

## Brief communication (Original)

# Seroprevalence of hepatitis C and human immunodeficiency viruses in blood donors of northwestern Pakistan

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**Background:** Hepatitis C virus (HCV) and human immunodeficiency virus (HIV) infections are major health problems associated with blood transfusion practices in Pakistan. This study was conducted on a large population to assess the epidemiology of HCV and HIV in the North West Frontier Province (N.W.F.P) of Pakistan

**Methods:** Between January 2008 and July 2009, 62,251 healthy blood donors (BDs), aged 17-50, were included. In that group, 61,059 (98.1%) were male and 1192 (1.9%) were female. All donors from the 11 areas of N.W.F.P were screened for HCV and HIV antibodies by ELISA (Biokit). Blood groups were also determined.

**Results:** HCV prevalence was 2.6% while HIV infection was 0.045% in this Pakistani population. Prevalence of HCV and HIV in 2008 was 2.4% and 0.049% respectively. In 2009, it was 3.0% for HCV and 0.038 for HIV. Among the age groups, the prevalence of HCV and HIV was not significantly different ( $p=0.128$ ). Only 1484 (2.4%) of the donors were voluntary, the remaining were paid and family blood donors. The difference in the number of male and female donors was highly significant ( $p=0.00001$ ). The B+ blood group was found in 30.5% followed by O+ in 25.9%, A+ in 24.9%, AB+ in 10.4%, A- in 2.6%, B- in 2.5%, O- in 2.3%, and AB- in 0.9%. Our study revealed a higher prevalence of HIV than in most of previous reports.

**Conclusion:** The frequency of HCV infection in blood donors is higher in N.W.F.P than in most of the rest of the world and lower than in other regions of Pakistan. Transfusion of infected blood is a common cause of transmission. HIV prevalence is increasing in Pakistan.

**Keywords:** Blood donors, hematological values, hepatitis C, HIV, northwestern Pakistan

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Hepatitis C Virus (HCV) and human immunodeficiency virus (HIV) are responsible for many transfusion-transmitted infections. Worldwide, approximately 200 million people have chronic HCV infection [1] and 30.6-36.1 million people are living with HIV [2]. According to the 2008 AIDS fact sheet estimation of the National AIDS Control Program, 85,000 individuals are living with HIV/AIDS in Pakistan. The prevalence of HIV among the public is less than 1% but it is up to 21% among high-risk groups such as Injecting Drug Users (IDUs), sex workers

and commercial blood donors [3]. IDUs, unprotected sexual contact, and dental care are high risks for HCV and HIV transmission [4]. Blood donation by IDUs is a common practice in Pakistan because many private blood banks use paid donors [5].

In Pakistan, 10 million people are infected with HCV with a prevalence of 5% in the general population. HCV contains six genotypes and more than 100 subtypes. Among these genotypes, HCV 3a is the predominant type in Pakistan [6]. Common routes of HCV transmission are blood transfusion and use of intravenous drugs, injections by reused disposable syringes. Shaving in unhygienic barbershops, contaminated blood transfusion, drugs, and unsafe sex are the main causes of HCV and HIV transmission in Pakistan [7, 8].

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According to the current estimates of the WHO country office in Pakistan, 1.2 to 1.5 million people is being transfused annually. Most of the hospitals and health care centers in Pakistan have no screening programs and transfused blood is not tested for HCV and HIV. Due to the lack of organized infrastructure and standard transfusion guidelines, frequent blood recipients such as thalassaemics have a high rate of HCV (8.4%) and HIV (56.8%) infections [9]. The majority of patients receive blood from parents, relatives, and friends. Most of these voluntary donors hide their health status. Mandatory screening of donors is essential to ensure safe blood transfusion. Since little is known about the prevalence of HCV and HIV in Pakistani blood donors, we conducted this study.

## Methods

### Study design

This study was carried out between January 2008 and July 2009. It screened 62,251 healthy blood donors aged between 16 and 50 at blood banks of Government's Lady Reading Hospital at Peshawar with collaboration of the Center of Virology and Immunology (NCVI), National University of Science and Technology (NUST) Islamabad, Pakistan. The study was approved by the Ethics Committee of NUST.

### Population and assays

Blood samples of 62,251 presumably healthy blood donors were collected. They were tested for Anti-HCV and anti-HIV antibodies using the first generation Enzyme Linked Immunosorbant Assay (ELISA) test for HCV and HIV (Biokit 480&96, Barcelona, Spain). Out of 62,251 blood donors 61,059

(98.1%) were male while only 1,192 (1.9%) were female. Only 1,484 (2.4%) of the donors were voluntary, the remaining were paid and family blood donors (e.g. parents, relatives, and family members). We classified donors into voluntary and non-voluntary. We did not make a distinction between parents and relatives. Basic information including age and sex were obtained from the donors. Their ages ranged from 17-50 years. Donors came from various districts and small cities of N.W.F.P province including Peshawar, Nowshera, Sawat, Mardan, Karak, Kohat, Sawabi, Charsadda, Waziristan (FATA), Khyber Agency (FATA), and Mohmand Agency (FATA).

