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Hepatitis C Virus Infection and Its Correlation with Multiple Risk Factors in Local Population of Gujranwala Pakistan

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Abstract

Hepatitis C virus is a single-stranded RNA virus belonging to the family of Flaviviridae that affects 71 million people in the world. In Pakistan, the occurrence of HCV is 10 million and national efforts are required to identify people. The current study was therefore planned to assess the occurrence of HCV relative to risk factors among the local population of Gujranwala, Pakistan. The viral infection was analyzed qualitatively by using PCR / third-generation ELISA, detailed history, and clinical examination. Data entered in already prepared Performa. Data analysis was done as mean ± standard deviation for the quantity's variable, whereas to assess the association between different group p-value as a level of significance, ANOVA was applied. Descriptive statistics mean ± standard deviation was used. LFTs have been performed. In the present study, a total of 320 patients (183 females and 137 males) were included. There were 172 (97 females and 75 males) patients diagnosed with HCV while 148 (85 females and 63 males) patients were non-infected. HCV-infected patients were 53.75% and non-infected were 46.25%. There were some additional diseases, 84 patients with HCV patients have diabetes mellitus, 34 patients have smoking addiction and 93 have hypertension. When the ratio between LFTs was observed for non-HCV and HCV patients it is revealed that it was greater in HCV patients. Numerous complications observed like ascites, diabetes mellitus, and splenomegaly. Numerous risk factors were observed in this trial, the most dangerous are the dentist procedures followed by frequent vaccinations, surgery, nose/ear piercing, shaving by barber, blood transfusion, and Jaundice. The result of this study showed that HCV patients have a significantly short life span.

Keywords: Hepatitis C virus, correlation, population, LFT, AST.

1. Introduction

Hepatitis C virus (HCV) is a single-stranded RNA virus belonging to the family of Flaviviridae that affects an estimated 71 million people in the whole world and in 2015, 1.75 million new infections were reported (WHO, 2019). Chronic Hepatitis C is a major source of chronic liver disease (C.L.D.) globally with an estimated 71 million people diseased and a 20-year risk for developing cirrhosis of up to 30% (WHO, 2017). Leading to 400,000 deaths yearly from hepatocellular carcinoma (H.C.C.) and end-stage liver disease (WHO, 2017; EASL, 2018). Well-tolerated treatments

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for Chronic Hepatitis C with cure rates above 95% are now available (Hezode, 2018). Treatment resulting in sustained virological response (SVR) is associated with a lowering in liver stiffness (Singh et al., 2018; Lledo et al., 2018). Decrease in the risk of developing cirrhosis, H.C.C., and end-stage liver disease (Konjeti and John, 2018; Su et al., 2018).

HCV infection often evolves asymptomatically for 20–30 years, and most deaths from HCV result from liver cirrhosis or hepatocellular carcinoma (HCC) years after the incident of HCV infection (Alter, 2007; WHO, 2017). HCV results in an estimated 27% of Liver cirrhosis and 25% of HCC cases globally (Perz and Alter, 2006). The entry of HCV virus in humans is through different routes and the most common is direct transfusion by blood. Which include needle sharing, organ transplantation, mother-to-child, and sexually transmitted is also noted. The major route which is under consideration is injection, blood transfusion, sex with intravenous drug users, piercing, and scarification (Peleg, 2017).

About 7 to 9 million people in Pakistan are living with HBV infection and 10 million people are suffering from HCV infection, with increased morbidity and mortality (Umar and Manzoor, 2014). Pakistan is fronting the Hepatitis C epidemic in the nation. A maximum percentage of people do not know their health status because the infection has no symptoms in its initial phase. The main factors to spread the disease are the usage of syringes, unsafe blood transfusions, unsafe practices of surgery and medical procedures, ear or nose piercing, and shaving at barbers. Pakistan is an average-earning country and has inadequate resources. Therefore, we should emphasize more on planning and executing the operative precautionary policies to decrease the disease load of HCV (Mahmood and Raja, 2017).

Many people did research to assess the causes of the spread of hepatitis C. One particular study in Pakistan (1994) established, that family members who had more than four injections per year have a greater chance (9-11 times) of being diseased with Hepatitis C. The study found that the use of unsterilized injections and shaving at barbers' shops are major noteworthy causes of spread (Bari et al., 2001; Shah et al., 2002). The earlier study found that injections by untrained medical professionals, blood transfusions, surgical procedures, shaving at barbers' shops, and dental procedures were common causes of HCV (Rehman et al., 2002). It was presented that para-medical staff are at increased risk of developing disease from hepatitis C (Akhtar et al., 2004). It was noted that people who have a history of hospitalization or those who have been injected with unsterilized injections are at increased risk of developing the disease (Arash et al., 1993).

