Original Research Article

Seroprevalence and Trend of Transfusion Transmitted Infections among blood donors in the eastern part of Bangalore city: A 3 year study

Shweta Pai1, *

1Dept. of Pathology, East Point College of Medical College & Research Centre, Bengaluru, Karnataka, India

Abstract

Introduction: For nearly eight decades, the transfusion of blood has been an integral part of medical practice. Though it is a life saving measure, every transfusion still bears the potential risk of Transfusion Transmitted Infections (TTI). Thus, donor screening is of paramount importance and has been in place in India since Independence. Currently, India’s blood transfusion scheme mandates the screening of 5 TTIs which are HIV, HBsAg, HCV, malaria and syphilis. It has been noted that the prevalence of these TTIs is lower among the voluntary blood donors (VBD) as compared to the replacement blood donors (RBD).

Aim: To assess the proportion of voluntary and replacement blood donors and to evaluate the prevalence and trend of various TTIs in a well-established blood bank located in the Eastern part of Bangalore.

Materials and Methods: The data for the current retrospective study was collected over a period of 3 years and 3 months from October 2015 to December 2018. Donors were screened for anti-HIV 1 and 2, HBsAg, and anti-HCV, using commercially available third-generation ELISA test kits, while syphilis and malaria were screened for using card test and rapid malaria test, respectively.

Results: Among 2514 donors, 2411 (95.9%) were voluntary and 103 (4.1%) were replacement donors. 2431(96.7%) were males and 83 (3.3%) were females. Seroprevalence of HIV, HBsAg, anti-HCV, syphilis, and malaria were 0.24%, 0.83%, 0.27%, 0.04%, and 0.12% among all donors, respectively. Among the various TTIs, majority of cases were of HBV (55.3%) followed by HCV (18.4%), HIV (15.8%), Malaria (7.9%) and Syphilis (2.6%).

Conclusion: HBV was the commonest TTI among apparently healthy donors in the present study, followed by HCV and HIV. 1.5% of healthy donors were seropositive for TTIs. This clearly shows the importance of stringent screening measures to avert the potential risk of TTIs.

© 2019 Published by Innovative Publication.
2. Materials and Methods

The data for the current retrospective study was collected over a period of 3 years and 3 months from October 2015 to December 2018, from the registries of a blood bank of a tertiary care medical college in the Eastern part of Bangalore city.

Donors were screened meticulously by trained personnel. Those with haemoglobin levels less than 12.5 gm/dl, sero-positivity for TTIs, low body weight for age and height, tattoos were deferred from the study group. Donors were asked to fill the eligibility questionnaire mandated by NACO. Eligible donors were bled and few ml were taken in an EDTA tube for the purpose of screening for potential TTIs. Donors were screened for anti-HIV 1 and 2, HBsAg, and anti-HCV, using commercially available third-generation ELISA test kits, while syphilis and malaria were screened for using card test (that detects both IgM and IgG antibodies), and rapid malaria test, respectively. All these tests were performed by trained technicians supervised by a medical officer in a well-equipped TTI wing of the blood bank. The standard protocol for each test kit was strictly followed as in accordance to the manufacturer guidelines. For each screening procedure, the controls used were the known positive and negative samples provided in the kit. Any samples that were found reactive were retested before being labelled seropositive. The standard disposal protocol for seropositive blood by autoclave and incineration was observed.

The available data was analysed using Microsoft Excel software.

3. Results

A total of 2514 donors donated their blood during the study period. Among them 2411 (95.9%) were voluntary donors and 103 (4.1%) were replacement donors. 2431 (96.7%) were males and 83 (3.3%) were females [Table 1].

