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**SEROCONVERSION OF HEPATITIS C VIRAL INFECTION
AND ASSOCIATED RISK FACTORS IN THE PATIENTS
SUFFERING FROM END-STAGE RENAL DISEASES AT
START OF HEMODIALYSIS**

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Abstract:		
<p>Objective: The rate of occurrence of Hepatitis C Virus infection in the patient suffering from end-stage renal diseases (ESRD) at onset of hemodialysis, to determine the seroconversion from Hepatitis C Virus negativity to Hepatitis C Virus positivity in the duration of study and various factors influencing this seroconversion.</p> <p>Methodology: This prospective research work carried out in the dialysis center of Jinnah Hospital, Lahore. This research work covers a duration of one year from January 2019 to December 2019. The collection of the data carried out on a Performa and following up of the patients carried out prospectively. This research work included all patients on maintenance hemodialysis for greater than one month. The exclusion of the patients suffering from acute renal diseases or on maintenance hemodialysis less than thirty days carried out. The analysis of the patients carried out by separating them into 3 different groups. Group-1 consists the patients who were positive for Hepatitis C Virus at the start of hemodialysis, Group-2 consists the patients who were Hepatitis C Virus negative at the start and seroconvert to positive for Hepatitis C Virus positive and Group-3 comprised the patients who were Hepatitis C Virus negative in the start and did not change their status. Followed up of all the seronegative patients carried out at 1, 3, 6 and 12 months on being maintenance hemodialysis for their seroconversion.</p> <p>Results: Out of 230 recruited patients, 52 patients were positive for Hepatitis C Virus at the start of hemodialysis and 19 patients did not complete the follow up. Out of remaining 159 negative patients for Hepatitis C Virus, 95 patients became positive for Hepatitis C Virus, only 64 patients remained negative for Hepatitis C Virus by the end of this research work.</p> <p>Conclusion: The rate of occurrence of seroconversion to Hepatitis C Virus among patients on chronic hemodialysis is discovered to be 53.370%. Amount of dialysis, arteriovenous access, reutilization of dialyzer and transfusion of the blood are the important risk factors associated with seroconversion.</p> <p>KEYWORDS: Hemodialysis, Hepatitis C Virus, Seroconversion, Chronic, Infection, Seroconversion, Positivity.</p>		
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INTRODUCTION:

ESRD are the outcome of the CKDs (Chronic Kidney Diseases) which are the serious burden on the health care issues and carry heavy finance burden [1]. The range of the prevalence of chronic kidney diseases in our country Pakistan is from 12.50% to 22.60% [2]. The rate of prevalence of these complications are continuously increasing in our country Pakistan because of the different factors as inadequate services of health care, low level of health education, insufficient funding from government for health department, intensive prevalence of the different risk factors as Diabetes Mellitus and Hypertension in public and conditions of dry weather in favor of Glomerulonephritis and kidney stones [3]. HD (Hemodialysis) in health care centers is main modality for the treatment of end-stage renal diseases in our country Pakistan as chronic PD (Peritoneal Dialysis) is highly expensive and dependent on nephrologist [4]. HCV (Hepatitis C Virus) is RNA virus which is a member of Flaviviridae family. Global rate of prevalence of infection of Hepatitis C Virus is 2.50% [5]. The rate of prevalence of Hepatitis C Virus infection in public of Pakistan is 6.80% [6].

There is high variation in the rate of prevalence of Hepatitis C Virus infection in the patients of Hemodialysis with area of geography from 4.0% to 59.0% in various countries in the whole world. All the patients on Hemodialysis are present with high danger of seroconversion, like patients of thalassemia and intensive care units due to different reasons, vital being are the multiple transfusions of blood, frequent needling, frequent sampling of blood, reduced cellular immunity and extracorporeal circulation [7, 8]. The rate of seroconversion to infection of Hepatitis C Virus is from as low as 1.10% in the patients on Hemodialysis in United Kingdom to as high as 48.90% in the patients on Hemodialysis in our country Pakistan [9, 10]. There is very slow progressive course of infection of Hepatitis C Virus but in this course of population seemed to be atypical due to late seroconversion secondary to adverse immunity and nutrition. The most common way of identification in the centers of hemodialysis is with the use of enzyme linked immunosorbent assay (ELISA) procedure which normally misses positive patients with seronegative PCR [11].

