

Prevalence of HCV Among Hemodialysis Patients at a Kidney Center, Gujrat: A Gender-Based Comparative Analysis

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Abstract

Background: Hepatitis C is a serious liver illness caused by the Hepatitis C virus (HCV). HCV is a major health concern in Pakistan. Hepatitis C is the most frequent hepatotropic viral infection among individuals receiving continuous hemodialysis. Hemodialysis patients are at significant risk of HCV infection due to their frequent dialysis treatments. This study analyzes HCV prevalence in hemodialysis patients: a comparative analysis by gender.

Objective: To study the Prevalence of HCV in Hemodialysis Patients at a Gujrat Kidney Center: A Comparative Analysis by Gender

Methodology: This data is retrospective data and was collected in coordination with the staff of Kidney Centre Gujrat, where they provided reports of several hemodialysis patients with HCV positive and negative. It consists of 188 patients including males and females of all the age groups that were referred in the Kidney Centre Gujrat. The study duration was 3 months i.e., from 10 November 2023 to 10 February 2024. Patients' information, duration of treatment, state of illness and other parameters of hemodialysis will determine.

Results: There were 188 patients in all that were part of the study, the number of HCV positive patients were 80/188(42.55%) including 36/188 (19.14%) females and 54/188 (28.72%) males. The mean and standard deviation of females with HCV positive was 6 ± 4.6 and with HCV negative was 5.3 ± 4.4 . Similarly, the mean and standard deviation of male with HCV positive was 8.8 ± 7.9 and with HCV negative was 11 ± 5.3 . The age range that was commonly affected by HCV was 30-59. The overall ratio of HCV is greater in females as compared to the males.

Conclusion: We can conclude that both genders are not equally affected by the HCV. The ratio of the male patients is lesser than the ratio of female's patients on hemodialysis with HCV. It is also concluded that the ratio of hypertension, comorbidities and side effects is also higher in males than females.

Keywords: Chronic kidney disease; Hemodialysis; Hepatitis C virus; End stage renal disease

Background

Hepatitis C virus (HCV) is a prominent cause of liver damage among chronic renal failure (CRF) patients who receive maintenance hemodialysis [1].

Hemodialysis is an extracorporeal procedure in which a semi-permeable membrane removes uremic retention products from the blood to cleanse it [2]. Worldwide, hemodialysis is the most

common kind of renal replacement therapy for individuals with end-stage kidney disease [3].

Hepatitis C Virus (HCV) was found in dialysis units at a significant rate, which has raised concerns since the early 1990s when HCV diagnostic testing became available [4]. An average hemodialysis center prevalence of HCV infection was found to be 13.5% (range 2.6–22.9%) in the Dialysis Outcomes and

Practice Patterns Study (DOPPS), which collected data from 1998 to 2001 in the United States, France, Germany, Italy, Japan, and Spain [5] and reported a 9.5% seroprevalence among hemodialysis patients recruited between 1996 and 2011 across 12 countries [6].

The DOPPS data also shown a correlation between HCV infection and worse quality of life scores, increased hospitalization and death rates in hemodialysis patients [7].

Hemodialysis is the commonest form of kidney replacement therapy in the world corresponding to over 89% of dialysis treatments and roughly 69% of total kidney replacement therapies. Both dialysis technology and patient access to the treatment have significantly improved over the past 60 years since the beginning of HD, especially in high-income nations [8].

It has been noted that liver failure is one of the main causes of death and morbidity in ESRD patients. It results in chronic hepatitis and raises the risk of hepatocellular carcinoma or liver failure. In the population with end-stage renal disease (ESRD), managing HCV-related liver disease is a serious health problem. It has been documented that liver failure is one of the main causes of death and morbidity in ESRD patients [9].

Hepatitis virus infection is one such illness that is still a big concern in the dialysis setting. The creation of hepatitis B diagnostic tests verified a high frequency and incidence of HBV infection in both HD unit personnel and patients. The spread of hepatitis B virus (HBV) infection was significantly curbed by the introduction of immunization, isolation of HBV-positive patients, specialized dialysis equipment, and routine surveillance for HBV infection [10].

