



## Original Article

## Prevalence of Transmissible Infectious Diseases among Healthy Blood Donors in Faisalabad, Pakistan

Syed Kashif Raza<sup>1\*</sup>, Hassan Bajwa<sup>2</sup>, Hina Javaid<sup>2</sup>, Rafia Anwar<sup>2</sup>, Muhammad Hashim<sup>1</sup> and Kamran Saleem<sup>1</sup><sup>1</sup>Faculty of Rehabilitation and Allied Health Sciences (FRAHS), Riphah International University, Faisalabad, Pakistan<sup>2</sup>College of Allied Health Sciences, Government College University, Faisalabad, Pakistan

## ARTICLE INFO

## Key Words:

TTIs, HCV, HBV, HIV, Syphilis, Malaria, Pakistan

## How to Cite:

Kashif Raza, S. ., Bajwa, H. ., Javaid, H. ., Anwar, R. ., Hashim, M. ., & Saleem, K. . (2023). Prevalence of Transmissible Infectious Diseases among Healthy Blood Donors in Faisalabad, Pakistan: Transmissible Infectious Diseases among Healthy Blood Donors. *Pakistan Journal of Health Sciences*, 4(03). <https://doi.org/10.54393/pjhs.v4i03.544>

## \*Corresponding Author:

Syed Kashif Raza  
 Faculty of Rehabilitation and Allied Health Sciences  
 (FRAHS), Riphah International University, Faisalabad,  
 Pakistan  
[s\\_kashif\\_raza@outlook.com](mailto:s_kashif_raza@outlook.com)

Received Date: 3<sup>rd</sup> February, 2023Acceptance Date: 25<sup>th</sup> March, 2023Published Date: 31<sup>st</sup> March, 2023

## ABSTRACT

Blood transfusions are necessary due to the increased incidence of blood diseases and an increase in automobile accidents. In healthcare systems with limited resources, the provision of safe blood products is hampered by transfusion-transmitted diseases (TTIs), such as the hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), syphilis, and malaria. **Objective:** To determine how common TTIs are among blood donors in Faisalabad. **Methods:** Immuno-chromatographic technique (ICT) kits and thick film (malaria) screening were used to test donors for HBV, HCV, HIV, syphilis, and malaria. **Results:** Among 1500 donors, prevalence of HCV was highest (n=106), followed by HBV (n=42), syphilis (n=11), and malaria (n=3). One positive case was reported as HIV. Between the ages of 21 and 40, donors who tested positive were more prevalent. **Conclusions:** By more carefully evaluating and screening each donor before selecting them for blood donation, safe blood transfusions can both increase recipient safety and reduce the spread of TTIs.

## INTRODUCTION

Even though giving blood might benefit patients' quality of life, it is also one of the main ways that infections spread. Patients, physicians, and governments who want to ensure a safe blood supply are very concerned about TTIs. Some of the most common TTIs include HIV, HBV, HCV, *Treponema pallidum* (Syphilis), and malarial parasite [1]. Everyone has the right to safe blood, claims the World Health Organization (WHO). For safe blood, a national program for donor selection, recruitment, retention, and education is required. As a result, there will be fewer donors available who might infect the receivers [2]. The WHO estimates that 118.2 million blood donations are made worldwide, with 58 percent taking place in low- and

middle-income countries [3]. Only 38 countries, in 2006, acquired more than 75% of their blood supplies from families; the remaining countries paid professional blood donors to provide the blood they needed [4]. Additionally, the WHO advises that each donation of blood be tested for those five pathogenic pathogens. The likelihood of morbidity and mortality linked to blood transfusions will increase with the transfusion of inflamed blood and blood additives. The effects on the individual, their family, and their communities are of extreme intensity [3]. In Pakistan, a country of almost 1.8 billion people, 1.5 million bags of blood are required annually; in the two main cities of the country, Karachi and Lahore, the private sector

meets 60% of the need and the public sector 40% [5]. In Pakistan, about 1.5 million units of blood are collected annually, with the bulk coming from replacement donors, who are typically the patient's family or close friends who want to lend a hand in times of need [4]. Although Pakistan has a high rate of HBV and HCV, recent research has raised questions regarding an increase in other TTIs, including HIV and Syphilis [6]. The precise prevalence of TTIs in our population is unknown due to a lack of information, the lack of screening tests, the limited availability of healthcare services, and the absence of surveillance systems [7]. This study's main goal was to determine the prevalence of these five TTIs, which are distributed through blood donation, to rule out the presence of TTIs in healthy donors of different ages and genders at public and private blood centers in the district of Faisalabad, Pakistan. Detecting asymptomatic patients among healthy donors is another goal, as is making it possible to eliminate risk factors for TTIs among healthy donors to prevent the need for blood transfusions.

