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Prevalence of Transfusion-Transmissible Infections among Voluntary Blood Donors in Tertiary Health-Care Facility in Islamabad, Pakistan

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Abstract

Objective: Transfusion-transmissible infection in asymptomatic donors is the major risk factors for transmission of infectious agents through blood transfusion. The objective of this study is to determine the seroprevalence, risk factors of Transfusion Transmissible Infections (TTIs) in blood donors in Islamabad, using a tertiary health-care centre as a case study.

Study design: A total number of 847 blood donors, at health care facility, were recruited into the study. This study was conducted from 1st November 2016 to 31st October 2017. World Health Organization (WHO) Protocols and Requirement for blood donation were used as Selection Criteria for the blood donors.

Methods: Immunochromatographic assay kit and chemiluminescence immunoassay were used to detect the TTI in the serum sample of the donors. The kit has been designed for qualitative determination of TTI in human serum. The immunoassay was performed in fully automated chemiluminescence immunoassay (CLIA) analyzer MAGLUMI (Maglumi 1000).

Results: The result shows that 32 (3.72%) of the blood donors had TTIs. The prevalence of Hepatitis B, Hepatitis C, Malaria, Syphilis and Human immunodeficiency viruses (HIV), was found to be 11 (1.29%), 15 (1.77%), 01 (0.11%), 03 (0.35%) and 02 (0.0.23%) respectively.

Conclusion: This study shows that TTIs appears to be lower among voluntary blood donors. However, a more expanded study should be extended to the general population. This is important; it will be helpful in planning public health interventions against TTIs.

Keywords: Transfusion; Infection; Hepatitis; HIV; HCV

Introduction

Blood transfusion serves as a major therapeutic intervention of choice in health care and for some clinical conditions. Annually, public health is often faced with the challenges of blood safety due to transfusion transmissible infections (TTI). This is more common especially among the high risk vulnerable groups like children and pregnant women that suffers from malaria, anaemia and or pregnancy related haemorrhage [1].

Parenteral administration of blood or blood products, in some cases, is a potential 'legal' route for transmission of various infectious agents of public health importance such as Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV), Hepatitis B Virus (HBV), malaria parasites, and syphilis among others. High prevalence of this infectious diseases increase the risk of blood safety around the world most especially in middle and low income countries [2].

The problem of TTI has heightened because in most cases of infection, infected blood is collected before the appearance of the serological markers of infection that is the window period or incubation period. Therefore, continuous monitoring of Blood transfusion TTI in the blood of potential donors is an important strategy to prevent transmission of infectious disease, minimise blood transfusion related mobility and mortality, not only in patients, but ultimately for their family members, the community and the global society [3].

Therefore, evaluation of the prevalence of TTI in blood and blood products will provide a good assessment of the trend and epidemiology of infectious diseases among the general population and consequently, it will serve as a valuable indicator to determine the safety of blood transfusion. Based on this findings, strategies to improve blood transfusion was suggested in consideration to minimise TTI especially among the venerable, children and pregnant women, groups.

Hence, this study was designed to provide data on the overall seroprevalence of major TTIs in blood donors. This analysis will help

to emphasize importance of screening among blood donors and to create awareness for the adoption of better screening practices for TTI.

Methods

This study was conducted in Blood Bank, Department of Pathology, Federal General Hospital Chak Shahzad Islamabad, Pakistan, from 1st November 2016 to 31st October 2017 (1 year).

Study population

A total of 847 prospective donors' samples were screened. Random consecutive sampling technique was used to recruit blood donors. Donors were interviewed; those that gave oral or written consent were recruited for the study.

All blood donors who fulfilled the Islamabad Blood Transfusion Authority (IBTA) criteria and the criteria set by our institute were included for the study. Blood donors who did not meet the inclusion criteria: >18 years and <60 years, weighing >50 Kg, haemoglobin ≥ 13 g/dL for male and ≥ 12 g/dL for female donors were excluded.

Data collection

Well-structured questionnaire containing the donor's age, sexual habits, occupation, gender, self- awareness and knowledge of TTI was administered.

Laboratory testing

All donors' samples were initially tested using immune chromatographic techniques, rapid diagnostic kit. If tested negative, whole blood was collected from the donated blood bag in 5 mL plain sterile vial. Plasma was separated from the whole blood at a speed of 3500 revolution per min (rpm) for 5 minutes. After centrifugation, the plasma was collected into a plain bottle using plastic pasture pipette.

