



Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com



Original Article

Seroprevalence of Transfusion Transmitted Infections (TTIs) in Blood Donors at Western Ahmedabad – A Secondary Care Hospital Based Study.

Piyush A.Patel^{*a}, Sangeeta P.Patel^b, H.V.Oza^c

^a Assistant Professor, Department of Pathology, GMERS Medical College, Sola, Ahmedabad.

^b Tutor, Department of Microbiology, B.J. Medical College, Ahmedabad

^c Professor and Head, Department of Pathology, GMERS Medical college, sola, Ahmedabad.

ARTICLE INFO

Keywords:

Blood donor
HCV
HIV
TTIs

ABSTRACT

The present retrospective study was carried out at GMERS Medical College & Civil Hospital, Sola situated in the western part of Ahmedabad. The period of the study was 7 years from 2005 to 2011. A total of 5,316 blood donations were accepted during the period either on voluntary (95.56 %) or replacement (4.44 %) basis through blood donation camps and from the relatives/friend of the patients. 5,076 donors (95.48 %) were male. 5,049 donors (94.98 %) were from the sexually active age group of 21-40 years. On screening the blood for TTIs, 28 (0.53 %) donors (27 male & 1 female) were found positive for one of the TTIs. Highest prevalence was for HBV (16 cases, 0.30%) followed by HCV (5 cases, 0.09 %), HIV (4 cases, 0.08 %) and syphilis (3 cases, 0.06%). None of the donor was found positive for malaria.

© Copyright 2010 BioMedSciDirect Publications IJBMR -ISSN: 0976:6685. All rights reserved.

1. Introduction

Blood is life. Blood transfusion involves transfer of biological material from man to man. Transfusion of blood and blood products is a lifesaving phenomenon that forms an integral part of medical and surgical therapy [1,2].

Wake and Cutting[3]. have postulated that the demand for blood and its components is likely to increase in the future. Invention of newer sophisticated medical and surgical procedures such as transplant surgery, heart surgery and trauma or cancer treatment depends highly on blood transfusions in each country. Moreover, blood transfusion improves the quality of life of multitransfused patients like thalassemia, hemophilia.

Globally, more than 81 million units of blood are donated each year [4]. More than 18 million units of blood are not screened for transfusion transmissible infections [5]. They are therefore unlikely to be totally free of the risk of the infections. Widman FK[6]. has claimed that with every unit of blood, there is a 1% chance of transfusion associated problems including transfusion transmitted diseases.

These unsafe blood transfusions are very costly from both human and economic points of view. Morbidity and mortality resulting from the transfusion of infected blood have far-reaching consequences, not only for the recipients themselves, but also for their families, their communities and the wider society [7,8].

The diseases transmitted by blood are HIV, hepatitis B and C, syphilis, malaria and infrequently cytomegalovirus, Epstein Barr virus, brucellosis etc. Preventing transmission of these infectious diseases through blood transfusion presents one of the greatest challenges of transfusion medicine[9].

In developing countries transfusion-transmitted infections (TTIs) often threaten the safety of patients requiring blood transfusion, and medical care providers face serious challenges with blood availability, safety, and affordability.

In the past several decades have great advance in techniques of detecting TTIs with the advance of nucleic acid tests (NAT-PCR), western countries have shown decline in the risk of TTI to the major extent. As per guidelines of the ministry of health and family welfare (Government of India) under The Drug and Cosmetic Act ,1945 (amended from time to time), all the blood donations are to be screened against the five major infections namely HIV I & II , HBsAg, HCV, syphilis and malaria [10,11].

* Corresponding Author : Dr. Patel Piyush A.

13, Mandakini Society, K. K. Nagar Road, Ghatlodiya,
Ahmedabad-380 061 ,Gujarat, India
Mob: 093279 57088
Email: piyush_doctor@yahoo.co.in

NACO recommended 3rd or 4th generation ELISA HIV I & II test kits which are 100% sensitive should be preferred for use at blood banks for screening donated blood.[12]

Blood transfusion service (BTS) is an integral and indispensable part of the healthcare system. The priority objective of BTS is to ensure safety, adequacy, accessibility and efficiency of blood supply at all levels[13].

Transfusion departments have always been a major portal to screen, monitor and control infections transmitted by blood transfusion. Blood transfusion departments not only screen TTI but also give clue about the prevalence of these infections in healthy populations [14].

