Original Article

Dialysis in HCV Pts.

Serological Monitoring of HCV Marker in Hemodialysis Patients from Tertiary Care Hospitals of Karachi

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ABSTRACT

Objective: This study was conducted to estimate the seroprevalence of HCV in maintenance hemodialysis patients.
Study Design: Experimental prospective study.
Place and Duration of Study: This study had been carried out in the Department of Microbiology, Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi from 1st July, 2010 to 30th April, 2011.
Materials and Methods: Irrespective of age and gender 200 samples were collected from the patients on chronic maintenance hemodialysis that at least had 20 cycles of hemodialysis from tertiary care hospital of Karachi. The nature of the sample was 5 cc blood. All the study subjects were briefed about the study program and a written consent form had been signed after getting permission from hospital ethical committee. Diagnosed patients of HCV prior to commencement of hemodialysis and patients who had less than 20 hemodialysis cycles were excluded from this study.
Results: Two hundred patients (125 male and 75 females) were between the ages of 30-77 years with mean 56.7±0.68. 29% patients were seropositive for HCV in chronic maintenance hemodialysis patients. According to duration of dialysis, 3.5% were seropositive in whom duration of dialysis was less than 1 year, 18.4% were seropositive in whom duration of dialysis is in between 1.1-2.0 years, 15.3% were seropositive in whom duration of dialysis is in between 2.1-3.0 years, 52.6% were seropositive in whom duration of dialysis is in between 3.1-4.0 years while 61% were seropositive in whom duration of dialysis is more than 4 years. Highly significant statistical difference is observed as the duration of dialysis increases as p-value is highly significant as 0.001 for HCV. Seroprevalence of HCV infection according to schedule of dialysis is insignificant as the p-value is greater then 0.05.
Conclusion: This study confirms that HCV infection is a serious and major problem in our hemodialysis units. Duration of dialysis and surgery is directly proportional to the seropositivity, while transfusion was not statistically related to the cause of HCV infections in hemodialysis patients.
Key Words: HCV, Hemodialysis, Tertiary Care Hospital

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INTRODUCTION

When conservative management of end stage renal disease (ESRD) is inadequate, hemodialysis, peritoneal dialysis, and kidney transplantation are alternatives[1].
Chronic maintenance hemodialysis in ESRD patients is a life saving procedure[2]. Patients undergoing chronic hemodialysis potentially have an increased risk of exposure to infections with viruses, such as hepatitis B (HBV) and hepatitis C (HCV) viruses[3].
Hepatitis C viral infections are an important cause of morbidity and mortality in hemodialysis patients and pose problems in the management of the patients in the renal dialysis units.[4]

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Hemodialysis patients do not clear these viral infections efficiently. Several outbreaks of hepatitis have occurred in these settings.[5]
The prevalence of HCV infection among hemodialysis is high and varies between countries (2-60%) and between dialysis units with in a single country.[6] Dual infection with HBV and HCV in hemodialysis patients leads to more aggressive liver diseases.[7]
Although dialysis is the treatment of choice for end-stage renal failure, dialysis patient are at risk for contacting blood-borne infections, including hepatitis C virus.[8,9]
HCV is efficiently transmitted by parenteral route. Therefore hemodialysis patients are at higher risk of acquiring hepatitis C, HCV infected hemodialysis patients have an increased risk of death when compared with those not infected.[10,11]
HCV infections continue to occur in patients on hemodialysis. Following a reduction in the transmission

from blood products, nosocomial spread of HCV infection has assumed more significance. Prevalence of infection correlates with duration of dialysis. GGT values are higher in HCV patients on dialysis and may be useful in predicting outcome of infection.[12]

In a study, fourteen hemodialysis patients with chronic hepatitis C received 135 µg PEG-IFN alpha-2a subcutaneously, once a week, after dialysis session for a period of 48 weeks. In the intention-to-treat analysis, sustained viral response was present in 36% of the patients (five out of fourteen patients) at the end of the follow up period.[13]

In US about 25,000 deaths occur annually due to chronic liver disease and cirrhosis; HCV appears to be a major contributor to this burden (40%).[14]

HCV infection has been frequently noticed in hemodialysis patients. When it develops, results in chronic liver disease and is likely to develop complications if they have renal transplantation, as immuno-suppressive therapy is required for prevention of rejection. High incidence of HCV has been noted in some countries like India where 83% prevalence is reported in dialysis patients. 71% prevalence has been noted in Venezuela and 46% in Saudi Arabia, while a low prevalence of 5.72% was noted in Switzerland.[15]

