

Prevalence of the Blood-Borne Infections in Blood Donors – Our Experience in A Tertiary Teaching Hospital In North India.

S Awasthi, V Singh, S M.D., D Agarwal, M Ansari, A N.

Citation

S Awasthi, V Singh, S M.D., D Agarwal, M Ansari, A N.. *Prevalence of the Blood-Borne Infections in Blood Donors – Our Experience in A Tertiary Teaching Hospital In North India..* The Internet Journal of Pathology. 2010 Volume 12 Number 1.

Abstract

Background: The infectious disease markers for which blood donors are screened include anti-human immunodeficiency virus (HIV), hepatitis B surface antigen (HBsAg), anti-hepatitis C virus (HCV), rapid plasma reagin (RPR) card test for syphilis and malarial parasites. Materials and Methods: A total of 3026 donors were screened over two years to assess the prevalence of infectious disease markers. Screening for anti-HIV I and II, HBsAg and anti-HCV was carried out by enzyme linked immunosorbent assay (ELISA). Syphilis was tested using RPR card test. Malaria parasite was tested by detection of genus specific Plasmodium lactate dehydrogenase. Result: The overall seropositivity for anti-HIV I and II was 3(0.1%), for HBsAg 55 (1.82%), for anti-HCV 25 (0.83%), for syphilis 4 (0.13%) and for malaria 6 (0.20%). There was a significant difference ($p < .05$) in the seropositivity of HBsAg between voluntary and replacement donors. A significant increase ($p < .05$) in the prevalence of seropositivity for HCV, but not for HIV and HBsAg and syphilis was found over the two year period of the study. Conclusion: The prevalence of infectious disease markers was similar to that reported by other studies in India. However, a significant difference was seen in the infectious marker positivity in voluntary and replacement donors, as no voluntary donor showed positivity for HIV, syphilis and malaria whereas only one voluntary donor for HBsAg and two voluntary donor for HCV infection was found positive in this period of study .

INTRODUCTION

Blood transfusion is an integral and life saving procedure of modern medicine, but simultaneously it carries the risk of transmitting the life- threatening transfusion-transmissible infectious agents such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria. Thus ensuring the safety of blood is a major concern in transfusion therapy although the improved screening and testing of blood donors has significantly reduced transfusion-transmitted diseases. In sub-Saharan Africa 5-10% of HIV infections are caused by blood transfusion, similarly the risk of post-transfusion hepatitis is 12.5% higher in patients receiving blood transfusion. The prevalence of anti-human

immunodeficiency virus (HIV), hepatitis B surface antigen (HBsAg), anti- hepatitis C virus (HCV) and syphilis positivity in Indian blood donors is 0.084-3.87% (3, 6,8-9,11), 0.66-12% (3,7-11), 0.5-1.5% (3-11) and 0.85-3% (3,6-11) respectively. The present study was designed with the aim and objective of estimation of the sero-prevalence of

infectious disease markers in the donor population of the blood bank of a tertiary teaching hospital, in North India and to compare the difference if any in prevalence of infectious disease markers among voluntary and replacement donors as well as to measure any significant change in trend over the period of study.

MATERIALS AND METHODS

A total of 3026 blood units from voluntary and replacement donors were collected and screened over the period of two years (may 2008 to april 2010) Samples were screened by enzyme linked immunosorbent assay (ELISA) kits from J Mitra & Co Ltd. for HIV-1 p24 antigen and anti-HIV I and II (4th generation Microlisa – HIV Ag and Ab), HBsAg (Hepalisa) and anti-HCV(HCV Microlisa).Third generation anti-HCV ELISA test kits utilizing a combination of antigens with the sequence of both HCV structural and non-structural antigens i.e. Core, E1, E2, NS3, NS4 and NS5, with increased sensitivity and specificity were used. The ELISA was validated by the acceptance criteria laid down by the manufacturer for the absorbance of reagent blank as well

mean absorbance of positive and negative controls provided with the test kits. The cut off value was calculated as per manufacturer's directions for reporting positive and negative results. Known positive and negative samples were used randomly as external controls in each screening. Screening for syphilis was carried out by using ultra rapid test strip from Acon Biotech (Hangzhou) Co. Ltd. The screening for malaria antigen was done by SD BIOLINE Malaria Antigen P.f/Pan rapid test kit from SD Bio Standard Diagnostic Private Ltd. by detection of malaria genus specific Plasmodium lactate dehydrogenase released from parasitized red cells. All reactive samples were retested before being labeled as seropositive and then all the seropositive blood units were disinfected and discarded.

