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Original Research Article

Seroprevalence of hepatitis C in haemodialysis patients in tertiary care hospital in Punjab

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ABSTRACT

Background: Hepatitis C is an emerging infectious disease all over the world especially in the developing countries. HCV is a blood borne virus, well known risk factors include blood transfusion, injection drug abuse, chronic haemodialysis patients. HCV is a single stranded positive sense RNA virus, belongs to family flaviviridae and genus Hepacivirus. Haemodialysis patients are the high risk group due to prolonged vascular access and contaminated equipments.
Methods: The present study was retrospective conducted from June 2019 to 31 July 2020 in the Department of Microbiology, Government Medical College, Amritsar. Clinical, demographic and geographical data of the renal disease patients admitted to the hospital for haemodialysis was recorded and analysed. The patients were tested for HCV by Third Generation ELISA.
Results: In the present study, out of enrolled 186 patients, 12 were HCV positive (0.06%). Prevalence of Hepatitis C infection in haemodialysis patients is associated with gender distribution more in females (72%) than males (62%), preponderance of HCV infection was observed in age group 41-60 years (69%) followed by 21-40 years (23%),more rural (85%) distribution. Diabetes (19%), hypertension (25%) and chronic kidney disease (63%) were the associated comorbid conditions.
Conclusions: The overall HCV sero prevalence was observed to be 0.06%, this low prevalence can be attributed to the fact that increased awareness regarding the disinfection of dialysis machines by improving the surveillance system of HCV and better education of nurses in dialysis units. HD patients should be routinely screened for HCV infection.

Keywords: Hepatitis C, Hemodialysis, Seroprevalence

INTRODUCTION

Hepatitis C is an emerging infectious disease all over the world especially in the developing countries. With approximately 170 million people worldwide estimated to be infected with HCV, a figure that is 4 times the HIV infection status HCV has the potential to become the next pandemic.[1] Hepatitis C virus (HCV) infection is a major cause of chronic liver disease in the world. The World Health Organisation (WHO) estimates that about 3% (170 million) of the world's population are chronically infected with HCV and more than 350,000 people die annually from hepatitis C-related disease.[2,3] Available estimates indicate that the overall prevalence of HCV in Sub-Saharan Africa is 3.[4]

The prevalence has been recorded as <1.0% in Northern Europe to >2.9% in Northern Scandinavia (0.01%-0.1%) and the highest prevalence has been recorded in Egypt (15%-20%).[5] The lowest prevalence has been reported

from the United Kingdom.[6] In India Prevalence studies done in Arunachal Pradesh showed a higher rate of 7.89% as compared to Maharashtra (0.09%), Andhra Pradesh (1.4%) and West Benga l(0.71%).[7-10]

Chronic infection with hepatitis C virus (HCV) becomes the major causes of liver cirrhosis and hepatocellular carcinoma. The high rate of chronicity makes HCV infection a serious health challenge.

Hepatitis C virus is a single stranded enveloped positive stranded RNA virus which belongs to genus hepacivirus, family flaviviridae initially recognized as non A non B hepatitis virus in 1974.[11,12] In 1989 agent responsible for non A non B hepatitis was cloned and identified as HCV.[6,13]

The hepatitis C virus particle consists of a lipid membrane envelope 55 to 65 nm in diameter. Two viral envelope glycoproteins, E1 and E2, are embedded in the lipid envelope. They take part in viral attachment and entry into the cell. Within the envelope is an icosahedral core 33 to 40 nm in diameter. Hepatitis C virus (HCV) infection is prevalent among patients who undergo maintenance haemodialysis (HD) and is a particular concern due to the high risk for chronic liver disease.

Various routes for HCV transmission include intravenous drug use, blood transfusion, organ transplantation, chronic haemodialysis, occupational exposure among health care workers, unprotected sexual contact and vertical transmission from mother to the foetus. Understanding the current seroprevalence of HCV in a tertiary care setup gives us an overview for the required preventive measures which in turn warrants stringent vigilance and education regarding precautions, prevention and treatment of HCV.

Among dialysis patients risk factors for HCV infection include cross infections from the sharing of dialysis machines and the dialysis equipment. .Hence, the present study was undertaken to assess the occurrence of the HCV infection in patients on maintenance HD.

METHODS

Study design and patients

The study was performed in the Department of Microbiology in collaboration with Department of Medicine. The present study was retrospective study conducted from June 2019 to July 2020 in the department of Microbiology, Government Medical College, Amritsar. The approval from Institutional Ethics Committee, Government Medical College, Amritsar was obtained before conducting the study. Clinical, demographic and geographical data of the renal disease patients admitted to the hospital for haemodialysis was recorded and analysed.