Aims and objectives

Aim: Study is focused on finding the prevalence of HCV in hemodialysis patient among males and females in kidney center Gujrat.

Objective: To access the prevalence of HCV in hemodialysis patient at Kidney Center Gujrat

Methodology

Study Design: A retrospective cross-sectional study was conducted for this purpose.

Settings: This data is retrospective data and was collected in coordination with the staff of Kidney Centre Gujrat, where they provided reports of several hemodialysis patients with HCV positive and negative.

Study Duration: The study duration was of 3 months i.e., from 10 November 2023 to 10 February 2024.

Sample Size: The sample size consists of 188 patients including males and females of all the age groups that were referred in the Kidney Centre Gujrat.

Sampling Technique: Stratified sampling technique

Data Collection Tools: Reports of the patients were collected from the Kidney Centre to study different parameters of CKD of the number of hemodialysis patients.

Data Collection Procedure: All the regulations set by educational institute and hospital authorities have followed while collecting the reports. Consent form signed from the health staff of hospital (kidney center) and department of pharmacy of respective institute (The University of Lahore).It was ensured that data was merely for the research purpose and for the benefit and knowledge of the patients. Data was analyzed by applying statistical tools i.e. mode, mean, frequencies, standard deviation to explain the numeric values and to generate the tables and the graphs. All the rules and regulations made by the ethical committee of the University of Lahore were followed while conducting this research.

Results

There were 188 patients out of which 63.8% were males and 36.1% were females. The male to female ratio was 0.98: 1.0, with 68/188 (36.17%) and 120/188 (63.8%) of the patients being male. We divided the patients into five age groups 19-29, 30-39, 40-49, 50-59, 60-69 and ≥70. There were 15.43% patients in the 19-29 age group, 29.26% in the 30-39, and 21.28% in the 40-49, 20.21% in the 50-59, 10.64% in the 60-69 and 3.19% in the ≥70 age group. The highest percentage of patients was found in the age group of 30-39 (29.26).

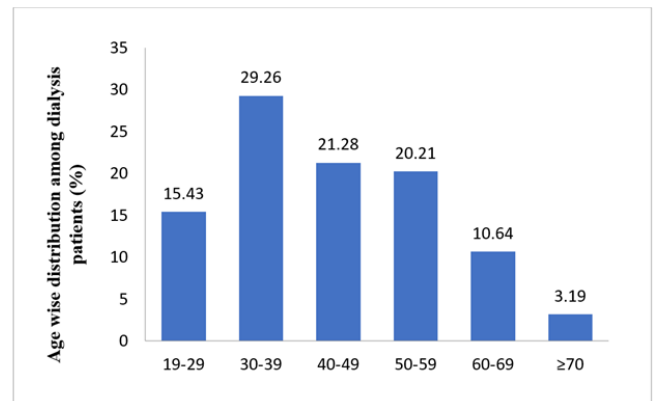


Figure 1: Age wise distribution among dialysis patients (%).

Table 1: Frequency of dialysis in hemodialysis patients.

Age groups	Dialysis frequency						F	P value
	Females		Males		Total			
	Twice a week	Thrice a week	Twice a week	Thrice a week	Twice a week	Thrice a week		
19-29	7	4	7	11	14	15	4.1	0.0386
30-39	9	12	14	20	23	32		
40-49	6	8	17	9	23	17		
50-59	9	6	11	12	20	18		
60-69	2	3	10	5	12	8		
≥70	2	0	1	3	3	3		

Table 2: Prevalence of HCV in hemodialysis patients.

Age groups	Positive HCV (Females)	Negative HCV (Females)	Positive HCV (males)	Negative HCV (males)
19-29	9	2	10	8
30-39	10	11	22	12
40-49	11	3	13	13
50-59	4	11	4	19
60-69	2	3	3	12
≥70	0	2	1	3
Mean ± Std. Deviation	6 ± 4.6	5.3 ± 4.4	8.8 ± 7.9	11 ± 5.3

Table 3: Blood pressure variability among males.

