

## Research Article

### Seroepidemiology of HBV and HCV at Tertiary Care Center Lahore, Pakistan: An Analytical Cross Sectional Study

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#### Abstract

**Background:** Pakistan is one of the highest burden countries for HCV. Hepatitis has unique transmission risk factors which vary based on geography and other factors.

**Objective:** To assess risk factors for HCV and HBV transmission in an urban city population of district Lahore, at Hepatitis Prevention and Treatment Clinic (HPTC) primarily serving as a hepatitis clinic, serving a large catchment area.

**Methods:** A clinical based cross-sectional study was conducted in 2018 at HPTC Lahore, Pakistan. Total of 1081 out of 22231 eligible patients blood samples were screened out for hepatitis B (HBsAg) and C (Anti-HCV) irrespective of age and gender through ELISA.

**Results:** HBV and HCV was 8.0% and 52.35% in the study population respectively. Males were more affected with HBV (64.0%) than females (36.0%). While HCV seroprevalence was significantly higher in females (59.6%) than males (40.4%). The coinfection recorded here was 2.40%. Multivariable logistic regression analysis of predicting variables showed that factors including, IV injections, barber shaving, blood donation and history of having more than ten injections were found associated as potential risk factors (OR>1: P-value<0.05) with the occurrence of HBV. Whereas, factors including, dental procedure, blood donation and visit to beauty parlor were significantly associated as risk factors (OR>1: P-value<0.05) with HCV occurrence.

**Conclusion:** Considering all the patients a single cohort irrespective of age and gender data analysis showed that exposure to dental procedures is significantly associated with the occurrence of HCV.

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#### Introduction

Viral hepatitis B and C is a global threat to public health as an emerging problem especially in

those areas where it is endemic. The seroprevalence of HBV is higher than 8% in such areas. While in areas where endemicity is low it is less than 2%.<sup>1,2</sup> Worldwide elimination of viral hepatitis with 65%

mortality reduction from viral hepatitis by 2030 has been proposed by WHO.<sup>3</sup>

Epidemiologically several risk factors in developed and 3<sup>rd</sup> world countries have been identified. Injectable drug usage (IDU) is reported to be one of the potential risk factors for HBV, HCV and HIV associated with sharing of contaminated injecting equipment's.<sup>4</sup> Risk of HCV transmission epidemiologically depends on the routes of infection. While studies report transfusion of blood as the most efficient way of HCV transmission depending on titer of virus, amount of the blood transfusion, and host immune level.<sup>5</sup> Viral RNA titer in the blood serum of habitual alcohol drinkers has been reported substantially higher with chronic hepatitis C.<sup>6</sup> Sharps injury other than healthcare settings i.e. meat slicers and razors have also been reported as risk factor for HCV transmission.<sup>7,8,9</sup>

Pakistan is an area of hyper-endemic for hepatitis B and C virus (HBV & HCV) infection from the last two decades.<sup>10</sup> Provincial seroprevalence of HBV reported was 6.7% in Punjab followed by 5%, 1.5% and 1.1% in Sindh, Baluchistan and Khyber Pakhtunkhwa. HCV seroprevalence was higher in Baluchistan of 4.3% followed by 2.5% in Sindh, 2.4% in Punjab and 1.3% in Khyber Pakhtunkhwa.<sup>11</sup> Considering the elevating incidence of viral hepatitis; the current study is conducted to identify the potential risk factors associated with the occurrence of HBV and HCV in patients visiting Hepatitis Treatment and Prevention Clinic (HPTC) Center, Lahore, Pakistan in 2017.

## Methods

Ethical approval of the study was obtained by the internal institutional research body (IRB) of PKLI-RC. Participants provided written informed consent for blood collection provided and interview. A clinical based cross-sectional study was conducted in 2018 at HPTC Lahore, Pakistan. Randomly patients were screened for hepatitis B and C from our study population. Study population was all the patients visiting HPTC at daily basis. Sampling frame was considered all the registered patients (22231) with distinct medical record (MR) number. A total of 1081 MR numbers were selected randomly from the study population following Mandal 12 at a fix study power of 80% at 95% significance level. An Electronic

Medical Record (EMR) surveillance tool was used to collect epidemiological information from patients visited HPTC during the study period. A total of 41 variables; including demography, health related practices, and previous medical history closed ended questions were asked in face to face interviews. Data cleaning was performed in excel sheet using filtration technique. Variables having more than 10% missing data were excluded from the final analysis.