Inclusion criteria

Patients visiting hemodialysis centre for the first time

Exclusion criteria

Follow-up patients of hemodialysis were not included

Serum collection and serology

With the informed consent, blood samples were collected of a total 186 HD undergoing patients. By following all the standard necessary precautions, 5 ml of whole blood was drawn from each of the suspected HCV patients undergoing HD under strict aseptic conditions. All the blood samples were transported to the Department of Microbiology and all the samples were allowed to clot. The clear serum was transferred into sterile test tubes. It was then centrifuged and the clear supernatant was transferred into vials for preservation at 4°C in refrigerator. All 186 blood samples sera were tested periodically for the incidence of HCV infection by determining the presence of anti-HCV antibodies using a third generation Enzyme-linked immunosorbent assay (ELISA) hepatitis C test.

Hemodialysis unit

The HD unit has one routine HD area and one isolated area for anti-HCV positive patients. The routine HD area has 3 HD machines. All the patients who were proved negative for anti-HCV before initiating dialysis were dialyzed in routine HD unit. Patients who were positive for anti-HCV before initiating the dialysis were dialyzed on concerned machines in the respective isolated areas of HD unit

Data analysis

Data was entered in Microsoft Excel sheets and statistical analysis was done using “IBM SPSS “statistical package for windows. Categorical data was presented as percentages. Chi square test was used as test of significance. A p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 186 patients on haemodialysis were enrolled in the study. Out of 186 patients, 12 patients were HCV positive (0.06%). The highest prevalence was found in the 41-60 years of age group (69%) followed by 21-40 years (23%) and thereafter in 61-80 years (8%) as shown in Figure 1. There was a predominant rural distribution (85%) as compared to urban (15%) as shown in Figure 2. The comorbid conditions include diabetes mellitus (19%). Hypertension (25%) and CKD (63%) (Figure 3).

In Table 1, prevalence of HCV seropositivity comes out to be 0.06%. The chi square value is 0.2148 and p is

0.643. Here p value is insignificant (p=0.643). So HCV seroprevalence is not associated with gender distribution.

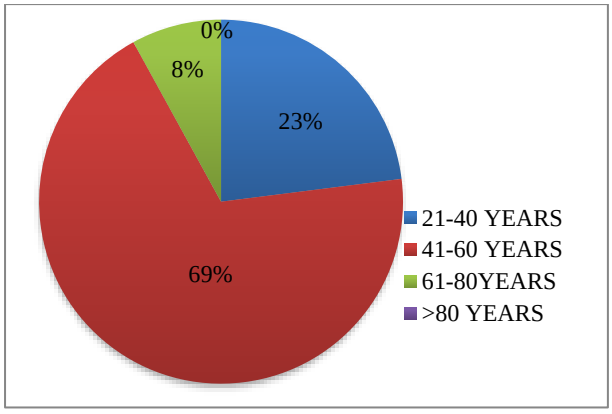

Figure 1: Age distribution of patients.

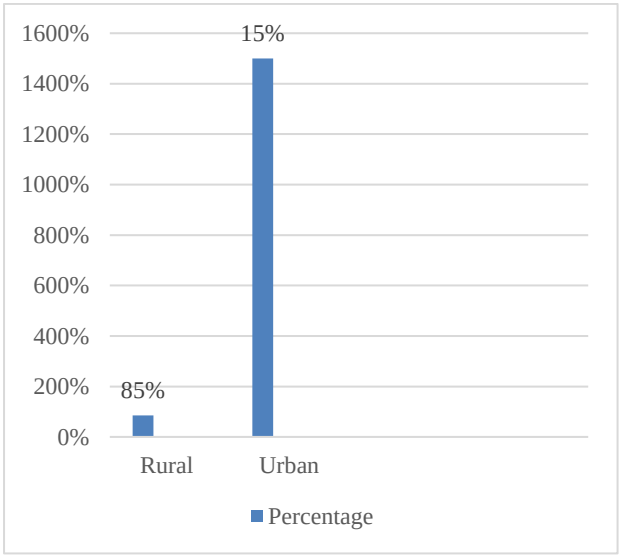

Figure 2: Locality distribution of patients.

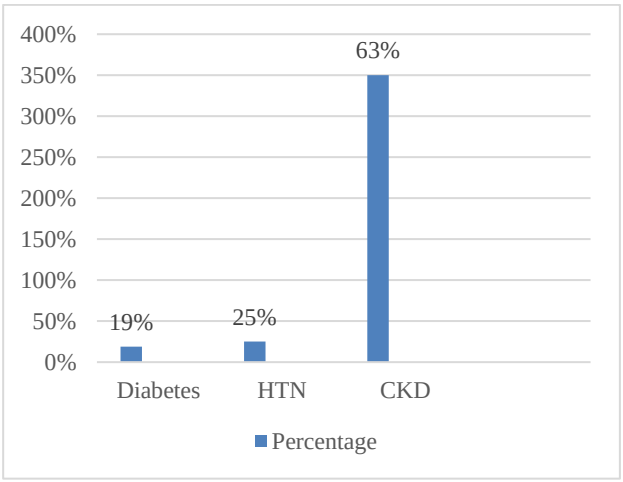

Figure 3: Comorbid conditions in haemodialysis patients.

