

Prevalence of Syphilis among the Healthy Blood Donors - A Hospital based Retrospective Study

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ABSTRACT

Aim: To highlight the emerging risk of acquiring the infectious pathogen through transfusion and the need to control and prevent such occurrences to make blood transfusion absolutely safe.

Methodology: A hospital-based, the descriptive retrospective study was conducted at Ghurki Trust Teaching Hospital, Lahore. The data from February 2019 to July 2019 was collected from the blood bank with the approval of the hospital ethics committee. The screening of the blood for Transfusion-transmitted infections (TTIs) is mandatory in the source hospital. These include HCV, HBV, HIV, Syphilis and Malaria.

Results: Out of 9152 blood donors, 9098 (99.41%) were males and 54 (0.59%) were females. Among these donors, 62(0.68%) were found to be reactive for *Treponema pallidum*. All confirmed cases of syphilis positive donors were males (98.39%), except for one female (1.61%).

Conclusion: The prevalence of the syphilis among the blood donors is considerably high and poses a threat to the safety of the recipient. Before this infectious disease becomes a menace to the society, it is imperative to launch a widespread awareness campaign and implement the 'integrated strategy for blood safety and availability' recommended by the World Health Organization (WHO).

Keywords: Blood donors, Syphilis, Pakistan, Prevalence

INTRODUCTION

Blood transfusion is a life-saving process, however, can be proved lethal to the recipients by exposing them to the transfusion-transmissible infectious pathogens¹. One of these agents is the spirochete called *Treponema pallidum* which causes the chronic infectious disease named "syphilis". Syphilis is classified as congenital (transmitted from mother to child in utero) or acquired (through sex or blood transfusion). It develops in four stages namely primary, secondary, latent, and the acute tertiary (neurosyphilis). In early stages, it causes significant morbidity and proves lethal in the tertiary stage. Congenital syphilis is a leading cause of childhood morbidity and mortality worldwide. Each year, there are an estimated 6 million new cases of syphilis globally in persons aged between 15 to 49 years². It is a prevalent sexually-transmitted disease in developed and developing countries¹. After being recognized as the most common disease transmitted by transfusion in 1937³, it was the first transfusion-transmitted infectious disease (TTID) to be screened following the implementation of serological screening by blood banks in 1938⁴.

Recent studies have raised concerns regarding increasing prevalence of syphilis as TTI^{5,6}. The risk of transfusion-transmitted syphilis is particularly high in lower-middle and low income countries⁷. In Pakistan, approximately 1.5 million bags per year are required to meet the demands of the blood transfusion⁸. With such a

high number, it is important to assess the prevalence and incidence of transmission-transfused syphilis so as to draw attention towards the need to control the spread of the disease through its rarest mode. This inevitably makes it important to prevent the occurrence of the disease in the general and high-risk population. Our study is designed to determine the burden of syphilis in healthy donor's community in the suburbs of Lahore where most of the people come from villages.

MATERIALS AND METHODS

This was a hospital-based, descriptive retrospective study conducted from February 2019 to July 2019. The data was obtained from the blood bank of Ghurki Trust Teaching Hospital under the approval of the hospital ethics committee.

Study subjects inclusion criteria: Age and weight criterion for males was 20-60 years and above 55kg respectively. For females, it was 20-35 years and above 50kg respectively. Hemoglobin count of 14.5g/dl in males and 13 g/dl in females was preferred. The volunteers were regular blood donors and had donated blood at least 3 months back. In addition to this, all the blood donors were non-diabetic, non-smoker, non-hypertensive, afebrile and post-prandial.

Study subjects exclusion criteria: The donors were excluded if they were anemic (Hb<12g/dl), pregnant, had a history of jaundice, malaria, HBV, HCV, HIV or syphilis, or were apparently unhealthy.

Methodology: 9152 blood donors, including both males and females, visited the blood bank during this period and were screened for transfusion-transmissible infectious pathogens as per the protocol. They were screened for Hepatitis B virus (HBV), Hepatitis C virus (HCV), Human immune deficiency

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virus (HIV), Malaria parasite (MP) and Syphilis. Potential blood donors were required to fill a health history questionnaire and consent form for donation prior to screening. This questionnaire included information such as bio data, general examination (weight, pulse rate, blood pressure, temperature and height) and questions regarding previous blood donation or transfusion, current or past illnesses (diabetes, cancer and cardiovascular, respiratory, renal or hepatic diseases), drug history such as aspirin, vaccination, previous history of Hepatitis B, C and tissue/liver transplant, tattoo piercing, history of treatment for syphilis and malaria, self-medication and previous hospital admission. Females were additionally inquired about their menstrual cycle, pregnancy and lactation status. Standard procedures of blood collection and storage were followed. The screening tests for transfusion-transmissible infections were then performed using Chemiluminescent Technique Architect i1000 SR (Abbot). The samples collected were screened for the detection of syphilis using ARCHITECT Syphilis *Treponema pallidum* (TP) assay. The specificity of this assay among blood donors is reported to be 99.94% and sensitivity is greater than or equal to 99.0%.