Males		BP Ranges				
Age distribution among patients	Number of males	Normal (<120/<80)	Elevated (120-129/<80)	stage 1 HTN (130-139/80-89)	stage 2 HTN (≥140/ ≥90)	HTN crisis (>180/>120)
19-29	18	3	1	2	10	2
30-39	34	0	2	4	25	3
40-49	26	1	0	1	17	7
50-59	23	1	2	2	12	6
60-69	15	1	0	0	13	1
≥70	4	0	0	0	3	1
Total	120	6	5	9	80	20

Table 4: Blood pressure variability among females.

Females		BP Ranges				
Age distribution among patients	Number of Females	Normal (<120/<80)	Elevated (120-129/<80)	stage 1 HTN (130-139/80-89)	stage 2 HTN (≥140/ ≥90)	HTN crisis (>180/>120)
19-29	11	1	1	2	5	2
30-39	21	2	3	4	10	2
40-49	14	1	0	2	8	3
50-59	15	2	0	0	10	3
60-69	5	0	0	0	5	0
≥70	2	0	0	0	2	0
Total	68	6	4	8	40	10

Comorbidities among hemodialysis patients

Table 5: Comorbidities among hemodialysis patients.

Comorbidities									
Age distribution among patients	Diabetes		HTN		CVD		Stomach Issues		
	Male	Female	Male	Female	Male	Female	Male	Female	
19-29	0	2	6	4	1	0	2	1	
30-39	5	0	17	8	1	1	1	1	
40-49	2	2	7	6	1	0	2	1	
50-59	0	2	4	4	2	0	4	0	
60-69	1	0	6	2	1	0	0	0	
>70	0	1	1	1	0	0	0	0	

Common side effects among hemodialysis patients

Table 6: Side effects among females.

Females		Side Effects			
Age distribution among patients	Number of Females	Pruritus	Body pain	Depression	Lack of appetite
19-29	11	1	1	0	1
30-39	21	6	0	1	2
40-49	14	0	1	2	0
50-59	15	4	1	0	1
60-69	5	3	0	1	0
≥70	2	0	0	0	1
Total	68	14	3	4	5

Table 7: Side effects among males.

Males		Side Effects			
Age distribution among patients	Number of Females	Pruritus	Body pain	Depression	Lack of appetite
19-29	18	2	0	4	0
30-39	34	3	5	4	1
40-49	26	8	2	1	3
50-59	23	5	2	3	3
60-69	15	4	2	2	0
≥70	4	0	1	1	0
Total	120	22	12	15	7

Prevalence of HCV in hemodialysis patients

There were 188 patients in all that were part of the study, the number of HCV positive patients were 80/188(42.55%) including 36/188 (19.14%) females and 54/188 (28.72%) males. The mean and standard deviation of females with HCV positive was 6 ± 4.6 and with HCV negative was 5.3 ± 4.4. Similarly, the mean and standard deviation of male with HCV positive was 8.8 ± 7.9 and with HCV negative was 11± 5.3. The age rang that was commonly affected by HCV was 30-59. The overall ratio of HCV is greater in females as compared to the males. In the 50 and older age group, the prevalence of males with HCV positive is 2.456 times higher than that of females, with a significant difference (P= 0.021*). Ultimately, it is determined that the age group 50 years of age and above was shown to be statistically significant and to be more affected by HBV and HCV [11].

Age-related blood pressure patterns among hemodialysis patients

There were 188 patients in all that were part of the study, the ratio of the males was 120/188 (63.8%) among these patients 6 patients had normal blood pressure (<120/<80), 5 patients had elevated blood pressure (120-129/<80), 9 patients had stage 1 hypertension (130-139/80-89), 80 patients had stage 2 hypertension (≥140/ ≥90) and 20 patients had hypertension crisis (>180/>120). The age in which hypertension is common rages from 19-69 years and the patients mostly had stage 2 hypertension.

