

Viral Hepatitis B and C in Hemodialysis Patients: A Study from Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

Objective: Viral hepatitis has high prevalence in hemodialysis dependent patients. We aimed to find the prevalence of viral hepatitis B and hepatitis C in hemodialysis dependent patients of Khyber Pakhtunkhwa (KPK), Pakistan. This study was also directed to assess the basic infection control measures practiced in different dialysis units of the region.

Study Design: Descriptive / cross-sectional study.

Place and Duration of Study: This study was conducted at the multiple hemodialysis centers of KPK, Pakistan, conducted from April 2017 to March 2018.

Materials and Methods: It was a survey of the hemodialysis patients in multiple hemodialysis centers of KPK. The study involved obtaining information from each dialysis center regarding the number of patients positive for viral hepatitis. Centers were also asked to report the measures adapted by them regarding infection control and monitoring of their patients.

Results: A total of 10 centers reported their data. Of the total population of 953 dialysis dependent patients, 169 (17.7%) patients were HCV positive, 31 (3.3%) patients were hepatitis B positive, and 08 (0.8%) patients were positive for both hepatitis B and C. Therefore a total of 208 (21.8%) patients were positive for markers of viral hepatitis B and C. Nine centers reported 03 monthly screening for viral markers but None of the centers reported using PCR based testing. Only 01 dialysis center reported adequate surface disinfection after each and every cycle. Majority of centers reported adequate internal machine disinfection practices (07 centers performing machine rinsing after every cycle of hemodialysis and 09 centers performing machine disinfection every day or every week). None of the centers reported re-use of dialyzers. Only 36 (55.4%) of the total 65 dialysis technicians working in these 10 centers were reported to be vaccinated against hepatitis B infection.

Conclusion: We conclude that our dialysis centers have a higher prevalence of viral hepatitis. Inadequate general infection control measures especially inadequate Surface disinfection can prove to be important risk factors for transmission of viral hepatitis among hemodialysis patients.

Key Words: Hemodialysis, End Stage Renal Disease (ESRD), Viral Hepatitis, Hepatitis B, Hepatitis C.

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INTRODUCTION

Infection caused by hepatitis B and C viruses is common in chronic kidney disease patients.¹

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These infection play an important role in the causation of kidney diseases. Hepatitis C is associated with Membrano proliferative Glomerulonephritis usually with Cryoglobulinemia, Mesangial-proliferative glomerulonephritis, Membranous nephropathy and Thrombotic microangiopathy.² Hepatitis B infection is also associated with renal diseases such as membranous nephropathy, Membranoproliferative glomerulonephritis, and polyarteritis nodosa which may involve renal vasculature.³ The adverse effect of viral hepatitis on mortality of hemodialysis patients is established for both viral hepatitis B and C virus.^{4,5,6}

Chronic kidney disease patients on maintenance hemodialysis are at a higher risk for developing hepatitis B and hepatitis C infection due to multiple risk factors including, frequent use of Intravenous injections, blood transfusions, surgical interventions, poor sterilization and sanitation practices of hemodialysis centers, and hemodialysis procedure

itself. Prevalence higher than that for general population is expected to be found in Hemodialysis dependent patients. Fissell et al sampled the population of the ‘Dialysis Outcomes and Practice Patterns Study’, which primarily included hemodialysis patients from developed world. They reported a mean prevalence for HCV of 13.5% in their multicenter data.⁷ In a second study from the same population, the mean prevalence of hepatitis B was 3.0% per center.⁸ Centers from South East Asia, Africa, and Middle East where viral hepatitis is more prevalent in the general population^{9,10} were not included.

Studies in Pakistani hemodialysis population report prevalence figures of 12.4%¹¹ for HBV, and 23.7 to 68%^{12, 13} for HCV. The prevalence of viral hepatitis increases with the duration of hemodialysis as these patients are persistently exposed to the risk factors for acquisition of these viral infections.¹⁴

Considering implications of viral Hepatitides in patients with chronic kidney disease, it is desirable to develop epidemiological figures, ascertain causation, and to develop prevention and treatment strategies. This study was aimed to clarify the Prevalence of hepatitis B and hepatitis C infection in hemodialysis dependent population of Khyber Pukhtunkhwa (KPK), Pakistan.

