Hepatitis C Virus Infection among High Risk Groups of District Hangu, Khyber Pakhtunkhwa, Pakistan

Abdul Wahab[1], Muhammad Umar[1], Baitullah[1], Said Nasir Shah[1], Kashif Rahim[1], Inamullah[1], Zabihullah[1], Mukhtarullah[1], Tariq Khan[1], Mustafa Asghar[1], Shamim Saleha[1]*

[1.] Department of Microbiology, Kohat University of Science and Technology, Kohat 26000, Khyber Pakhtunkhwa Pakistan
shamimsaleha@yahoo.com

Abstract: Limited information was available about the prevalence of hepatitis C virus (HCV) infection in district Hangu of Khyber Paktunkhwa region of Pakistan. Therefore, a cross-sectional study was conducted to determine and evaluate the prevalence of HCV infection among the high-risk groups in district Hangu. Blood samples were collected from 1800 individuals at high risk for HCV infection. Serum samples were screened for anti-HCV antibodies by using strips for immuno-chromatographic test and then positive samples were further confirmed by third generation ELISA. Finally, the data of sampled population was analyzed by using SPSS software. Out of 1800 participants HCV antibodies were detected in 578 (32.1%) and rate of infection was observed higher in illiterate married individuals of rural areas with increased age. Rate of infection was 53.5%, highest in participants being treated by untrained health practitioners, followed by 32.9% in those who visited barbers and further 8.1% in those who received unsafe blood transfusion. Furthermore, statistically these factors were found significantly associated with HCV infection. The findings of this study may assist in prevention and control spread of HCV infection in district Hangu through proper management and monitoring of patients.
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1. Introduction

Hepatitis C virus (HCV) is a major cause of liver diseases worldwide. It causes chronic liver diseases, cirrhosis of the liver and hepatocellular carcinoma. The progression of the disease towards chronic stage is associated with the host immune system, the nature of virus and environmental factors (Mondelli, 2003). HCV is a silent infection (Abdo, 2008) with an early stage as typically asymptomatic and signs and symptoms are noticed only in case of severe and advanced stage of infection due to extra hepatic manifestations (Houghton et al., 2000). Moreover, efficient transmission of HCV infection is believed to occur primarily through blood transfusion and parenteral exposures to blood contamination during medical procedures (Prati, 2006).

Hepatitis C virus infection is among life threatening public health problems in world as well as in Pakistan. The estimated global prevalence of HCV infection is 3.3%, and is increasing day by day. HCV has been recognized the most common cause of chronic liver disease and liver transplant in Pakistan. According to WHO estimates, Pakistan is standing at 2nd position in prevalence of HCV infection all over the world (WHO, 2014). The prevalence of Hepatitis infection in Pakistani population has been estimated to be 8% and 5%-9% in various regions of Khyber Pakhtunkhwa (Khan et al., 2011). The HCV infection is increasing gradually due to deficiency in basic health care recourses, shortage of medically trained and technically skilled health care professionals, use of therapeutic injections in high numbers, drug addiction particularly intravenous drug addiction, unscreened blood transfusion, practice of shaving by barbers and lack of the general public awareness about safety measures (Bari et al., 2001; Kuo et al., 2006; Raja et al., 2008; Rind et al., 2009; Ali et al., 2009).

Few studies have addressed the prevalence of HCV infection in the high-risk populations of Pakistan. Therefore the aim of study was to determine and evaluate the prevalence of HCV infection among the high-risk groups in district Hangu of Khyber Paktunkhwa region of Pakistan.

2. Material and Methods

2.1 Sampling

This cross-sectional study was conducted from June 2011 till August 2012 in district Hangu of Khyber Pakhtunkhwa region of Pakistan. High risk groups, for HCV were the subjects of this study. The study was approved by the ethical committee of Department of Microbiology, Kohat University of Science and Technology. In this study participation of individuals was voluntarily and informed consent was obtained from all individuals for participating in this study.

Blood samples were taken from 1800 individuals including 382 males and 418 females of

different age groups, who were residents of Tehsil Hangu, and Thall (Urban), and villages namely Durri Banda, Kahi, Khisari Danda, Chani Banda, Babu Tang, Chapri Waziran and Dallan (rural) in district Hangu. The high risk groups for transmission of HCV infection were those who practiced activities such as health care related procedures by untrained health practitioners, visit to barber's shop, blood transfusion from unscreened donors, hospitalization at public sector hospital, and drug addiction. Socio-demographic characteristics and history of exposure to potential risk factors during the past one year of participants was recorded in the form of a structured questionnaire.