A total of 5mL blood sample was collected via disposable vacuum syringes. Serum was separated according the standard procedures described by WHO. On the same day until tested for HBsAg or AntiHCV in the HPTC laboratory using a detail established lab-testing standard protocol. HBsAg and AntiHCV was estimated using an enzyme-linked immunosorbent assay (ELISA) as per manufacturer recommendation (Abbott machine). Data was analyzed using SPSS version 26.00. A comprehensive of list of 41 independent explanatory variables studied here. "Dummy variable adjustment" method was adopted for missing data management in the predicting variables in regression models used her. Data normality was assessed using Kolmogorov-Smimov (Sig<0.001) and Shapiro-Wilk (Sig = <0.001) test. Regression analysis of the data was conducted using univariable and multivariable logistic regression model. Attributable odd ratios based on gender and age for Hep C were also assesses using multivariable logistic regression models.<sup>13</sup>

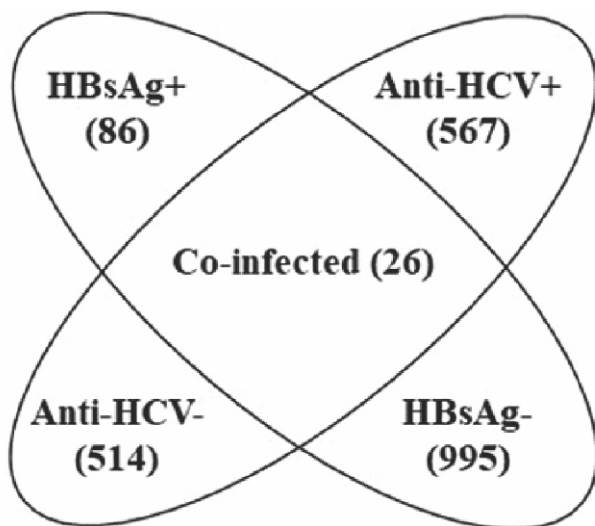
## Results

### Characteristics of the study population

Patients were included in the study irrespective of their gender, age, ethnicity and religion. A total of 22231 patients met the study criteria, where randomly 1081 were included in the study analysis including 591 females and 490 males. All the patients were screened for both HBV and HCV. Age wise the studied patients were distributed into five groups including 14.3% of age 16-25 years, 23.5% age 26-35 years, 25.9% age 36-45 years, 24.0% age 46-55 years, and 12.3% of age greater than 55 years. Overall 1024 (94.7%) patients self-reported that they had intravenous (iv) injections while 57 (5.3%) reported never had iv injections.

### HBV and HCV seroprevalence

The overall prevalence of HBsAg and Anti-HCV recorded was 8.0% (86/1081) and 52.5% (567/1081) respectively. The seroprevalence of HBsAg positivity was higher in males compared to females within HBV positive in males was (64.0%) significantly ( $P$ -value $<0.001$ ) higher than in females (36.0%). While Anti-HCV seroprevalence within HCV positive was significantly ( $P$ -value=0.001) higher in females (59.6%) than males (40.4%). Age also showed a significant association with the occurrence of HCV. A directly associated increasing trend of HCV was found with age; which means that HCV prevalence increased with increase in age. The seroprevalence of coinfection was 2.40% (26/1081) in the patients screened for HBV and HCV (Fig 1).



**Fig 1.** Total no of Coinfection Cases Recorded at HPTC, Lahore, Pakistan in 2017.

There were total of 13 cases for coinfection in females and 13 in males. The results showed that the risk of coinfection increases with the increase in age.

### Epidemiology of Risk Factors Gender Base in different Age Group

Univariable analysis of binomial risk factors studied for HBV and HCV in MALE patients in different age groups. In male patients with age 16-25 years' family history of liver disease was found significantly associated as a risk factor ( $OR=4.42$ ;  $P<0.05$ ) with HCV infection. In patients with 36-45 years of age body tattooing was found statistically associated ( $OR=8.37$ ;  $P$  value=0.01) with HCV. Further details of the results are depicted in Table 1.

