Epidemic history of hepatitis C virus, Prevalence and potential transmission risks in Punjab, Pakistan

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Abstract

Hepatitis C virus (HCV) was first identified in 1989 and belongs to the Flaviviridae family. It is a single-stranded RNA virus and has a long lag time between onset of infection and clinical manifestation of liver disease. HCV has been estimated to infect 170 million people worldwide. The current study examined the risk factors and prevalence of HCV infection in Punjab. A total of 350 patients attending District Head Quarter (DHQ) Hospital were randomly selected for investigation studies. The Blood sample was collected and screened for anti-HCV antibodies and subjected to polymerase chain reaction (PCR) method. The results indicated 100 positive HCV RNA patients out of total selected 350 people. Hopefully, Successful treatment will have a profound effect on the incidence and prevalence of HCV infection.

Keywords: HCV, Antibodies, Infection, PCR.

Introduction

HCV is a chronic blood-borne pathogen that infects liver. Liver is an important organ, plays a pivotal role for removing chemicals. HCV is primarily acquired by large or repeated percutaneous exposures to blood. About 3.5 million people in the U.S. have the disease approximately. Most of the people carry this infection by sharing needles or other equipment used for injecting drugs.

HCV is considered as the most common cause of death in HIV-positive patients on highly active antiretroviral therapy.[1] The long persistence of HCV leads to liver cirrhosis, hepatocellular cancer, liver failure, and death. The Scientists claim that death rate from HCV will probably continue to increase 20% more till the next twenty years.[2] Moreover, the incidence rate of HCV infection has starting decreasing in the developed countries.[3,4]

The infection caused by HCV has become the leading indication for liver transplantation. The high incidence rate of hepatitis C requires some treatment to prevent disease from spreading. However, the overall impact of treatment may differ for patients. The acute and chronic illness are identified by progress of disease. After six months of HCV disease persistence, the infection is defined as being chronic. Moreover, the transition from acute to chronic hepatitis C is usually sub-clinical. The symptoms encountered for acute and chronic hepatitis are not only limited to: jaundice, anorexia, abdominal discomfort and change of urine color. Physical findings are usually minimal, apart from jaundice in a third of patients.

Many different forms of hepatitis are common. Each of these types respond differently to treatment. The acute phase is also referred as early phase which occurs immediately after infection. Previous studies, reported nearly 50-80% of individuals having infection will develop a chronic infection. The prevalence of HCV remains very high. The reason is involvement of some vector that promotes disease transmission. According to some studies, approximately 3% of the world's population is chronically infected with HCV with severe contribution of disease and highlighting the need for anti-HCV vaccines and antiviral agents.

The frequent encounter of HCV disease reveals the fact of being endemic in many countries of the world with almost 175 million global disease cases nearly. The ratio of this 175 million is equal to 3% of the whole population in the world. The frequency of HCV carriers with disease was 3-4 million every year.[5-6-7] The transmission route of HCV was more commonly by blood transfusion and intravenous drug abuse[8]

The present study was carried out to detect HCV infection in the general population of Faisalabad. In this study, various serological and molecular techniques such as reverse transcriptase–polymerase chain reaction (RT-PCR) methods were applied to see HCV prevalence in the area and their comparative study was carried out for early diagnosis of the disease.

Material and Methods

Sample Collection

Sum of 350 blood samples were collected from suspected patients of DHQ hospital, Faisalabad. The patients gave consent in written form, including demographic characteristic, age, district, risk factor and estimated time of infection along with complete address, phone numbers and other details.

PCR analysis of HCV RNA

The collected blood samples were used for qualitative analysis of HCV-RNA. Total RNA from the subject patient's sera (100 µl) was extracted using

Isohelix RNA extraction kit. RT-PCR was used for the detection of HCV-RNA. The obtained product was visualized under UV light using gel documentation system on 1% agarose gel.

Results

The blood sample was collected from three hundred and fifty patients. Out of which 211 were male and 139 females. All of these selected persons having disease were looking healthy and energetic with no signs of any weakness, nausea or history of jaundice. All the samples were screened for HCV. The results obtained by this test indicated that 32% were positive for antiHCV antibodies (anti-HCV). All other samples were found negative for anti-HCV antibody test. The results are shown in (table 1).

Table 1: Shows the Interrelation of various age groups with hepatitis C virus-ribonucleic acid (HCV-RNA) detection in samples from general population.

No of Patients	Age Group	Gender (Male/Female)	No. of HCV RNA (+ve)
11	10-20	7/4	4
37	21-30	26/11	16
74	31-40	42/32	22
108	41-50	66/42	26
120	51-60	70/50	32
Total = 350		211/139	100

The samples were analyzed by PCR using external primers, while nested PCR was carried. However, both negative and positive samples were used as control with a 100 bp DNA ladder (Fermentas) as DNA marker. Polymerase chain reaction products indicated amplification in several samples when checked on agarose gel shown in (Figure 1).
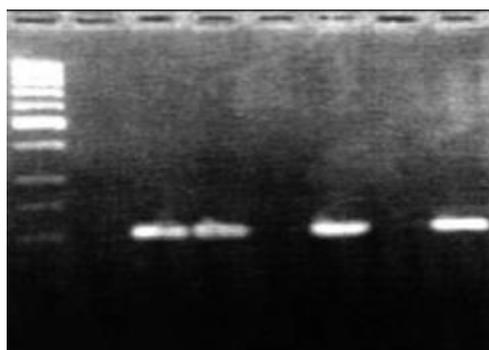

Fig. 1: Rt-PCR analysis of samples for HCV RNA. Lane 1: DNA Marker, Lane 2: negative control, Lane 3: positive control, Lanes 4-8: specific RT-PCR products of HCV positive and HCV negative samples.

Discussion

Hepatitis C virus infection is one of the most common disease responsible for chronic liver disease leading towards liver transplantation worldwide. The infection with the hepatitis C virus (HCV) is a significant public health concern associated with a high burden of morbidity and mortality [9-10]. The estimated annual death rate of infected people was over 700 000.[11-12]

According to previous studies, an estimated 70% to 85% of HCV patients are likely to develop chronic hepatitis, and only up to 30% of these cases progress towards liver cirrhosis [13]. However, in year 2013, hepatitis C was the foremost cause of 1.46 million deaths worldwide and 7.2 million deaths were expected from the years 2015–2030 [14]. Moreover, the estimated figure of affected people in Pakistan is nearly about 10 million people with 4% of prevalence rate.[15-16]

The rate of reinfection is increased after transplantation in patients having active type of infection.[17] However, the disease progression was observed in recipients with recurrent HCV after transplant.[18-19]

The scientists have claimed HCV is completely curable. The reported data showed, the fact for HCV drug development in countries with less economy.[20] Future generations should witness a remarkable transformation in the treatment of HCV infection. Medication with already available medicines, showed numerous side effects in HCV patients but now the second generation medicines showed improved rate of cure with 90% showing minimal side effects.[21] Further, a number of new therapies which target distinct HCV proteins are being developed. The use of these therapies along with pre exiting therapies proven to be most beneficial.[22]

Conclusions

The common transmission route is the reuses of needles/syringes and unsafe injections. A strong campaign and other precautionary measure are needed to inform the health care professionals and dispensers of the rural areas to avoid the reuse of needles /syringes and unsafe injections to control further spreading of HCV. Effective strategy still needs more efforts to be approved.

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