The present retrospective study was aimed at identifying the status of transfusion transmitted diseases among healthy non-remunerated donors at our secondary care hospital over a period of 7 years from 2005 to 2011, so as to heighten the awareness of the infectious complications of blood transfusion.

2.Materials and Methods

The present retrospective study was carried out at blood bank, GMERS Medical College and Civil Hospital, Sola, Ahmedabad (A secondary care hospital) during the 7 year period from January 2005 to December 2011.

The blood collections were carried out from the voluntary donors at outdoor blood donation camp and in-house blood bank as well as from replacement donors at blood bank. The donors were first required to fill up a registration form which carried all the information like personal details, demographic details, occupation details and medical history regarding risk factor like history of previous surgery, hospitalization, blood transfusion, tattoo mark etc. Next step was pre-donation counselling which included explanation of the procedure of blood donation, post-donation care and the outcome of the donation i.e. TTIs test. They were also counselled about high risk behaviour to make sure that the donor is not engaged in any such type of activities. The donors were then screened by a doctor according to blood donor selection criteria and guideline from drug and cosmetic act and NACO [15,16]. Haemoglobin estimation was performed. This screening procedure was very helpful to exclude the professional donors.

Total 5,316 donors were considered medically fit and accepted for blood donation during the study period. On completion of blood donation, the units were screened for the five commonest TTIs namely HIV I & II, HBsAg, HCV syphilis and malaria. The reactive sample was retested in duplicate before considering it seropositive. Seropositive blood bags were discarded.

The data were recorded on specially formed proforma, tabulated, analyzed and compared with the similar studies by other authors.

3.Result and Discussion

It can be seen from table no.1 that a total of 5,316 blood donations were collected during the 7 year period from 2005 to 2011. Out of them 5,080 (95.56%) were voluntary donors either from the out-door blood donation camps or in-door at blood-bank. The remaining 236 donors (4.44%) were replacement donors from the relatives and friends of the patient admitted at Civil Hospital, Sola, and Ahmedabad. Amongst these 5,316 accepted donors, a large part i.e. 5076 (95.48%) were male and only 240 (4.52%) were female. This is because of the fact that in developing country like India, because of social taboo and cultural habits, number of female donors was very less. Other reason is that a large number of females from the menstruating age-group are anemic, so declared unfit for blood donation and eliminated by the pre-donation screening and counseling.

Age-groups and sex-wise classification of accepted and reactive donors is described in table-2. It can be seen that 28 donors (0.53 %) donors were positive for one of the TTIs. It included 27 male donors (0.53 % of 5076) and 1 female donor (0.42 % of 240). The rate is far less and so better than the studies by other authors within India. It is because of the fact that we had about 97% of blood donor on voluntary basis, healthy & non-remunerated. In addition we strictly followed stringent blood donor selection criteria.

While looking at age-group wise classification it can be seen that majority of the donors (94.98 %) were from the age group of 21-40 years and the majority of the reactive donors (89.28 % of total reactive donors) were also from the same age group i.e. 21-40 years. This is the sexually active group of the community, which is the major risk group for the infections transmitted through blood.

Preventing the transmission of infectious diseases through blood transfusion in developing countries like India is difficult given that the resources required are not always available even when policies and strategies are in place. Even when these strategies have been extremely effective, the transmission of diseases still occurs. It is primarily because of the inability of the test to detect the disease in the pre-seroconversion or 'window' phase of their infection, high cost of screening, a lack of funds and trained personnel, immunologically variant viruses and non-seroconverting chronic or immune-silent carriers. Transfusion Transmitted Infections is still a major concern to patients, physicians and policy makers who wish to see a risk free blood supply.

Sero-reactive donors with reference to sero-markers and age-groups are classified in table - 3. It can be seen that 16 donors (57.14 %) were positive with HBV, 5 donors (17.86 %) with HCV, 4 donors (14.29 %) with HIV and 3 donors (10.71 %) with syphilis. According to Mann J et al (1992), developing countries account for more than 90 percent of all new HIV cases.[17] In contrast, the HIV positive donors in present study are far less compared to HBV and HCV. None of the donor was found positive for malarial parasite on

peripheral blood smear. This is because of the fact that infection with malarial parasite results in development of fever and weakness. Because of the prominent signs and symptoms majority of the infected persons will not visit the blood donation camp/centre and even if they come, will be readily excluded by medical fitness examination and counselling. Srikrishna A[18] (Banglore,1999) has also not found any of the 8,617 donors positive for malaria.

