysis (HD) are at high risk of acquiring hepatitis C virus (HCV) infection. There is a high prevalence of hepatitis viruses among HD patients all over the world. Serious sequelae may occur due to the absence of effective treatment for hepatitis C virus. Lack of data on the prevalence of this virus and it's risk factors among HD patients in Tripoli, Libya would increase the incidence rate of this virus. The high cost of the treatment of complications due to infection by this agent adds to the burdens of the devastated health sector. This study highlights the prevalence of hepatitis C virus in HD patients, which may contribute to the improvement of practices in HD centres and the management of hepatitis C virus among HD patients. In addition, the determination of risk factors for transmission of these infections would greatly reduce their incidence not only in HD patients but also in their contacts. The aim of the current study was to investigate the prevalence of HCV infection among HD patients from one unit in Tripoli, Libya. Accordingly, sera from all patients (*n*= 578) attending *Tareeq Al-Shat* HD unit, Tripoli were tested for the presence of anti-HCV by using the Enzyme Linked Immunosorbent Assay (ELISA). The overall prevalence of HCV among the mentioned HD unit was 11.41%. The much higher prevalence of Hepatitis C virus among HD patients compared to normal population of Libya indicates a causative relation between HD and hepatitis C virus transmission. Adaptation of strict disinfection protocols and universal precautions in every dialysis unit, will reduce the cost effectiveness instead of discontinuing reuse of dialyzer. Automation in dialyzer reprocessing can go a long way in limiting the spread of hepatitis C viral infection. Therefore extremely careful observation of preventive infection control measures is essential to limit Hepatitis C virus transmission in HD centres.

***Keywords*:** Prevalence, Haemodialysis, HCV, Tripoli, Libya.

1. Introduction

Patients undergoing haemodialysis (HD) potentially have an increased risk of infection with parenterally transmitted viral agents due to the impairment of their host immune response and to the multiple transfusion requirements (Goldblum S. E., and Reed W. P., 1980). Hepatitis C virus (HCV) infection is important cause of morbidity and mortality in HD patients and pose problems in the management of patients in the renal dialysis units, because chronic renal failure patients do not clear these viral infections efficiently (Saha., and Agarwal., 2001; Moreira R., *et al*., 2003). The prevalence of HCV infections among HD patients is high and varies from 2% to 60% between different countries, and between different dialysis centres within a single country (Delarocque E., *et al*., 2002). Moreover a dual infection with HBV and HCV leads to more aggressive liver disease (Devi K. S., *et al*., 2004).
The nosocomial transmission of HCV appears to be an important contributing factor to the spread of these viruses among populations (Castro-Figueiredo J. F., *et al*., 1986). Several reports from around the world indicated that the frequency of HCV is higher in patients undergoing maintenance HD than in the general population. The reported prevalence of HCV infection in maintenance HD patients varies markedly from country to country and from one centre to another, ranging between 8% to 39% in North America, 1% to 54% in Europe, 17% to 51% in Asia, and 1% to 10% in Australia (Khohler H., 1995; Sanchez-Tapias JM., 1999). In Iran, the prevalence of HCV varies from 5.5% to 24% and it reaches more than 20% in the Mediterranean area (Khohler H., 1995; Rais-Jalali G., and Hakjehdehi P., 1999; Broumand B., *et al*., 2002). The relevance of HCV infection in patients on HD is usually related to the development of serious liver disease, particularly after renal transplantation (Pol S., *et al*., 1993). Blood transfusion and the length of time on HD were the main factors involved in HCV transmission to HD patients in the past. Despite the nowadays screening of blood products for HCV and the wide use of erythropoietin, which reduces blood transfusion requirements, some patients still become infected by HCV during HD (Chauveau P., *et al*., 1993). Screening of HCV is based on the detection of anti-HCV antibodies. However serological assays for detecting anti-HCV antibodies cannot distinguish

between patients with active infection and those who have cleared the virus. Moreover, false negative results may be obtained during the PDF created first 4 months after the exposure when no enough antibodies are produced. Due to the absence of an efficient in vitro culture system for HCV or assays capable of detecting viral antigens, direct detection of HCV depends on nucleic acid amplification technology (NAT) techniques such as Polymerase Chain Reaction (PCR) (Chauveau P., *et al*., 1993).