The occurrence of HCV infection is higher in Pakistan and national efforts are required to identify persons who may have been diseased with HCV and HBV. The current study was therefore planned to evaluate the prevalence of the Hepatitis C virus (HCV) in relation to risk factors among the local human population of Gujranwala, Punjab, Pakistan.

2. Materials and Methods

The current study was conducted from 2018 to 2019. A total of 320 (Males: 138, 43.13%; females: 182, 56.87%) samples from the Medical Unit of Chaudhary Hospital and Civil Hospital, Gujranwala were collected. Patients who were admitted either with the diagnosis of liver cirrhosis or were diagnosed as such during their stay in the hospital. The patients above 15 years of age (both males and females) were in this study while those with acute liver failures were excluded. Demographic characteristics were recorded. After a detailed history, a clinical examination was performed to look for the prevalence of the HCV virus. This study was approved by the ethical committee of the Institute of Molecular Biology and Biotechnology, University of

Table 1 Demographic and biochemical features of HCV & Non-HCV (Control) Patients

	HCV (N=172)		**Non-HCV (N= 148)**		**P-Value**
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	
Age (years)	49.1162790	13.84324828	47.25	14.72555047	0.2439
Weight (kg)	71.9651162	14.68376011	74.4121	16.58206927	0.16250
WBC	8.21831395	7.977684157	8.43087	3.48527123	0.76409
HB	13.1052325	5.618570551	21.8655	106.368704	0.28156
Platelets	202.069186	102.0194107	266.723	113.7184027	0.002
Albumin	4.04029069	4.24069817	4.08162	4.42127972	0.193
Billirubin	2.30318604	10.59834918	1.19439	1.414310835	0.451
AST (U/L)	97.4563953	189.3606557	54.6081	61.7980731	0.041
ALT (U/L)	96.3604651	169.9604297	52.6351	66.68457059	0.0391
ALP	164.568604	103.2866117	149.560	126.8355959	0.3013
Urea	29.2447674	31.74235432	28.4799	27.19427715	0.5814
Creatinine	1.42215116	5.314107179	2.56770	10.6595725	0.4145
Na	138.337209	4.426423754	137.902	5.461572244	0.5144
K	4.10930232	0.551643564	5.49101	11.654292	0.5213
Blood Sugar	128.296511	61.52866863	136.058	83.65828626	0.4294
INR	1.28313953	0.705762847	1.31878	0.869841572	0.0451
AST/ALT Ratio	1.11689926	0.608759683	1.36030	1.17925134	0.0389

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The patients were divided into two groups. Group 1 was designated as the HCV group and Group 2 as Non-HCV

(Control) group. Among 320 patients, 172 were affected with HCV, and 148 were Non-HCV (Control) patients. The patients with severe HCV or liver infection and those having severe co-infection with other diseases or illnesses were not included in this study. The designated patients were examined by skin specialists specifically oral cavities, nails, and hairs to diagnose the cutaneous condition.

A conversational survey, studied and accepted in earlier studies was used to gather information on individual data, past and present health, socioeconomic features, and risk sources for the spread of HCV infection such as dentist procedures, surgical operations history, transfusion of blood, schistosomiasis treatment, contaminated needles or syringes, hospitalization, share toothbrushes, share shaving razors, circumcision, use of a condom, use of drug oral or with common syringes, smoking, multiple sexual partners, tattooing and nose or ear piercing. At the same time, blood samples from the people were collected to examine the HCV-RNA virus by the qualitative real-time PCR (polymerase chain reaction).