RESULTS

Over the two years period under study, a total of 3026 blood units were collected from apparently healthy donors (n=448, 14.81 % voluntary and n=2578, 85.19 % replacement). Majority of the donations were made by males (n=2876, 95.04%) and females represented a very small group (n=150, 4.96%) of donation for their friends and relatives. The overall seropositivity of HIV infection was 0.10 %, with 0.09 % seropositivity in first year and 0.10 % in second year. No voluntary donor was found positive for HIV infection. No significant change in the prevalence of HIV infection was found over the period of two years.

Similarly, the overall seropositivity for HBsAg was 1.82% with 2.0 % and 1.71% seropositivity in first and second year respectively. A non-significant change (P-value: 0.663) in prevalence of HBsAg seropositivity was seen in first and second year. A significant difference (P- value: 0.01) was found in seropositivity of HBsAg among voluntary and replacement donors.

The HCV positivity ranged from 0.18 % in first year to 1.20 % in second year with a overall positivity of 0.83%.The difference in prevalence of HCV infection was non-significant (P- value:0.49)among voluntary and replacement donors. A significant change (P-value: 0.06) in the prevalence of HIV infection was found over the study period.

A significant increase in prevalence of syphilis (P-value: 0.32) was found in second year (0.21%) with overall positivity 0.13%, as no single case showed positivity for syphilis in first year. All voluntary donors were found negative for syphilis infection.

The prevalence of malaria infection also showed a non-significant increase (P-value0.56), with 0.09% positivity in first year, 0.26% in second year and overall positivity 0.20%. No voluntary donors showed positivity for malaria infection.

Figure 1

Table- 1 HIV prevalence trend in first and second year

Year	HIV positive	HIV negative	Total
First year	01	1098	1099
Second year	02	1925	1927
Total	03	3023	3026

P-value: 0.914 (non-significant), chi square: 0.012

Figure 2

Table-2 HBsAg prevalence trend in first and second year

Year	HBsAg positive	HBsAg negative	Total
First year	22	1076	1099
Second year	33	1894	1927
Total	55	2971	3026

P-value: 0.663 (non-significant), chi square: 0.189

Figure 3

Table-3 Prevalence of HBsAg in voluntary and replacement donors

HBsAg status	Voluntary	Replacement	Total
Positive	01	54	55
Negative	447	2524	2971
Total	448	2578	3026

P-value: 0.01(significant), chi square: 6.479

Figure 4

Table- 4 HCV prevalence trend in first and second year

Year	HCV positive	HCV negative	Total
First year	02	1097	1099
Second year	23	1904	1927
Total	25	3001	3026

P-value: 0.006 (significant), chi square: 7.55

Figure 5

Table- 5 Prevalence of HCV in voluntary and replacement donors

HCV status	Voluntary	Replacement	Total
Positive	02	23	25
Negative	446	2555	3001
Total	448	2578	3026

P-value: 0.49 (non-significant), chi square: 0.46

Figure 6

Table- 6 Malarial antigen prevalence trend in first and second year

Year	Malaria antigen positive	Malaria antigen negative	Total
First year	01	1098	1099
Second year	05	1922	1927
Total	06	3020	3026

P-value: 0.56 (non-significant), chi square: 0.33

Figure 7

Table- 7 Syphilis prevalence trend in first and second year

Year	Syphilis positive	Syphilis negative	Total
First year	00	1099	1099
Second year	04	1923	1927
Total	04	3022	3026

P-value: 0.32 (non-significant), chi square: 0.98

During the study period an interesting donor was found positive for three infectious markers (HIV, HBsAg and HCV infections) at the same time. Similarly a second case was found positive for co-infection with HBsAg and HCV.

Only one female blood donor was found positive for HBV infection.

DISCUSSION

Majority of donations in our study, were done by replacement donors (85.19%) for their family or friends and females represented a very small group as blood donors (4.96%). Nanu A et al and Singh B et al found similar results in their study (8,11).

The overall seropositivity of HIV (0.10%) was similar to the

rate of seropositivity shown by Gupta N et al (0.084%) (3). However the other studies showed a higher prevalence rate (7-11). No voluntary donor was found positive for the HIV infection in our study where as Salawu L et al (10) showed a statistically significant difference in HIV prevalence rate between replacement and voluntary donors. There was no significant change in prevalence of HIV seropositivity over the period of the study.