The characteristics of the group were as follows: 69% of the participants were men out of which 7% had diabetes as the reason for End-Stage Renal Disease (ESRD), 34% had a history of hypertension and 5% had a Cardiovascular Disease (CVD). The age group in which comorbidity is most common ranges from 30-39 years and the patients in age group of ≥70 years are less affected. Most of the patients had hypertension.

36% of the participants were females out of which 10% had diabetes as the cause of End-Stage Renal Disease (ESRD), 37% had a history of hypertension and 1% had Cardiovascular Disease (CVD). Most of the females had hypertension followed by the diabetes and cardiovascular disease. The ratio of hypertension is greater in males as compared to the females. Age group 30-39 had the highest prevalence of most comorbid conditions, along with the highest mean age of 43. Comorbidities and older age were linked to a higher death risk. In a research, patients were divided into age groups (20–44, 45–59, 60–69, or ≥70 years) and comorbidity groups (none, one, two, or three to five comorbidities) to see whether the likelihood of having dialysis was affected by age and comorbidity counts (Van De Luijngaarden et al., 2011).

Diabetic nephropathy accounts for 48.8% of cases of End-Stage Renal Disease (ESRD), while hypertensive nephropathy

accounts for 19.8% of newly diagnosed patients. These findings highlight the significance of managing hypertension and diabetes in ESRD. Cardiovascular disease complications accounted for around 33.7% of the deaths among ESRD dialysis users in 2018 (Park, Oh, & Kang, 2013).

Among 188 patients, 36.1% were female. The greatest and frequent problems during hemodialysis that have been reported are muscle pruritus (20.5%) and depression (6%), respectively. Only 4.4% patients had body pain and the severity of pain varies from severe, moderate to mild. 7.3% patients had lack of appetite. According to Akhyani et al. 41.9% had pruritus. 51.4%, 11.4%, and 37.7% of patients had mild, moderate, or severe itching, respectively. The pruritus worsened during and after dialysis in 22 patients (31.4%). Between individuals with and without pruritus, there was no discernible difference in the serum concentrations of creatinine, blood urea nitrogen, calcium, phosphorus, alkaline phosphatase, PTH, and hematocrit (Akhyani, Ganji, Samadi, Khamesan, & Daneshpazhooh, 2005).

Among 188 patients, 63.8% were male. According to our findings, most of the patients had pruritus (18.3%), followed by depression (12.5%), body pain (10%) and lack of appetite (5.8%). The age group in which side effects are more common is 40-49 years. Side effects are more common in males as compared to females.

Variability in hemoglobin levels in hemodialysis patients

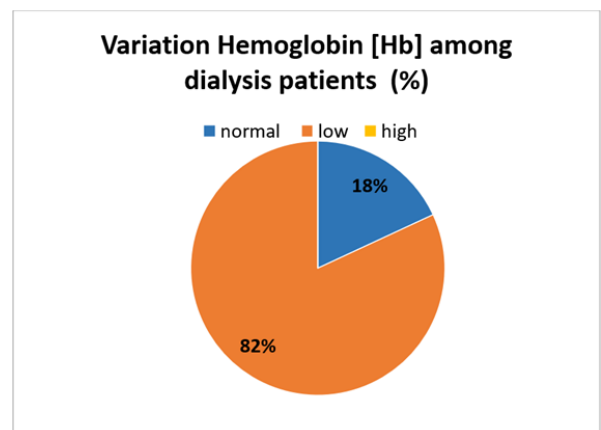


Figure 2: Hemoglobin variability in hemodialysis patients.

There were 188 patients. The mean age of participants was 43 years and the majority of patients (63.8%) were male. Among patients 82% had low hemoglobin level (<12 g/dL) and only 18% had normal hemoglobin level (12-18 g/dL). The low hemoglobin level was associated with anemia which was a major risk factor in hemodialysis patients.

