

Prevalence of hepatitis C in people who inject drugs in the cities of Rawalpindi and Islamabad, Pakistan

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Abstract. Pakistan has the second highest burden of hepatitis C (HCV) in the world. The major route of HCV transmission is contaminated blood or needle sharing. Seventy percent of people who inject drugs (PWIDs) shared needles at some time in their addiction history. The aim of the present study was to estimate the prevalence of HCV in PWIDs in cities of Pakistan. We enrolled 100 PWIDs from the Rawalpindi and Islamabad cities of Pakistan. Blood samples were taken in collection tubes and were subjected to HCV screening by using three rapid HCV screening kits including one step anti-HCV test, onsite HCV Ab rapid test and advance quality rapid anti-HCV test. All 100 blood samples were also subjected to HCV detection by using Elecsys anti-HCV II performed on the Roche Cobas 601 platform based on the ECLIA principle. Seventy-two percent of PWIDs showed the presence of HCV antibodies using the Roche anti-HCV II ECLIA test. We also compared the performance of different rapid kits in comparison with the anti-HCV II by Roche. The sensitivity of CTK kit was 84.72%, which was almost equal to the sensitivity by the SD Bioline HCV and Advanced Quality Rapid HCV tests, which was 83.33%. All three kits showed 100% specificity and positive predictive values. The results showed that the three market competitors of HCV rapid test showed almost equal results. The prevalence of HCV is very high in PWIDs in the capital twin cities of Pakistan. There is dire need to initiate the administration of a hepatitis test and treatment program for both high-risk and the general HCV-positive population. This is the optimal way to achieve HCV control targets established

by the United Nations Sustainable Development Goals and Global Health Sector Strategy by WHO.

Introduction

Hepatitis C (HCV) is a major health problem worldwide. Approximately, 130-150 million individuals currently live with HCV worldwide (1). The annual global mortalities from hepatitis are 1.4 million, which is higher than the annual mortality by human immunodeficiency virus or tuberculosis. Hepatitis is now the 7th leading cause of death globally (2).

In Pakistan, approximately 10 million individuals are currently infected with HCV. In the general population, the prevalence is 5% while the people who inject drugs (PWIDs) and multi-transfused populations have higher prevalence rates (3).

HCV is a blood-borne virus, which is transmitted by contaminated blood and blood products, reuse of syringes, reuse of needles for ear and nose piercing, unsterilized surgical and dental instruments, sharing razors during shaving or circumcision by barbers and tattooing (3). At present, no vaccine is available for protection against HCV (4).

The annual hepatitis mortality remained underestimated for many years up to 2013, where figures regarding the global burden of diseases were released (2). The international community recognized the high global burden of hepatitis and included it in the United Nations Sustainable Development Goals (5). The recent breakthrough in the fight against hepatitis is the adoption of Global Health Sector Strategy by the 69th World Health Assembly. The strategy is composed of five pillars including hepatitis diagnosis and treatment, blood and injections safety, HBV vaccinations and harm reduction, which may lead to 65% reduction in hepatitis mortality and 90% reduction in hepatitis incidence by 2030 (1).

Interferon plus Ribavirin remained the standard HCV treatment from 2001 to 2011. The combination has limited response with a number of side effects (6). Currently different combinations of direct-acting antiviral drugs are available on the market for HCV treatment. These drugs have a response rate of over 90% with limited adverse effects (7). There is dire

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need to initiate the administration of a hepatitis test and treatment program for both high-risk and the general HCV-positive population. This is an optimal way to achieve HCV control targets in the United Nations Sustainable Development Goals and Global Health Sector Strategy by WHO.

Afghanistan, the leading producer of opium, shares a porous border with Pakistan. Afghan opium (40%) is smuggled through the traffic roads passing from different towns and cities of Pakistan. During the last few years, a rapid increase in injectable drugs has been observed in Pakistan. Approximately 430,000 PWIDs are present in Pakistan and 70% of these are sharing needles (8).

Approximately, 16 million drug users by injection are present worldwide, 10 million of whom are hepatitis-positive. The leading burden of HCV-positive PWIDs are from China (1.6 million), the USA (1.5 million) and Russia (1.3 million). A major disease burden linked with drug use by injection is due to unsafe drug injections (9).