It is to be noted that all the reactive donors under the study were male except that one female donor from the age group of 31-40 years was positive for syphilis.

Year-wise trends of TTIs amongst blood donors from table – 4 do not show any wide and remarkable variations.

The detailed analysis and comparison of TTIs with the studies by different authors within India is described in table -5. It is found that HBV is the commonest TTI in the present study. This finding is similar to the studies by Chadra et al 2001–2006, Nilima Sawke et al (2006–2008), Bhawani et al (2004-2009), Jasani et al 2004-2011 and Dayal S 2006-2011, who have also found HBV to be the commonest TTI. The second most common in all these studies is HCV. This is because of higher prevalence of hepatitis B in the community compared to other infections. Only Gupta et al has found HCV as the commonest TTI in his study followed by syphilis.

Despite of pre-donation counseling and medical fitness test, the presence of TTIs is inevitable in blood donations. Since a person can transmit an infection during its asymptomatic phase (window period), transfusions can contribute to an ever widening pool of infection in the population. The economic costs of the failure to control the transmission of infection include increased requirement for medical care, higher levels of dependency and the loss of productive labour force, placing heavy burdens on already overstretched health and social services and on the national economy.^[19]

Only continuous improvement and implementation of donor selection, sensitive screening tests, and effective inactivation procedures can ensure the elimination, or at least reduction, of the risk of acquiring TTIs.^[20]

Table-1. Year-wise classification of accepted donors and sex-wise distribution

| Year | Total accepted donors | Voluntary donors | Replacement donors | Males | Females |
|-------|-----------------------|------------------|--------------------|------------------|----------------|
| 2005 | 471 | 467 | 4 | 408 | 63 |
| 2006 | 452 | 443 | 9 | 430 | 22 |
| 2007 | 648 | 623 | 25 | 633 | 15 |
| 2008 | 704 | 667 | 37 | 656 | 48 |
| 2009 | 735 | 679 | 56 | 722 | 13 |
| 2010 | 918 | 882 | 36 | 896 | 22 |
| 2011 | 1388 | 1319 | 69 | 1331 | 57 |
| Total | 5316 (100%) | 5080 (95.56%) | 236 (4.44%) | 5076 (95.48%) | 240 (4.52%) |

Table – 2. Age-group & Sex wise classification of accepted donors & reactive donors

| Agegroups | Male | | Female | | Total | |
|-----------|---------------|-----------------|---------------|-----------------|---------------|-----------------|
| | No. of donors | Reactive donors | No. of donors | Reactive donors | No. of donors | Reactive donors |
| 18-20 | 142 | 1 | 1 | 00 | 143(2.68%) | 1(3.51%) |
| 21-30 | 2181 | 11 | 104 | 00 | 2285(42.98%) | 11(39.28%) |
| 31-40 | 2630 | 13 | 134 | 01 | 2764(51.99%) | 14(50%) |
| 41-50 | 105 | 2 | 1 | 00 | 106(1.99%) | 2(7.14%) |
| 51-60 | 18 | 0 | 0 | 00 | 18(0.33%) | 00(0.00%) |
| Total | 5076 | 27 | 240 | 01 | 5316(100%) | 28(100%) |

Table 3. Age-group wise distribution of blood donors and seromarkers

| Agegroups | Seropositive status of donors | | | | | Total |
|-----------|-------------------------------|----------------|---------------|---------------|---------|------------|
| | HIV | HBV | HCV | SYPHILIS | MALARIA | |
| 18-20 | 00 | 00 | 1 | 00 | 00 | 1(3.51%) |
| 21-30 | 2 | 6 | 2 | 1 | 00 | 11(39.28%) |
| 31-40 | 1 | 9 | 2 | 2* | 00 | 14(50%) |
| 41-50 | 1 | 1 | 00 | 00 | 00 | 2(7.14%) |
| 51-60 | 0 | 00 | 00 | 00 | 00 | 00(0.00%) |
| Total | 4 (14.29%) | 16 (57.14%) | 5 (17.86%) | 3 (10.71%) | 0 | 28(100%) |

* Only one female was sero-positive and that was for syphilis from the age group of 31-40 years.

