

Seroprevalance of Transfusion Transmitted Diseases among Blood Donors at the Blood Bank of Government Medical College, Yavatmal

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Abstract

Background: Transfusion-transmitted infections (TTIs) are the major problem associated with blood transfusion. Accurate estimates of risk of TTIs are essential for monitoring the safety of blood supply. The present study was undertaken to determine the seroprevalence of TTI in voluntary and replacement donors.

Methods: This study was based on the records of all voluntary and replacement donations which were collected from January 2016 to December 2017 in blood bank placed in a tertiary care hospital.

Results: A total of 24,488 donors were analyzed for the seroprevalence of TTI over a period of 2 years. Of these 76.61% were voluntary donors and 23.38% were replacement donors. Prevalence of TTI in total donors was 1.03%. The overall seroprevalence of human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria were 0.11, 0.88, 0.024, 0.012 and 0.00 per cent, respectively.

Conclusion: The increase in public awareness regarding blood donation, meticulous donor screening, counseling and use of highly sensitive tests can help in reducing the risk of TTIs.

Keywords: Transfusion-transmitted infections, Seroprevalence, Voluntary, Replacement, Human immunodeficiency virus, Hepatitis B virus, Syphilis.

1. Introduction

Blood transfusion is an integral part of medical care and treatment. Adequate, safe and timely given transfusion saves millions of life; however, with every unit of blood there is a 1% chance of transfusion associated problems including transfusion transmitted infections (TTIs) [1]. Unsafe transfusions are costly from both human and economic points of view and lead to high morbidity and mortality [2,3]. An integrated strategy for blood safety is required for elimination of transfusion transmissible infections (TTI) and for provision of safe and adequate blood transfusion services (BTSs) to the people. The main component of an integrated strategy include collection of blood only from voluntary, non-remunerated blood donors, screening for all TTIs and reduction of unnecessary transfusion [4].

According to the National AIDS Control Organization (NACO) guidelines all blood sample must be tested for human immunodeficiency virus (HIV) 1 and 2, hepatitis B, hepatitis C, syphilis and malaria [5]. Donors having history of being HIV, hepatitis B surface antigen/hepatitis C virus antibody positive should be permanently deferred. Donors having history of malaria should be accepted after 3 months [5]. The median prevalence rates of transfusion-transmissible infections in blood donations in high-income countries are considerably lower than in middle- and low-income countries.

Preventing the transmission of infectious diseases through blood transfusion in developing countries is difficult given that the resources required are not always available even when policies and strategies are in place [6]. According to the World health organization (WHO), safe

blood is a universal right. A crucial requirement in the procurement of safe blood is to have a national program for donor selection, recruitment, retention, and education; this will minimize donations from donors who might transmit diseases to the recipients. Equally important is to evaluate the burden and risk factors for TTIs in the general population [1]. Hence, the present study was carried out with the aim to determine the seroprevalence of TTI among blood donors in a tertiary care hospital.

2. Materials and Methods

This study was based on the records of all voluntary and replacement donations which were collected from January 2016 to December 2017 in blood bank placed in Shri Vasantnao Naik Government Medical College and Hospital, Yavatmal. A total of 24,488 donors were analyzed for the seroprevalence of TTI during the study period of 2 years. The completely filled donor forms which included the type of donation (voluntary/replacement), the patient's details, pre-donation questionnaire, counseling details and medical examination findings available for each case were analyzed along with the TTI records.

All blood donors' samples were screened for HIV, hepatitis B surface antigen (HBsAg), HCV, syphilis and Malaria. HIV, HBsAg, HCV tests were done by enzyme-linked immunosorbent assay (ELISA) procedure using the third generation kits. Syphilis was diagnosed by performing the rapid plasma reagin (RPR) test. Malaria testing was done by slide method using Leishman's staining.

3. Observations and Results

A total of 24,488 donors were enlisted in the study, out of which 11,263 units were collected through outdoor camps and 7499 units were collected from blood bank placed in our tertiary care center. Thus, out of the total donors, 18,762 (76.61%) were voluntary and 5,726 (23.38%) were replacement donors. Among the total donors, 253 donors were tested reactive for blood transmitted infection. Thus, prevalence of TTI in total donors was 1.03% as shown in figure 1.

