Hepatitis Viruses in Hemodialysis Patients at a Tertiary Care Hospital

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**Abstract**

Hepatitis C virus and Hepatitis B virus are the most important infections transmitted in Hemodialysis patients. HBV and HCV are the major cause of liver diseases in these patients. These infections lead to serious complications like cirrhosis and hepatocellular carcinoma. Hence the present study was done to determine the seroprevalence of HCV and HBV in chronic renal failure patients undergoing Hemodialysis. The study was a prospective study conducted over a period of 1 year from 2018-2019 in Chronic Renal failure patients undergoing Hemodialysis. A total of 60 serum and plasma samples were collected and tested for HBV by HBsAg ELISA, HCV by Anti HCV ELISA, HCV RNA by HCV RT PCR. All the patients were seronegative for HBsAg. Anti HCV antibodies were detected in 13(21.66%) patients. HCV RNA was detected in 25(41.66%) patients. To conclude Hemodialysis patients are at risk of acquiring blood borne viral infections like HBV and HCV. Prevention and adherence to universal precautions are the main factors for the control of these blood borne viral infections. Hence use of dedicated dialysis machines, screening of patients for Blood borne viral infections for every 3 months and training of staff is recommended to reduce the risk of complications in these patients.

**Keywords:** Hemodialysis, Hepatitis viruses, Cirrhosis, Carcinoma, Universal precautions, Chronic Renal Failure.

**INTRODUCTION**

Chronic renal failure (CKD) is a global public health problem due to its main risk factors hypertension and diabetes. It requires hemodialysis, peritoneal dialysis or renal transplantation in its terminal stage. As soon as the patient is terminally ill with CKD, these treatments are started [1]. In hemodialysis blood is removed from the patients and pumped across the dialysis membrane. Poisons and toxins in the blood are discarded after entering the dialysate and blood is returned to the patient [2]. Hemodialysis allows survival but increases the risk of viral infections. Vascular exposure for prolonged periods and frequent blood transfusions increase the risk of acquiring blood-borne infections. Contaminated equipment, environmental surfaces and health care workers also play a crucial role in the nosocomial transmission of these infections [3-5].

HCV and HBV are the most important infections transmitted via parenteral routes in patients undergoing hemodialysis. They are the major cause of liver diseases in these patients. These infections lead to serious complications like cirrhosis and hepatocellular carcinoma [6]. At present in India around 10-15 million are infected with Hepatitis C virus (HCV) with a prevalence of 0.5-1.5% of population [7]. High prevalence of HBV infection (20.2%) has been reported after conducting various studies at hemodialysis centres in developing countries [8]. There is a considerable reduction in the spread of HBV infection in hemodialysis patients with the advent of infection control practices particularly immunization and separation of patients who are HBsAg positive. The best way to prevent HBV infection in hemodialysis patients is to vaccinate the patients against HBV before progressing to end stage renal failure in these patients [9]. Hence the present study was done to know the most common blood borne hepatitis viruses in patients undergoing hemodialysis.

**MATERIALS AND METHODS**

The study was prospective study conducted over a period of 1 year from 2018 to 2019 in chronic renal failure patients undergoing treatment for maintenance hemodialysis in Nephrology Department of Osmania General Hospital. Patients who have given informed consent, both sexes & all age groups were included in the study after ethical committee permission. Acute renal failure patients and patients not willing to give informed consent were excluded from the study. A total of 60 Patients undergoing...
hemodialysis were explained about the protocol of the study and written consent was obtained. In each plain (for serum) and EDTA (plasma) vacutainers 5ml of blood was taken under strict aseptic precautions, centrifuged and stored in aliquots at -20°C.

METHODS-HCV IgG Antibody detection was by 3rd generation HCV MICROLISA-J Mitra and Co. Pvt. Ltd, Nucleic acid extraction by Spin Star Viral™ Nucleic Acid Extraction Kit 1.0 ADT BIOTECH, HCV RNA detection was done by Real star HCV RT-PCR Kit 1.0 ALTONA DIAGNOSTICS. HBV Antigen detection by HBsAG ELISA-MERIL DIAGNOSTICS.

RESULTS

Out of 60 samples tested anti HCV antibody was positive in 13 (21.66%) patients. 25 (41.6%) patients were positive by HCV RT PCR. of the 60 samples tested 42 were males and 18 were females. Maximum number of males has undergone hemodialysis. Prevalence of HCV was more in the age group of 41-60 years (FIGURE 1).