In Pakistan, 27% of PWIDs are HIV-positive (10). PWIDs contract HIV and hepatitis from injection sharing and are bridging these viruses to their families and other key populations, such as sex workers. In this study, we enrolled 100 PWIDs from the cities of Rawalpindi and Islamabad in Pakistan. We screened all 100 PWIDs by rapid screening kits followed by HCV detection by using Elecsys anti-HCV II performed on the Roche Cobas 601 platform based on the ECLIA principle.

Materials and methods

All 100 samples were taken from the capital twin cities of Pakistan, Rawalpindi and Islamabad, from October to December 2016. All the PWIDs were aged 18-55 years. Ninety nine PWIDs were male and only one PWID was female.

The study was approved by the Ethical Review committee of the Bridging Health Foundation. Informed consent was taken from all the participants before blood collection and they were assured that the personal information of all the participants will be kept secret. Different hide-outs of PWIDs were visited and approximately 1500 ml of blood samples were taken from PWIDs in blood collection tubes. The blood was centrifuged at 12,000 rpm for 2 minutes to get the serum. The serum samples were used for detection of Hepatitis C antibodies by different rapid and Elecsys kits.

All the experiments were performed in accordance with the ethical standards mentioned in the Declaration of Helsinki. All the blood samples were screened by using rapid HCV detection kits from three different companies including HCV one step anti-HCV test by SD Biotec, Inc. (Yongin-si, Korea) Onsite HCV Ab rapid test by CTK Biotech Co. (San Diego, CA, USA) and Advance quality rapid anti-HCV test by InTec Products, Inc. (Xiamen, China). All 100 blood samples were also subjected to hepatitis C detection by using Elecsys anti-HCV II (Roche, Indianapolis, IN, USA) performed on the Roche Cobas 601 platform based on, the ECLIA principle.

Results

Drug use by injection is the major route of transmission of different blood-borne viruses. We enrolled 100 PWIDs in our study, screened them with three rapid test kits and confirmed

the data by anti-HCV II on the Roche Cobas 601 platform. The results of all three rapid kits in comparison with the anti-HCV II by Roche is shown in Table I.

Of the 100 samples, 72 were positive and 28 samples were negative following anti-HCV II by Roche. Additionally 11 samples observed in the study, were negative for all four devices, but were tested positive by anti-HCV II by Roche.

We also calculated the sensitivity, specificity, positive and negative predictive values for all four rapid devices in comparison with the anti-HCV II by Roche performed on Cobas 601 platform as shown in Table II.

Discussion

Pakistan has the second highest burden of HCV in the world. The hepatitis infection remains asymptomatic for a long period of time and most of the hepatitis patients are unaware of their positive disease condition. The prevalence of hepatitis is 5% in the general population while the high-risk population has a high burden of HCV infection (3). In this study, we screened HCV in the PWIDs from the capital twin cities of Pakistan. The PWIDs conceal themselves from their families and relatives and are found near the Nullah Lai, sewerage lines, in graveyards and other uninhabited places.

Most of the PWIDs are very poor, are scavengers or beggars or accept money from friends and family as they do not have the financial ability to purchase drugs. PWIDs come from all walks of life including university-enrolled students.

Injection sharing is very common among PWIDs. All the PWIDs enrolled in this study shared injections at some point in their life, specifically when they are unable to purchase the drugs. Many non-government organizations (NGO) provide free injections to PWIDs in the Islamabad and Rawalpindi cities of Pakistan. We met with the workers of Nai Zindagi (leading NGO working on PWIDs in Pakistan), using biometric identification for the distribution of syringes among PWIDs.

Results of the present study showed that 72% of PWIDs were HCV positive in the capital twin cities of Pakistan. A systematic review published in 2009 showed the prevalence of HCV was 57±17.7% in PWIDs in Pakistan (3). Prevalence of hepatitis also varies from city to city. Akhtar *et al.*, screened 241 PWIDs from Lahore (Pakistan) and reported 36% of them were HCV positive (11). Different reports of the prevalence of HCV in PWIDs from different regions of Pakistan are summarized in Table III (11-16).