Table -4. Trend of Different TTIs Among Blood Donors

| Year | No. of Donors | HIV | HBV | HCV | SYPHILIS | TOTAL INFECTION |
|-------|---------------|----------|----------|----------|----------|-----------------|
| 2005 | 471(8.86) | 2(0.42%) | 2(0.42%) | 1(0.21%) | 1(0.21%) | 6(1.27%) |
| 2006 | 452(8.5%) | 0(0.00%) | 1(0.22%) | 1(0.22%) | 0(0.00%) | 2(0.44%) |
| 2007 | 648(12.18%) | 0(0.00%) | 2(0.30%) | 0(0.00%) | 1(0.15%) | 3(0.46%) |
| 2008 | 704(13.24%) | 0(0.00%) | 2(0.28%) | 1(0.14%) | 1(0.14%) | 4(0.56%) |
| 2009 | 735(13.82%) | 1(0.13%) | 2(0.27%) | 1(0.13%) | 0(0.00%) | 4(0.54%) |
| 2010 | 918(17.26%) | 0(0.00%) | 3(0.32%) | 0(0.00%) | 0(0.00%) | 3(0.32%) |
| 2011 | 1388(26.10%) | 1(0.07%) | 4(0.28%) | 1(0.07%) | 0(0.00%) | 6(0.43%) |
| TOTAL | 5316(100%) | 4(0.08) | 16(0.30) | 5(0.09) | 3(0.06) | 28(0.53%) |

* No donor was found positive for malaria

TABLE 5. Comparison of prevalence of TTIs with various studies in India.

| Author & Year | Place | Total TTIs | HIV | HBV | HCV | Syphilis |
|--|-----------------------------|------------|-------|-------|-------|----------|
| Gupta N et al ²¹ (2001-2003) ⁽¹¹⁾ | Ludhiana | 2.68% | 0.08% | 0.66% | 1.09% | 0.85% |
| Chadra et al ²² 2001-2006 (15) | Lucknow, U.P. | 2.54% | 0.23% | 1.96% | 0.34% | 0.01% |
| Nilima Sawke et al ²³ (2006-2008) (12) | BHANPUR, M.P. | 4.21% | 0.51% | 2.90% | 0.57% | 0.23% |
| Bhawani et al ²⁴ (2004-2009) (13) | Vikarabad, AP | 2.72% | 0.39% | 1.41% | 0.84% | 0.08% |
| Jasani et al ²⁵ 2004-2011 PIpARIA (16) | Piparia Gujarat | 3.35% | 0.25% | 1.35% | 0.85% | 0.90% |
| Dayal S ²⁶ 2006-2011 (14) | Etawah, UP | 3.16% | 0.19% | 2.63% | 0.34% | Not done |
| Present study | Sola, Ahmedabad, Gujarat | 0.53% | 0.08% | 0.30% | 0.09% | 0.06% |

4. Conclusion

The present study clearly documents a relatively low seroprevalence (28 out of 5,316, 0.53 %) of major TTIs among voluntary blood donors at Secondary Care Hospital of Sola, Ahmedabad. Amongst the sero-positive donors the prevalence of HBV was highest (16 cases, 0.30 %) followed by HCV (5 cases, 0.09 %). Incidence of Sexually transmitted diseases, i.e. HIV (4 cases) and Syphilis (3 cases) was relatively low (0.8 & 0.6 % respectively). None of the donor was found positive for Malaria.

5. Suggestions

Although TTIs in blood donors are low in our region, we underline the need for the implementation of better screening methods with improved sensitivities that could detect the agents of TTIs even during the window period. Public awareness programs about voluntary blood donation should be combined with transfusion transmitted disease awareness programs.

Reporting the results of the tests and follow-up counselling with treatment also helps to prevent further transmission of the infection in the community.

