Frequency of Hepatitis B, Hepatitis C and Human Immunodeficiency Virus in Blood Donors.

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ABSTRACT:

Objectives: To bring new data forward about the frequency of Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) in individuals who donate blood in Karachi to determine safety of collected donations, study is conducted in Dr. Ishrat ul Ebad Institute of Blood Diseases (DIEKIBD), Dow University of Health Sciences (DUHS) from January 2021 to July 2021.

Methodology: A retrospective analysis was performed for this study in which we retrieved the data of blood donors reported in Dr. Ishrat ul Ebad Institute of Blood Diseases (DIEKIBD) from the period of 1st January 2021 to 31st July 2021. All details are noted from the retrospective data.

Results: Among the total number of donors, 1204 donors were the deferred donors. Hepatitis C Virus (HCV) was positive in 194 (16.11%) of donors. Donors who were positive for Hepatitis B Virus (HBV) were 149 (12%) cases. Donors who were Human Immunodeficiency Virus (HIV) positive were 25(2%).

Conclusion: Frequency of viral infection in blood donors is extremely high, and it needs continues monitoring and evaluation for preventive measures.

Key words: Blood transfusion, blood donors, HCV, HBV, Immunodeficiency virus.

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Introduction:

Blood Transfusions are used for diverse hematological and other diseases to replace whole or lost components of the blood. Globally approximately 118 hundred thousand pints of blood endowments are gathered annually, however more units should be made available to meet the requirement of transfusion of all the patients in the world and protect the life of patients. Failure to ensure blood safety may pose life-threatening risks and there is an elevated risk of transfusion transmitted infection. With each transfusion there's a possibility of spreading of blood derived pathogens, among them viral infections have high contribution, including mainly viral hepatitis B virus, human immunodeficiency virus, and hepatitis C virus.[1]

As reported by Global health agency like World Health Organization (WHO) guidelines, screening should be done for all blood donations prior to use, including mandatory screening of HIV, hepatitis B, and hepatitis C. As these illnesses give rise to carrier states, infectivity and increase viremia and chronic stages that contribute in high mortality and morbidity due to infection spread, opportunistic infection and carcinomas, respectively.[2] Among blood donors' population the occurrence of virus-related illness shows variation by geography and area, and it is related to the dominance of these viral illnesses in their general population. Developing countries have high frequency of transmissible transfusion viral infections.[3] Amongst the blood donation population, incidence of HBV, HCV and HIV has diverse figures ranging from 0.008% to 6.08%, 0.004% to 1.96%, and 0.0004% to 2.0%, respectively shown by WHO reports. In Pakistan it was previously reported that hepatitis B and hepatitis C are widespread viral viruses (HBV: 2.5% and HCV: 4.9%).[4] Recently new patterns of Blood transfusion infections show increased frequency of HIV together with HBV and HCV.[5,6] More than 150 thousand pints of blood is donated every year in Pakistan. However, majority of these are substitute donors who are among the close contact like family members and friends of the patient. As reported by WHO, replacement and paid donors have increased prevalence of TTIs than voluntary, unpaid blood donors. It is especially important to investigate the frequency of these viral illnesses in donors of blood to know current prevalence rate.

During current study we will focus on the viral infections mostly spread through blood transfusions in Karachi, Pakistan to get an average prevalence among different age groups and gender. We will retrospectively evaluate blood screening record of blood donors.

Methodology:

This is a retrospective study in which we retrieved the data of blood donors reported at Dr. Ishrat ul Ebad Institute of Blood Diseases from the period of 1st January 2022 to 30th June 2022. Before donation, each donor was assessed through a physical examination and medical history

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interview as a routine step to ensure eligibility. Individuals were deemed eligible as blood donors if they were between 18 and 65 years of age, had a body weight exceeding 45 kg, and a hemoglobin concentration of 12.5 g/dL or higher. In addition, donors were required to be both physically and mentally fit, with no prior history of high-risk behaviors, blood transfusions, surgical procedures, high blood pressure, or other significant medical conditions. Donors presenting with an active fever at the time of assessment were also excluded from eligibility. Donors falling outside the specified eligibility requirements were not considered for participation.