In Tripoli, slightly more than 578 End Stage Renal Disease (ESRD) patients receive HD in *Tareeq Al-Shat* Unit- Tripoli Centre of Kidney's Services. There is almost no data about the situation in this unit regarding hepatitis C infection, while infection control measures are not perfectly applied and/or not strictly followed. In addition, recommendation for the prevention of blood borne infection which include infection control practice specifically designed for the HD setting, routine serologic testing and immunization; surveillance; and training and education programs are not available in most of haemodialysis units. No documented data or previous studies have been reported about the prevalence and risk factors of hepatitis C virus among patients of *Tareeq Al-Shat* HD unit in Tripoli, Libya.

The main objective of this investigative work is to estimate the prevalence of hepatitis C virus among patients of mentioned HD unut, using ELISA test.

2. Materials and Methods

2.1 Study population

The current study was conducted in one governmental HD unit of Tripoli, Libya (32° 54' North latitude and 13° 11' East longitude). *Tareeq Al-Shat* Haemodialysis Unit is in the centre of Tripoli city serves patients from the North and Centre of the city and it's neighboring (suburbs) areas. All patients attending *Tareeq Al-Shat* HD unit between January and December 2016 were interviewed and blood samples were collected in the location.

2.2 Subjects and samples collection

Blood samples were collected from all 578 patients attending the one HD unit in Tripoli. Blood sample was collected in plain tube, prior to dialysis to prevent the interference of heparin with downstream applications.

Serum separated from blood tube was subjected within two hours to anti-HCV antibodies test.

2.3 Serology

Anti-HCV antibodies were determined for all samples in the Virology Department- the Reference Laboratory of the Central Hospital of Tripoli. For anti-HCV antibodies determination, 3rd generation commercial enzyme-linked immunosorbent assay (ELISA) INNO-LIA-HCV (Innogenetics®, Belgium) kit was used. The assay utilizes well-defined antigens derived from HCV immunodominant proteins from the core region, the E2 hypervariable region (HVR), the NS3 helicase regions and the NS4A, NS4B, and NS5A regions as described previously (Higuchi R, *et al*., 1992). Non reactive samples were considered negative for HCV, while reactive samples were retested to confirm the result and repeatedly reactive samples were considered positive. Positive and negative serum samples were included in each run as controls to ensure proper serology results.

2.4 Data analysis

The data was collected, summarized, tabulated and analyzed using the statistical package for social sciences (SPSS) 13.0 software.

3. Results

From a total of 578 HD patients, sixty six (11.41%) were anti-HCV positive.

3.1 Patients description:

The study was conducted on 578 HD patients attending HD *Tareeq Al-Shat* Unit in Tripoli. As inclusion criteria, the study accepted only those patients attending HD centre and undergoing HD for more than one month, patients who underwent HD for less than one month were excluded. From 578 HD patients mentioned above, data and blood samples were gathered from only twenty-eight of them attending HD unit and undergoing dialysis in the morning shift. Merely We get comprehensive data from these 28 patients through personal contact and complete the questionnaire.

3.2. Patients distributions:-

3.2.1 Age distribution of the study group:

Patient's age ranged between 30 to 76 years; 12 patients were between 30-50 years old, and 16 patients between 51 to 76 years (Figure: 1). No statistically significant relationship was found between HCV and age of the patients (*P*= 0.15).

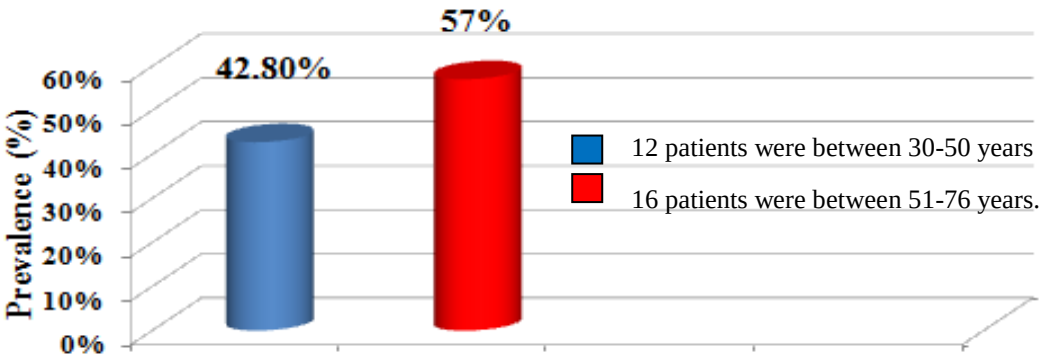

Figure 1: Age distribution of the study group

3.2.2 Sex distribution of the study group:

From the 28 patients tested, there are 19 male and 9 female (Figure: 2). There is no statistically significant relationship between HBV and sex of patients (*P*= 0.74).