Figure 1: Seroprevalence of transfusion-transmitted infections in the present study

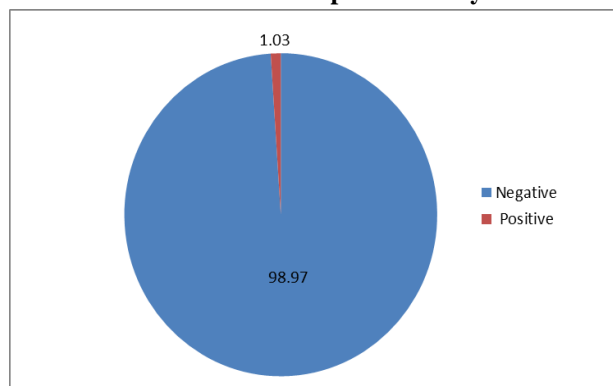


Table 1 shows the donors and their seroprevalence of TTI in different years. The overall seroprevalence of human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria were 0.11, 0.88, 0.024, 0.012 and 0.00 per cent, respectively.

Table 1: Seroprevalence of HIV, HBV, HCV, Syphilis and Malaria in Two Years

Years	No. of Donors	HIV	HBV	HCV	Syphilis	Malaria
2016	11,902	16 (0.13%)	94 (0.78%)	02 (0.016%)	01 (0.0084%)	00 (0%)
2017	12,586	11 (0.08%)	123 (0.97%)	04 (0.031%)	02 (0.015%)	00 (0%)
Total	24,488	27 (0.11%)	217 (0.88%)	06 (0.024%)	03 (0.012%)	00 (0%)

4. Discussion

Safe blood transfusion services are a cornerstone of an effective, high-quality healthcare system. However, contaminated blood transfusion is a potential source of TTIs and can be fatal instead of saving life [7-9]. The prevalence of TTIs amongst blood donors in a well-structured healthcare system with good blood bank services can be used as a reliable tool for statistical estimations of these infectious agents in the general population [10]. In developing countries the prevalence of TTI is much higher and quite far from attaining a zero risk level at the present moment.

Patients requiring blood transfusion are more prone to acquire HBV, HIV, HCV, and syphilis [11]. HBV is highly contagious and easily transmitted from one individual to another by transfusion during birth, by unprotected sex and by sharing needles. Syphilis can be

spread by sexual contact, blood transfusion and by vertical transmission. Due to the nature of blood born virus, HCV is widely recognized as a major causative agent for post transfusion non-A, non-B hepatitis. Other less common routes of transmission are sexual intercourse and mother to child transfer [12]. In case of HIV, transmission during window period is possible even if each unit is tested for HIV antibodies. The possibility of window period transmission would be minimized if blood is collected from low risk targeted general public [13]. However, blood safety remains an issue of major concern in transfusion medicine. However, HBV and HIV can also be transmitted from person to person contact, especially HBV which is transmittable from tears, urine, etc., Seroprevalence of HBsAg ranges from intermediate (2%– 7%) to high (>8%) levels in India. High prevalence rate of 10% has been seen in Southern China, Korea, Melanesia, the Philippines, India,

Indonesia, Japan, and Pakistan have intermediate rates of endemicity. However, these rates may be inaccurate and possible the tip of the iceberg as rates of occult HBV infection is not included in this [14].

In present study, total 24,488 donations were done during study period. The majority of donors were voluntary donors (76.61%). Voluntary donors are those donors who donate blood at regular intervals constituted 18762 in our study. This was comparable to the study done by Matee *et al* [15] and Chandekar *et al* [16]. The increase in voluntary donors may be attributed to the increasing public awareness and involvement of government bodies like NACO (National AIDS control organisation) that actively propagate voluntary donation in our country. However, many earlier studies have reported increased number of replacement donors [17,18].

The seroprevalence of the HIV was seen in 0.11% per cent donors which was comparable to other studies [19,20]. Fasola *et al* [21] showed a significantly high prevalence of 13.2 per cent in Nigeria. A similar study conducted at the same institution in 1999 showed 0.8 per cent HIV seropositivity[22]. Hepatitis B is one of the most infectious diseases; it has infected around 2 billion people worldwide, including an estimated 400 million chronically infected cases. It is also hyper endemic in sub-Saharan Africa and Asia [23].