Limitation: The study was based on hospital records thus follow up could not be done in confirmed cases.

RESULTS

9152 blood donations were processed at blood bank of Ghurki Trust Teaching Hospital, Lahore. Of these 9098 (99.41%) were from males and 54 (0.59%) were from females. A total of 62 (0.68%) donations were found to be reactive for *Treponema pallidum*. All confirmed cases of syphilis positive donors were males (98.39%), except for one female (1.61%).

Fig. 1: Distribution of syphilis+ve blood donors according to sex

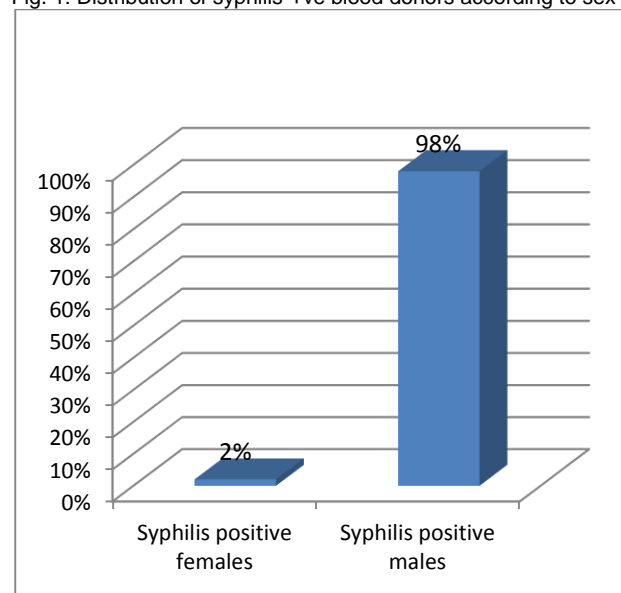


Table 1: Number of donors from February 2019 to July 2019

Months	Total donors	Males	Females
February	1318	1304	14
March	1571	1564	7
April	1722	1709	13
May	1477	1469	8
June	1368	1363	5
July	1696	1689	7
Total	9152	9098	54

Table 2: Prevalence of syphilis in healthy blood donors from February 2019 to July 2019

Months	Total donors	Total	Syphilis positive	
			Male	Female
February	1318	8(0.61%)	8(100%)	0
March	1571	13(0.83%)	13(100%)	0
April	1722	11(0.64%)	11(100%)	0
May	1477	11(0.74%)	11(100%)	0
June	1368	12(0.88%)	12(100%)	0
July	1696	7(0.41%)	6(85.71%)	1(14.29%)
Total	9152	62(0.68%)	61	1(1.61%)

DISCUSSION

A lot of people suffer from the hazardous outcomes of inappropriate blood transfusions annually. One of these is TTIs¹. The most threatening among these are human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV) and syphilis. Pakistan has observed notably higher rates of syphilis prevalence in the blood donor community. According to our study, this rate is 0.68% which is consistent with the increasing trend of syphilis seropositivity. Most of the blood donors in our study came from the villages situated around the hospital. A high prevalence of syphilis can be attributed to the lifestyle of people, lack of awareness and facilities available in this area. Similar studies in the country reported a prevalence of 0.89% in Islamabad⁹, 2.1% in National Institute of Blood disease and Bone Marrow transplantation (NIBD) Karachi¹⁰, 0.91% in Liaquat National Hospital Karachi¹¹ and 1.10% in Faisalabad¹². Another study in Lahore reported prevalence of 3.1%⁸ which shows the variability of the results. Overall, Pakistan faces the challenge of availability of safe and efficacious blood to donate owing to increased demand, escalating rate of TTIs, inadequate screening and suboptimal blood transfusion services^{9,11}. Lack of awareness and unprotected sexual intercourse further aggravates the situation.