Majority of cases (73.2%) were in the age group of 18-30 years followed by 31-40 years (21.8%) [Figure 1]. As seen in table 2 below, among the various TTIs, majority of cases were of HBV (55.3%) followed by HCV (18.4%) and HIV (15.8%). Malaria (7.9%) and Syphilis (2.6%) formed the least number of cases. There was increase in the HIV and HBV cases over the years with peak of HBV cases in 2017(10 cases) while Agarwal et al.’s study had more number of HBV cases in the 31-40 years age group.12 Most of the HCV positive donors in our study were in the 31-40 years age group which was again similar to Agarwal et al.’s study.13 But overall, we came across more number of TTIs in the 18-30 years group which is again similar to Yadav et al’s study.12

From table 3, it may be inferred that the prevalence rate of TTIs in our study was 1.5% which is comparable to what was obtained by Vandana WV et al., Bobde V et al., and Shah N et al. but few studies like Chaurasia RK et al. and Swaroop D et al. documented higher rates.14–18 Similar HIV seroprevalence rates were obtained in studies done in North India and Western India, however, our findings were found to be higher compared to some of the other studies.15,19–21 HBV, HCV and syphilis seroprevalence rates were relatively low in our study while that of malaria was on the higher end.15–24

TTIs were more common in voluntary donors compared to replacement donors which could be explained by the fact that there are more number of voluntary donors relative to replacement donors to begin with.

4. Discussion

Like other studies, the majority of blood donors in our study belonged to the male gender (96.7%) while female donors comprised an insignificant fraction.11–13 This gender disparity can be explained by the higher deference rates seen in females owing to the increased likelihood of them being diagnosed anaemic and/or underweight. Another attributable reason is simply the lack of motivation in females to do a blood donation in the first place. This can be easily remedied by sponsoring more targeted awareness campaigns along gender lines.

There were more HIV positive blood donors in our study in the age group of 31-40 years compared to the study by Yadav et al which had an equal distribution of cases in the age groups 18-30 years and 31-40 years.12 However, our study was similar to Yadav et al’s study in that there were more number of HBV cases in the age group of 18-30 years while Agarwal et al’s study had more number of HBV cases in the 31-40 years age group.12,13 Most of the HCV positive donors in our study were in the 31-40 years age group which was again similar to Agarwal et al’s study.13 But overall, we came across more number of TTIs in the 18-30 years group which is again similar to Yadav et al’s study.12

From table 3, it may be inferred that the prevalence rate of TTIs in our study was 1.5% which is comparable to what was obtained by Vandana WV et al., Bobde V et al., and Shah N et al. but few studies like Chaurasia RK et al. and Swaroop D et al. documented higher rates.14–18 Similar HIV seroprevalence rates were obtained in studies done in North India and Western India, however, our findings were found to be higher compared to some of the other studies.15,19–21 HBV, HCV and syphilis seroprevalence rates were relatively low in our study while that of malaria was on the higher end.15–24
Table 1: Distribution of blood donors according to voluntary or replacement blood donation status and gender

| Year         | Voluntary (Males) | Voluntary (Females) | Total | Replacement (Males) | Replacement (Females) | Total | Grand Total |
|--------------|------------------|---------------------|-------|--------------------|-----------------------|-------|-------------|
| 2015 (Oct-Dec) | 114(96.6%)       | 4(3.4%)             | 118   | 0                  | 0                     | 0     | 118 (100%)  |
| 2016 (Jan-Dec) | 371(80.3%)       | 30(6.5%)            | 401   | 56(12.1%)          | 5(1.1%)               | 61    | 462 (100%)  |
| 2017 (Jan-Dec) | 1078(97.4%)      | 24(2.2%)            | 1102  | 4(0.4%)            | 0                     | 4     | 1106(100%)  |
| 2018 (Jan-Dec) | 771(93.1%)       | 19(2.3%)            | 790   | 37(4.5%)           | 1(0.1%)               | 38    | 828 (100%)  |
| Total        | 2334(92.8%)      | 77(3.1%)            | 2411  | 97(3.9%)           | 6(0.2%)               | 103   | 2514(100%)  |

Table 2: Year-wise distribution of TTIs among blood donors

| Year         | HIV (%) | HBV (%) | HCV (%) | Syphilis (%) | Malaria (%) | Total |
|--------------|---------|---------|---------|--------------|-------------|-------|
| 2015         | 1       | 0       | 1       | 0            | 1           | 3     |
| 2016         | 1       | 4       | 2       | 0            | 2           | 9     |
| 2017         | 2       | 10      | 2       | 1            | 0           | 15    |
| 2018         | 2       | 7       | 2       | 0            | 0           | 11    |
| Total        | 6 (15.8%) | 21 (55.3%) | 7 (18.4%) | 1 (2.6%) | 3 (7.9%) | 38 (100%) |