2.2 Screening

From every individual 5 ml of blood was collected in separate disposable sterilized syringes. Blood samples were then transported to Department of Microbiology, Kohat University of Science and Technology. The samples were centrifuged for five minutes at 14000 rpm to separate serum. Sera screening for anti-HCV antibodies was performed by using strips (Acon laboratories Inc, USA) followed by (Standard diagnostics Inc. Korea) for Immuno-chromatographic test (ICT). Sera positive by ICT test, were further tested for the anti-HCV antibodies by using a third generation enzyme linked immunosorbent assay (ELISA) (EIA-2.0; Abbott Laboratories, Abbott Park, IL) according to the instructions from manufacturer.

2.3 Statistical Analysis

The SPSS-PC version 16.0 software was used for the descriptive statistical analysis of the data of the sample population. The frequencies, percentages, and the 95% confidence interval (CI) for the relative risk were calculated for various risk factors under study. Statistically $P < 0.05$ was accepted to be significant and $P > 0.05$ insignificant.

3. Results

3.1 Demographic features of HCV infected participants:

HCV antibodies were detected in 578 (32.1%) out of 1800 participants. Table 1 shows the socio-demographic characteristics of HCV infected participants in this study. Most of infected individuals were married (88.8%) and rate of infection was comparatively higher in females (51.4%) than males (48.6%). Of 578 infected individuals, 413 (71.5%) were from rural areas, and 165 (28.5%) were from urban areas. Majority of infected participants (35.1%) were from the age group 35-45 years, followed by age group 46 & above (30.8 %). More than 80 % of the infected participants were illiterate and nearly equally distributed in different socio economic groups (on the basis of monthly income) as shown in Table 1.

Table 1. Demographic features of HCV infected participants

Demographic features	Total	Male (%)	Female (%)
Gender	578	281 (48.6)	297 (51.4)
Marital status			
Married	513 (88.8)	225 (80.1)	288 (96.97)
Unmarried	65 (11.2)	56 (19.9)	09 (3.03)
Locality			
Urban	165 (28.5)	123 (43.8)	42 (14.1)
Rural	413 (71.5)	158(56.2)	255(85.9)
Age in Years			
15-25	78 (13.5)	46 (16.4)	32 (10.8)
26-35	119 (20.6)	56 (19.9)	63 (21.2)
35 -45	203 (35.1)	100 (35.6)	103 (34.7)
46- above	178(30.8)	79 (28.1)	99 (33.3)
Educational status			
illiterate	492 (85.1)	214(76.2)	278 (93.6)
School level	57 (9.9)	40 (14.2)	17 (5.7)
College level	29 (5.0)	27 (9.6)	02 (0.7)
Economics Status (Monthly income)			
<10,0000	148(25.6)	65 (23.1)	83 (27.9)
10,000-20,000	145(25.1)	76 (27.0)	69 (23.2)
20,000-30,000	141(24.4)	71(25.3)	70 (23.6)
>30,000	144 (24.9)	69 (24.6)	75 (25.3)

3.2 The distribution of HCV among the risk groups:

Table 2 represents the distribution of HCV infected participants in risk groups in this study. Analyzing the distribution of cases with risk factors, our study confirmed that the potential risk factors for the acquisition of HCV in district Hangu are irrational practices of untrained health practitioners (53.5%) and (32.9%) barbers, followed by unsafe blood transfusion(8.1%). Our study has reported less frequently transmission of HCV infection in participants who were hospitalized at public sector hospital or basic health care centre (3.1%) and among those who were drug abusers (2.4 %).

3.3 Data Analysis

Table 3 shows gender distribution of risk factors which might be associated with HCV infection in this study. In studied participants, 309 (53.46%) of participants were infected with HCV among those who received treatment from untrained health practitioners during illnesses, and this was statistically found highly significant (RR = 0.4306; 95%CI 0.3571 to 0.5193; P <0.0001). Similarly, 190 (32.9%) of participants were infected with HCV among those who used to visit to barbers for facial and armpit shaving and this was found statistically very much significant (RR = 4.2402; 95%CI 3.5441 to 5.0731; P <0.0001). Of the total , 47 participants (8.14%) in this study were those who received unscreened blood and blood products in case of gynecological or surgical procedures and infected with HCV and this was also found statistically significant (RR = 0.5480; 95%CI 0.3425 to 0.8768; P = 0.01). Those participants who were hospitalized at public sector hospital or basic health care centre, 18 (3.11%) were found infected

with HCV and this was not detected statistically significant (RR = 1.2675; 95%CI 0.8682 to 1.8505; P =0.22). Moreover, 14 of participants (2.42 %) were involved in drug abusing (oral, inhalation, intravenous) were infected with HCV, while, significant correlation (P > 0.05) was not found between HCV infection and drugs abusers (RR = 0.8790; 95%CI 0.4772 to 1.6189; P =0.68).