Approximately 4 million persons in the United States and probably more than 100 million persons worldwide are infected with hepatitis C virus (HCV).[16] It is estimated that there are more than 170 million chronic carriers world wide.[14]

The presence of anti HCV positive patients who had never been transfused, suggest nosocomial transmission of the virus in the dialysis units.[17]

Hepatitis C virus infection is a major health problem among dialysis patients in developing countries.[18] Mansour-Ghanaei[19] concluded in their study that hepatitis C infection has a high prevalence in dialysis patients and Anti-HCV Ab test should be performed before scheduling them.

Hypothesis: Seroprevalence of HCV is high in chronic maintenance hemodialysis patients..

MATERIALS AND METHODS

The study had been carried out in the Department of Microbiology, Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi.

All the study subjects were briefed about the study program and a written consent form had been signed after getting permission from hospital ethical committee. Irrespective of age and gender 200 samples were collected from the patients on chronic maintenance hemodialysis that had at least 20 cycles of hemodialysis from tertiary care hospital of Karachi. The nature of the sample was 5 cc blood. All patients on chronic maintenance hemodialysis who had been at least 20 cycles of hemodialysis were included in this study.

Diagnosed patients of HCV prior to commencement of hemodialysis and patients who had less than 20 hemodialysis cycles were excluded from this study.

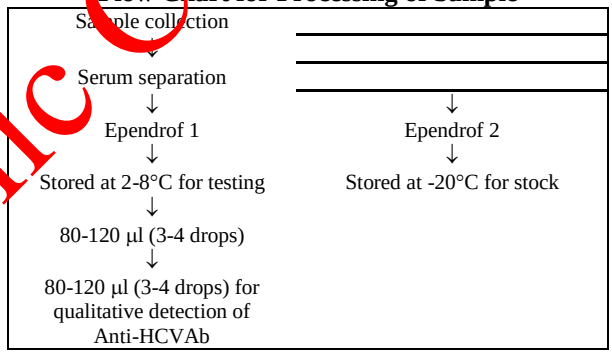
The study was started on 1st July, 2010 and continued till 30th April, 2011. After all necessary aseptic measures 5 cc of blood was collected by veni puncture and shifted to a clean sterilized tube and allowed to clot (non-hemolysed sample). Serum was separated and stored in two labeled ependroff's in equal quantity for further testing. One ependroff was stored at -20°C for long storage of stock. Second ependroff was stored at 2-8°C and tested within an hour or so.

Test procedures for detecting HCV. is described in Appendix.

Serum had been tested according to the guidelines and literature provided by the MK Bio GmbH Robert-Bosch-Breite 23, 37079 Goettingen, Germany.

Test kits are commercially available for measuring antibodies by enzyme linked immunoassay (EIA). If properly performed, these tests have a sensitivity and specificity exceeding 98%. When EIA based antibody tests are used for screening populations with a low prevalence of HCV infection (e.g. blood donors).

Flow Chart for Processing of Sample



RESULTS

Table 1 shows the gender and age outcome variables of the present study. Two hundred patients (125 male and 75 females) were between the ages of 30-77 years with mean 56.7±0.68.

Table 2 shows the basic parameters of hemodialysis patients which include Hospital/Dialysis centre, Cause of Chronic renal failure, Duration of dialysis, Surgical history, History of blood transfusion, Dialysis schedule and Hepatitis B vaccination.

Table 3 shows the seroprevalence of HCV in chronic maintenance hemodialysis patients, in which 29% were HCV seropositive.

Table 4 shows the seroprevalence of HCV infection according to duration of dialysis, in which 3.5% were seropositive in patients whom duration of dialysis is less than 1 year, 18.4% were seropositive in patients whom duration of dialysis is in between 1.1-2.0 years, 13.3 were seropositive in patients whom duration of dialysis is in between 2.1-3.0 years, 52.6 were

seropositive in patients whom duration of dialysis is in between 3.1-4.0 years while 61% were seropositive in patients whom duration of dialysis is more than 4 years.