Individuals with chronic renal failure (CRF) frequently expe-

rience concomitant anemia. Endogenous erythropoietin insufficiency is the main cause of anemia in chronic renal failure patients. A significant turning point in the clinical practice of nephrology was the introduction of recombinant human erythropoietin (rHuEPO) in 1989 to treat the anemia of chronic renal failure. Compared to individuals with $11 \leq \text{hemoglobin} < 12 \text{ g/dL}$, those with $\text{hemoglobin} < 9 \text{ g/dL}$ had an adjusted relative risk of mortality of 2.11 ($P < 0.0001$). For $12 \leq \text{hemoglobin} < 13 \text{ g/dL}$, the adjusted relative risk of mortality was 0.84 ($P = 0.007$). These findings imply that hemoglobin levels exceeding the currently advised ranges do not carry a higher risk of death. (Ofsthun, Labrecque, Lacson, Keen, & Lazarus, 2003).

$10-11 \text{ g/dL}$ was the most prevalent hemoglobin level (42.2%). $9-10 \text{ g/dL}$ was the second most typical Hb level (24.9%). An Hb level of $9-11 \text{ g/dL}$ was linked to around 67.1% of patient sessions. In order to minimize the need for transfusions, the updated ESA label advises initiating ESA when a hemoglobin level is less than 10 g/dL and using the lowest dose of ESA that is necessary (Jung et al., 2015).

Serum phosphorous variation in hemodialysis patients

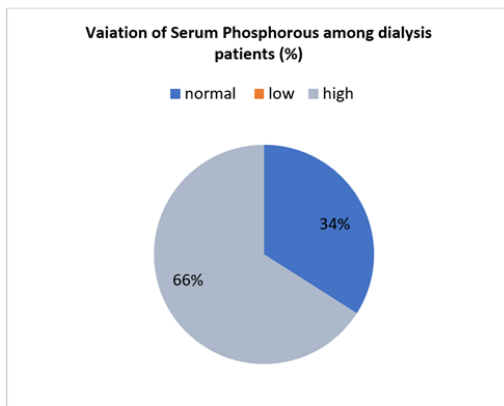


Figure 3: Variability of serum phosphorous among hemodialysis patients.

The normal serum phosphorous concentration in blood is $2.4-4.9 \text{ mg/dl}$. 66% of patients had high level of phosphorous which is greater than 4.9 mg/dl and 34% of patients had serum phosphorous level within the normal range. The average phosphorous level in patients was 6.5 mg/dl . We find that a significant portion of hemodialysis patients who have been on dialysis for at least a year has serum phosphorus levels exceeding 6.5 mg/dL .

When the product of serum calcium and phosphorus ($\text{Ca} \times \text{PO}_4$) is raised, hyperphosphatemia can lead to the development and progression of secondary hyperparathyroidism as well as an increased risk of metastatic calcification. The significant morbidity and mortality rates observed in ESRD patients could be attributed to either of these disorders (Block, Hulbert-Shearon, Levin, & Port, 1998).

Reduced all-cause mortality was linked to a low serum phosphorus level ($< 3.5 \text{ mg/dL}$) only in older patients (≥ 65 years old), not in younger patients (< 65 years old). While hypophosphatemia is only linked to higher mortality in older MHD patients, hyperphosphatemia and mortality are similar across all age groups of MHD patients. Future research must look into whether keeping older dialysis patients' serum phosphorus levels from falling too low is linked to improved results (Lertdumrongluk et al., 2013).

Serum albumin variability among hemodialysis patients

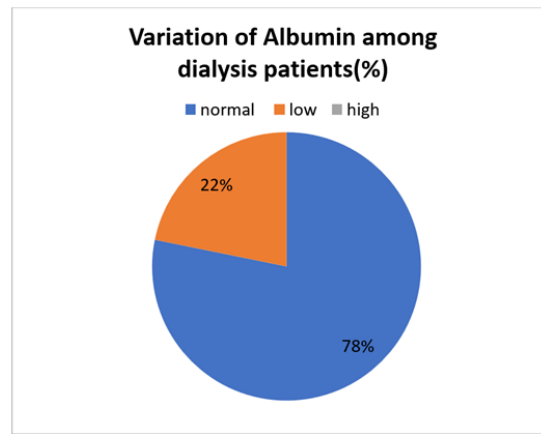


Figure 4: Variability of serum albumin among hemodialysis patients. Out of 188 patients who were undergoing hemodialysis, out of which 22% patients had low serum albumin level ($< 3.8 \text{ g/dl}$) while 78% patients had normal serum albumin level between $3.8-5.1 \text{ g/dl}$.