6. References

- [1] 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: 308-309.
- [2] Ekadashi R, Langer S (2009) Seroprevalence of Human Immunodeficiency Virus and Syphilis in blood donors of Delhi. *Indian J Med Microbiol.* 2009; 27; 167-168.
- [3] Wake D J and Cutting W A. Blood transfusion in developing countries, problems, priorities and practicalities. *Trop Doct.* 1998; 28; 4-8.
- [4] WHO fact sheet on Blood safety and donation, 2008.
- [5] WHO Guidelines of Blood Transfusion Safety Appia, CH-1211, Geneva 27, Switzerland.
- [6] Widman FK. American Association of Blood Banks, Arlington - Technical manual. 1985: 325-344.
- [7] World Health Organization (WHO). Blood Safety Strategy for the African Region. Brazzaville, World Health Organization, Regional Office for Africa (WHO AFR/RC51/9 Rev.1). 2002
- [8] World Health Organization (WHO). Status of blood safety in the WHO African Region: Report of the 2004 Survey WHO Regional Office for Africa, Brazzaville 2007: 1-25.
- [9] Srikrishna A, Sitalakshmi S, Damodar P. How safe are our safe donors? *Indian J. Pathol Microbiol.* 1999; 42; 411-6.
- [10] Government of India .Drugs and Cosmetics rules, 1945 (amended till 30TH June 2005) available <http://www.cdsc.nic.in/html/Drugs&cosmeticsAct.pdf>.
- [11] "National Blood Policy" produced & published by NACO (National AIDS Control Organization), Ministry of Health and Family Welfare, Government of India, New Delhi. June 2003 (reprint 2007).
- [12] "Manual on quality standards for HIV testing laboratories" produced & published by NACO (National AIDS Control Organization), Ministry of Health and Family Welfare, Government of India, New Delhi published in March 2007.
- [13] Islam M B. Blood transfusion services in Bangladesh. *Asian J Transf Sci.* 2009; 3:108-110.
- [14] Khan Z T, Asim S, Tariz Z, Ehsan I A, Malik R A, Ashfaq B et al. Prevalence of Transfusion transmitted infections in healthy blood donors in Rawalpindi District, Pakistan—a five year study. *Int J Pathol.* 2007; 5: 21-25.
- [15] Drugs and Cosmetics rules, 1945 (amended till 30TH June 2005) from Government of India available from <http://www.cdsc.nic.in/html/Drugs&cosmeticsAct.pdf>.
- [16] "Standards for blood banks and blood transfusion services" produced & published by NACO (National AIDS Control Organization), Ministry of Health and Family Welfare, Government of India, New Delhi published in 2007: 19-24.
- [17] Mann J, Tarantola D, Netter T. AIDS in the world, 1992. Cambridge: Harvard University Press.
- [18] Srikrishna A, Sitalakshmi S, Damodar P. How safe are our safe donors? *Indian J. Pathol Microbiol* 1999; 42: 41-6.
- [19] Kitchen A D, Barbara J A J. Transfusion transmitted infections. In: Murphy M F and Pamphilon D H (Eds): *Practical Transfusion Medicine.* Blackwell Science, Oxford. 2001: 192-210.
- [20] Tiwari B R, Ghimmire P, Karki S, Raj Kumar M. Seroprevalence of human immunodeficiency virus in Nepalese blood donors: A study from three regional blood transfusion services. *Asian Journal of Transfusion Science.* 2008; 2: 66-68.
- [21] Gupta N, Kumar V, Kaur A. Seroprevalence of HIV, HBV, HCV and syphilis in voluntary blood donors. *Indian J Med Sci.* 2004; 58: 255-257.
- [22] Chandra T, Kumar A, Gupta A. Prevalence of transfusion transmitted infections in blood donors: an Indian experience. *Transfusion.* 2009; 49 (10): 2214-20.
- [23] Sawke N, Sawke G K, Chawla S. Seroprevalence Of Common Transfusion-Transmitted infections among Blood Donors at Bhanpur, B h o p a l , M . P . from 2006-2008. *Peoples J of sci. Research* 2010; 3(1) 5-7
- [24] Yedlapati Bhawani, P Raghava Rao, V Sudhakar. Seroprevalence of transfusion transmissible infections among blood donors in a tertiary care hospital of Andhra Pradesh from. 2004-2009. *Biology and Medicine* 2010; 2 (4): 45-48.
- [25] Jasani J, Patel V, Bhuvra K, Vachhani A, Patel H, Falleiro J J. Sero-prevalence of transfusion transmissible infections among blood donors in a tertiary care hospital *Int J Biol Med Res.* 2012; 3(1): 1423-1425.
- [26] Dayal S, Omar B J, Sipai H H, Agarwal S K, Chandra S, Chaturvedi V. Prevalence of transfusion transmitted Viral Diseases among blood donors in a rural setup of North India from 2006-2011. *Int J Sci Tech and Management.* 2011; 2(3): 97-99.