In current study the prevalence rate of HBV was 0.88%, which was higher in our population. HBV positivity indicates a carrier state or an active infection. These seropositive donors may progress to develop chronic hepatitis, cirrhosis, and even progress to hepatocellular carcinomas [24,25]. Hepatitis C prevalence in this study was 0.024%, which was compared with Patel *et al* [26] from western Ahmedabad. Hepatitis C is an important blood borne infection and can progress to chronic stage-ultimately leading to cirrhosis and hepatocellular carcinoma.

The low prevalence of HCV when compared with HBV might be due to the fact that HCV is less infective when compared with HBV and HCV is transmitted mainly through transfusion of blood or blood products, intravenous drug abuse and needle sharing. For syphilis the prevalence was lowest (0.012%) of all the TTI in the present study. Scant positivity for syphilis has been documented in literature among healthy blood donors. Syphilis being a sexually transmitted disease is the illness of much concern as it shows the existing dangerous activities of people in the society which are peril to the infections like HIV and hepatitis.

Thus, in the present study, seroprevalence was highest for hepatitis B (0.88%) followed by HIV (0.11%) and hepatitis C (0.024%) and least for syphilis (0.012%). Though our concern for blood safety was mainly due to HIV infection, but in the present study the hepatitis B was

the most prevalent infection, similar to other studies from India [27,28]. The seroprevalence of TTI in current study was lower as compared to previous studies [29-31]. A very low prevalence rate in our study may be attributed to increased number of donors donating at the blood bank with strict screening criteria when compared to the number of donations from the camps. Difference in infection rates between voluntary and replacement donors have been observed in many earlier studies [32,33]. Concealment of the medical history by professional or replacement donors poses a great threat to the safety of blood supply.

5. Conclusion

A substantial percentage of the blood donor's harbored transfusion transmitted infections. Prevention of TTIs should be the main goal right now. There is a need to increase public awareness regarding voluntary donation and its benefits. Meticulous donor screening, counseling and use of highly sensitive techniques for detection of TTIs may help reduce the risk of TTIs.

References

- [1]. Widman FK (ed) (1985) Technical manual. American Association of Blood Banks, Arlington, pp 325–344.
- [2]. World Health Organization. Blood Safety Strategy for the African Region. Brazzaville: WHO Regional Office for Africa; 2002.
- [3]. World Health Organization. Status of Blood Safety in the WHO African Region: Report of the 2004 Survey. Brazzaville: WHO Regional Office for Africa; 2007. p. 1-25.
- [4]. National blood policy, 2003. Available from: http://www.unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN_009847.pdf. [Last accessed on 2012 Jun 15].
- [5]. National AIDS Control Organization. Standards for Blood Banks and Blood Transfusion Services. New Delhi: Ministry of Health and Family Welfare Government of India; 2007.
- [6]. Fernandes H *et al*. Prevalence of transfusion transmitted infections in voluntary and replacement donors. *Indian J Hematol Blood Transfus* 2010; 26(3):89–91.
- [7]. Chaudhary IA, Samiullah, Khan SS, Masood R, Sardar MA, Mallhi AA. Seroprevalence of HBV and C among health donors at Fauji Foundation Hospital, Rawalpindi. *Pak Med J* 2007; 23: 64-7.
- [8]. Irshad M, Peter S. Spectrum of viral hepatitis in thalassemic children receiving multiple blood transfusions. *Indian J Gastroenterol* 2002; 21: 183-4.
- [9]. Mollah AH, Nahar N, Siddique MA, Anwar KS, Hassan T, Azam MG, *et al*. Common transfusion-transmitted infectious agents among thalassaemic