MATERIALS AND METHODS

As there is no central record of hemodialysis centers and their patient population, the regional centers were contacted for the provision of their data. These centers were asked to include the data pertaining to their hemodialysis dependent patients, of all ages and both genders. A total of 10 centers agreed to provide their patient data for the purpose of this study. These centers included the following:

1. Institute of Kidney Diseases, Hayatabad Medical complex, Peshawar.
2. Department of Nephrology, Khyber Teaching Hospital Peshawar.
3. Department of Nephrology, Lady Reading Hospital Peshawar.
4. Dialysis Unit, Ayub Teaching Hospital. Abbottabad.
5. Dialysis Unit, Mardan Medical Complex. Mardan.
6. Dialysis Unit, Saidu Group of Hospitals. Swat.
7. Dialysis Unit, Kuwait Teaching Hospital. Peshawar.
8. Dialysis Unit, Alkhidmat Hospital. Peshawar.
9. Ittefaq Dialysis center, Peshawar.
10. Saidu Dialysis Center, Swat.

These centers constitute the majority of hemodialysis centers in our province. Six of these centers are government hospitals where hemodialysis is provided free of cost to the patients. These centers provide healthcare services to most of the population in their areas. Two of the participating centers are charity hospitals, again providing hemodialysis free of cost or

at subsidized rates. Two centers were private centers and operated on commercial basis. Therefore it is safe to assume that these centers catered to the majority of hemodialysis dependent patients in the province.

Data was collected over a period of one year, from April 2017 to March 2018, after the approval by the research and ethical committee.

Approval was obtained from the hospital research and ethical committee. All of these centers were asked to provide the data regarding the total number patients registered for Hemodialysis and the number of Anti-HCV-Ab and HBs-Ag positive patients being dialyzed at that center. This information was collected on a Performa. This proforma also contained questions pertaining to basic infection control measures.

RESULTS

A total of 10 centers responded to our request for submission of data. A total of 953 patients were being dialyzed at these centers.

Viral Prevalence: Off the total population of 953 dialysis dependent patients, 169 (17.7%) patients were HCV positive, 31 (3.3%) patients were hepatitis B positive, and 08 (0.8%) patients were positive for both hepatitis B and C. Therefore a total of 208 (21.8%) patients were positive for markers of viral hepatitis B and C. Table 1& Figure 1.

Table No.1: Prevalence of viral hepatitis b & c in hemodialysis dependent patients. Cumulative data from all ten centers

Patients negative for HBC & HCV	HCV positive patients	HBV positive patients	Patients positive for both HCV & HBV	Total patients positive for either or both HCV & HBV	Grand total of the number of patients. (total study population)
745 (78.1%)	169 (17.7%)	31 (3.3%)	08 (0.8%)	208 (21.8%)	953

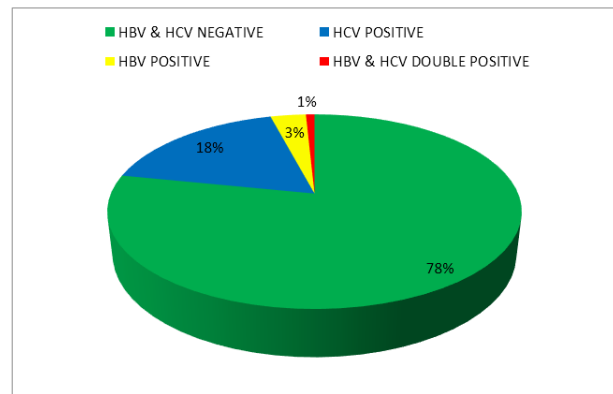


Figure No.1: Prevalence of viral hepatitis in hemodialysis dependent patients

Viral Testing: All the centers but one reported regular 03 monthly screening of their patients for viral

hepatitis. Six out of the total 10 centers were testing the viral serology using ICT based method, while 04 centers were utilizing ELISA based testing for viral screening. None of the centers reported using PCR based testing.