Sandwich Immunoluminometric assay technique was used to determine for the presence of HBsAG antibody, anti-HCV Core non-structural 3 (NS3) protein, and HIV-1 p24 antigen, HIV-1 and HIV-2 antibodies, using Chemiluminescence Immunoassay (CLIA) Analyzer (Fully-Auto Maglumi 1000). Rapid immunoassay technique was used for the qualitative detection of antibodies (IgG and IgM) to Treponema Pallidum and Malaria PF/PV Ag. To ensure proper test procedure, positive and negative quality control samples were analyzed with each batch of the test.

Data analysis

The data generated were entered into Microsoft Excel and then exported into R Studio version 1.1.462 for analysis. Summary of statistics such as frequency, percentage were presented using tables, boxplots and graphs.

Results

Socio-demographical features of blood donors

Out of total 847 blood donors screened during this study, 836 (98.70%) donors were male, 11(1.30%) donors were female. About 626 (73.90%) of the donors were between the age of 18-31 years, 203 (23.96%) were of age group between 32-45 years, and 18 (2.12%) were of age group between 46-60 years. Among the volunteer subjects, 807 (95.30%) donated blood for replacement or for their relatives whereas, 40 (4.70%) were Voluntary non replacement blood donors (Table 1).

Donor characteristic		Number (N)	Percentage (%)
Sex	Male	836	98.7
	Female	11	1.3
Total		847	100
Age	18-31	626	73.9
	32-45	203	23.97
	46-60	18	2.13
Total		847	100
	Replacement donor	807	95.3
Dononation Type	VNRBD	40	4.7
Total		847	100

Table 1: Socio-Demographic characteristics of blood donors in Federal General Hospital year (2016-2017).

Prevalence of TTI

TTI were detected in 32 (3.72%) of the serum of all the donors screened. The prevalence of Hepatitis B, Hepatitis C, Malaria, Syphilis and Human immunodeficiency viruses, among voluntary donors, was found to be 11 (1.29%), 15 (1.77%), 01 (0.11%), 03 (0.35%) and 02 (0.24%) respectively (Figure 1). Co-infection for more than one pathogen was not detected among the voluntary blood donor tested. All cases of TTI recorded in this study were found in the blood samples of the male donors, no record of TTIs infection among female donors.

Regarding the distribution of TTI among different age group, 4 (0.4%) of the donors were between the age group of 18- 20 years, 19 (2.24%) of the donors were between the age of 21-30 years, 8 (0.94%) were within the age group 31-40 years while 1 (0.12%) of the donors is above 41 years. Co-infection for two or more pathogen was not recorded in this study.

Discussion

This current study shows the seroprevalence of TTI among blood donors in Pakistan. It shows the prevalence rate of 3.72%. This result is lower than the record of 14.9% prevalence reported in Nigeria [4], 43.2% reported in Bair Dar, Ethiopia, 21.6% in Cameroon, Africa [5]. However, this prevalence report is higher than the reports from Nepal [6], India and other part of Asia [7] like Iran with prevalence of 0.25% and Southern China with prevalence of 1.98% [8]. This difference may be due to the socioeconomic status and awareness rate in different countries.

Prevalence of HBsAg among blood donor that participated in this study is 1.29%. This study is in concordance with current findings in China with an estimated prevalence rate of 1.6% [9], 1.68% in Turkey. However, it is lower than 2.84% reported in another study in Islamabad, Pakistan, 3.02% in Saudi Arabia, 5.05% in Yemen, 14.2%

reported in Nigeria [10,11], 14.9% in Burkina Faso, 10.1% reported in Cameroon [5].

The prevalence rate of (1.77%) for HCV reported in this study is considerably similar to the reports from previous study conducted in Ethiopian and Nigeria respectively [12]. However, on the contrary, the result of seroprevalence of HCV reported in this study is lesser when compared with the prevalence rate of 8% [13], 5-25% and 13.3% reported in Ghana, Egypt and Northern Ethiopia respectively [14]. This result is also lower than the prevalence rate of 6.2% reported in another study conducted elsewhere in Pakistan in 2018 [15]. The difference in the report of this study and that of Kanaani et al., might be due to more public enlightenment and sensitization on the risk involved in HCV infection that have been on the increase in different part of the world and Islamabad, Pakistan in particular [15].