MATERIAL AND METHODS:

This observational research work carried out at Dialysis Center of Jinnah Hospital, Lahore. All the patients suffering from end-stage renal diseases on maintenance dialysis for greater than thirty days got recruitment in this research work, all these patients completed the follow up of one year. Total 230 patients having 16-75 years of age were the participants of this research work, nineteen patients

got exclusion from this research work because of follow up loss. All the patients suffering from acute diseases of kidney, patients who visited our center for short duration, patients with HIV infection, patients less than fifteen year of age, and patients having more than seventy-five years of age were not included in this research work. We collected the data about demography of the patients carried out by arranging direct interview. We also noted the information about the total duration on hemodialysis, history of transfusion of blood, getting dialysis from different centers and number of transfusions of blood in one month. We acquired the serological results of all the patients from the records of the center and then comparison of current serological findings carried out with those records. The follow up of only seronegative patients carried out for complete twelve months.

SPSS V.20 was in use for the analysis of the collected information. We represented the qualitative variables in percentages. Categorical variables were represented in averages and standard deviations. The utilization of the Chi-square test carried out to examine the relationship of Hepatitis C Virus infection with clinical & baseline parameters. The utilization of the sample T-test carried out for the comparison of the average of biochemical parameters. Binary logistic regression carried out for the estimation of the odds with 95.0% CI (Confidence Interval) for positivity of Hepatitis C Virus, P value of less than 0.050 was significant.

RESULTS:

Total two hundred and thirty patients got recruitment in this research work. Total 19 patients got exclusion from this research work because of non-completion of follow up. All the patients were on maintenance hemodialysis, 2 sessions in seven days, every session was for 4 complete hours, and dialysis of the seropositive patients was also being carried out in same floor but on separate machines. There was reuse of one dialyzer for 3 times in a day. There was performance of chemical disinfection after every dialysis. Majority of the patients (69.170%) were present with age of more than forty years. There were total 122 male patients. Total 78.67% patients were not employed; 53.08% patients were living in the non-urban regions. Most important reasons of end-stage renal diseases were DM (Diabetes Mellitus) in 46.92% patients, HTN (Hypertension) in 41.7% patients, chronic GN (Glomerulonephritis) in 3.81% patients and CDs (Cystic diseases) in 2.84%, and there were some other reasons in 2.84% population. Majority of the patients 83.880% started hemodialysis with dual lumen catheter, dialysis of only 16.120% patients carried out via AVF (Arteriovenous Fistula). About all the patients were being dialyzed two times in a week. Only 28.920% patients were getting

transfusion of blood two to four times in one month and 9% patients were getting transfusion of blood for greater than 4 times in one month. Every patient was getting erythropoietin 4000.0 IU two time in a week.

Among total patients, one hundred and seventy-eight patients were Hepatitis C Virus negative, 52 patients were Hepatitis C Virus positive, nineteen patients did not complete follow up, the rate of occurrence of infection of Hepatitis C Virus was 22.20% at the start of the research work. Out of total

one hundred and fifty-nine negative Hepatitis C Virus patients, ninety-five patients became Hepatitis C Virus seropositive. Six patients got seroconversion at 3 months, 60 patients at six months and 29 patients in 12 months. So, seroconversion was present in 95 out of 159 patients. Table-1 elaborates the baseline traits of 211 samples, we were not able to observe significant relationship of the baseline characteristics with the infection. Table-2 shows the relationship between the status of viral infection with dialysis and parameters of risk.