The prevalence of overall seropositivity for HBsAg is higher than the study done by Gupta N et al (3) 0.66% whereas other studies showed same results (6,8,9,11). Matee MI et al (7) and Salawu L et al (10) showed higher seropositivity for HBsAg (8.8% and 7.50% respectively). A statistically significant difference was found in the prevalence rate among voluntary and replacement donors for HBsAg as high prevalence was found in replacement donors, similar as reported in other studies (3,8-9). There was no significant change in the prevalence of HBsAg positivity in the study period.

Anti- HCV positivity (0.83%) was almost similar to that reported in other studies (3-5, 7-11). Gosavi et al (2) reported a quite higher prevalence rate (15.9%). A statistically significant higher prevalence is found among replacement donors as compared to voluntary donors. Also, there was a significant increase in the prevalence of anti-HCV positivity over the period of two years.

The overall positivity for syphilis (0.13%) was lower than the other studies (3, 7-11) and a significant difference in prevalence similar to other studies (3, 8,11) was found among voluntary and replacement donors.

None of these studies have reported the prevalence and trend over a period of time for the malaria infection. The overall prevalence of malaria infection (0.20%) also showed a non-significant increase (P-value 0.56) in second year.

No female donor was found positive for HIV, HCV, syphilis and malaria infection in our study population. Only a single female donor was found

positive for HBV infection which was statistically significant (p-value < 0.005).

To conclude, the prevalence of infections in our study is similar to those reported by other studies in India (2-6,8-9,11). The prevalence of positivity for infectious disease markers is quite higher in replacement donors as

compared to voluntary donors (3,7-9,10). This may be due to the fact that voluntary donors are likely to be from better socioeconomic background than the replacement donors. These findings call for adequate screening of all prospective blood donors to reduce the transmission of the infection. Effective control strategies including a sensitive and stringent screening of all blood donors, public awareness programmes and institution of adequate public health measures are urgently needed.

References

1. Dodd RY. Infectious Disease Testing. In: Hillyer CD, Silberstein LE, Ness PM, Anderson KC, editors. Blood Banking and Transfusion Medicine Basic Principles and Practice. 1st edition. Edinburg: Churchill Livingstone, 2003: 137-43.
2. Gosavi MS, Shah SK, Shah SR, et al. Prevalence of Hepatitis C infection in Mumbai. *Ind J Med Sci* 1997; 51:378-85.
3. 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.
4. Jain A, Rana SS, Chakravarty P, et al. The prevalence of hepatitis C virus antibodies among the voluntary blood donors of New Delhi, India. *Eur J Epidemiology* 2003; 18: 695-7.
5. Makroo RN, Raina V, Kaushik V. Prevalence of Hepatitis C virus antibody in healthy blood donors. *Indian J Med Res* 1999; 10:123-5.
6. Makroo RN, Salil P, Vashist RP, et al. Trends of HIV infection in blood donors of Delhi. *Indian J Pathol Microbiol* 1996; 39:139-42.
7. Matee MI, Magesa PM, Lyamuya EF, et al. 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.
8. Nanu A, Sharma SP, Chatterjee K, et al. Markers for transfusion transmissible infection in north Indian voluntary and replacement donors: prevalence and trends 1989-1996. *Vox Sanguinis* 1997; 73:70-3.
9. Pallavi P, Ganesh CK, Jayashree K, et al. Seroprevalence and Trends in Transfusion Transmitted Infections Among Blood Donors in a University Hospital Blood Bank. *Indian J of Haematol and Blood Transfus* 2010; 27,1-6: 10.1007/s12288-010-0047x.
10. Salawu L, Bolarinwa RA, Adegunloye AB, et al. HBsAg, anti- HCV, anti-HIV and VDRL in blood donors: Prevalence and trends in last three and a half years in a tertiary health care facility in Ile- Ife, Nigeria. *International J of Med and Med Scie* 2010; 2(11): 335-341.
11. Singh B, Kataria SP, Gupta, R. Infectious markers in blood donors of East Delhi : prevalence and trends. *Indian J PatholMicrobiol* 2004; 47:477-9.

Author Information

Seema Awasthi, M.D.

Assistant Professor, Teerthanker Mahaveer Medical College and Research Centre

Vinod Kumar Singh, M.D.

Assistant Professor, Teerthanker Mahaveer Medical College and Research Centre

Shyamoli Dutta M.D.

Professor, Teerthanker Mahaveer Medical College and Research Centre

Deepthi Agarwal, M.D.

Associate Professor, Teerthanker Mahaveer Medical College and Research Centre

Maryem Ansari, M.D.

Assistant Professor, Teerthanker Mahaveer Medical College and Research Centre

Arathi N., M.D.

Associate Professor, Teerthanker Mahaveer Medical College and Research Centre