- children in Bangladesh. *J Health Popul Nutr* 2003; 21: 67-71.
- [10]. Gharehbaghian A. An estimate of transfusion-transmitted infection prevalence in general populations. *Hepat Mon* 2011; 11: 1002-3.
- [11]. Tiwari BR, Ghimire P, Kandel SR, Rajkarnikar M. Seroprevalence of HBV and HCV in blood donors: A study from regional blood transfusion services of Nepal. *Asian J Transfus Sci* 2010; 4:91-3.
- [12]. Tiwari BR, Ghimire P, Karki S, Rajkarnikar M. Seroprevalence of human immunodeficiency virus in Nepalese blood donors: A study from three regional blood transfusion services. *Asian J Transfus Sci* 2008; 2:66-8.
- [13]. Azarkeivan A, Nasiritoosi M, Kafiabad SA, Maghsudlu M, Hajibeigi B, Hadizadeh M. Evaluation of new cases of HCV infection in thalassaemia patients for source of infection. *Asian J Transfus Sci* 2011; 5:132-5.
- [14]. Purdy MA. Hepatitis B virus S gene escapes mutants. *Asian J Transfus Sci* 2007; 1:62-70.
- [15]. 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; 6:21.
- [16]. Chandekar SA, Amonkar GP, Desai HM, Valvi N, Puranik GV. Seroprevalence of transfusion transmitted infections in healthy blood donors: A 5-year Tertiary Care Hospital experience. *J Lab Physicians* 2017; 9:283-7.
- [17]. Kakkar N, Kaur R, Dhanoa J. Voluntary donors-need for a second look. *Indian J Pathol Microbiol* 2004; 47:381-383
- [18]. Garg S, Mathur DR, Garg DK. Comparison of seropositivity of HIV, HBV, HCV and syphilis in replacement and voluntary blood donors in western India. *Indian J Pathol Microbiol* 2001; 44:409-412.
- [19]. Agarwal VK, Sharma VP, Agrawal P, Gupta D. Seroprevalence of transfusion transmissible infections among blood donors in urban area. *Asian J Med Res* 2012; 1: 112-4.
- [20]. Gupta N, Kumar V, Kaur A. Seroprevalence of HIV, HBV, HCV and syphilis in voluntary blood donors. *Indian J Med Sci* 2004; 58: 255-7.
- [21]. Fasola FA, Kotila TR, Akinyemi JO. Trends in transfusion transmitted viral infections from 2001 to 2006 in Ibadan, Nigeria. *Intervirology* 2008; 51: 427-31.
- [22]. Singh B, Kataria SP, Gupta R. Infectious markers in blood donors of East Delhi: Prevalence and trends. *Indian J Pathol Microbiol* 2004; 47: 477-9.
- [23]. Fessehaye N, Naik D, Fessehaye T. Transfusion transmitted infections-a retrospective analysis from the National Blood Transfusion Service in Eritrea. *Pan Afr Med J.* 2011; 9:40-6.
- [24]. Tafuri S, Prato R, Martinelli D, Melpignano L, De Palma M, Quarto M, et al. Prevalence of hepatitis B, C, HIV and syphilis markers among refugees in Bari, Italy. *BMC Infect Dis* 2010; 10:213.
- [25]. Elghannam DM, Aly RM, Goda EF, Eltoraby EE, Farag RE. Clinical significance of antibody to hepatitis B core antigen in multitransfused hemodialysis patients. *Asian J Transfus Sci* 2009; 3:14-7.
- [26]. Patel PA, Patel SP, Oza HV. Seroprevalence of transfusion transmissible infections (TTI) in blood donors at Western Ahmedabad - A secondary care hospital based study. *Int J Biol Med Res* 2012; 3:1806-10.
- [27]. Unnikrishnan B, Rao P, Kumar N, Ganti S, Prasad R, Amarnath A, et al. Profile of blood donors and reasons for deferral in coastal South India. *Australas Med J* 2011; 4: 379-85.
- [28]. Kaur G, Basu S, Kaur R, Kaur P, Garg S. Patterns of infections among blood donors in a tertiary care centre: A retrospective study. *Natl Med J India* 2010; 23:147-9.
- [29]. Adhikari L, Bhatta D, Tsering DC, Sharma DK, Pal R, Gupta A. Infectious disease markers in blood donors at Central Referral Hospital, Gangtok, Sikkim. *Asian J Transfus Sci* 2010; 4:41-2.
- [30]. Pahuja S, Sharma M, Baitha B, Jain M. Prevalence and trends of markers of hepatitis C virus, hepatitis B virus and human immunodeficiency virus in Delhi blood donors: A hospital based study. *Jpn J Infect Dis* 2007; 60:389-91.
- [31]. Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. *Indian J Pathol Microbiol* 2010; 53:308-9.
- [32]. Mujeeb SA, Mehmood K. Prevalence of HBV, HCV and HIV infections among family blood donors. *Ann Saudi Med* 1996; 16:702-703.
- [33]. Chandra T, Kumar A, Gupta A. Prevalence of transfusion transmitted infections in blood donors: an Indian experience. *Trop Doct* 2009; 39:152-154.