Table-I: Baseline Characteristics of Studied Samples (n=211) at Start of Dialysis

Characteristics		No (%)	p- value
Age group	≤40 Years	65 (30.81%)	0.48
	>40 Years	146 (69.19%)	
Gender	Male	122 (57.82 %)	0.35
	Female	89 (42.18 %)	
Education	Literate	121 (57.82 %)	0.36
	Illiterate	90 (42.65 %)	
Employment Status	Employed	45 (21.33 %)	0.72
	Unemployed	166 (78.67%)	
Address	Urban	99 (46.92 %)	0.4
	Rural	112 (53.08 %)	
Cause of ESKD	DM	99 (46.92 %)	0.76
	HTN	88 (41.70 %)	
	disease	4 (1.89 %)	
	GN	8 (3.81 %)	
	disease	6 (2.84%)	
	Other	6 (2.84 %)	

Table-II: Association of Viral Status with Dialysis and Other Risk Parameters

Characteristics		Number (%)	p-value
Dialysis start via	AVF	34 (16.12 %)	<0.01*
	double lumen catheter	177 (83.88 %)	
Total number of dialysis	<50	49 (23.22 %)	<0.01*
	50-100	53 (25.11 %)	
	>100	109 (51.66 %)	
Need for transfusion	Yes	159 (75.36 %)	0.156
	No	52 (24.64 %)	
Blood transfusion required	<2 times per month	131 (62.08 %)	0.075
	2-4 times per month	61 (28.92 %)	
	more than 4 times per month	19 (9.00 %)	

DISCUSSION:

Infection of hepatitis C virus is one of the highly prevalent infection in our country Pakistan. This infection can lead to the DCLDs (Decompensated Liver Diseases) and even HCC (Hepatocellular Carcinoma) [12]. Hepatitis C Virus has association with the enhanced risk of morbidity as well as

mortality in the patients on maintenance Hemodialysis [13]. One meta-analysis stated the 1.570 times enhanced risk of mortality after the infection from Hepatitis C Virus [14]. The rate of incidence in this research work was 22.20%. despite this high incidence rate of Hepatitis C Virus, the rate of seroconversion of this research work was much

high as compared to the other research works performed in different countries as UK, United States of America, Africa, India and Egypt where rates of seroconversion are 1.20%, 2.50% [9], 25.0% [17], 7.44% [15] and 14.0% [16], respectively. This is even much high as compared to the research work of past performed in our country Pakistan, proportioned to be 48.90% [10]. Some of the important risk factors for the high prevalence of seroconversion rates are multiple transfusions of blood, chronic Hemodialysis, surgical interventions, multiple injections, transplantation of organs, professional exposure in case of healthcare workers and sexual contact without protection. Very extensive utilization of the recombinant erythropoietin for the correction of anemia has markedly decreased the requirement for transfusion but still the rate of transfusion is very high. Frequent transfusions of blood are the acknowledged risk factors for the high rate of seroconversions. Most of the patients (59.740%) became positive in 12 months of onset of Hemodialysis and one research work stated in past that there is association of the early seroconversion with the transfusion of blood [18].

Research works conducted by Daniele P stated the rates of seropositivity in the blood donors of our country, Pakistan is about 21.0% [19]. Majority of the patients 83.880% started the Hemodialysis with temporary dual lumen catheters, they had surgical interventions for the AVF or graft for access of dialysis. Approximately 46.92% patients were suffering from diabetes, some among them were present with its complications like multiple recurring abscesses, infections of skin and they had surgical methods for that. All the patients with Hepatitis C Virus positivity were being dialyzed on same unit with separate machines. The reuse of every dialyzer carried out for 3 times after washing with solution acid. This reutilization may be a solid infection source but in previous research works, the reuse of the dialyzer was not thought to be a significant risk factor for high risk of seroconversion [20]. There are many reports from past research works with controversies about the significance of the isolation of positive Hepatitis C Virus patients on hemodialysis. One research study conducted by Huraib considered this isolation as favorable [21]. But the isolation of the patients of Hepatitis C Virus infection on Hemodialysis is not considered by the KDIGO (Kidney Disease Improving Global Outcome) [22]. The findings of this research work have suggested that there can be transmission of the infection from one patient to another in the environment of hospital, there are some recent indirect evidences that infection of Hepatitis C Virus occurs among the patients on Hemodialysis during repeated procedures of dialysis but not through the

clinical equipment, possibly because of the errors in procedures.

CONCLUSION:

The rate of occurrence of seroconversion of Hepatitis C Virus among the patients on hemodialysis was discovered to be 53.37%. Most important risk factors associated with this seroconversion are the amount of dialysis, transfusions of blood, arteriovenous access and reutilization of dialyzer. There is requirement to adopt the universal precautions for the prevention and control of infection in the dialysis centers of our institutes.

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