The global epidemiology of HBV/HCV in PWIDs was estimated by Nelson *et al.* (9). Their studies included 1,125 publications worldwide and states the prevalence of HCV in PWIDs is 60-80% in 25 countries and more than 80% in 12 countries. In Pakistan, the prevalence of HCV in PWIDs was 75-93.9%. Our results of 72% HCV prevalence in PWIDs is very close to the HCV prevalence range published by Nelson *et al.* (9).

In another study, HCV and HIV prevalence was calculated in PWIDs in Middle East and North Africa (MENA). Approximately 626,000 PWIDs reside in MENA, with Iran, Pakistan and Egypt holding the highest numbers. Half of the PWIDs in MENA are HCV positive, with some studies reflecting a prevalence of approximately 90% (17).

Table I. Comparison of HCV screening by rapid kits with Roche HCV ECLIA.

Device name	SD Bioline HCV	Advance Quality Rapid HCV	CTK HCV Rapid
Results shown by device/ Results confirmed by Roche	HCV positive 60/72	HCV positive 60/72	HCV positive 61/72
Results shown by device/ Results confirmed by Roche	HCV negative 28/28	HCV negative 28/28	HCV negative 28/28

HCV, hepatitis C virus.

Table II. Comparison of sensitivity, specificity, positive and negative predictive values of HCV rapid kits with Roche HCV ECLIA.

Variables	SD Bioline HCV (%)	Advance Quality Rapid HCV (%)	CTK HCV Rapid (%)
Sensitivity	83.33	83.33	84.72
Specificity	100	100	100
Positive predictive value	100	100	100
Negative predictive value	70	70	71.79

HCV, hepatitis C virus.

Table III. Reports of HCV prevalence among PWIDs reported from different regions of Pakistan.

S. No.	Author, year	Region	Methods	Population Size	HCV (%)	Refs.
1	Akhtar <i>et al</i> , 2016	Lahore	ELISA	241	36	(11)
2	ur Rehman <i>et al</i> , 2011	Khyber Pakhtunkawa	RT-PCR	200	24	(12)
3	Altaf <i>et al</i> , 2009	Karachi	ELISA	161	94	(13)
4	Platt <i>et al</i> , 2009	Abbottabad	ELISA	102	8	(14)
5	Platt <i>et al</i> , 2009	Rawalpindi	ELISA	302	17.30	(14)
6	Achakzai <i>et al</i> , 2007	Quetta	ELISA	50	60	(15)
7	Kuo <i>et al</i> , 2006	Lahore	ELISA	351	88	(16)

HCV, hepatitis C virus; PWIDs, people who inject drugs.

PWIDs also spread viral infections to other population groups. In a study conducted in the cities of Lahore and Faisalabad (Pakistan), 23% spouses of PWIDs were found to be using drugs and 19% of them were injecting drugs (18). Most PWIDs had unprotected sex with their spouses and small numbers of these spouses, some of whom were engaged in commercial sex, bridging the viral infections to other populations.

We used three different rapid HCV screening kits for the detection of HCV in PWIDs from the capital twin cities of Pakistan. We also compared the performance of different rapid kits in comparison with the anti-HCV II by Roche performed on the Cobas 601 platform. The sensitivity of the CTK kit was 84.72% which almost equalled the sensitivity by SD Bioline HCV and Advanced Quality Rapid HCV kits at 83.33%. All three kits showed 100% specificity and

positive predictive values. The negative predictive value of CTK was 71.79% which was almost equal to 70% by both SD Bioline HCV and Advanced Quality Rapid HCV. The results showed that the three market competitors of the HCV rapid test showed almost equal results. We found 11 samples from PWIDs that had negative results by all three kits while the anti-HCV II by Roche, performed on the Cobas 601 platform, showed them as positive. A possible reason for this is the co-infection with HIV, although this remains to be determined.

HCV infection has a high incidence in PWIDs in the Rawalpindi and Islamabad cities of Pakistan. During the discussion with PWIDs, it was found that 50% of PWIDs would prefer a replacement for drug use by injection albeit this measure has not received support. Sound support is needed from the government and NGOs to enroll PWIDs in

rehabilitation programs and provide them suitable skills to ensure their re-integration in to society. Highly effective HCV treatment is available on the market. Thus, it is imperative to initiate a hepatitis test and treatment program to achieve the HCV control targets established by the United Nations Sustainable Development Goals and Global Health Sector Strategy by WHO.

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