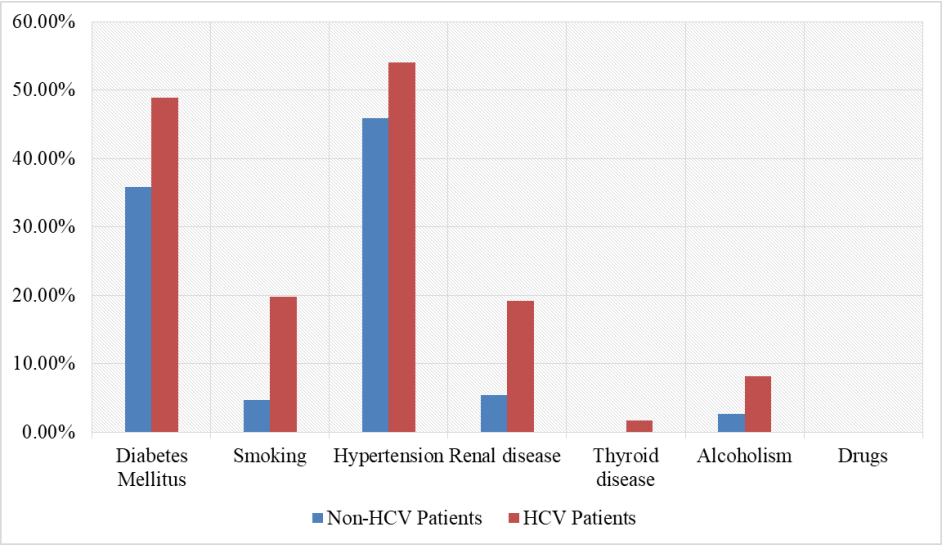

Figure 1 Distribution of co-morbidities in non-HCV and HCV patients

After HCV PCR and genotyping, different clinical tests including Liver Function Test (LFT), Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphate (ALP), Albumin and Bilirubin Total were conducted following the standard protocols (Afzal, 2017).

3. Statistical Analysis

Data analysis was done by using SPSS (Scientific Package for Serial Sciences, version 21) as mean ± standard deviation for the quantities variable, whereas to assess the association between different group p-value as a level of significance, ANOVA was applied.

4. Results

The demographic and biological features of the HCV group and control group have been given in (Table 1) in which the mean value, standard deviation, and p-values for both groups have been provided.

In the participants of this study, there were some additional morbidities found which means that they were suffering from some additional diseases. Figure 1 represents the graphical form of co-

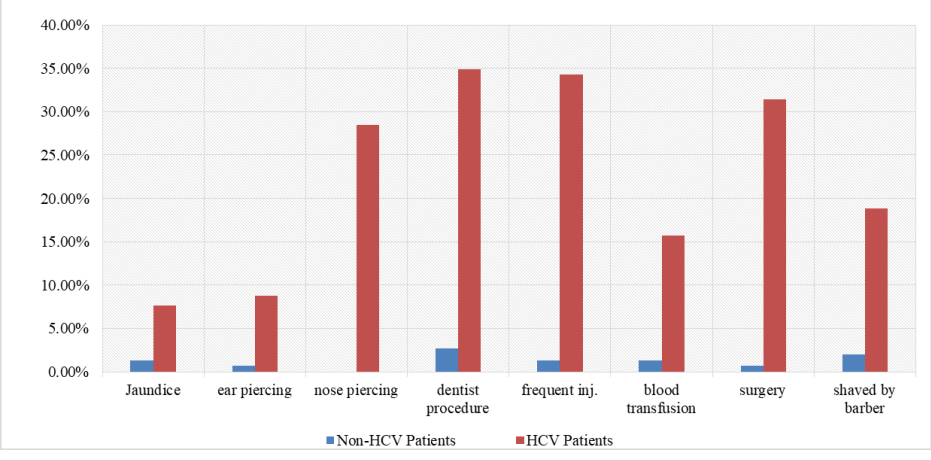

Figure 2 Prevalence of different Risk factors in non-HCV and HCV patients

Table 2 Distribution of disease burden in non-HCV and HCV patients

Disease Burden	Non-HCV (N= 148)	HCV (N=172)	p-value
Ascites	26 (17.57%)	29 (16.86%)	0.8231
Portal Hypertension	0 (0%)	2 (1.16%)	0.4213
Cholelithiasis	12 (8.11%)	24 (13.95%)	0.2169
Hepato-renal syndrome	8 (5.41%)	0 (0%)	0.8134
Hepato-cellular Carcinoma	4 (2.70%)	19 (11.05%)	0.0913
Umbilical Hernia	3 (2.03%)	1 (0.58%)	0.5213
Splenomegaly	2 (1.35%)	19 (11.05%)	0.0452

morbidities in both groups in which the proportions of study participants having respective additional diseases have been plotted on the graph. It can be seen in Figure 1 that the chances of having additional diseases in Hepatitis C patients are greater than non-Hepatitis C patients.