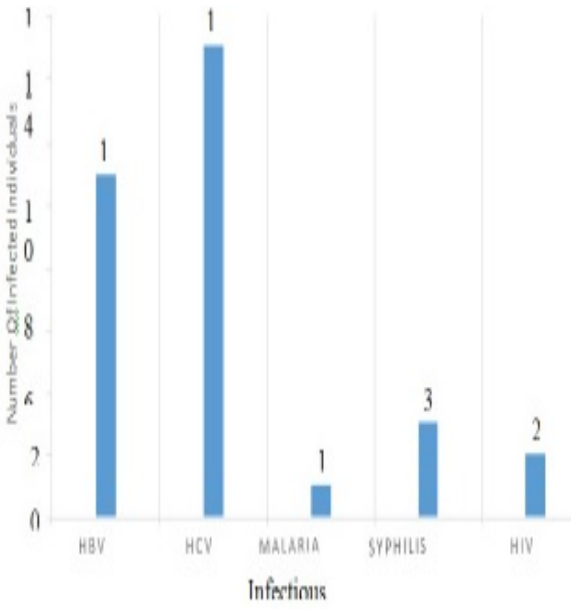

Figure 1: Prevalence of TTIs among male donors in Federal General Hospital year (2016-2017).

This study shows the prevalence rate of 0.24% for HIV among blood donors in the study area. This rate is considerable higher than the local data of prevalence rate of 0.04% for HIV reported in another study conducted somewhere else in Karachi, Pakistan. However, different screening method, Enzyme Link Immunosorbent Assay (ELISA) was used for the detection of TTI [16]. The discordance in the report might be as a result of different methods used for detection of HIV. However, the prevalence rate reported in this study is considerably in concordance with the result reported in China (0.31%) [2], Nepal (0.21%) [6]. However, this result is considerably higher than 0% HIV prevalence obtains in a study in Mongolia, 0.00019% from Italy and 0.0003% from Australia [17]. The prevalence of HIV reported in this study shows little discrepancy with the national prevalence rate of 0.1% previously reported in July, 2012 by the World Bank. It has been reported that Pakistan is facing a concentration of intravenous drug users. This could have resulted into the 'scale up' value as a result of linkages between these groups and the vulnerable populations. Also, the increase in HIV prevalence may be a result of lower voluntary counselling test coverage in this region and other part of Pakistan.

Furthermore, in this study, the seroprevalence of syphilis was reported to be 0.35%. Previous local report from Pakistan shows a higher prevalence rate of 2.1% [18], a downward trend in syphilis seroprevalence. This report is in consistence with 0.36% reported in China [19]. A study done in Iraq and China and India shows considerable low prevalence of 0.06% and (0.07%) [20] Compare to our study respectively. On the contrary, the prevalence rate of Treponemal positivity in this study is considerably lower than the prevalence reported in Ethiopia (7.9%), Ghana (13.5%) [13] and Cameroon (5.7%) [5]. The difference in the result of researches in different countries may be as a result of the difference in the social economic status of the participant in various countries.

Conclusion

The limitation of this study is that all TTIs such as Leishmaniasis and toxoplasmosis have not been covered. Effective blood transfusion starts from the selection of donors with low TTIs risk and effective laboratory screening. This is the very important part in blood bank processing which has reduced the risk of transmission to very low levels. This study reports the prevalence of Hepatitis B, Hepatitis C, Malaria, Syphilis and Human immunodeficiency viruses (HIV), among voluntary blood donors to be 11 (1.29%), 15 (1.77%), 01 (0.11%), 03 (0.35%) and 02 (0.0.23%) respectively. However, screening of potential donors with better selective and sensitive screening test methods such as Nucleic acid amplification test (NAT) assay will definitely reduce the risk of TTI.

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Author contributions

Fariha Masood siddiqui and Abdul Sattar conceived and designed the study. Niaz Ahmed, Sadia Jabeen and Syed Mehmood Qadir participated in data analysis; Olasunkanmi Oluwatayo Israel drafted the article. All authors have approved the final article.