## Results

The frequency of HCV and HIV infection in blood donors was 2.6% (1,622 out of 62,251) and 0.045% (28 out of 62,251) respectively. The seroprevalence of HCV and HIV in 2008 was 2.4% and 0.049% respectively. In 2009, it was 3.0% (CI 2.7-3.28,) for HCV and 0.038 for HIV as seen in **Table 1**. The prevalence of HCV and HIV in the age group 17-33 was lower as compared to the age group 34-50 shown in **Table 2**. Only 674 (1.08%) of the donors were unrelated volunteers. Our study revealed a higher prevalence of HIV than most of the previous reports from Pakistan. Among the blood groups, B+ was the most common type (30.5%) followed by O+ in 25.9%, A+ in 24.9%, AB+ in 10.4%, A- in 2.6%, B- in 2.5%, O- in 2.3% and AB- in 0.9% blood donors (**Table 1**).

The difference in the number of male and female donors was highly significant ( $p=0.00001$ ). The comparison of our findings with previous studies with respect to geographical distribution is shown in **Table 3**.

**Table 1.** Summary of HCV, HIV, and various blood groups

Year	HCV	HIV	A+/A-	B+/B-	O+/O-	AB+/AB-	Total
2008	924	19	9899/914	12024/874	10321/836	3841/292	39,001
2009	698	09	5601/704	6962/683	5801/596	2633/270	23,250
P-Value	0.00001	0.56	0.0002	0.0001	0.0001	0.005	-
Percent	2.4 (2008) 3.0 (2009)	0.049 (2008) 0.039 (2009)	24.9/2.6	30.5/2.5	25.9/2.3	10.4/0.9	62.7 (2008) 37.3 (2009)

**Table 2.** HCV and HIV seropositivity with respect to age groups

Age group	HCV positive cases and prevalence (n, %)	HIV positive cases and prevalence (n, %)	CI (95%)	P-Value	Total donors
17-33	770 (2.3%)	17 (0.051%)	2.28-2.44	0.128	32,846
34-50	852 (2.9%)	11 (0.037%)	2.85-3.15		29,405

**Table 3.** HCV and HIV prevalence in blood donors in different areas of Pakistan

Region/ city	Author	Year	Population size (n)	Prevalence of HCV (%)	Prevalence of HIV (%)
N.W.FP (Peshawar)	Safi et al (present study)	2009	62,251	2.6	0.045
Karachi	Mujeeb et al [10]	2007	21,125	3.3	0.0001
Bahawalpur	Fayyaz et al [11]	2006	27,938	2.5	0
Lahore	Sirhindi et al [12]	2005	18,216	4.16%	0
Islamabad	Asif et al [13]	2004	3,430	5.14%	0.25
Rawalpindi	Mumtaz et al [14]	2002	580	6.21%	0

## Discussion

Pakistan is a resource-constrained country where blood transfusion procedures are widely unsafe and below WHO standards. Luby *et al* [19] conducted a study on blood banks in Karachi and reported that 29% of the blood banks were storing blood above WHO recommended temperature and only 23% were screening blood for HCV. In our study, 62,251 presumably healthy blood donors were screened for HCV and HIV in one of the four provinces of Pakistan lying on the border with Afghanistan. Our analysis suggests that the prevalence of HCV (2.6%) is lower than in most of the previous studies conducted in other provinces of Pakistan while HIV (0.045%) is more prevalent. Among the blood groups, B+ as the most common. According to our previous report [7], the average prevalence of HCV in Pakistani blood donors is 3.78%.

In western societies, women are actively engaged in welfare and volunteer. However, in Pakistan and other Islamic countries males are more frequently involved. Our study revealed 98.1% donors were male ( $p=0.00001$ ). Among the age group 17-33, HIV was more frequent than in the age group 34-50. In contrast, the HCV prevalence was higher among ages 34-50. This prevalence of HIV in young blood donors indicates the involvement of the younger people in risk related activities like IDUs, blood transfusions,

and commercial sex. Three studies were conducted in Pakistan (Rawalpindi, Lahore and Bahawalpur respectively), in which a zero percent prevalence of HIV was reported [11, 12, 14]. Studies from Karachi also show a low HIV prevalence of 0.0001% [10]. According to the US Centers for Disease Control, most of the new HIV cases are the direct consequence of promiscuous sexual relationships [15].

Our findings are not comparable with the prevalence of HCV and HIV in other Southwest and Southeast Asian countries [16, 17]. HIV is less frequent while HCV is relatively more frequent in Pakistan. Between 1998 and 2002, the seroprevalence of HCV in consecutive blood donors was assessed at two blood banks in Karachi, Pakistan. The overall of HCV seropositivity in blood donors revealed a significant linear increase from 1998 to 2002 [18]. However, onward from 2002, there seems to be a decrease in the HCV seroprevalence in blood donors. Various studies have revealed a decreased incidence and trend of post-transfusion hepatitis C virus. HCV prevalence in blood donors have been reported 6.2%, 5.1%, 4.16%, and 3.3% from Rawalpindi, Islamabad, Lahore, and Karachi regions respectively [10, 12-14]. Our study shows a relatively lower prevalence of HCV (2.6%) than all these studies. This striking decrease may be due to the awareness and more frequent donor screening.

## Conclusion

The frequency of HCV infection in blood donors is higher in N.W.F.P than in the most of the rest of the world and lower than in other provinces of the country. Transfusion of infected blood is one of the common causes of its transmission. HCV prevalence is decreasing while HIV is increasing in northwestern of Pakistan.

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