Table 3: Comparison of prevalence of TTIs among various studies

| Authors      | Study Place                     | Duration | Total Donors | TTD (%) | HIV (%) | HBV (%) | HCV (%) | Syphilis (%) | Malaria (%) |
|--------------|---------------------------------|----------|--------------|---------|---------|---------|---------|--------------|-------------|
| Bobde V et al. | Nagpur, Maharashtra          | 2010-14 (4.5 yrs) | 43190 | 1.66   | 0.3     | 1.18    | 0.16    | -            | -           |
| Makroo RN et al. | New Delhi | 2005-13 (9 yrs) | 180477 | 2.099  | 0.24    | 1.18    | 0.43    | 0.23         | -           |
| Shah N et al. | Ahmedabad, Gujarat          | 2006-13 (7.5 yr) | 92778 | 1.48   | 0.18    | 0.98    | 0.108   | 0.23         | -           |
| Dobariya GH et al. | Surat, Gujarat | 2011-16 (5 yr) | 40971 | 1.34   | 0.08    | 0.98    | 0.098   | 0.16         | 0.02        |
| Vandana WV et al. | Bangalore, Karnataka | 2012-15 (4 yr) | 4087  | 1.59   | 0.2     | 0.75    | 0.34    | 0.3          | -           |
| NACO         | India                          | 2015 (1 yr) | 6828055 | 1.622  | 0.136   | 0.939   | 0.326   | 0.182        | 0.039       |
| Pallavi P et al. | Mysore, Karnataka | 2004-8 (5 yrs) | 39060 | 2.22   | 0.44    | 1.27    | 0.23    | 0.28         | -           |
| Mandal R et al. | Darjeeling, West Bengal | 2010-12 (3 yrs) | 28364 | 2.93   | 0.42    | 1.24    | 0.62    | 0.65         | 0.004       |
| Chaurasia RK et al. | Bhopal, Madhya Pradesh | 2011-16 (5 yrs) | 15060 | 4.19   | 0.14    | 2.13    | 0.62    | 1.30         | -           |
| Chaudhary V et al. [23] | Bareilly, Uttar Pradesh | 2013 (1 yr) | 28,395 | 3.3    | 0.27    | 1.93    | 1.02    | 0.16         | -           |
| Swaroop D et al. | Meerut, Uttar Pradesh | 2011-16 (6 yrs) | 34342 | 3.5    | 0.11    | 1.74    | 1.50    | 0.09         | 0.046       |
| Present Study | Bangalore, Karnataka          | 2015-18 (3 yrs 3mon) | 2514 | 1.5    | 0.24    | 0.83    | 0.27    | 0.04         | 0.12        |
Fig. 1: Age-wise distribution of blood donors