Prevalence of HCV was high among Males. Out of 25 positive cases by PCR, 20 (80%) were males and 5 (20%) were females (Figure 2).

Clinicopathological details of 60 patients tested for HCV RNA shown in Table 1.
### Table-1: Clinicopathological details of 60 patients included in Realstar HCV RT-PCR assay

| Total (%) | RealStar HCV RT-PCR DET* (%) | RealStar HCV RT-PCR NDE** (%) | p Value |
|-----------|-----------------------------|-------------------------------|---------|
| 60 (100)  | 0                           | 0                             |         |

**Gender**
- Male: 48 (80%) DET: 20 (41.6) NDE: 28 (58.3) p = 1
- Female: 12 (20%) DET: 5 (41.6) NDE: 7 (58.3)

**Age**
- ≤20 Years: 1 (1.66) DET: NIL (0) NDE: 1 (100) p = 0.896
- >20 ≤40 Years: 24 (40) DET: 11 (45.83) NDE: 13 (54.16)
- >40 ≤60 Years: 30 (50) DET: 12 (40) NDE: 18 (60)
- >60 ≤80 Years: 5 (8.33) DET: 2 (40) NDE: 3 (60)

**Median Age**
- Male: 48 (80%) DET: 20 (41.6) NDE: 28 (58.3) p = 1
- Female: 12 (20%) DET: 5 (41.6) NDE: 7 (58.3)

**Hemodialysis Duration**
- >1 ≤ 3 Years: 36 (60) DET: 9 (25) NDE: 27 (75) p = 0.001
- >3 ≤ 6 Years: 24 (40) DET: 16 (66.66) NDE: 8 (33.33)

**No. Of blood transfusion**
- 0: 5 (8.33) DET: 2 (40) NDE: 3 (60) p = 0.743
- 1≤2: 23 (38.33) DET: 11 (47.82) NDE: 12 (52.17)
- >2≤3: 32 (53.33) DET: 12 (37.5) NDE: 20 (62.5)

**Alanine Transaminase (ALT)**
- Normal: 28 (46.6) DET: 12 (42.15) NDE: 16 (57.14) p = 0.210
- Elevated: 2 (3.3) DET: 2 (100) NDE: Nil
- Depressed: 30 (50) DET: 11 (36.66) NDE: 19 (63.33)

**ESRD**
- Contrast induced nephropathy: 6 (10) DET: 2 (33.33) NDE: 4 (66.66) p = 0.922
- Glomerulonephritis: 11 (18.33) DET: 5 (45.45) NDE: 6 (54.54)
- HTN: 18 (30) DET: 8 (44.44) NDE: 10 (55.55)
- DM: 20 (33.33) DET: 10 (50) NDE: 10 (50)
- Obstructive uropathy: 5 (8.33) DET: 3 (60) NDE: 2 (40)

**Hemodialysis in ESRD patients/week**
- Twice: 35 (58.3) DET: 11 (31.42) NDE: 24 (68.57) p = 0.057
- Thrice: 25 (41.6) DET: 14 (41.6) NDE: 11 (44)

*DET - Detected, **NDE – Not Detected

Out of 60 samples tested for HBsAg all were negative by HBsAg ELISA

### DISCUSSION

In the present study, high HCV positivity was seen in the age group 41-60yrs with 46.15% by ANTI HCV ELISA. High positivity in this age group is because of high incidence of CKD which is correlating with a study done by Col Partharoy et al. [11](Table 2).

#### Table-2: Age wise prevalence of HCV infection in haemodialysis patients in various studies

| AUTHOR                | PLACE     | YEAR | AGEGROUP | % OF HCV INFECTION |
|-----------------------|-----------|------|----------|--------------------|
| Anandh perumal et al. [10] | Tamilnadu | 2016 | 31-40yrs | 40%                |
| Col Partharoy et al.   | Pune      | 2019 | 41-60yrs | 60%                |
| PRESENT STUDY          | HYDERABAD | 2019 | 41-60yrs | 46.15%             |

Male predominance was seen in this study with 80% of HCV positive patients being males which can be associated with higher incidence of CKD per se and in males owing to higher incidence of Diabetes and Hypertension. In this study around 20% of HCV positive patients were females, this low number could be because of high HCV clearance rate in females compared to males (Table 3) which is similar to study done by AmritDhar et al. [14] in which female percentage was 19%.