Disinfection Practices: Participating dialysis centers were asked about their practices of SURFACE DISINFECTION of machine and other patient contact surfaces. Only 01 dialysis center reported surface disinfection after each cycle. Five centers reported the surface disinfection after every duty shift, while the remaining 04 centers were performing surface disinfection once daily or once weekly.

Regarding dialysis machine rinsing, 07 centers reported machine internal rinsing after every cycle while in the remaining 03 centers the dialysis machines were rinsed after every 08 hourly shifts.

Regarding machine internal disinfection, 01 center reported machine disinfection after every shift, while the remaining 09 centers were performing machine disinfection every day or every week. Figure 2.

None of the centers reported re-use of dialyzers.

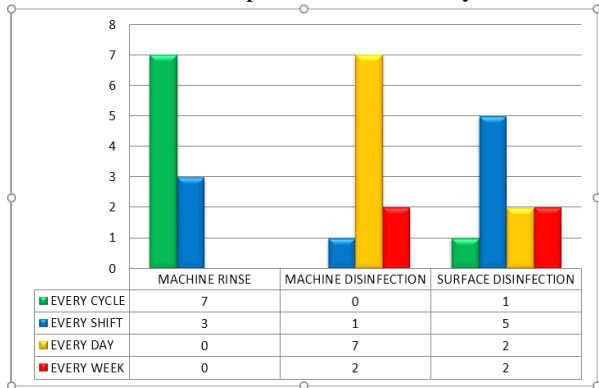


Figure No.2: Hemodialysis machine and surface disinfection practice

Staff Protection And Infection Control: These dialysis centers were asked about basic infection control measures including hand hygiene, eye protection, gowns and gloves. Seven out of 10 centers reported observing infection control measures. A total of 65 dialysis technicians were working in these 10 centers and only 36 (55.4%) were reported to be vaccinated against hepatitis B infection.

DISCUSSION

This survey aimed to determine the prevalence of viral hepatitis B and C in our local hemodialysis population. The total prevalence for viral hepatitis B and C was 21.8%. HBV was found in 3.3% patients, HCV was positive in 17.7% patients, and 0.8% patients were found to be positive for both HBV and HCV sero-markers. As compared to the international figures of DOPPS study population of North America and Europe (HBV 3.0% and HCV 13.5%),^{7,8} the prevalence of viral

hepatitis (especially HCV), is significantly higher in our patient population.

Seroprevalence of HBV in Pakistani ESRD population is reported to range from 10.2 % to 14.6%.^{11,15,16} Thus, the prevalence of HBV of 3.3% in our hemodialysis population is significantly less than that mentioned by other authors from Pakistan. Such a high prevalence of HBV in some centers can be attributed to the selective referral of HBV positive patients for hemodialysis, as not all centers entertain HBV positive patients. Since in our study multiple centers across the province were included, the effect of selective referral of HBV positive patients to centers offering dedicated HBV positive machines is unlikely to affect our results.

The prevalence of HCV ranges from 23.7% to 68% in Pakistani ESRD patients.^{12,13,16} In a study by Khan et al Anti HCV antibodies were detected in 29.2% of their hemodialysis patients. In addition, 5.9% of patients who were initially negative for anti HCV antibodies were found to be HCV positive by PCR testing. Thus the total prevalence was in order of 35.1%.¹⁷ In another study, Zarkhoon et al found 23.7% of their hemodialysis dependent population to be anti-HCV positive.¹⁸ Thus in comparison the prevalence of HCV of 17.7% in our hemodialysis dependent population is less than that mentioned by other authors from Pakistan.

Studies of the general healthy Pakistani population yield the prevalence of HBV from 1.7 to 5.5%, and that of HCV from 2.52% to 5.4%.^{16,19} Azam et al concluded that the overall country wide prevalence of HBV was 4.5% and HCV was 3.2% in healthy population. Khyber Pakhtunkhwa (KPK) (former NWFP) had lower prevalence values as compared to the other provinces, 2.7% for HBV and 1.4% for HCV.²⁰ Other Studies primarily focusing on the local population of KPK have yielded similar conclusions. For HBV the prevalence ranges from 1.9-3.0% and for HCV this ranges from 2.2-3.19%.^{21, 22} This can be one reason why in our hemodialysis patients the prevalence of viral hepatitis is less than other studies from other regions of Pakistan.