## METHODS

This hospital-based prospective cross sectional study received approval from the institutional ethics committee and was carried out with the consent of the hospital's administrator in accordance with the Helsinki Declaration. The samples were analyzed in the blood banks at the Allied Hospital, DHQ Hospital, Regional Blood Bank, and Mujahid Hospital in Faisalabad, Pakistan. These hospitals offer medical care to the local people as well as those who come from other areas of the region. The study was carried out between March and July 2022. The blood donors' demographic data was documented. Each potential blood donor was required to complete a questionnaire about their general health and medical history. We chose donors who were between the ages of 18 and 50, had hemoglobin levels larger than or equal to 12 mg/dl, pulse rates of 50 to 100 beats per minute, weights greater than or equal to 50 kg, normal blood pressure, and skin free of any lesions at the site of venipuncture. Prior to screening, all blood donors underwent regular medical examinations to check for exclusion criteria. Additionally, blood donations were turned down for anyone who appeared to be ill or undernourished. If the possible donor was under the age of 18, under 50 kg, anemic, or otherwise appeared unwell or undernourished, if they had a history of jaundice, malaria, asthma, or HBV, HCV, or HIV infection. All samples that didn't fulfil the specified standards were disqualified from blood donations. Blood-borne infection sufferers with a recent history were also prohibited from donating. A sterile test tube was used to collect the blood, and 5 ml of each sample was centrifuged for 5 minutes at 3500 rpm to

separate the serum. Within 24 hours following the collection, tests were conducted. ICT kits were used for screening for HBsAg, anti-HIV, and anti-HCV (Healgen Scientific LLC, China). With the enzyme-linked immune sorbent assay (ELISA), all seropositive samples were retested for confirmation. Examining both thick and thin blood smears allowed researchers to identify the malarial parasite, and following thorough quality control, all serological testing was conducted. Microsoft Excel was used to process and display the data that had been collected.

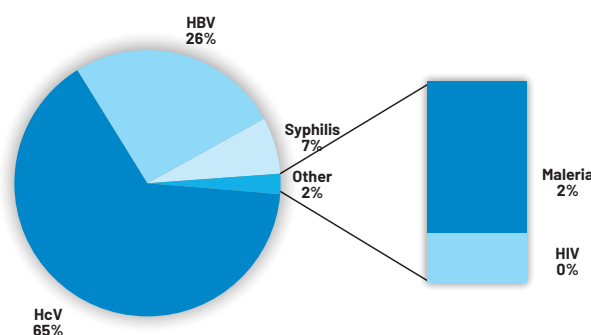
## RESULTS

A total of 1500 donors (male= 1404, female=96) were screened for the prevalence of TTIs. Out of 1500 donors, 163 (10.9%) donors were positive and 1337 (89.1%) were negative. Prevalence of HCV was most prevalent 7% (n=106), followed by HBV 2.8% (n=42), Syphilis 0.7% (n=11), malaria 0.2% (n=3), and HIV 0.06% (n=1) (Table 1).

**Table 1:** Detail of positive and negative samples

Variables	Category	Frequency (%)
Gender	Female	96 (6.4%)
	Male	1404 (93.4%)
Negative cases	Total	1500 (100%)
	-	1337 (89.1%)
Positive cases	HCV	106 (7%)
	HBV	42 (2.8%)
	Syphilis	11 (0.7%)
	Malaria	3 (0.2%)
	HIV	1 (0.06%)
	Total	163 (10.9%)

Out of positive donors, prevalence of HCV, HBV, Syphilis, malaria, and HIV was 65%, 26%, 7%, 2%, and 0.6% (Figure 1).



**Figure 2:** Distribution of TTIs in infected donors

Donors between the ages of 20 and 55 were chosen at random while keeping in mind the standard requirements for blood donation. The current study did not select and include donors whose ages were not within the selection criteria. The highest % of donors were reported between the age group of 25 to 40 years and lesser with reported at a minimum and maximum age of selection criteria. The

sample gender distribution of donors demonstrated that men made up the majority. Three anti-HCV antibodies and only two HBsAg positive female donors were found. For syphilis, malaria, and AIDS, no females tested positive.