#### Table-3: Sex wise prevalence of HCV infection (rt pcr) in haemodialysis patients in various studies

| AUTHOR             | PLACE            | YEAR | MALES | FEMALES |
|--------------------|-----------------|------|-------|---------|
| Surendrakumar et al. | Coimbatore       | 2011 | 72.2% | 27.8    |
| Shantanuprakash et al. [12] | Lucknow      | 2013 | 84.61%| 15.39%  |
| Anandh perumal et al. | Tamilnadu     | 2016 | 87%   | 13%     |
| Amrit Dhar et al.   | Jammu & Kashmir | 2019 | 81%   | 19%     |
| PRESENT STUDY       | HYDERABAD       | 2019 | 80%   | 20%     |
In a study in Pakistan, by shafi et al. [13], prevalence of HCV was 27.2%. In a study by Fabrizi et al. HCV prevalence was 20%. Similarly in a study across 7 countries (DOPPS) the mean prevalence of HCV was found to be 13.5% by Fissell et al. Variations in results is because of various geographical regions, different time periods of study, different methods of detection and infection control practices in different countries. Compared to general population (0.5-1.5%) prevalence of HCV infection was significantly higher in the present study. In a study done by col parthaoy etal positivity of anti HCV ELISA was 18.8% which is correlating with present study which is 21.6%(13/60) (Table 4).

Table-4: Prevalence of hcv infection in hemodialysis patients in various Indian studies

| AUTHOR       | PLACE                | YEAR | TOTAL NO.OF PATIENTS | PATIENTS WITH HCV INFECTION (%) |
|--------------|----------------------|------|----------------------|---------------------------------|
| Medhi et al. | Delhi                | 2008 | 250                  | 17.2%                           |
| Jasuja et al.| Delhi                | 2009 | 119                  | 27.7%                           |
| Amritdharr et al.| Jammu and Kashmir | 2019 | 67                   | 31.4%                           |
| Present study| Hyderabad            | 2019 | 60                   | 21.66%                          |

HCV positivity by RT PCR was 41.6% whereas by ELISA it was 21.66% which is correlating with the study done by S.Datta et al. [16] where in prevalence was 67.4% with RT PCR in comparison with 36.48% using ELISA. In a study done by Col Partha et al. prevalence of anti HCV positivity was 19.2% and prevalence by RT PCR was 78.7%. In another study in India anti HCV positivity was 27.07% and prevalence by RT PCR was 79.16%. (Table 5).

Table-5: Prevalence of hcv infection by pcr in various studies

| Author                | Year | Patients with HCV infection% (PCR) |
|-----------------------|------|-----------------------------------|
| S Jasuja et al.       | 2009 | 21.6%                             |
| S Datta et al.        | 2005 | 67.4%                             |
| Present study         | 2019 | 41.6%                             |

In a study done in Western Europe and United States (developed countries) the prevalence of HBV infection was 0 to 6.6% which is correlating with the present study. In the present study HBs Ag prevalence was ZERO, this could be due to proper vaccination of all patients and following strict universal precautions for prevention of HBV (Table 6).

Table-6: Prevalence of hbv infection in patients undergoing haemodialysis

| AUTHOR                | PLACE     | YEAR | HBsAg PERCENTAGE |
|-----------------------|-----------|------|------------------|
| Shantanuprakash et al.| Lucknow   | 2013 | 3.23%            |
| Kranthikosaraju et al.| Karnataka | 2013 | 1.52%            |
| Mdjamil et al.        | Shillong  | 2016 | 2.17%            |
| PRESENT STUDY         | HYDERABAD | 2019 | 0                |

CONCLUSION

Risk of exposure to hepatitis viruses is maximum in patients on maintenance Haemodialysis and with increased number of dialysis sessions. Hence use of dedicated dialysis machines , screening of patients for viral infections once in every 3 months and training of staff is recommended .To reduce the risk of complications these patients need to be actively intervened. In present study duration of dialysis, number of blood transfusions was considered as significant risk factors for acquiring viral infections. HBV prevalence was zero in the present study because of strict adherence to universal precautions for the prevention of infection and vaccination of all patients on maintenance haemodialysis. Screening for HCV antibodies alone does not exclude infection with HCV in patients on hemodialysis. Hence molecular detection of HCV may be useful for identifying antibody negative HCV infected patients on hemodialysis.

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