This leads to an interesting conclusion that the seroprevalence of HBV in our hemodialysis dependent patients is only slightly higher as compared to that of the general population in Pakistan while the prevalence of HCV in our dialysis dependent patients is significantly higher as compared to the general healthy population of Pakistan.

Majority of the centers reported regular 3 monthly screening of their patients for viral hepatitis which reflects the level of their concern. Kidney Disease Improving Global Outcome (KDIGO) guidelines²³ recommend initial testing for viral hepatitis serology with EIA (Enzyme Immunoassay) in low prevalence areas and nucleic acid test (NAT) in high prevalence areas. The same guidelines recommend 6-12 monthly monitoring of hemodialysis dependent patients using

the same test recommendations. Majority of our centers reported using immune-chromatography (ICT) based technique to screen and monitor patients for viral hepatitis infection. This is clearly not in compliance with the recommended guidelines. Our dialysis patients should be considered a high risk, high prevalence group. Therefore viral testing at our centers should ideally be NAT based instead of EIA or ICT based.

The care of dialysis machine involves cleaning of the external surfaces and internal machine circuits. The external cleaning and disinfection involves cleaning of all the surfaces with a detergent followed by disinfection with an intermediate level disinfectant such as Bleach or chlorine. It is recommended that this process should be performed after each and every dialysis cycle. This is because viruses and bacteria can live on machine surfaces for variable periods of time, notably HBV that can survive for up to one week in dried blood. The pressure transducer filters should be changed after each treatment cycle. Guidelines also recommend measures of internal machine disinfection. There is general consensus that routine disinfection of the machine internal pathways is not mandatory after each treatment as with single-pass machines the risk of transmission of infection is minimal. However in case there is a blood leak from the hemodialyser it is recommended that the machine should be disinfected before reuse. The internal machine pressure transducer port should also be disinfected if found to be contaminated. The United States Center for Disease Control Recommendations for Preventing Transmission of Infections among Chronic Hemodialysis Patients recommends that for single pass machines the rinsing and disinfection should be done once every day.

Indian guidelines recommend heat rinsing after every dialysis session, Citric Acid based chemical disinfection every day and Bleach based disinfection every month. In our study only one center reported surface disinfection after each and every dialysis session. Majority of centers were performing surface disinfection after each shift or once a day, which is clearly insufficient. This clearly shows the lack of education and the room for improvement in our dialysis practices. Regarding the internal disinfection, our centers reported that they were rinsing the machines after each dialysis cycle and were disinfecting their machines every shift or every day which suggests adequate internal machine disinfection practices.

Majority of centers claimed the application of staff protection and infection control measures such as, hand hygiene, use of masks, gloves, gowns, proper disinfection of patient contact surfaces and proper handling of waste materials and spills. Only about half (55.4%) dialysis technicians were vaccinated against Hepatitis B infection. This can be taken as an indirect marker of lack of safety measures of the dialysis staff. None of our centers reported Re-use of hemodialysers.

Although when appropriately handled, the dialyzer re-use has not been shown to be involved in the transmission of blood borne viruses and it is a cost effective measure; this practice is seldom performed in our dialysis centers.

CONCLUSION

We conclude that viral hepatitis is common in our local hemodialysis dependent patient population. The prevalence of HBV is only slightly higher than that of general population while the prevalence of HCV is significantly higher than that for our general population. When comparing to the international figures, our dialysis centers have a higher prevalence of both viral Hepatitis. We conclude that inadequate general infection control measures especially inadequate Surface disinfection can prove to be important risk factors for transmission of viral hepatitis among our hemodialysis patients.

Author's Contribution:

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Final Approval of version:	Mufti Baleegh-ur-Raheem Mahmood

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