References

1. Dongare HC, Khatib KI (2016) Exchange transfusion in severe falciparum malaria. J Clin Diagn Res 10: 5-6.
2. Song Y, Bian Y, Petzold M, Lam Ung CO (2014) Prevalence and trend of major transfusion-transmissible infections among blood donors in Western China, 2005 through 2010. PLoS One 9: 94528.
3. Choudhury N (2010) Transfusion transmitted infections: How many more. Asian J Transfus Sci 4: 71-72.
4. Okoroiwu HU, Okafor IM, Asemota EA, Okpokam DC (2018) Seroprevalence of transfusion-transmissible infections (HBV, HCV, syphilis and HIV) among prospective blood donors in a tertiary health care facility in Calabar, Nigeria: A eleven years evaluation. BMC Public Health 18: 645.
5. Noubiap JJN, Joko WYA, Nansseu JRN, Tene UG, Siaka C (2013) Sero-epidemiology of human immunodeficiency virus, hepatitis B and C viruses, and syphilis infections among first-time blood donors in Edea, Cameroon. Int J Infect Dis 17: 832-837.

6. Shrestha AC, Ghimire P, Tiwari BR, Rajkarnikar M (2009) Transfusion-transmissible infections among blood donors in Kathmandu, Nepal. J Infect Dev Ctries 3: 794-797.
7. Chandekar SA, Amonkar GP, Desai HM, Valvi N, Puranik GV (2017) Seroprevalence of transfusion transmitted infections in healthy blood donors: A 5-year Tertiary Care Hospital experience. J Lab Physicians 9: 283-287.
8. Xu T, Yi Z, Luo J, Yu H, Fan Y, et al. (2019) Prevalence and trends of transfusion-transmittable infections among blood donors in Southwest China. J Public Health 41: 55-61.
9. Ji Z, Li C, Lv Y, Cao W, Chen Y, et al. (2013) The prevalence and trends of transfusion-transmissible infectious pathogens among first-time, voluntary blood donors in Xi'an, China between 1999 and 2009. Int J Infect Dis 17: 259-262.
10. Kramvis A, C Kew M (2007) Epidemiology of hepatitis B virus in Africa, its genotypes and clinical associations of genotypes. Hepatol Res 37: S9-S19.
11. Babanejad M, Izadi N, Najafi F, Alavian SM (2016) The HBsAg Prevalence Among Blood Donors From Eastern Mediterranean and Middle Eastern Countries: A Systematic Review and Meta-Analysis. Hepat Mon 16: 35664.
12. Hundie GB, Raj VS, GebreMichael D, Suzan DP, Haagmans BL (2017) Genetic diversity of hepatitis C virus in Ethiopia. PLoS One 12: 0179064.
13. Ampofo W, Nii-Trebi N, Ansah J, Abe K, Naito H, et al. (2002) Prevalence of blood-borne infectious diseases in blood donors in Ghana. J Clin Microbiol 40: 3523-3525.
14. Mohamoud YA, Mumtaz GR, Riome S, Miller D, Abu-Raddad LJ (2013) The epidemiology of hepatitis C virus in Egypt: A systematic review and data synthesis. BMC Infect Dis 13: 288.
15. Al Kanaani Z, Mahmud S, Kouyoumjian SP, Abu-Raddad LJ (2018) The epidemiology of hepatitis C virus in Pakistan: Systematic review and meta- analyses. R Soc Open Sci 5: 180257.
16. Korenromp EL, Mahiané SG, Nagelkerke Nico, Taylor MM, Williams V, et al. (2018) Syphilis prevalence trends in adult women in 132 countries-estimations using the Spectrum Sexually Transmitted Infections Model. Sci Rep 8: 11503.
17. Polizzotto (2008) Reducing the risk of transfusion-transmissible viral infection through blood donor selection: The Australian experience 2000 through 2006. Transfusion 48: 55-63.
18. Arshad A, Borhany M, Anwar N, Naseer I, Ansari R, et al. (2016) Prevalence of transfusion transmissible infections in blood donors of Pakistan. BMC Hematol 16: 27.
19. Chen Y, Liu Z, Zhang Q, Chen J, Sun W, et al. (2014) Trend in prevalence of syphilis among voluntary blood donors in Xi'an, China from 2006 to 2010. Int J Infect Dis 19: 98-99.
20. Saini PA, Chakrabarti PR, Varma AV, Gambhir S, Tignath G, et al. (2017) Unnoticed and on the Rise in Blood Donor Screening? A 5 Years Cross-sectional Study on Seroprevalence in Voluntary Blood Donors from Central India. J Glob Infect Dis 9: 51-55.