Fig. 2: Trend of Transfusion transmitter infection over the years
5. Conclusion

Thus, to conclude, HBV was the commonest TTI among apparently healthy donors in the present study, followed by HCV and HIV; 1.5% of healthy donors were seropositive for TTIs. This clearly shows the importance of stringent screening measures to avert the potential risk of TTIs. Stern and apt implementation of donor’s selection criteria and thorough history taking and examination should be implemented in all cases. Screening using the higher-generation sensitive ELISA kits and circumventing rapid screening methods can help rapidly and accurately identify seropositive bags. This will act as an effective strategy to counter any possibility, however remote, of transfusion of infected whole blood or its various components, particularly in those patients that require transfusions on a routine basis.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. N Z. A survey of blood transfusion practices. J Coll Physicians Surg Pak. 2000;10:90–2.
2. from:http://www.redcrossblood.org/learn-about-blood/history-blood-transfusion.;
3. National AIDS Control Organization (NACO, India). Standards for Blood Banks & Blood Transfusion Services. New Delhi: NACO, Ministry of Health and Family Welfare, Government of India; 2007.;
4. World Health Organization. WHO Global Database on Blood Safety, 2004–2005 Report. Geneva: World Health Organization; 2008.;
5. 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.
6. Panda M, Kar K. Assessment of NACO Supported blood banks-A Preliminary Report 2016. National AIDS Control Organization (NACO) and National Blood Transfusion Council (NBTC), Ministry of Health and Family Welfare, Government of India. Indian J Public Health. 2008;52:43–4.
7. Ministry of Health & Family Welfare Government of India. HIV Estimations 2015. Technical report. National AIDS Control Organisation and National Institute of Medical Statistics, ICMR. 2015 .
8. Sachan D, Varghese J, Joseph J, Singh P. HBsAg positive patient characteristics in hospital and blood donation camps. ISRN Hematol. 2013;2013:675191.
9. Narahari S, Juwle A, Basak S. Prevalence and geographic distribution of hepatitis C virus genotypes in Indian patient cohort. Infect Genet Evol. 2009;9:643–5.
10. Saran RK. Transfusion Medicine Technical Manual. 2nd ed. Ministry of Health and Family Welfare: Drugs Controller General, India, Directorate General of Health Services, MoHFW, Govt. of India; 2003.;
11. Arya DR, Mahawar NL, Pachaury R. Seroprevalence of transfusion transmitted infections among blood donors at a Tertiary Care Hospital Blood Bank in North India. Indian J Health Sci Biomed Res. 2016;9:77–81.
12. Yadav BS, Varma AV, Singh P. Seroprevalence of transfusion-transmitted infections (TTIs) in blood donors: a study from central India. Int J Med Sci Public Health. 2016;5(6):1158–62.
13. Agarwal SP, Chakrabarti PR, Varma AV. Hepatitis C Virus: 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. 2017;9(2):51–56.
14. Bobde V, Parate S. Seroprevalence of viral transfusion transmitted infections among blood donors at a government hospital blood bank in central India. The Health Agenda. 2015;3(1):15–9.
15. Shah N, Shah JM, Jhaiveri P. Seroprevalence of HBV, HCV, HIV and syphilis among blood donors at a tertiary care teaching hospital in Western India. Gut Med J. 2013;68(2):35–9.
16. Vandana WV, Rani KL. Transfusion transmitted infections among blood donors at a tertiary care teaching Hospital in South India. Int J Microbiol Mycol. 2017;6(1):24–31.
17. Chaurasia RK, Puja, Kumar A, Singh P. Pattern of transfusion transmitted infections in blood donors around bhopal-a 5 years retrospective study. Ann Int Med Den Res. 2016;2(6):12–5.
18. Swarup D, Wadhiera SV, Bansal R. Analysis of Transfusion Transmitted Infections Among Blood Donors:To Prepare a Road Map for its Prevention and Control. National Journal of Laboratory Medicine. 2018;7(2):9–14.
19. Makroo RN, Hegde V, Chowdhry M. Seroprevalence of infectious markers & their trends in blood donors in a hospital based blood bank in north India. Ind J Med Res. 2015;142(3):317–22.
20. Pallavi P, Ganesh CK, Jayashree K. Seroprevalence and trends in transfusion transmitted infections among blood donors in a university hospital blood bank: A 5 year study. Indian J Hematol Blood Transfus. 2011;27(1):1–6.
21. Mandal R, Mondal K. Transfusion transmissible infections among blood donors from a sub-Himalayan rural tertiary care centre in Darjeeling. India Journal of Traditional and Complementary Medicine J Tradit Complement Med. 2016;6(3):224–33.
22. Dobariya GH, Raja KA, Unagar CA. Prevalence and trends of transfusion transmitted infections among blood donors of a university hospital blood bank: A 5 year study. Indian J Hematol Blood Transfus. 2011;27(1):1–6.
23. Assessment of NACO Supported blood banks-A Preliminary Report 2016. National AIDS Control Organization (NACO) and National Blood Transfusion Council (NBTC), Ministry of Health and Family Welfare, Government of India; 2016.;
24. Chaudhary V, Agrawal VK, Sexena SK. Seroprevalence of common transfusion transmissible infections among blood donors in western Uttar Pradesh, India. Int J Med Sci Public Health. 2014;3:1381–1385.

Author biography

Shweta Pai Assistant Professor (Pathology)