The risk factors have been assessed in terms of their occurrence in HCV and non-HCV groups of patients. The graphical representation of risk factors is showing that surgery was found as a risk factor in a large number of HCV patients while it was identified as a risk factor in 0.68 percent of non-HCV patients only. It means that surgery can really be a serious risk factor among patients with HCV. Similar results have been shown by ear piercing, jaundice, dentist procedure, frequent injection, and blood transfusion because they were found as risk factors in 8.73%, 7.65%, 34.88%, 34.30%, and 15.70% HCV patients respectively, while they were identified as risk factors only in 0.68%, 1.35%, 2.70%, 1.35%, and 1.35% patients of non-HCV groups respectively (Figure 2). The Ascites, Portal hypertension, Cholelithiasis, Hepato-renal syndrome, Hepato-cellular Carcinoma, Umbilical Hernia, and splenomegaly were analyzed in non-HCV and HCV patients to know the percentages of patients in both groups in

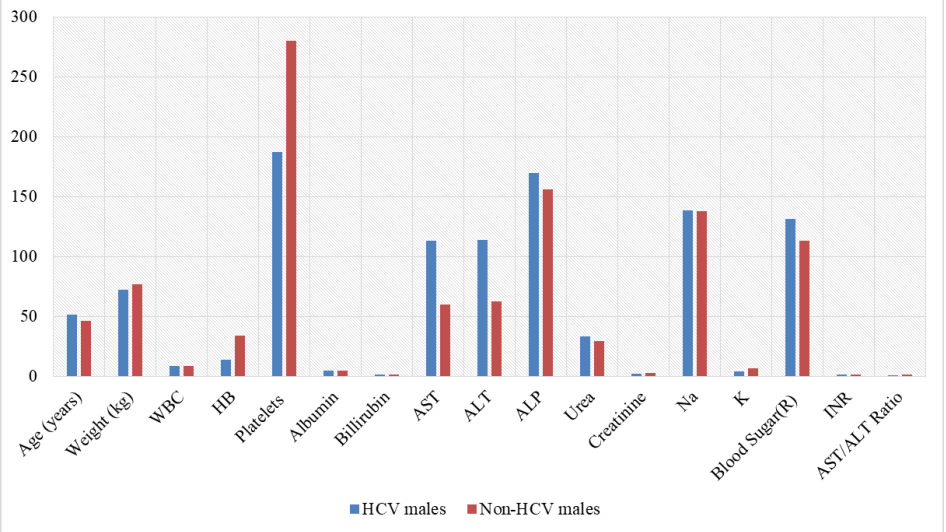

Figure 3 Demographic and biological features of non-HCV and HCV male patients

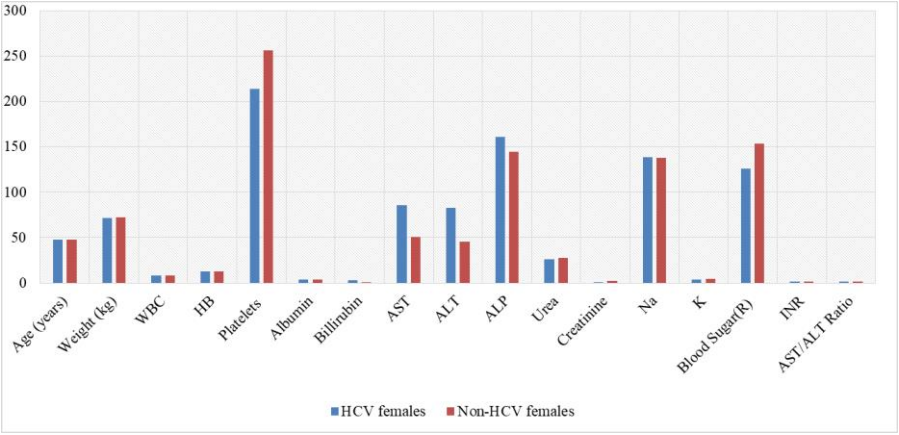

Figure 4 Demographic and biological features of non-HCV and HCV female patients

which these disease burdens were found (Table 2).

Demographic and biological features of male and female non-HCV and HCV patients is represented in Figure 3 & 4, respectively. It is clear from the graphs that there is no significant difference between the average age and average weight of male HCV patients and male non-HCV patients. It means that demographic characteristics do not vary between male patients of HCV groups and non-HCV groups.