## DISCUSSION

Transfusions of unsafe blood are extremely costly, both monetarily and in terms of human lives. TTIs infections affect recipients, families, and communities for the long term since the sick person is a virus reservoir and can propagate the disease [8]. Hepatitis B, C, D, and G viruses, HIV, CMV, human T lymphotropic virus (HTLV I and II), *Treponema pallidum*, *Brucella species*, *Toxoplasma gondii*, *Plasmodium species*, and *Trypanosoma cruzi* are among the pathogens that can spread through transfusion [6]. A screened donor's donation of blood and blood products can lessen the chance of TTIs [9]. In our study, ICT kits were used to screen all donated blood for the presence of HBsAg, HIV Ag/Ab, and anti-HCV Ab, and ICT is the most widely used test in diagnostic laboratories around the world for making quick decisions regarding patient diagnosis and care. Hepatitis was the most prevalent TTI among the donors at the district Faisalabad blood transfusion centers. In 106 donors (7%), anti-HCV antibodies were discovered. In a systematic review in 2020 researchers showed a cumulative frequency of HCV 2.44% (ranging 1.57% to 8.34%), in 26 studies conducted all over Pakistan, among 17660 blood donors. HCV prevalence was <2% in 8 studies, 2–4% in 15 studies, and >4% in 3 studies [10]. Previously in 2019, 3.24% HCV prevalence was reported in Faisalabad at Madinah Teaching Hospital [11]. Our study showed that prevalence of HCV is increasing among blood donors of this locality. For the HBV antigen, 42 blood donors (2.8%) had positive results as compared to another study in which load of HBV in donors was 1.12% in Faisalabad [11]. While all over the Pakistan the 2.04% cumulative prevalence of HBV ranging from 0.81% to 4.22%, was reported in 24 studies among 16230 blood donors, in which 20 studies had HBV prevalence <2% while 4 studies showed >2% [10]. Worldwide over 350 million of the 2 billion people with HBV infection are suffering from a chronic infection, which is characterized by the persistence of the virus and HBsAg in the blood as well as the generation of viral antigens and HBV DNA in the liver. A million people every year pass away from chronic liver disease linked to HBV. 15 to 40% of those with persistent HBV infection develop cirrhosis, liver disease, or hepatocellular carcinoma (HCC). Infected people have HBV in their blood, saliva, semen, vaginal secretions, and menstrual blood [12]. During the infection's window period, a carrier person can spread HBV without being noticed [13]. Nucleic acid testing (NAT) may be utilized to identify such carriers when the amount of

detectable HBsAg is insufficient. Because of NAT testing of blood and blood products as well as pre-transfusion screening, the prevalence of TTI infection has significantly decreased in the US and Europe [14]. Using the VDRL, 11 (0.7%) cases of syphilis were verified, which was low as compared to previously reported value of 1.10% in Faisalabad [11]. In 2020 researchers reported a cumulative frequency of 1.1% in 6974 blood donors, in which seven studies reported <1%, six studies between 1% and 2%, and four studies reported >2% syphilis prevalence [10]. Each year, almost 1 million women with active syphilis give birth. Without treatment, 25% of them will give birth to a stillborn child and 33% will have a baby that is underweight and has a higher risk of dying within the first month of life. By screening pregnant women and giving those who test positive a single dosage of penicillin before 28 weeks' gestation, adverse pregnancy outcomes caused by syphilis can be avoided [15]. Three donors (0.2%) who had minor fever symptoms were discovered to have *plasmodium* during temperature monitoring. Previously, a review article reported cumulative 0.11% material frequency ranged from 0.005% to 1.2% in Pakistan in 368 donors. All research showed <1% prevalence of malaria except one study conducted by Ehsan et al., (1.20%) [10]. One of the deadliest infectious diseases to affect humans—presents challenges in both clinical and economic terms. The mosquito is typically the insect vector that spreads *Plasmodium* species across vertebrate hosts [16]. In 1911, the first case of malaria associated with transfusion was reported [17]. Malaria is growing prevalent in underdeveloped nations, notably Africa, with approximately 300 million cases and 100 million fatalities annually [18]. In our study only a single case (0.06%) was reported of HIV, while 0.18% prevalence was reported previously in healthy donors of Faisalabad [11]. Ehsan et al., reported 0.038% of cumulative HIV prevalence ranged between 0% and 0.18% in 497 blood donors based on 18 studies in Pakistan [10]. According to a study by Agha Khan University, transfusion-associated HIV prevalence ranged from 0.013 percent to 0.116% [19]. The viremia in a given population, the sensitivity of screening tests like ELISA done on blood donors, the stage of blood transfusion including the preantibody phase of infection, and the quantity of blood bags being transfused to the recipient could all be significant factors in transmission [20]. The average incubation period and time to produce measurable antibody levels, according to various research, is almost eight weeks. Due to the low likelihood of antibody detections during that stage, there is a higher risk of HIV transmission from blood transfusions [21]. The interval between the commencement of the illness and viremia may be five years [22]. Prior to blood transfusion, screening techniques have reduced the annual incidence