The prevalence of syphilis among the blood donors across the globe is: 5.7% in Edea, Cameroon, 2.9% in Ghana, 0.8% in Sierra Leone and 3.1% in Nigeria^{13,14,15,16}. A significant decrease in the sero prevalence of syphilis was seen in India from 2005-2013¹⁷ whereas an upward trend was observed in China from 0.88% in 2005 to 0.98% in 2017⁶. A very high prevalence rate of 20% was reported in Angola from 2011 to 2016¹⁸. Such variations in different countries may depend upon certain factors such as awareness, lifestyle, prevalence in the residential area, family and neighboring countries and sensitivity and specificity of the testing¹¹.

According to some studies, blood donors cannot be considered as true reflector of infection among the community¹⁹ as these may be underestimated or overestimated. In our study, most of the donors were men and belonged to young or middle aged group so it cannot be considered as representative of the general population. According to figure 1, the prevalence of syphilis among males is significantly higher than that in females, however, it is apparently due to very few numbers of female donors involved in the study. This may be due to socio-cultural beliefs and traditional practices, especially in the villages that surround the hospital, that most of the times allow only men to donate the blood.

The risk of transfusion-transmitted syphilis is linked to risk factors in the blood donor specifically the sexual behavior. In 2004, National AIDS control program carried out a survey reporting a syphilis prevalence of 60% among Hijras and 36% between male sex workers (MSM)²⁰. Unsafe sexual practices have, undoubtedly, increased the prevalence of syphilis²¹.

Such practices are common in the villages due to lack of awareness which may be a reason of a high prevalence of syphilis among the blood donors of Ghurki Trust Teaching Hospital which is surrounded by 1112 villages. Since there is an estimated 2- to 5-fold increased risk of acquiring HIV if exposed to it in the presence of syphilis²², there is a potential risk of HIV co-infection in the villagers if unchecked. Intravenous drug abuse, tattooing and bisexuality are some other risk factors associated with transfusion-transmitted syphilis. Such donors with a high-risk profile can only be filtered out by using questionnaires. In a study, a low prevalence has been attributed to a compulsory interview and filling of a questionnaire before donation in Norway²³. Through this selection of low-risk groups and efficient laboratory screening prior to donation, the spread of the disease via transfusion can be controlled.

The gravity of the situation lies in the fact that the blood donors included in the study appeared apparently healthy. A history of past exposure to infection during the preceding 2 months is vital in case the donors show no clinical or biological signs of the disease²⁴. Extensive history taking or deferral during selection is useful in such cases. However, obtaining correct and adequate information and convincing these blood donors is a major challenge due to lack of knowledge and understanding.

CONCLUSION

This study purposes the implementation of concrete measures to control the spread of transfusion-transmitted syphilis. This includes stringent donor selection, promotion of non-remunerated voluntary blood donors as a public responsibility, mandatory universal serological screening, rational use of blood and national policies that monitor and evaluate the implementation strategies for recruitment of donors, organization of blood centers and legislations to standardize blood transfusions.

In addition to this, early diagnosis and treatment, health education and promotion of safer sex can help prevent syphilis in the general population consequently helping to decrease its emergence in the blood donors. Therefore, it is imperative to launch a widespread awareness campaign especially in the areas of low-literacy rate like villages surrounding Ghurki hospital.

REFERENCES

1. J.-P. ALLAIN, S. L. STRAMER, A. CARNEIRO-PROIETTI, M. MARTINS, S. LOPES DA SILVA, M. RIBEIRO, *et al.*, "Transfusion-transmitted infectious diseases," *Biologicals*, vol. 37, pp. 71-77, 2009.
2. W. H. Organization, "Global health sector strategy on sexually transmitted infections 2016-2021: toward ending STIs," World Health Organization 2016.
3. R. Kilduffe and M. DeBakey, "The Blood Bank and the Technic and Therapeutics of Transfusions," *St. Louis, CV Mosby Company*, vol. 942, p. 500, 1942.
4. M. A. Kane, E. M. Bloch, R. Bruhn, Z. Kaidarova, and E. L. Murphy, "Demographic determinants of syphilis seroprevalence among US blood donors, 2011-2012," *BMC infectious diseases*, vol. 15, p. 63, 2015.
5. B. O. Motayo, A. O. Faneye, U. A. Udo, B. A. Olusola, "Seroprevalence of transfusion transmissible infections (TTI), in first time blood donors in Abeokuta, Nigeria," *African health sciences*, vol. 15, pp. 19-24, 2015.
6. S. Liu, L. Luo, G. Xi, L. Wan, L. Zhong, X. Chen, *et al.*, "Seroprevalence and risk factors on Syphilis among blood donors in Chengdu, China, from 2005 to 2017," *BMC Infectious Diseases*, vol. 19, p. 509, 2019/06/10 2019.