Table 1: Incidence of different types of asterion.

Gender	HCV positive	HCV negative	% positivity	Total
Male	8	95	8	103
Female	5	78	6	83
Total	13	173	0.06	186

DISCUSSION

It is well known that HD patients are at a high risk for the developmentof HCV infection. The prevalence of the HCV infection in our study is 0.06%.

Initial studies by Arankalle et al in 1995 and Gosavi et al in 1997 reported very high anti-HCV positivity rates in such patients accounting for nearly 24-28% of cases.[6,7,14,15] In a study from Hyderabad by Chandra et al that comprised of both renal transplant and renal failure patients on haemodialysis, the HCV prevalence was as high as 46%.[8,16] More recently, a study from Delhi by Agarwal et al in 1999 noted that the prevalence of HCV in 208 patients undergoing haemodialysis was 4.3%.[9,17] There is wide geographical variation in prevalence of HCV among haemodialysis patients, the relation between HCV infection and kidney disorders is well recognized. Patients with renal disease have been at increased risk of acquiring HCV because of prolonged vascular access as well as the potential for exposure to the infected patients and contaminated equipment. Liver disease is also significant cause of morbidity and mortality in renal dialysis patients.

In the present study, prevalence of Hepatitis C infection in haemodialysis patients is not associated with Gender distribution, preponderance of HCV infection was observed in age group 41-60 years (69%) followed by 21-40 years (23%).

The performance parameters of the testing method used have a direct impact on the detection of hepatitis C and thus can lead to differences in the prevalence data. In the early 1990's, the first-generation HCV antibody testing kits were introduced using NS4 antigen. These tests were further improvised with the addition of NS3 and the core regions of the viral genome. This second-generation ELISA assay had a higher sensitivity and specificity over the earlier one.[18,19] At present, the third generation ELISA assays use highly purified antigens with addition of NS5 region of HCV genome and have the highest sensitivity and specificity.[20] But there are some limitations to our study. Firstly, follow up patients were not included in the study. The frequency of haemodialysis can only be studied in follow up patients. As the frequency of haemodialysis also poses the risk factor for the transmission of HCV infection in haemodialysis patients. Secondly molecular techniques are not used in this study for HCV detection.

With the advent of molecular techniques, the circulating virus can now be detected by HCV ribonucleic acid measurement using polymerase chain reaction (PCR) test.[21] The testing is used for early detection (before seroconversion) and is also essential for confirmation of active HCV infection and monitoring of antiviral therapy. However, the limitation of this test is the cost effectiveness. The adherence to 'universal precautions for HCV control' remains a priority. The use of dedicated dialysis equipment, spaces, nursing staff, separate washing areas and the screening of the patients once in 3 months for preventing cross-infection

Lack of strict adherence to universal precautions by staff and sharing of articles such as multidose drugs might be the main mode of nosocomial HCV spread among HD patients.[22] Although some studies found that nosocomial spread of HCV declined when HCV - infected patients were treated in dedicated HD units, other investigators could control nosocomial spread by strict application of hygienic precautions without isolation of HCV - infected subjects or machine segregation.[23]

CDC recommends that special precautions should be observed in dialysis units. These include wearing and changing of gloves and water-proof gowns between patients, systematic decontamination of the equipment circuit and surfaces after each patient treatment and no sharing of instruments (e.g., tourniquets) or medications (e.g., multidose vials of heparin) among patients.[24]

To promote more efficient biosafety controls, quality programs must be implemented in dialysis centers requiring methodology training of technical teams.

Predominant rural distribution (85%) of patients infected with HCV infection is most likely due to lack of proper health care facilities in rural areas, reuse of unsterilized instruments and syringes by quacks, drug abuse and lack of awareness about the prevention and the treatment of this infection among rural people.

CONCLUSION

The overall HCV sero prevalence was observed to be 0.06%, this low prevalence can be attributed to the fact that increased awareness regarding the disinfection of dialysis machines by improving the surveillance system of HCV and better education of nurses in dialysis units. HCV infection prominently increases the burden of disease in the HD population. The longer the patient is on HD, the more susceptible he/she is to HCV acquisition. HD patients should be routinely screened for HCV infection, preferably using serological methods.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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