of TTIs from 4000 to 100. The majority of TTIs currently occurs during pre-antibody screening and transfusion. NAT may aid in the safe transfusion of blood prior to the establishment of a detectable quantity of antibody when ELISA is inadequate [23]. Pakistan is at a high risk for transmittable infectious illnesses due to its underdeveloped status. According to a recent WHO study, there are currently 2 billion, 200 million, and 33.4 million HBV, HCV, and HIV infections, respectively, making the complete eradication of risk factors linked to TTIs still unattainable. Between 97,000 and 125,000 people in Pakistan contract HIV. In Pakistan, 3 million pints of blood are donated each year, and there is a 1% possibility of developing TTIs (transfusion-related illnesses). Many healthy individuals carry these infectious agents, which can be reduced by enabling effective TTIs agent pre-screening [24]. When antibody testing techniques fail to detect pathogens in blood components, NAT testing has improved the sensitivity of pathogen detections during window or incubation periods of the pathogen.

## CONCLUSIONS

It was concluded that 10.9% blood donors who look healthy had some type of TTIs, especially hepatitis, and had potential to transmit TTIs more commonly. It is mandatory to improve the procedure and sequence of events involved in the order of selection of blood donors so that the spread of TTIs can be controlled, maintaining increased recipient safety.

## Conflicts of Interest

The authors declare no conflict of interest.

## Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

## REFERENCES

- [1] Arshad A, Borhany M, Anwar N, Naseer I, Ansari R, Boota S, et al. Prevalence of transfusion transmissible infections in blood donors of Pakistan. *BMC Hematology*. 2016 Dec; 16: 1-6. doi: 10.1186/s12878-016-0068-2.
- [2] Karimi G, Gharehbaghian A, Tafti MF, Vafaiyan V. Emerging infectious threats to the blood supply: seroepidemiological studies in Iran-a review. *Transfusion Medicine and Hemotherapy*. 2013 May; 40(3): 210-7. doi: 10.1159/000351540.
- [3] Saba N, Nasir JA, Waheed U, Aslam S, Mohammad I, Wazeer A, et al. Seroprevalence of transfusion-transmitted infections among voluntary and replacement blood donors at the Peshawar Regional Blood Centre, Khyber Pakhtunkhwa, Pakistan. *Journal of Laboratory Physicians*. 2021 Jun; 13(02): 162-8. doi: 10.1055/s-0041-1729485.
- [4] Manzoor I, Hashmi NO, Daud SE, Ajmal SA, Fatima HI, Rasheed ZA, et al. Seroprevalence of transfusion transmissible infections (TTIS) in blood donors. *Biomedica*. 2009 Jul; 25(10): 154-8.
- [5] Nazir S, Pracha HS, Khan A, Nazar A, Fayyaz A, Khan MS, et al. Prevalence of syphilis in Pakistani blood donors. *Advancements in Life Sciences*. 2013 Oct; 1(1): 27-30.
- [6] Mogtomo ML, Fomekong SL, Kuate HF, Ngane AN. Screening of infectious microorganisms in blood banks in Douala (1995-2004). *Cahiers D'études Et De Recherches Francophones/Santé*. 2009 Jan; 19(1): 3-8. doi: 10.1684/san.2009.0144.
- [7] Motayo BO, Faneye AO, Udo UA, Olusola BA, Ezeani I, Ogiogwa JI. Seroprevalence of transfusion transmissible infections (TTI), in first time blood donors in Abeokuta, Nigeria. *African Health Sciences*. 2015 Mar; 15(1): 19-24. doi: 10.4314/ahs.v15i1.3.
- [8] Ataro Z, Urgessa F, Wasihun T. Prevalence and trends of major transfusion transmissible infections among blood donors in Dire Dawa Blood bank, Eastern Ethiopia: retrospective study. *Ethiopian Journal of Health Sciences*. 2018 Nov; 28(6): 701-10. doi: 10.4314/ejhs.v28i6.4.
- [9] Rerambiah LK, Rerambiah LE, Bengone C, Siawaya JF. The risk of transfusion-transmitted viral infections at the Gabonese National Blood Transfusion Centre. *Blood Transfusion*. 2014 Jul; 12(3): 330.
- [10] Ehsan H, Wahab A, Shafqat MA, Sana MK, Khalid F, Abdullah SM, et al. A systematic review of transfusion-transmissible infections among blood donors and associated safety challenges in Pakistan. *Journal of Blood Medicine*. 2020 Nov; 11: 405-20. doi: 10.2147/JBM.S277541.
- [11] Rauf R and Cheema A. Potential risk of transfusion-transmissible infections among blood donors in district Faisalabad of Pakistan. *Clinical Medicine (London)*. 2019 Jun; 19(Suppl 3): 27. doi: 10.7861/clinmedicine.19-3s-s27.
- [12] Wright TL. Introduction to chronic hepatitis B infection. *American Journal of Gastroenterology*. 2006; 101(Suppl 1): S1-6. doi: 10.1111/j.1572-0241.2006.00469.x.
- [13] Keechilot CS, Shenoy V, Kumar A, Biswas L, Vijayrajratnam S, Dinesh K, et al. Detection of occult hepatitis B and window period infection among blood donors by individual donation nucleic acid testing in a tertiary care center in South India. *Pathogens and Global Health*. 2016 Nov; 110(7-8): 287-91. doi: 10.1055/s-0041-1729485.