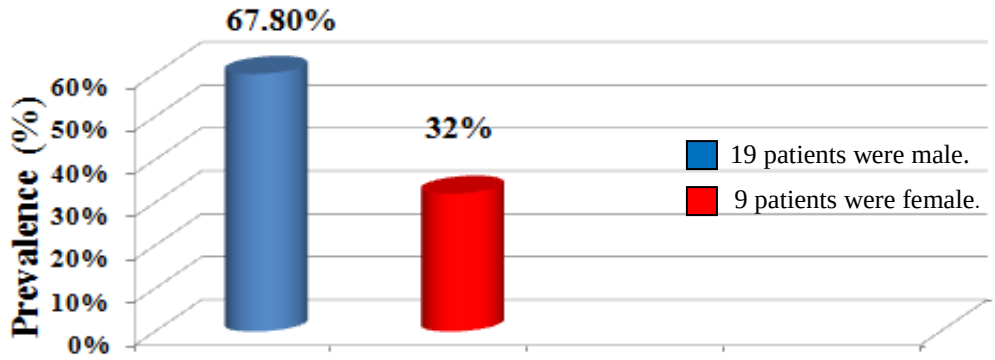

Figure 2: Sex distribution of the study group

4. Discussion

For both patients and medical staff of HD units (Sammy S., Parentally transmitted hepatitis virus infection has always been a major health problem in patients with ESRD, especially those on haemodialysis. Viral hepatitis remains a major hazard 2001; Fabrizi F., *et al*., 2003; Feher T.,

and Ambuhi P. M., 2004). HCV became the major form of viral hepatitis among HD patients especially after the decline in incidence of HBV infection due to several factors including vaccination and screening of transfused blood for HBV (Padmanabhan R.,1994; Martin P., and Frriedom L., 1995; Fabrizi F., *et al*., 2002).

To our knowledge, in city centre area of Tripoli (*Tareeq Al-Shat*), the prevalence of hepatitis viruses among HD patients was not previously investigated and their related risk factors were not assessed. This study investigates the prevalence of hepatitis C virus among HD patients using serological technique. HCV infection is a major cause of liver disease among the general population leading to chronic active hepatitis with or without cirrhosis in 50% of cases (AlKhader A. A., 1995). If left untreated chronic hepatitis C progress to cirrhosis and in certain countries it is a major cause of primary hepatic carcinoma (Okuda K., and Hayashi H., 1996). In HD centres HCV is also a major problem and is prevalent both in pre-dialysis population and more significantly in patients on maintenance HD (Yamaguchi K., *et al*., 1990; Niu M. T., *et al*., 1993; Conlon P. J., *et al*., 1993; Huraib S., *et al*., 1995; Soetjipto, *et al*., 1996; Yonemura K., *et al*., 1996). HCV infection is usually asymptomatic (Yuki N., *et al*., 2000), and can be diagnosed by serological methods and amplification of HCV RNA by RT-PCR (Young K. Y., *et al*., 1993). The later distinguishes between viraemic and non viraemic HCV patients and also is used for HCV genotyping (Galan F., *et al*., 1998).

In this cross-sectional study, the prevalence of anti-HCV among HD patients was 11.41%. This percentage is much higher when compared with a prevalence rate of 1.8% among healthy blood donors in Libya according to recent study performed in 2016 by Daw, M. A, *et al*.,. This anti-HCV prevalence is higher than recorded in Germany (3.3% to 6.1%), India (5.9% to 9.93%), Mexico (6.7%) and Netherlands (3.8%); and lower than Tunisia (19.1%), Iran (21%), Greece (24%), Lebanon (27%), Jordan (34.6%), Peru (43.7%), Italy (46%), Indonesia (63.4% to 76.3%), Syria (75%) and Egypt (80%) (Schneeberger P. M., *et al*., 1993; Reddy A. K., *et al*., 2005; Méndez-Sanchez N., *et al*., 2004; Schneeberger PM., *et al*., 1998; Hachicha J., *et al*., 1995; Alavian S., *et al*., 2003; Rigopoulou E. I., *et al*., 2005; Naman R. E., *et al*., 1996; Bdour S., 2002; Sanchez J. L., *et al*., 2000; Lombardi M., *et al*., 1999;