5. Discussion

The main objective of the current study was to assess the occurrence of Hepatitis C virus antibodies in Gujranwala, Pakistan. The relationship between possible causes and HCV seropositivity was evaluated for the whole nation and the population-attributable risk for many causes was evaluated by case-control method. This is the first population-based Hepatitis C virus prevalence study based on the PCR and genotyping and conducted in a characteristic sample of the region of Gujranwala with widespread levels higher than 2.5%. However, a similar study from China showed that 5.2% of co-infected HBV/HCV patients (Zhou et al., 2012). In contrast to another study in Burmese (Myanmar), the results showed an HBV/HCV co-infection value of 19.5% (Zhou et al., 2011).

In our study, the mean age of HCV patients was 49 and the people with non-HCV had a mean age of 47. The maximum weight of HCV patients was observed at a mean age of 74 while in the control group, it was observed at the age of 71. In 2017, a similar study was conducted in Pakistan having patient samples between ages 18-55 (Afzal,2017).

According to the findings of the current study, the mean age of the control group (47.25%) was less than the HCV group (49.17%). The results of white blood cells proposed that the mean value of the control group (8.43) was higher when compared to the HCV group (8.21). The mean values of blood sugar showed a decrease in the HCV group (128) when compared to the control group (136). The AST/ALT ratio is used to distinguish patients with liver cirrhosis due to chronic Hepatitis C infection from non-cirrhotic patients and to compare the ratio with the stage and grade of hepatitis and other biochemical indices. The mean AST/ALT ratio in the HCV patient was 1.11 which is relatively less than the non-HCV patients 1.36. A ratio less than 1 had 100% specificity and positive predictive value in differentiating cirrhotic from non-cirrhotic patients. In a study conducted in the U.S.A. showed that AST/ALT ratio in cirrhotic patients was 1.06 and in non-cirrhotic patients was 0.60 (Waheed et al.,

2017). From this AST/ALT ratio, the liver fibrosis stage was predicted.

Another study suggested a relationship between fibrosis and cirrhosis on the basis of the AST/ALT ratio they suggested that if the ratio is greater than 1 has a 100% positive prediction for cirrhosis from non-cirrhotic patients (Table 1; Figure 3) (Sheth et al., 1998). In non-HCV patients, the factor of hypertension was 45.95%, and in HCV patients that percentage was 54.07%. Similar results of hypertension (42%) were found in another study (Park et al., 2001). The risk of frequent injection in the non-HCV patient is very less than compared to patients with HCV, and the major risk of blood transfusion, is in non-HCV patients was less percentage as associated with HCV patients.

In this study the factor of surgery which may cause risk in the patients of HCV that proportion was 31.40%. Some earlier studies have shown that dental procedures were the main cause of HCV (39.7%) and surgical procedures (16.6%) (Shimotohno, 2000). Shaved by a barber is a type of risk for the HCV patient having a percentage of 16.86% and in the non-HCV patients that same risk was at 2.03%. The research has also explained the disease burden and how many burdens they face while bothering from HCV or also for patients non-HCV. Similar results were reported in a previous study (Mohammed et al., 2009).

The splenomegaly was also a burden in HCV patients. In the present study, different blood-related parameters (WBC, Hb, Platelets, Blood sugar, Albumin, Bilirubin, and AST/ALT etc) were also evaluated and the values were found higher in HCV patients when compared to non-HCV patients (Control group). In some earlier studies, similar results of blood transfusion and screening of blood were recognized as the major source of HCV transmission (Alashek et al., 2012; Sy and Jamal, 2006).

In the current study, mean values of ALP were found less in the control group as compared to the HCV male patients, and the avg. weight of female non-HCV patients was found higher than the HCV group. The Ascites, Portal hypertension, Cholelithiasis, Hepato-renal syndrome, Hepato-cellular Carcinoma, Umbilical Hernia, and splenomegaly were analyzed in non-HCV and HCV patients to know the percentages of patients in both groups in which these disease burdens were found (El-Serag and Mason, 2000).

6. Statements and Declarations

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Author contributions: Iram Amjad conceived, collected, and analyzed data and wrote the manuscript. Mubasher Hassan and Syed Zeeshan Haidar supervised the study design, and read, edited, and approved the final manuscript. Dilawar Hussain: Prepared the edited and suggested version after review.

Ethical approval: The data presented in this study was obtained from two hospitals in Gujranwala under the policy of the ethical approval committee of the University of Lahore (Letter no.15/2018).

Conflicts of Interest: The authors declare no conflict of interest.

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