- 10.1080/20477724.2016.1248171.
- [14] Salunkhe V, Van der Meer PF, de Korte D, Seghatchian J, Gutiérrez L. Development of blood transfusion product pathogen reduction treatments: a review of methods, current applications and demands. *Transfusion and Apheresis Science*. 2015 Feb; 52(1): 19-34. doi: 10.1016/j.transci.2014.12.016.
- [15] Marks M and Mabey DC. The introduction of syphilis point of care tests in resource limited settings. *Expert Review of Molecular Diagnostics*. 2017 Apr; 17(4): 321-5. doi: 10.1080/14737159.2017.1303379.
- [16] Sato S. Plasmodium—a brief introduction to the parasites causing human malaria and their basic biology. *Journal of Physiological Anthropology*. 2021 Dec; 40(1): 1-3. doi: 10.1186/s40101-020-00251-9.
- [17] Verra F, Angheben A, Martello E, Giorli G, Perandin F, Bisoffi Z. A systematic review of transfusion-transmitted malaria in non-endemic areas. *Malaria Journal*. 2018 Dec; 17: 1-4. doi: 10.1186/s12936-018-2181-0.
- [18] Kogan F. Remote Sensing for Malaria: Monitoring and Predicting Malaria from Operational Satellites. *Springer Nature*; 2020. doi: 10.1007/978-3-030-46020-4.
- [19] Moiz B, Ali B, Chatha MH, Raheem A, Zaheer HA. HIV prevalence in blood donors and recipients in Pakistan: a meta-analysis and analysis of blood-bank data. *WHO South-East Asia Journal of Public Health*. 2015 Jan; 4(2): 176-183. doi: 10.4103/2224-3151.206687.
- [20] Hyman JM, Li J, Stanley EA. The differential infectivity and staged progression models for the transmission of HIV. *Mathematical Biosciences*. 1999 Feb; 155(2): 77-109. doi: 10.1016/S0025-5564(98)10057-3.
- [21] Muñoz A, Sabin CA, Phillips AN. The incubation period of AIDS. *AIDS*. 1997; 11Suppl A: S69-76.
- [22] Han WM, Apornpong T, Kerr SJ, Hiransuthikul A, Gatechompol S, Do T, et al. CD4/CD8 ratio normalization rates and low ratio as prognostic marker for non-AIDS defining events among long-term virologically suppressed people living with HIV. *AIDS Research and Therapy*. 2018 Dec; 15(1): 1-9. doi: 10.1186/s12981-018-0200-4.
- [23] Ye X, Li T, Zhang R, Liu H, Zeng J, Hong W, et al. Comprehensive analysis of hepatitis B virus infections in blood donors in southern China that are surface antigen positive but nucleic acid testing negative. *Transfusion*. 2020 Jul; 60(7): 1476-82. doi: 10.1111/trf.15824.
- [24] Saeed M, Hussain S, Rasheed F, Ahmad M, Arif M, Rahmani MT. Silent killers: Transfusion transmissible infections-TTI, among asymptomatic population of Pakistan. *Journal of Pakistan Medical Association*. 2017 Mar; 67(3): 369-74.