

## Seroprevalence of Hepatitis B, Hepatitis C, Human Immunodeficiency Virus, syphilis, and malaria among blood donors at tertiary care hospital blood bank

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### Abstract

**Objective:** To ascertain the frequency of markers of transfusion-transmitted infections among blood donors in a tertiary care setting.

**Method:** The retrospective cross-sectional descriptive study, was conducted in the Blood Bank section of the Department of Pathology at the Dow University of Health Sciences, Karachi, and comprised data of blood donors from January 2013, to October 2018. All blood donors had been screened for hepatitis B, hepatitis C, human immunodeficiency virus I and II, syphilis through electrochemiluminescence and malaria using immunochromatography. Data was analyzed using SPSS 21.

**Results:** Of the 29,732 donors, 29,712(99.93%) were males and 20(0.06%) were females; 12(0.04%) were volunteers and 29,720(99.95%) were exchange donors. Overall, 2587(8.7%) donors were positive for an infectious disease; 908(3%) hepatitis C virus, 887(2.9%) hepatitis B, 620(2%) syphilis, 168(0.5%) human immunodeficiency virus and 4(0.02%) malaria.

**Conclusion:** Hepatitis C and B were the most frequent infections, followed by syphilis in the sample.

**Keywords:** Blood transfusion, Transfusion-transmitted infections, Blood donors. (JPMA 71: 897; 2021)

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### Introduction

Blood transfusion is a therapeutic procedure used widely for a variety of conditions and diseases. However, transfused blood may be potentially fatal due to contamination with high-risk common infectious diseases, like hepatitis B virus (HBV) and hepatitis C virus (HCV) which are the most prevalent.<sup>1</sup>

Pakistan is a developing country, with a yearly transfusion rate of approximately 1.5 million.<sup>2</sup> Volunteer or exchange transfusions are mostly hospital-based, with hospital blood banks covering the entire haemovigilance process through the donor-to-recipient chain, including, but not limited to, blood collection, screening, crossmatching and transfusion. There are also multiple private blood banks across the country which provide suboptimal quality control, ineffective screening procedures, and storage and transfusion practices. In addition to the private sector, several non-profit organisations provide transfusion services for targeted population groups, such as thalassaemic patients.<sup>3</sup> This lack of harmony between hospitals and other transfusion services in Pakistan has resulted in transfusion-transmitted infections (TTIs) being a significant issue, compromising the safety of both the donors and the recipients. The prevalence of these TTI-based diseases have decreased globally due to established

regional TTI trends and strict implementation and maintenance of haemovigilance practices. However, the prevalence of TTIs is still an issue in Pakistan.

The current study was planned to ascertain the frequency of TTI markers among blood donors in a tertiary care setting.

### Materials and Methods

The retrospective cross-sectional descriptive study was conducted in the Blood Bank section of the Department of Pathology at the Dow University of Health Sciences (DUHS), Karachi, and comprised data related to blood donors from January 2013 to October 2018. Data was collected after approval from the institutional ethics review board. The data collected was related to both voluntary and replacement donors from whom informed consent had been obtained at the time of blood collection. For the purpose of the study, data included was related to donors of both genders aged 18-60 years, weighing at least 50kg or more, with females having haemoglobin (Hb) of at least 12.5g/dl and males with at least 13.5g/dl. Physical examination, including height, weight, blood pressure (BP), pulse and temperature was recorded for all donors. Data related to high-risk donors was excluded in accordance with the World Health Organisation (WHO) guidelines implemented through the standardised donor questionnaire.

At the DUHS blood bank, all blood products after preparation undergo screening for HBV, HCV, human immunodeficiency virus (HIV) I and II and syphilis through

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**Table:** Trend and frequency of transfusion-transmitted infectious marker in blood donors.

Years	2013	2014	2015	2016	2017	2018	TOTAL
No: of Donors	4277	3666	3385	4287	8114	6003	29732
Anti HCV	105 (2.5%)	115 (3.1%)	111 (3.2%)	132 (3.07%)	218 (2.68%)	227 (3.78%)	908 (3.05%)
HbsAg	101 (2.3%)	118 (3.21%)	105 (3.1%)	174 (4.05%)	215 (2.64%)	174 (2.89%)	887 (2.9%)
Syphilis	74 (1.73%)	106 (2.89%)	102 (3.01%)	68 (1.5%)	139 (1.71%)	131 (2.18%)	620 (2.0%)
HIV	74 (1.7%)	11 (0.30%)	12 (0.35%)	29 (0.67%)	21 (0.25%)	21 (0.34%)	168 (0.5%)
Malaria	01 (0.02%)	None	None	None	01 (0.01%)	02 (0.03%)	04 (0.02%)

HCV: Hepatitis C virus; HbsAg: Hepatitis B surface antigen; HIV: Human immunodeficiency virus.

electrochemiluminescence (Cobas e 601 Roche), while malaria is confirmed either way using immunochromatography (ONSIT Malaria Ag P.f /Pan). For further confirmation, products with negative viral serology are tested with nucleic acid amplification testing (NAT) to rule out the window period of replicating viruses. The screening results, when completed, are notified to the donor.