In hemodialysis (HD) patients, lower serum albumin concentrations are predictive with higher mortality. Patients on maintenance HD may have different serum albumin concentrations due to variations in the volume of distribution, synthesis rate, or elimination rate of albumin. Less food intake causes synthesis to be down-regulated, which is why reduced serum albumin is frequently suggested as a visceral-protein diagnostic for protein-energy malnutrition (Iseki, Kawazoe, & Fukiyama, 1993). At the onset of the study, 39% of all patients had serum albumin levels below 3.7 g/dL . Other nutritional surrogates, such as predialysis creatinine ($r = 0.36$), predialysis BUN ($r = 0.16$), serum phosphorus ($r = 0.12$), and serum cholesterol ($r = 0.08$), exhibited a substantial connection ($P < 0.001$) with serum albumin (Leavey et al., 2000).

Platelet count variation in hemodialysis patients

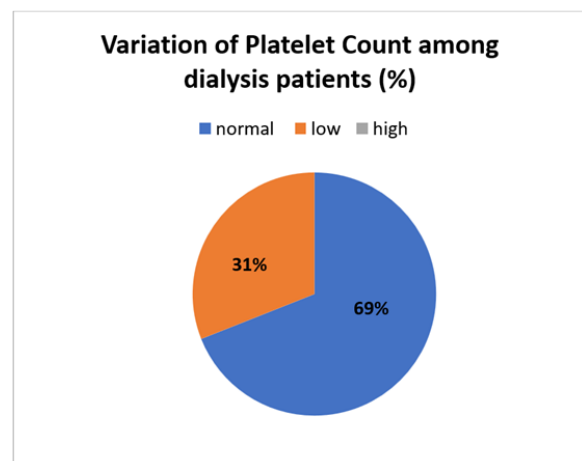


Figure 5: Variability of platelet count among hemodialysis patients.

Among patients 31% had a platelet count below $150000/\text{mm}$ while 69% patients had a platelet count between $150000-450000/\text{mm}$. The platelet count usually decreases during the first 15–30 minutes of dialysis, usually by 5–15%. By the end of the dialysis session, the platelet counts almost always either reaches the pre-dialysis level again or slightly exceeds it.

Additionally, it was noted that following HD, the majority of

hematological parameters increased. More importantly, it was discovered that post-HD, platelet counts decreased concurrently with increases in PT, APTT, and fibrinogen (Alghythan & Alsaeed, 2012).

Platelet counts in hemodialysis patients are often lower than those in healthy controls, ranging from 175 to 180,000/mm³. The only paper that looked into platelet survival in hemodialysis patients was published in 1967; however, it is believed to be of normal duration in these patients. The reticulated platelet count, a gauge of thrombopoiesis, is lower even with increased thrombopoietin levels, even while the number of megakaryocytes in the bone marrow is normal (Daugirdas & Bernardo, 2012).

Conclusion

Both genders are not equally affected by the HCV. The ratio of the male patients is lesser than the ratio of females' patients on hemodialysis with HCV. It is also concluded that the ratio of hypertension, comorbidities and sides effects is also higher in males than females. Hypertension is common in chronic kidney disease patients and mostly ESRD patients have hypertension. Systolic hypertension is more common as compared to the diastolic hypertension in hemodialysis patients. Side effects of the hemodialysis such as pruritus, body pain, depression and lack of appetite are also common. Pruritus is common outcome of the dialysis. According to the above mention data the ratio of the females having ESRD is greater as compared to the males.

Limitations: The limitation of study is that the data is collected from the laboratory reports only. There is no prescription data included in this study. The data collected from the laboratory reports tells us only about the lab values of ESRD patients. There is no information about the medication of ESRD patients on hemodialysis included in this study.

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