Table No.1: Gender and Age Distribution of Hemodialysis Patients

Variables	Number	Percent
Gender		
Male	125	62.5
Female	75	37.5
Age in years		
< 40	9	4.5
40 – 49	31	15.5
50 – 59	76	38.0
60 – 69	63	31.5
≥ 70	21	10.5
Total	200	100.0

Table No.2: Basic parameters of hemodialysis patients (n=200)

Basic parameters	Number	Percent
Hospital/Dialysis centre		
The Kidney Centre	70	35.0
Dua dialysis centre	29	14.5
SIUT	51	25.5
Farhan dialysis centre	30	15.0
Imam Clinic dialysis centre	10	5.0
Sawab Medical Centre	10	5.0
Cause of chronic renal failure		
Chronic glomerulonephritis	49	24.5
Diabetic nephropathy	46	23.0
Hypertension	19	9.5
Polycystic Kidney	7	3.5
Chronic Pyelonephritis	4	2.0
Calculus	3	1.5
Not known	72	36.0
Duration of dialysis		
<1 year	57	28.5
1.1 – 2.0 years	49	24.5
2.1 – 3.0 years	15	7.5
3.1 – 4.0 years	38	19.0
>4 years & above	41	20.5
Surgical history present	**37**	**18.5**
Blood Transfusion	**58**	**29.0**
Whole blood	55	27.5
Fresh Frozen Plazma	3	1.5
Pack cells	2	1.0
Dialysis schedule		
Two / week	161	80.5
Three / week	39	19.5
Vaccinated for HBV	**51**	**25.5**

Highly significant statistical difference is observed as the duration of dialysis increases, there is increase in the chance of acquiring HCV infections in chronic maintenance hemodialysis patients, as the p-value is highly significant as 0.001 for HCV .

Table 5 shows the Hospital / dialysis centre wise distribution of HCV seropositive samples in which there is no statistical significant data obtained. While comparing different hospitals / dialysis centre, in which 28.6, were seropositive in Hospital A, 31.0, were seropositive .in Hospital B, 21.6, were seropositive in Hospital C, 33.3, were seropositive in Hospital D, 40 were seropositive in Hospital E while 40, were seropositive in Hospital F.

Table No.3: Seroprevalence Of Hcv In Maintenance Hemodialysis Patients

Test results	Number	Percent
HCV	58	29.0

Table No.4: Seroprevalence of HCV Infection According to Duration of Dialysis

Duration of dialysis	No. of Subjects	HCV No. (%)
<1 year	57	2 (3.5)
1.1 – 2.0	49	9 (18.4)
2.1 – 3.0	15	2 (13.3)
3.1 – 4.0	38	20 (52.6)
> years	41	25 (61.0)
P-value	0.001	

Table No.5: Seroprevalence of HCV Infection According to Hospital/Dialysis Centre

Hospital / dialysis centre	No. of Patients	HCV No. (%)
The Kidney Centre	70	20 (28.6)
Dua dialysis centre	29	9 (31.0)
SIUT	51	11 (21.6)
Farhan dialysis centre	30	10 (33.3)
Imam Clinic dialysis centre	10	4 (40.0)
Sawab Medical Centre	10	4 (40.0)
The Kidney Centre	70	20 (28.6)
P-value	0.718	

Table No.6: Seroprevalence of HCV infection according to history of surgery

Surgery	No. of Subjects	HCV No. (%)
Yes	37	17 (45.9)
No	163	41 (25.2)
P-value	0.012	

Table 6 shows the seroprevalence of HCV infection according to history of surgery, in which HCV is statistically related to the surgeries. History of surgery is present in 45.9% of seropositive for HCV.

Table No.7: Seroprevalence of HCV infection according to blood transfusion

Blood transfusion	No. of Subjects	HCV No. (%)
Yes	55	19 (34.5)
No	145	39 (26.9)
P-value	0.0186	

Table 7 shows history of blood transfusion and seroprevalence of HCV in which 34.5 have the history of blood transfusion, while 26.9 did not give the history of blood transfusion. The data analyzed, shows that there is no statistical significant correlation with transfusion and seropositivity of HCV.

Table No.8: Seroprevalence of HCV infection according to schedule of dialysis

Schedule of dialysis	No. of Subjects	HCV No. (%)
1-2 / week	161	42 (26.1)
3 / week	39	16 (41.0)
P-value	0.052	

Table 8 shows seroprevalence of HCV infection according to schedule of dialysis in which, 26.1% (HCV), 41% (HCV) infections are present in twice and thrice schedule of hemodialysis respectively. Data is statistically insignificant as the p-value is greater than 0.05.