Screening approach: Standard commercial ELISA kits were used to screen all blood samples for HBsAg, HIV Ag/Ab, and anti-HCV once they were collected. Every sample that tested positive at first was retested. Samples were classified as seropositive if they consistently reacted when tested again. HIV Western Blot (WB), HCV recombinant immunoblot assay (RIBA), and HBsAg positive assay were used to confirm positive results. A monoclonal assay of neutralization was used to confirm the presence of the HIV p24 antigen in samples that tested negative on Western Blot (WB).

Statistical analysis: Statistical Package for the Social Sciences version 22.0 employed for interpretation. Entire dataset was provided in terms of percentages and frequency to provide basic descriptive information.

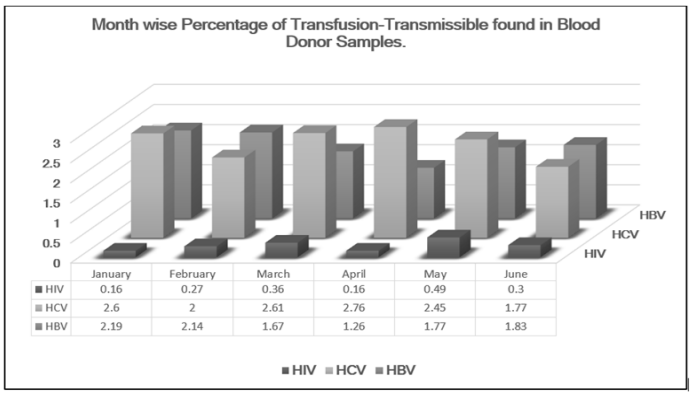
Results:

During current study most of the blood donations collected were from replacement by the family donors. There was a total of 8265 blood donors amongst which 8241 were males and 24 were females. Among the total number of donors, 1204 donors were the deferred donors. HCV was positive in 194 (16.11%) of donors. Donors who were positive for HBV were 149 (12%) cases. Donors who were HIV positive were 25(2%).

Table 1 shows the number of male and female donors in over a six-month interval.

Donor	Jan	Feb	March	April	May	June	Total
Male	1231	1116	1376	1265	1634	1619	8241
Female	0	01	01	03	01	18	24

Fig No 1: Month wise Percentages of HCV, HBV and HIV



Bar graph in fig no 1 shows percentages of HCV, HIV and HBV Infections in our donors of blood samples per month. X axes show months. Y-axis has percentages of cases of HIV, HBV & HCV. Black bar represents HIV cases, Light grey bar represents HCV and dark grey represents HBV.

Discussion:

Blood transfusion services constitute a reliable platform for epidemiological monitoring, offering critical public health data in resource-limited regions and during humanitarian emergencies. Evaluation and surveillance of Transfusion related viral infection prevalence trends in blood donors allows us to assess the protective availability of the blood products as well as the efficiency of donor detention criteria and hemovigilance methods. Furthermore, it may show the prevalence of Transfusion related viral infection in the general population. Blood transfusion has a potential risk of transmitting life-threatening. It is estimated that over 100 million units of blood are donated annually around the world.[7] Transfusion related viral infection which has a serious health impact world-wide. HIV is especially concerning because of its chronic carrier status and the serious repercussions that come with untreated or advanced infection, such as immunosuppression that lead to higher vulnerability to opportunistic illnesses. Current study highlights the prevalence of viral infections in donors.[8] Majority of our donors are male as compared to the women which is coherent with other findings done by Valerian D.M et al , Siraj N et al and Wang W et al.[9-11] However, given that the numbers of female donors were just 24 this may not accurately reflect the reality. Major type of donors in our study is from family/replacement donors. According to WHO report, fifty percent of blood donors in fifty four countries is still relying on family/ replacement or paid donors where as in other countries like Ethiopia voluntary un paid donors has major share.[12]