Soetjipto, *et al*., 1996; Abdulkarim A., *et al*., 1998; Hassen A., and Khalil R., 2000). Partial immunosuppression in HD patients resulting in a poor antibody response to hepatitis viruses infection (Goldblum S. E., and Reed W. P., 1980), which make serological screening of HCV underestimate. Such short coming could be overcome by detecting HCV RNA (Seelig R., *et al*., 1994; Schroter M., *et al*., 1997; Fabrizi F., *et al*., 1999). Because HCV infections are of special public health concern and the infected person is a potential reservoir for its transmission, we considered patients positive for either ELISA or PCR as positive for HCV.

Hepatitis C is relatively properly documented in Libya and different studies have shown the prevalence of HCV infection and genotypes among Libyans (Daw M. A, *et al*., 2002; Elasifer H. A, *et al*., 2010; Alashek W. A, *et al*., 2012). Recently a comprehensive study in over 1% of the Libyan population has shown that the prevalence of HCV infection was 1.2%, varying from 0.6% to 2.2% according to the region within the country (Daw M. A, and El-Bouzedi A., 2014). The prevalence indicated an shocking spread in HCV between the younger generation, intensely within new emerging risk groups in Libyan community such as intravenous drug users (IVDUs) (Daw M. A, and El-Bouzedi A., 2014; Daw M. A, *et al*., 2012).

As age increases and disease progresses among infected individuals, there will be an increase in expected complications. This will place an increasing burden on the Libyan health care system which is still developing. Therefore, studies must be going to originate strategies and create plan to fight the consequences of infection (Galan F., *et al*., 1998). Maintenance dialysis for end-stage renal disease (ESRD) is complimentary medical service in Libya by means of many health care facilities countrywide. In 2003, the reported incidence of ESKD and prevalence of dialysis-treated ESKD in Libya were the same at 200 per million population (pmp). In 2007, the prevalence of dialysis-treated ESKD was 350 pmp, but the true incidence of ESKD was not available. The most recent published WHO data in 2012 showed the incidence of dialysis-treated ESKD had risen to 282 pmp and the prevalence of dialysis-treated ESKD had reached 624 pmp. The leading causes of ESKD were diabetic kidney disease (26.5 %), chronic glomerulonephritis (21.1%), hypertensive nephropathy (14.6%) and

congenital/hereditary disease (12.3 %). The total number of dialysis centres was 40 with 61 nephrologists (Goleg F. A., *et al*., 2014). To control the spread of Hepatitis viruses among HD patients, the CDC published universal recommendations that must be implemented by all HD centres to achieve a comprehensive infection control program (CDC., 2001). The components of such programme include infection control practice specifically designed for HD setting, including routine serologic testing and immunization, surveillance, training and education. The factors related to HCV infection are highly suggestive of nosocomial transmission within HD units.

HCV genotypes may have specific or temporal distributions. Therefore, determine the predominant genotype in Libya, genotyping studies with sera collected from countrywide of Libya should be performed. The preventive strategies for the causes for ESKD are also straight away without delay required for a comprehensive integrated renal care system. The time is now given the recent political upheavals and need to restructure the healthcare system for the new millennium.

5. Conclusion

The study, being a descriptive one, serves to provide useful baseline information on the magnitude of HCV infection among HD patients, as well as the need for future studies using more robust study designs, sample sizes and sampling techniques to further explore suspected risk factors, transmission patterns as well as biological characteristics of the virus in the different regions of country in an attempt to fully understand local disease dynamics. In the long term, there may be need for additional control measures for example, screening for HCV infection among HD patients with high risks for HCV transmission as well as those with symptoms and signs of liver malfunction. This will be arrived upon after careful analysis of studies with stronger evidence on the magnitude of HCV infection among high risk HD patients. The study emphasized the need for applying molecular testing for genotype(s) characterizing of HCV investigated individuals. A better conception of the HCV structure, genome organization and genotyping have helped endeavors to progress the usefulness, tolerability, and safety of HCV treatment. Finally the study proved the role of HD units in transmission of hepatitis C virus and the

instantaneous demand for accomplishment of a comprehensive infection control programme.

Disclosure Statement

The authors declare that there is no conflict of interest.

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