DISCUSSION

Patients with renal disease are at increased risk of acquiring hepatitis C virus (HCV) infection because of their frequent exposure to HCV-contaminated medical equipment during hemodialysis. The prevalence of anti-HCV antibodies among hemodialysis patients varies between 5–10% in the developed world and 10–70% in developing countries.[13] Which is in agreement with our study.

Another study by Sinniah M and Doi BG (1993) shows the prevalence of HCV Ab in chronic renal failure patients undergoing dialysis (CRFD) was 53.9 %(192 cases were seropositive against 356 CRFD sera tested patients). [20] This is in contrast very high from our study findings.

A cross sectional analysis among patients from two dialysis units in the period of six months (2009) was conducted by Bosevska G., et al. which show the prevalence of Anti HCV Ab. of 32.02%[21], which is in close approximation with our study 29%.

Nosocomial routes of transmission including the use of contaminated equipment and patient-to-patient exposure is considered more important.[22] This is in agreement with our study.

Fabrizi et al[10] in their study show seroprevalence of HCV to about 31.4% in Turkey which is in agreement with our study (29%).

Quaglio et al in its[23] study revealed the seroprevalence of HCV as 86% which is in contrast high as compared to our study.

Male and female percentage in our study is 62.5% and 37.5% respectively which is in close agreement with a study conducted by Mansour-Ghanaei[19] which shows 66% and 34% respectively.

Another study on seroprevalence of HCV in hemodialysis patients conducted in Tehran (Iran) by Mohssen Nassiri Toosi et al[24] shows prevalence of HCV of 8.5%. This is in contrast to our study.

Prevalence of HCV among hemodialysis patients were 24.5% in Turkey. [25] Which we found is slightly higher (29%) in, our studied population.

Conclusion of the study conducted by Pisula et al is[26] in agreement with my study which shows the amount of hemodialyzed patients infected with HCV does not decrease and stays on a high level which is in agreement with our study.

Khokhar et al[27] in their study which was conducted in Islamabad show the mean age of study participants were 54.93years, which is coinciding with the mean age of our study population that is 56.7±0.68 years. Male were 66% and females were 34% which is in close approximation with our study that is 62.5% and 37.5% respectively.

Hemodializing patients without a screening blood test for HBV and HCV might lead to treating infected patients as non-infected ones.[28] This is well appreciated and observed during our study that patients usually do not have proper screening.

Multivariate analysis of risk factors showed that male gender, length of time on hemodialysis were associated with HCV positivity.[29]

CONCLUSION

This study confirms that HCV infection is a serious and major problem in our hemodialysis units. Duration of dialysis is directly proportional to the seropositivity. We found chronic glomerulonephritis to be the most common known cause of renal failure.

Transfusion was not statistically related to the cause of HCV infections in hemodialysis patients, while surgery is linked to increase the seroprevalence of HCV in our studies population.

Recommendations: This study emphasized the use of barriers (e.g., gowns, gloves, and eyewear) and adherence to routine hand washing, appropriate disposal of needles and other sharp instruments, and disinfection and sterilization procedures. To prevent transmission of blood-borne pathogens in hemodialysis settings, both universal precautions and the following hemodialysis-specific infection-control practices recommended in 1977 should be used:

1. Serum specimens from all susceptible patients should be tested monthly for Anti HCV Ab,

these results should be reviewed promptly.

2. Anti HCV Ab. positive patients should be isolated by room, machine, instruments, medications, supplies, and staff.
3. Instruments, medications, and supplies should not be shared between any patients. When sharing of multidose medication vials is necessary, medications must be prepared in a clean centralized area separate from areas used for patient care, laboratory work, or refuse disposal.
4. Routine cleaning and disinfection procedures should be followed, including clear separation of areas established to handle clean and contaminated items. Blood specimens should be handled with gloved hands and stored in designated areas away from medication preparation or central supply areas.
5. Serological evaluation of hemodialysis seronegative patients should have to be done on every three month interval.

However, 50% of hemodialysis patients can be protected from hepatitis B by vaccination, and maintaining immunity among these patients will reduce the frequency and costs of serologic screening.

More multicenter studies should be arranged on timely (6 months) basis to further evaluate the confidence interval and prevalence, as it changes from time to time.

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