Major viral infection that cause donors defer is due to high HCV frequency approximately 16.2 % of donors which is consistent with the many studies show high prevalence of HCV in donors.[13,14] Previous studies from Pakistan also reported high HCV infection in donors.[15] But Mavenyengwa et al and Okunade, K. S.et al found that HBV and HIV is the most frequent infection in donors in Nambia and Nigeria, respectively.[16,17]

In our study, HCV is followed by HBV infection whose frequency found in donors is 12 % which is very high compared to other regions of world. HBV infection poses a concern to health in many regions of the world, notably in highly prevalent places like the Asia-Pacific region. This may be much lower among the donor group, but it might potentially be considerable in the general population.[16] Many studies also reported high HBV prevalence.[18-20] This is a concerning situation that requires particular care.

HIV contributes 2% frequency in donors which is higher as compare to the analyses done by Aliyo, A.et al, Farshadpour, and Al hazari T et al.[13,21,22] In our study, the frequency of viral infection is increasing in six months of time. However certain studies reported decrease pattern of these viral infection among the donors.[23] Observed heterogeneity in prevalence estimates among studies can be attributed to disparities in regional risk profiles, donor population composition, methodological frameworks, and contextual determinants including occupational exposure and geographic setting. Additionally, discrepancies may arise from differences in diagnostic methods and prescreening processes.[24] Fluctuations in the seroprevalence geographically due to the variation in risk activities, informative programs, preventive actions, public alertness, choice of donor assortment and selection method, sensitivity and specificity of screening techniques available in blood banks characteristics of their test kits and diagnostic algorithms used in each

study.

Given its retrospective design, the study was constrained by incomplete access to key demographic variables, including marital status, educational attainment, and occupational information, as well as by the restricted study duration and the unavailability of data on hepatitis B vaccination status. Moreover, the reliance on serological assays instead of molecular diagnostics may have led to an underestimation of the true prevalence of transfusion-transmissible viral infections. Furthermore, several persistently diseased people show inconsistent HBV viral load, whilst many people have no obvious HBsAg owing to the mutations in viral genomes and defects in replication.

Conclusion:

Among the blood donors the frequency of viral infection is very high, and it needs continues monitoring and evaluation for preventive measures. Public awareness regarding voluntary blood donation should be spread. Strict criteria should be implemented for the donor's selection, blood and blood related products screening method by using sensitive diagnostic kits.

Conflict of interest: none

References:

1. Stokx J, Gillet P, De Weggheleire A, Casas EC, Maendaenda R, Beulane AJ, Jani IV, Kidane S, Mosse CD, Jacobs J, Bottieau E. Seroprevalence of transfusion-transmissible infections and evaluation of the pre-donation screening performance at the Provincial Hospital of Tete, Mozambique. BMC Infect Dis. 2011 May 23;11:141. doi: 10.1186/1471-2334-11-141. PMID: 21605363; PMCID: PMC3120673.
2. Andino R, Diamond M. Editorial overview: Viral pathogenesis: Strategies for virus survival - Acute versus persistent infections. Curr Opin Virol. 2017 Apr;23:v. doi: 10.1016/j.coviro.2017.06.002. PMID: 28622998; PMCID: PMC7129643.
3. Kardam P, Mehendiratta M, Rehani S, Kumra M. Seroprevalence and vaccination status of hepatitis B amongst dental health-care workers in North India. Indian J Gastroenterol. 2014 Mar;33(2):190-1. doi: 10.1007/s12664-013-0370-x. Epub 2013 Sep 1. PMID: 23996799.
4. Arshad A, Borhany M, Anwar N, Naseer I, Ansari R, Boota S, Fatima N, Zaidi M, Shamsi T. Prevalence of transfusion transmissible infections in blood donors of Pakistan. BMC Hematol. 2016 Nov 18;16:27. doi: 10.1186/s12878-016-0068-2. PMID: 27891232; PMCID: PMC5116208.
5. Attaullah S, Khan S, Khan J. Trend of transfusion transmitted infections frequency in blood donors: provide a road map for its prevention and control. J Transl Med. 2012 Jan 31;10:20. doi: 10.1186/1479-5876-10-20. PMID: 22293125; PMCID: PMC3286364.
6. 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. Afr Health Sci. 2015 Mar;15(1):19-24. doi: 10.4314/ahs.v15i1.3. PMID: 25834526; PMCID: PMC4370154.
7. World Health Organization. Global status report on blood safety and availability 2021. Geneva: WHO; 2022. Available from: https://www.who.int/publications/i/item/9789240051683
8. Matee MI, Magesa PM, Lyamuya EF. Seroprevalence of human immunodeficiency virus, hepatitis B and C viruses and syphilis infections among blood donors at the Muhimbili National Hospital in Dar es Salaam, Tanzania. BMC Public Health. 2006 Jan 30;6:21. doi: 10.1186/1471-2458-6-21. PMID: 16445860; PMCID: PMC1373616.
9. Valerian DM, Mauka WI, Kajeguka DC, Mgabo M, Juma A, Baliyima L, Sigalla GN. Prevalence and causes of blood donor deferrals among clients presenting for blood donation in northern Tanzania. PLoS One. 2018 Oct 25;13(10):e0206487. doi: 10.1371/journal.pone.0206487. PMID: 30359434; PMCID: PMC6201946.
10. Siraj N, Achila OO, Issac J, Menghisteab E, Hailemariam M, et al. Seroprevalence of transfusion-transmissible infections among blood donors at National Blood Transfusion Service, Eritrea: a seven-year retrospective study. BMC Infect Dis. 2018 Jun 7;18(1):264. doi: 10.1186/s12879-018-3174-x. PMID: 29879912; PMCID: PMC5992706.
11. Wang W, Kong X, Zhao G, Huang X, Yuan J, Li N, Zhang X, Luo K, Luan J, Fan X. Seroprevalence of Transfusion Transmissible Infections and Associated Risk Factors in Hospitalized Patients before Transfusion in Jinling Hospital Nanjing University: A Three-Year Retrospective Study. Pathogens. 2022 Jun 20;11(6):710. doi: 10.3390/pathogens11060710. PMID: 35745563; PMCID: PMC9227149.
12. Heyredin I, Mengistie B, Weldegebreal F. Seroprevalence of transfusion-transmittable infections and associated factors among blood donors in Eastern Ethiopia: an Institutional-based cross-sectional study. SAGE Open Med. 2019 Feb 25;7:2050312119834468. doi: 10.1177/2050312119834468. Erratum in: SAGE Open Med. 2019 Mar 22;7:2050312119841832. doi: 10.1177/2050312119841832. PMID: 30834117; PMCID: PMC6393942.
13. Alharazi T, Alzubiery TK, Alcantara JC, Qanash H, Bazaid AS, Altayar MA, Aldarhami A. Prevalence of Transfusion-Transmitted Infections (HCV, HIV, Syphilis and Malaria) in Blood Donors: A Large-Scale Cross-Sectional Study. Pathogens. 2022 Jun 26;11(7):726. doi: 10.3390/pathogens11070726. PMID: 35889972; PMCID: PMC9321235.
14. Dodd RY, Crowder LA, Haynes JM, Notari EP, Stramer SL, Steele WR. Screening Blood Donors for HIV, HCV, and HBV at the American Red Cross: 10-Year Trends in Prevalence, Incidence, and Residual Risk, 2007 to 2016. Transfus Med Rev. 2020 Apr;34(2):81-93. doi: 10.1016/j.tmrv.2020.02.001. Epub 2020 Feb 18. PMID: 32178888.
15. Samo AA, Laghari ZA, Baig NM, Khoso GM. Prevalence and Risk Factors Associated with Hepatitis B and C in Nawabshah, Sindh, Pakistan. Am J Trop Med Hyg. 2020 Dec 21;104(3):1101-1105. doi: 10.4269/ajtmh.20-1228. PMID: 33350368; PMCID: PMC7941847.
16. Mavenyengwa RT, Mukesi M, Chipare I, Shoombe E. Prevalence of human immunodeficiency virus, syphilis, hepatitis B and C in blood donations in Namibia. BMC Public Health. 2014 May 5;14:424. doi: 10.1186/1471-2458-14-424. PMID: 24884633; PMCID: PMC4012713.
17. Okunade KS, Odeghe E, Akinlawon DO, Oladele RO. Prevalence of Human Immunodeficiency Virus, Hepatitis B, Hepatitis C and Syphilis among Antenatal Patients, Gastroenterology Patients and Blood Donors in