Table 2. The distribution of HCV infected participants in risk groups

Risk factors	No. of cases	%
Untrained health practitioners	309	53.5
Visit to Barber	190	32.9
Blood transfusion	47	8.1
Hospitalization	18	3.1
Drugs abusers	14	2.4
Total	578	100

The number of species varied spatially in both forests. In oak forest it varied from 15 (HT) to 30 (HB) and in pine forest from 12 (HT) to 23 (HB). Across the forests, maximum species were present in oak forest (at HB, 30) as compared to pine forest (at HB, 23). Species richness was higher (7.4) at HB and lower at HT (5.0) in oak forest. Similar pattern was found in pine forest, i.e., maximum species richness was at HB (10.5) and minimum at HT (4.7).

Table 3. Gender distribution of risk factors

Risk Factors	Total 578	Male (%) 281 (48.6)	Female (%) 297 (51.4)	Risk Ratio (95% CI)	P-Values
Untrained health practitioners					
Yes	309 (53.5%)	93 (51.2)	216 (55.6)	0.4306 (0.3571 to 0.5193)	< 0.0001
No	269 (46.5%)	188 (48.8)	81 (44.4)		
Visit to Barber					
Yes	190 (32.9%)	190 (67.6)	0 (0)	4.2402 (3.5441 to 5.0731)	< 0.0001
No	388 (67.1%)	91 (32.4)	297 (100)		
Blood transfusion					
Yes	47 (8.1%)	13 (4.6)	34 (11.4)	0.5480 (0.3425 to 0.8768)	0.01
No	531 (91.9%)	268 (95.4)	263 (88.6)		
Hospitalization					
Yes	18 (3.1%)	11 (3.9)	07 (2.4)	1.2675 (0.8682 to 1.8505)	0.22
No	560 (96.9%)	270 (96.1)	290 (97.6)		
Drugs abusers					
Yes	14 (2.4 %)	6 (2.1)	8 (2.7)	0.8790 (0.4772 to 1.6189)	0.68
No	564 (97.6 %)	275 (97.9)	289 (97.3)		

4. Discussions

Hepatitis C virus infection is a major health problem in developing countries including Pakistan (Ali et al., 2011). Therefore, in this study we have investigated prevalence of HCV infection in high risk groups in district Hangu. Our study established the prevalence of HCV antibodies among all participants was found 32.1%. This prevalence rate of HCV infection is relatively high in this area. As the participants of our study were from selected high risk groups, therefore the rate of HCV infection in the entire population of the district Hangu might be different.

This study illustrates gender wise distribution of HCV infection with a prevalence of 51.4% and 48.6% in females and males respectively. This is in contrary to the result in another study conducted in Karachi school teachers, where HCV infection was shown more prevalent in males probably due to more exposure to some risk factors particularly visits to the barber shop (Mustufa et al., 2010). The high prevalence of HCV infection among the females could be attributed to the fact that more females had participated in this study due to availability at homes and males were not available due to their jobs in other cities or in the Middle East countries.

Our results also showed the high prevalence of anti-HCV 513 (88.8%) in married female participants (96.97%) as compared to male participants (80.1%). The high prevalence of HCV infection among the married individuals could be attributed to the fact that sex with an infected partner may play a role in transmission of HCV (Terrault, 2002).

In the current study, area of residence (locality) was the important demographic factor associated with the HCV infection. Similar association has been reported in another study from India (Chowdhury et al., 2003).The prevalence of HCV infection was 413 (71.5%) among the female participants (85.9 %), having rural residency. This high prevalence of HCV in rural areas may be due to shortage of trained practitioners and in case of illnesses subjects usually receive treatment from untrained village health practitioners who don't have proper skills and knowledge of therapeutic procedures.

The highest number (35.1%) of HCV positive participants belonged to the age groups of 35-45 years, followed by age group 46 years & above (30.8 %). In these age groups the number of anti-HCV positive female participants was considerably high as compared to male participants. Regardless of the age group, more females (51.4 %) as compared to males (48.6 %) were found HCV positive in the whole

studied population. Another study from Romania has revealed similar results (Voiculescu et al., 2010).