Data was analysed using SPSS 21. The frequency of infectious disease markers hepatitis B surface antigen (HBsAg), anti-HCV, HIV, syphilis and malaria were calculated.

## Results

Of the 29,732 donors, 29,712(99.93%) were males and 20(0.06%) were females; 12(0.04%) were volunteers and 29,720(99.95%) were exchange donors. Overall, 2587(8.7%) donors were positive for an infectious disease; 908(3%) anti-HCV, 887(2.9%) HBsAg, 620(2%) syphilis, 168(0.5%) HIV and 4(0.02%) malaria (Table).

## Discussion

Blood transfusion is an important therapeutic procedure for several diseases that can be lifesaving. However, the local burden of transfusion-transmitted reactions can cause this very lifesaving intervention to be potentially fatal.

The prevalence of hepatitis C in Pakistan is possibly the second highest in the world, affecting approximately 5% of the population.<sup>4</sup> A recent study in Punjab showed that 17.3% participants were positive for anti-HCV antibodies.<sup>5</sup> In the current study, the mean prevalence of anti-HCV was 3%, with an overall static trend from 2014 up until 2018. This is lower compared to the frequency of 3-5% reported by a local study, and similar to the 2.46% reported by a systemic review carried out in Pakistan.<sup>7</sup> However, the prevalence noted in the current study is much higher than a similar study in Islamabad which reported a prevalence of 1.03%.<sup>8</sup> The discrepancy among the prevalence at different hospitals may be secondary to differences in quality control practices and might be secondary to the fact that the DUHS caters to a low socioeconomic group

which may be related to the high burden of HCV in the current study. The mean prevalence of HbsAg in blood donors in the current study was 2.9% which was higher compared to a local study in Islamabad and Karachi<sup>8,9</sup> due to differences in patients' socioeconomic group. The prevalence was similar to but still

higher than that reported by a systemic study in Pakistan (2.68%).<sup>7</sup> Studies report that there is a decreasing trend of HBV due to the availability and increased awareness of vaccinations against HBsAg.<sup>10</sup> However, in Pakistan, vaccination alone against HBV cannot account for a decrease in prevalence due to it being unavailable to a larger lower socioeconomic income group and this population might not be able to afford it.<sup>11</sup> This may explain the higher prevalence of HBV seen in the current study. This is further enforced by a study carried out to determine the prevalence of TTIs in blood donors from interior Sindh between 2004 and 2007, where the decreasing prevalence of HBV was found in literate blood donors, emphasising that socioeconomic background is an important factor contributing to HBV prevalence.<sup>12</sup> There is limited study on the prevalence of syphilis and HIV in Pakistan. The prevalence in the current study is higher than that reported in previous studies, reflecting an increasing trend in these TTIs.<sup>13,14</sup> The current prevalence of syphilis and HIV is higher compared to 0.75% and 0.16% respectively reported recently.<sup>7</sup> Another large study reported 0.11% positivity for HIV and 0.91% for syphilis infection among blood donors. The trend for syphilis positivity appears to be increasing, while HIV infection has remained static.<sup>15</sup> The current malaria prevalence is similar to that reported by a local study.<sup>7</sup> With a transfusion rate of 1.5 million per year, according to the WHO,<sup>2</sup> it makes it incumbent upon blood bank physicians to keep updating TTI prevalence data in their respective hospitals and private laboratories. This will help in monitoring TTI trends and to perform root cause analysis of increasing trends, leading to proper interventions for safe blood transfusion practices. Pakistan is a developing country with different safety practices amongst hospital blood banks, private-sector entities and non-profit organisations. This is partly due to unorganised infrastructure, lack of continuous supply of electricity and the inability to buy expensive reagents and equipment, and mainly due to poor transfusion network chain and haemovigilance.<sup>16</sup> The differences in the prevalence of TTIs across hospitals reflect this lack of harmonious safe transfusion practices. Another factor contributing to the variation in prevalence in TTIs with a

higher prevalence is also due to the differences in socioeconomic groups, with the DUHS catering to a lower income group. This makes population-based studies an important requirement to identify different groups with high TTI prevalence. Identification of such groups will help in the analysis of contributing factors, which will lead to control of these diseases in the general population. Other interventions should be done simultaneously to decrease frequencies of TTIs which include educating public and healthcare personnel regarding TTIs, stressing the importance of stringent donor deferral criteria, and conducting audits to measure the trend and frequencies of these infectious markers after application of such interventions.

### Conclusion

HbsAg and anti-HCV were the most frequent infections, followed by syphilis. Hepatitis B and C are to date among the most prevalent risk factors of transfusion in Pakistani population. The variance in quality control steps amongst different hospitals and private-sector entities along with differences in socioeconomic groups catered by various facilities impose a challenge to decrease the trend of TTIs in blood donors and in the general population at large. Appropriate interventions, such as stringent donor screening, and following appropriate guidelines on safe blood transfusion along with population-based studies are required to decrease the risk of TTIs.

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