Variables having  $p$ -value  $<0.25$  were passed onto

multivariable logistic regression for further gender and age wise analysis (Table 1 and 2). On multivariable logistic regression the predicting variables in Males including IV injections ( $OR=1.17$ ;  $P$ -value=0.100), barber shaving ( $OR=1.05$ ;  $P$ -value=0.017) and blood donation ( $OR=29.22$ ;  $P$ -value=0.023) in patients with age 36-45 years were found as potential risk factors statistically associated with the occurrence of HBV (Table 1). In Male patients of 16-25 years of age dental procedure performed ( $OR=1.102$ ;  $P$ -value=0.016) was recorded as a potential risk factors for HCV. Blood donation in patients of 36-45 years of age was found as a significant risk factor ( $OR=2.34$ ;  $P$ -value=2.34) for HCV (Table 1). In Females patients having age 16-25 years' family history of HCV was recorded as a potential risk factor for HCV patients. Beauty parlor visit in age group 36-45 years was a significant risk factor ( $OR=2.90$ ;  $P$ -value=0.031) for the occurrence of HCV (Table 2).

### Discussion

We found a very higher prevalence of HBV and HCV in our study population. Which might be due to the nature of individual screened. As most of them were presumptive patients for viral hepatitis. Another reason for such higher prevalence in these participants was due to inadequate knowledge of disease and the hospital wastes improper disposal as well as low literacy rate reported in Pakistan.<sup>10,11</sup>

### Epidemiology of HBV Risk Factors

To control the confounders the patients into different age groups was done following Ann et al.,<sup>14</sup> and Mahmoud et al.,<sup>15</sup> reporting that immune response to infectious agents varies with age. No of variables were found significantly associated with the seroprevalence of HBV on univariable analysis. In male patient population IV injections were found significantly associated as potential risk factor with HBV.<sup>9,11</sup> It might be due to the re-use of syringes or unhygienic health practices. In males of age group 36-45 years' barber shaving was recorded statistically associated with HBV.<sup>16</sup> This might be a major threat for the transmission of viral hepatitis. Hepatitis B virus can survive easily for seven days on instruments and solid surfaces.<sup>9,16,17</sup> Blood donation in patients of 36-45 years of age was found as a strongly associated risk factor with HBV which is a spurious association

**Table 1:** Multivariable Analysis of Variables in MALES for Hepatitis B and C in different Age Groups.

Variables	Levels	Coefficient of (B)	S. E	Odds ratio	C.I (Lower-Upper)	Sig
<b>Hepatitis B- (Age group-1)</b>						
IV drug	Yes	1.504	.986	4.500	.652-31.08	.127
	No	-				
Family HOD	Yes	-.993	.692	.370	.095-1.43	.151
	No	-				
<b>Hepatitis B- (Age group-2)</b>						
dental	Yes	1.004	.681	2.730	.719-10.36	.140
	No					
*Blood donation	Yes	.694	.578	2.002	.645-6.21	.230
	No					
<b>Hepatitis B- (Age group-3)</b>						
Iv injections	Yes	3.006	1.173	20.206	2.029-201.1	.010
	No	-			Ref	
Barber shaved	Yes	2.536	1.058	12.628	1.586-100.5	.017
	No				Ref	
Piercing	Yes	-3.523	1.709	.030	.001-.841	.039
	No				Ref	
*Blood donation	Yes	3.375	1.481	29.221	1.6-532.62	.023
	No				Ref	
<b>Hepatitis B- (Age group-4)</b>						
Dental procedure	Yes	-1.903	1.147	.149	.016-1.41	.097
	No				Ref	
Barber shaved	Yes	1.685	.932	5.394	.868-33.52	.071
	No				Ref	
<b>Hepatitis C- (Age group-1)</b>						
Dental Procedure	Yes	1.572	1.102	4.816	.555-14.78	0.016
	No				Ref	
Barber shaved	Yes	-.961	.677	.382	.101-1.443	.156
	No				Ref	
Recreational drug usage	Yes	-2.372	1.450	.093	.005-1.599	.102
	No				Ref	
Toothbrush sharing	Yes	1.369	.886	3.933	.693-22.31	.122
	No				Ref	
<b>Hepatitis C- (Age group-2)</b>						
Barber shaved	Yes	1.254	.542	3.506	1.211-10.14	.021
	No				Ref	
*Blood donation	Yes	.865	.376	2.374	1.136-4.96	.021
	No				Ref	
<b>Hepatitis C- (Age group-3)</b>						
*Blood donation	No			Ref		
	Yes	.850	.432	2.340	1.004-5.45	0.049
	No			Ref		
	Yes					
<b>Hepatitis C- (Age group-4)</b>						
*Blood donation	Yes	.706	.518	2.026	.734-5.59	0.176
	No				Ref	
Family with HBV and HCV	Yes	-.771	.497	.462	.175-1.22	.121
	No				Ref	
<b>Hepatitis C- (Age group-5)</b>						
hospitalization	Yes	.830	.613	2.293	.690-7.61	0.176
	No				Ref	
Family history with HBV and HCV	No				Ref	
	Yes	1.119	.618	3.063	.913-10.275	0.070
	No				Ref	