Similarly our results showed the high prevalence rate of anti-HCV 492 (85.1%) in illiterate female participants (96.97%) as compared to male participants (80.1%), and this result is in conformity with a previous one reported from Pakistan(Ghias and Pervaiz, 2009. Illiterate individuals generally lack the knowledge about risk factors that play role in transmission of HCV infection. Health education to the illiterate individuals regarding the patterns of transmission of the Hepatitis C virus may prove useful.

Socioeconomic status of individuals plays a vital role in finding the level of health status. Therefore, socioeconomic status of all participants was determined on their monthly income basis and it was found that participants were nearly equal distributed into four socioeconomic groups as shown in table 1. In our study none of socioeconomic group has been recognized to play a role in transmission of HCV infection. This observation is inconsistent with the previous observation carried out in Yemen (Gacche et al., 2012), where the prevalence of anti-HCV was found increasing with the decreased monthly income.

Analysis of potential risk factors in transmission of HCV infections in district Hangu is shown in Table 3. A very alarming finding in both male and female participants was that about 53.5% of participants with the history of unsafe and unnecessary frequent injections by untrained health practitioners during treatment of minor illnesses were more likely to have HCV infection than those who had no history of prior therapeutic unsafe and unnecessary injections. It could be due to the fact that the untrained health practitioners don't have appropriate knowledge about use of injections and sterilization of medical equipments. They are usually in practice of using same syringe and medical equipment for more than one patients. Due to non availability of trained practitioners particularly in rural areas, these untrained health practitioners are usually the first choice of treatment of subjects. The trained physician available in urban areas and in big cities is the last choice of treatment when untrained health practitioner has failed to provide a cure in a locality. Such rational practices of untrained health practitioners have reported in rural areas of Sindh (Rind et al., 2009).

In the present study, the number of male participants suffering from HCV infection has also been increased due to visit to the barber shops that is significantly associated with HCV infection. It could be due to the fact that most of the barbers are uneducated and unaware of transmission of HCV and due to their practice of reuse of unsterilized razors and scissors for multiple customers. Such practice of barbers is promoting the risk of transmission of HCV from one individual to another. A study that was conducted in Rawalpindi-Islamabad has also reported that most of the HCV male patients had histories of shaving from barbers (Bari et al., 2001).

Blood transfusion is an important means of transmitting infection of HCV (Busch et al., 2003). Our study has found statistically significant association between blood transfusion and HCV infection. The female participants as compared to male participants had received unscreened blood or blood products in gynecological or surgical procedures were more likely candidates for HCV infection (11.4 %) than those who had no prior gynecological or surgical procedures. Most of studied participants had no concept of HCV infection transmission through blood transfusion from an infected individual and due to this reason they didn't screen blood and blood products for HCV, at times due to financial limitations. A study from Morocco reported that screening of blood and blood products for anti- HCV is not conducted throughout the country and consequently blood transfusion has been found to be associated with HCV infection (Baha et al., 2013).

We observed that a small proportion of hospitalized participants (3.1%) both males and females at public sector hospital or basic health care centre were infected with HCV, however statistically significant association was not found between HCV infection and hospitalized participants in our study. In contrary, hospitalized patients were reported a key factor for transmission of HCV infection in Libya due to inadequate disinfection procedures and sharing of contaminated equipments between patients, consequently nosocomial transmission of HCV was common (Alashek and Altagdi, 2008).

Drug abuse (oral, inhalation, Intravenous) has been recognized as an important risk factor of HCV infection, although our study failed to provide an association between drug abuse and HCV infection due to the fact that only a few drug abusers participated in the study. This is inconsistent with result of another study conducted in France among drug users that demonstrated that HCV infection is an alarming problem among drug abusers (Jauffret-Roustide et al., 2009).

In conclusion, the present study confirms that the most potential risk factors for the acquisition of HCV in district Hangu are irrational practices of untrained health practitioners and barbers particularly in rural areas, followed by unsafe blood transfusion. The findings of our study emphasizes on the need of safe and standard medical practices and to follow the universal precautionary measures in public sector

health care centers to prevent further transmission of HCV to minimize disease burden. The government should take action against the untrained health practitioners to prevent them from playing with the lives of people in district Hangu. The high prevalence of HCV infection demands us to start primary preventive public health awareness programs to control its spread in this community.

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Corresponding Author:
Dr. Shamim Saleha
Department of Microbiology
Kohat University of Science and Technology (KUST), Kohat 26000, Khyber Pakhtunkhwa Pakistan
E-mail: shamimsaleha@yahoo.com

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