Public Hospitals in Lagos. Niger Postgrad Med J. 2025 Apr 1;32(2):127-134. doi: 10.4103/npmj.npmj_28_25. Epub 2025 May 14. PMID: 40364680.
18. Mobarki AA, Madkhali MM, Dobie G, Saboor M, Madkhali AM, Madkhli B, Hummadi Y, Meshi A, Al-Mekhlafi HM, Akhter MS, Hamali HA. Patterns of Hepatitis B, Hepatitis C and HIV Among Blood Donors in Samtah-Jazan Region. J Epidemiol Glob Health. 2022 Sep;12 (3):304-310. doi: 10.1007/s44197-022-00051-7. Epub 2022 Jul 30. PMID: 35907148; PMCID: PMC9470796.
19. Li L, Han T, Zang L, Niu L, Cheng W; et al. The current incidence, prevalence, and residual risk of hepatitis B viral infections among voluntary blood donors in China. BMC Infect Dis. 2017 Dec 6;17(1):754. doi: 10.1186/s12879-017-2861-3. PMID: 29212443; PMCID: PMC5719753.
20. Nkansah C, Serwaa D, Osei-Boakye F, Owusu-Ampomah R. Seroprevalence and trend of hepatitides among blood donors in a district hospital in Ghana: a nine-year retrospective, descriptive cross-sectional study. J Immunoassay Immunochem. 2020;41(1):71-83. doi: 10.1080/15321819.2019.1682601. Epub 2019 Oct 22. PMID: 31635519.
21. Farshadpour F, Taherkhani R, Tajbakhsh S, Gholizadeh Tangestani M, Hajiani G; et al. Prevalence and Trends of Transfusion-Transmissible Viral Infections among Blood Donors in South of Iran: An Eleven-Year Retrospective Study. PLoS One. 2016 Jun 16;11 (6):e0157615. doi: 10.1371/journal.pone.0157615. PMID: 27309959; PMCID: PMC4911153.
22. Aliyo A, Ashenafi G, Adem S. Evaluation of Transfusion Transmissible Infections Prevalence and Trend Among Blood Donors Attended at Bule Hora Blood Bank, West Guji, South Ethiopia. Health Serv Res Manag Epidemiol. 2022 Nov 3;9:23333928221136717. doi: 10.1177/23333928221136717. PMID: 36337767; PMCID: PMC9634199.
23. Luz E, Marques M, Netto EM, Campos LM, Amaral S; et al. HIV, HTLV, and Hepatitis B and C Infection in Blood Donors in Bahia, Brazil from 2008 to 2017. Viruses. 2022 Oct 22;14(11):2323. doi: 10.3390/v14112323. PMID: 36366422; PMCID: PMC9692744.
24. Belkacemi M, Merbouh MA. Seroprevalence of Human Immunodeficiency Virus, Hepatitis C Virus, and Hepatitis B Virus Among Blood Donors in Sidi Bel Abbes, West Algeria. Cureus. 2023 Oct 15;15(10):e47066. doi: 10.7759/cureus.47066. PMID: 38022198; PMCID: PMC10644989.

Authors' Contribution	
Mehwish Sajjad	Conceive, Methodology, manuscript writing
Fatima Arshad	Literature review
Farah Fatima Abbas	Data collection
Anum Liaquat Ali	Statistical analysis
Saima Naseem	Critical revisions for intellectual content.
Uzma Bukhari	Oversight of overall project, Final approval of the manuscript.