7. <https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability>
8. S. Nazir, H. S. Pracha, A. Khan, A. Nazar, A. Fayyaz, M. S. Khan, *et al.*, "Prevalence of syphilis in Pakistani blood donors," *Advancements in life sciences*, vol. 1, 2013.
9. U. Waheed, H. Khan, H. Satti, M. Ansari, M. Malik, and H. Zaheer, "Prevalence of transfusion transmitted infections among blood donors of a teaching hospital in Islamabad," *Ann Pak Inst Med Sci*, vol. 8, pp. 236-9, 2012.
10. Arshad, M. Borhany, N. Anwar, I. Naseer, R. Ansari, S. Boota, *et al.*, "Prevalence of transfusion transmissible infections in blood donors of Pakistan," *BMC Hematology*, vol. 16, p. 27, 2016/11/18 2016.
11. S. Sultan, S. Murad, S. M. Irfan, and B. M. AMJAD, "Trends of venereal infections among healthy blood donors at Karachi," 2016.
12. R. Rauf and A. Cheema, "Potential risk of transfusion-transmissible infections among blood donors in district Faisalabad of Pakistan," *Clinical Medicine* 2019; 19: 27-27,
13. J. J. N. Noubiap, W. Y. A. Joko, J. R. N. Nansseu, U. G. Tene, and C. Siaka, "Sero-epidemiology of human immunodeficiency virus, hepatitis B and C viruses, and syphilis infections among first-time blood donors in Edéa, Cameroon," *International Journal of Infectious Diseases*, vol. 17, pp. e832-e837, 2013.
14. F. Sarkodie, O. Hassall, E. Owusu-Dabo, S. Owusu-Ofori, I. Bates, I. C. Bygbjerg, *et al.*, "Syphilis screening practices in blood transfusion facilities in Ghana," *International Journal of Infectious Diseases*, vol. 43, pp. 90-94, 2016.
15. E. E. Yambasu, A. Reid, P. Owiti, M. Manzi, M. J. S. Murray, and A. K. Edwin, "Hidden dangers-prevalence of blood borne pathogens, hepatitis B, C, HIV and syphilis, among blood donors in Sierra Leone in 2016: opportunities for improvement: a retrospective, cross-sectional study," *The Pan African Medical Journal*, vol. 30, 2018.
16. H. U. Okoroiwu, I. M. Okafor, E. A. Asemota, and D. C. Okpokam, "Seroprevalence of transfusion-transmissible infections (HBV, HCV, syphilis and HIV) among prospective blood donors in a tertiary health care facility in Calabar, Nigeria; an eleven years evaluation," *BMC Public Health*, vol. 18, p. 645, 2018/05/22 2018.
17. R. N. Makroo, V. Hegde, M. Chowdhry, "Seroprevalence of infectious markers & their trends in blood donors in a hospital based blood bank in north India," *The Indian journal of medical research*, vol. 142, pp. 317-322, 2015.
18. E. Quintas, A. Del Carmen Cogle, C. Dias, A. Sebastiao, A. da Costa Pereira, A. Sarmiento, *et al.*, "Prevalence of Syphilis in Blood Donors in Angola from 2011 to 2016," *Clinical and Medical Reports*, vol. 1, 01/01 2018.
19. W. Jafri, N. Jafri, J. Yakoob, M. Islam, S. F. A. Tirmizi, T. Jafar, *et al.*, "Hepatitis B and C: prevalence and risk factors associated with seropositivity among children in Karachi, Pakistan," *BMC infectious diseases*, vol. 6, p. 101, 2006.
20. National study of reproductive tract and sexually transmitted infections. Survey of high risk groups in Lahore and Karachi. National AIDS control program. Ministry of Health Government of Pakistan; 2005. Unpublished
21. M. A. Maan, F. Hussain, J. Iqbal, and S. J. Akhtar, "Sexually transmitted infections in Pakistan," *Annals of Saudi medicine*, vol. 31, pp. 263-269, May-Jun 2011.
22. HIV prevention through early detection and treatment of other sexually transmitted diseases—United States. Recommendations of the Advisory Committee for HIV and STD prevention. *MMWR Recomm Rep*, 1998; 47(12): 1-24.
23. P. Jenum, Ø. Flesland, H. Blystad, I. Vik, T. Hervig, A. Maeland, *et al.*, "Syphilis and blood transfusion," *Tidsskrift for den Norske laegeforening: tidsskrift for praktisk medicin, ny række*, vol. 130, pp. 839-841, 2010.
24. G. Kaur and P. Kaur, "Syphilis testing in blood donors: an update," *Blood Transfusion*, vol. 13, p. 197, 2015