*Age groups= group 1= 16-25; group 2= 26-35; group 3= 36-45; group 4= 46-55 and group 5= >55. \*Blood donation was analyzed separately to rule out its confounding impact on other predicting variables manually.*

**Table 2:** Multivariable Analysis of Variables in FEMALES for Hepatitis B and C in different Age Groups

Variables	Levels	Coefficient of (B)	S. E	Exp (B)	C.I (Lower-Upper)	Sig
<b>Hepatitis B- (Age group-1)</b>						
Vaccination against HBV	Yes	-1.914	1.297	.148	.012-1.87	.140
	No				Ref	
<b>Hepatitis B- (Age group-2)</b>						
Iv drugs	Yes	2.234	1.294	9.333	.738-117.99	.084
	No				Ref	
<b>Hepatitis B- (Age group-3)</b>						
surgery	Yes	-2.039	1.073	.130	.016-1.06	.057
	No				Ref	
<b>Hepatitis B- (Age group-4)</b>						
Recreational drug	Yes	-3.085	1.072	.046	.006-.37	.004
	No				Ref	
<b>Hepatitis B- (Age group-5)</b>						
Dental procedure	Yes	-1.718	1.120	.179	.020-1.61	.125
	No				Ref	
<b>Hepatitis C- (Age group-1)</b>						
Surgery performed	Yes	-1.603	.978	.201	.030-1.36	.101
	No				Ref	
Family history of hepatitis b and c	Yes	1.324	.692	3.757	.968-14.77	0.046
	No				Ref	
<b>Hepatitis C- (Age group-2)</b>						
Iv drugs	Yes	-1.215	.868	.297	.054-1.62	.161
	No				Ref	
<b>Hepatitis C- (Age group-3)</b>						
Piercing done	Yes	-.865	.607	.421	.128-1.38	.154
	No				Ref	
Beauty parlor	Yes	1.065	.459	2.901	1.101-7.64	0.031
	No				Ref	
<b>Hepatitis C- (Age group-4)</b>						
Blood transfusion	Yes	-.610	.429	.543	.234-1.26	.155
	No				Ref	
Piercing done	Yes	-.637	.522	.529	.190-1.47	.222
	No				Ref	
*Blood donation	Yes	.955	.783	2.599	.560-12.06	.223
	No				Ref	
<b>Hepatitis C- (Age group-5)</b>						
Family history of liver disease	Yes	-1.735	1.180	.176	.017-1.78	.142
	No				Ref	

*Age groups= group 1= 16-25; group 2= 26-35; group 3= 36-45; group 4= 46-55 and group 5= >55.*

because most of the patient population knows about their hepatitis status at the time of blood donation.<sup>10,18</sup>

### Epidemiology of HCV Risk Factors

In male patients of 16-25 years of age individuals exposed to dental procedures were 1.102 times at higher risk of HCV significantly than those not exposed to dental procedures. Dental procedures have been reported potential risk factors from Pakistan from the past couple of decades.<sup>19</sup> Blood donation in age group 36-45 years of age was also found statistically associated with the risk of HCV occurrence.<sup>18</sup>

In previous studies Therapeutic injections, contami-

nated blood; dental surgeries and shaving through barbers have been reported potential risk factors for HCV transmission in Pakistan in previous studies.<sup>18,19,20</sup>

Female patients having more than 5 blood transfusion were 1.06 times at greater risk of getting HCV than those who did not had any blood transfusion or less than 5 blood transfusions. Previous epidemiological studies show that HCV could be efficiently transmitted through blood transfusion.<sup>19,20</sup> Variation in the HCV transmission risk through blood transfusion could be related to the titre of virus, host susceptibility to HCV and quantity of blood transfusion. In female patient's surgery performed at DHQ recently was identified as a potential risk factor for HCV. These results are in parallel with those of Razaqat et al.,<sup>21</sup> reporting surgeries performed at civil hospitals

statistically associated with HCV occurrence.

### Conclusion

Considering all the patients a single cohort irrespective of age and gender data analysis showed that exposure to dental procedures is significantly associated with the occurrence of HCV.

**Ethical Approval:** Given

**Conflict of Interest:** The authors declare no conflict of interest

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